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Math 65

An Incremental Development

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MATH 65

An Incremental Development

Stephen Hake
John Saxon

SAXON PUBLISHERS, INC.

Math 65: An Incremental Development

Printed in the United States of America

ISBN: 0-939798-18-2

Editor and Production Supervisor: Nancy Warren
Graphic Artist: Andrew Sims
Compositor: Syntax International Pte., Ltd.
Printer and Binder: R. R. Donnelly & Sons Company

Eleventh printing: October 1997

Saxon Publishers, Inc.
2450 John Saxon Boulevard
Norman, OK 73071

Contents

Preface

To the Student

This book will take you from basic arithmetic through the foundation of many areas of mathematics, including geometry, measurement, algebra, and scale and graph reading. We study mathematics because it is an important part of our daily lives. Our school schedule, our trip to the store, the preparation of our meals, and many of the games we play all involve mathematics. Most of the word problems you will see in this book are drawn from our daily experiences.

Mathematics is even more important in the adult world. In fact, your personal future in the adult world may depend in part upon the mathematics you have learned. This book was written with the hope that more students will learn mathematics and learn it well. For this to happen, you must use this book properly. As you work through the pages of this book, you will find similar problems presented over and over again. **Solving these problems day after day is the secret to success. Work every problem in every practice set and in every problem set. Do not skip problems. With honest effort you will experience success and true learning which will stay with you and serve you well in the future.**

To the Teacher

This book grew out of a decade of intense classroom interaction with students in which the goal was for students to learn and **remember** the foundational skills of mathematics. The term "foundational" is appropriate because mathematics, perhaps more than any other subject, is a cognitive structure which builds upon prior learning. The ultimate height and stability of the mathematical structure within each individual is determined by the strength of the foundation. This book, as well as each book that precedes and follows it, provides the student with the time and opportunities necessary to build a rock-solid foundation in beginning mathematics. **For this to occur it is essential that all practice problems and all problem sets be completed by the student.**

How to Use This Book

This book presents a series of daily lessons, each followed by a set of 25 problems. Rather than providing practice in only the new topic, the problem sets review everything that has been taught previously. The sequence of the lessons and the content of the problem sets have been carefully planned. Do not skip lessons or sets. The teacher should briefly present the lesson, using the examples to lead the students through guided practice. The students should do the "Practice" at the end of each lesson as guided or independent practice before going on to the problem set. **It is essential for students to work every problem in the lessons and in the problem sets.** All work should be shown and all errors should be corrected. Consistent, honest effort will produce genuine learning with a high level of retention.

An available test booklet contains two forms of tests for every five lessons. Students will make excellent progress if they are able to score 80% or better on the tests. Students who fall below the 80% level should be given remedial attention immediately. For remediation the appendix contains additional practice problems for selected lessons. These practice sets may be used as a supplement to, not as a replacement of, the regular problem sets. In addition to periodic tests, the test booklet contains "Facts Practice" masters for daily use. Specific "Facts Practice" activities are suggested at the beginning of each lesson for Lessons 1–130. These brief "speed drills" improve recall, increase speed, and automate frequently needed skills. Opening class with these exercises in a competitive setting where students press to improve their time and performance produces focused concentration and often enthusiasm.

Acknowledgments

We thank the teachers and administration of the El Monte City School District for their support and suggestions. We thank Barbara Knox and Dorothy Simonds for their cheerful help.

Thanks to Dan Gallup and to Ann, Karina, and John Bodine for their excellent comments. Special thanks to Lillian Hake for her expert typing.

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LESSON
1

Counting Sequences, Identifying Digits

Facts Practice: 100 Addition Facts (Test A in Test Booklet)

Sequences Counting is one of the first math skills that we learn. We count by ones as follows.

1, 2, 3, 4, 5, 6, . . .

It is useful to learn to count by numbers other than ones. Here we show the first five numbers that we use when we count by twos. Then we show the first five numbers that we use when we count by fives.

2, 4, 6, 8, 10, . . .
5, 10, 15, 20, 25, . . .

A counting pattern is a kind of **sequence**. The three dots following the sequences above mean that the sequences continue even though the numbers are not written. We can study a number sequence to discover what counting pattern or rule is being used. Then we can figure out more numbers in the sequence. In this lesson we will practice figuring out the counting pattern in some sequences. Here we show two examples of this kind of problem.

Example 1 What are the next three numbers in this sequence?

3, 6, 9, 12, __, __, __, . . .

Solution In this sequence the pattern is "counting by threes." If counting by threes is difficult, we can count by ones and emphasize every third number, as "one, two, **three**, four, five, **six**, . . ." Counting like this, we find the next three numbers are fifteen, eighteen, and twenty-one, so for our answer we write **15**, **18**, **21**.

Example 2 What is the next number in this sequence?

56, 49, 42, __, . . .

Solution This is another sequence, but this sequence counts down. We must first discover the rule of the sequence. How much is counted down each time? (Reading a sequence backward may help us discover the rule.) We find the rule of this sequence is "count down seven." Counting down 7 from 42 gives us the next number, which is **35**.

Digits Digits are the numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. The number 385 has three digits, and the last digit is 5. The number 148,567,896,094 has 12 digits, and the last digit is 4.

Example 3 The number 186,000 has how many digits?

Solution The number 186,000 has **six digits**.

Example 4 What is the last digit of 26,348?

Solution The number 26,348 is written with five digits. The last digit is **8**.

Practice Write the next three numbers in each of the following sequences.

a. 6, 8, 10, ___, ___, ___

b. 7, 14, 21, ___, ___, ___

c. 4, 8, 12, ___, ___, ___

d. 21, 18, 15, ___, _, _

e. 45, 40, 35, ___, ___, ___

f. 12, 18, 24, ___, ___, ___

How many digits are used to write each of the numbers in problems (g)–(i)?

g. 36,756

h. 8002

i. 1,287,495

What is the last digit of each of the numbers in problems (j)–(l)?

j. 17

k. 3586

l. 654,321

Problem set 1 For problems 1–6 write the next number in each sequence.

1. 10, 15, 20, ___, . . .

2. 56, 49, 42, ___, . . .

3. 8, 16, 24, ___, . . .

4. 18, 27, 36, 45, ___, . . .

5. 24, 21, 18, ___, . . .

6. 32, 28, 24, 20, ___, . . .

For problems 7–12 write the missing number in each sequence.

7. 7, 14, __, 28, 35, . . .

8. 40, __, 30, 25, 20, . . .

9. 20, __, 28, 32, 36, . . .

10. 24, 32, __, 48, . . .

11. __, 36, 30, 24, . . .

12. 21, 28, __, 42, . . .

For problems 13–18 write the next three numbers in each sequence.

13. 3, 6, 9, 12, __, __, __, . . .

14. 8, 16, 24, __, __, __, . . .

15. 6, 12, 18, __, __, __, . . .

16. 40, 35, 30, __, __, __, . . .

17. 18, 21, 24, __, __, __, . . .

18. 9, 18, 27, __, __, __, . . .

19. What word is used to name an orderly list of numbers like the lists in problems 1–18?

How many digits are in each number in problems 20–22?

20. 186,000

21. 73,842

22. 30,004,091

What is the last digit of each number in problems 23–25?

23. 26,348

24. 347

25. 9,675,420

LESSON 2

Identifying Even and Odd Numbers

Facts Practice: 100 Addition Facts (Test A in Test Booklet)

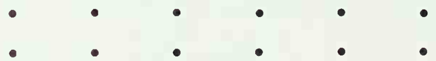
When we count by twos we say this sequence of numbers:

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, . . .

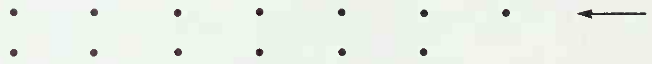
This is a special sequence, and the numbers in this sequence have a special name. These numbers are called **even numbers**.

The number 0 is also an even number. The sequence of even numbers continues on and on. The numbers 36 and 756 and 148,567,896,094 are also even numbers. We can tell if a number is an even number by looking at the last digit of the number. If the last digit of a number is 0, 2, 4, 6, or 8, then the number is an even number.

If we have an even number of objects, we can pair them together. Twelve is an even number. Here we have drawn 12 dots and have paired the dots together. Notice that every dot has a "partner."



Next we draw 13 dots and pair them. We find that there is an "odd fellow" without a "partner."



We see that 13 is not an even number.

The whole numbers which are not even numbers are called **odd numbers**. To make a list of the odd numbers, we begin with 1. Then we add 2 to get the next odd number, add 2 more to get the next odd number, and so forth. Thus the sequence of the odd whole numbers is

1, 3, 5, 7, 9, 11, 13, 15, 17, . . .

All whole numbers are either odd numbers or even numbers.

In this lesson we will answer questions like those in the following two examples.

Example 1 Which of these is an even number?

3586 2345 2223

Solution The even numbers are the numbers we would say when counting by twos. For large numbers we can look at the last digit to see if the number is odd or even. If the last digit is even, then the number is even. The last digits of these three numbers are 6, 5, and 3. Since the digit 6 is even, the even number is **3586**.

Example 2 Which of these numbers is not odd?

123,456 654,321 353,535

Solution All whole numbers are either odd or even. A number which is not odd is even. The last digits of these numbers are 6, 1, and 5. Since 6 is even (and not odd), the number which is not odd is **123,456**.

Practice Tell whether each of these numbers is an odd number or an even number.

a. 0 **b.** 1234 **c.** 20,001
d. 999 **e.** 3000 **f.** 391,048

Problem set 2

1. If a whole number is not even, then it is what?

What is the last digit in each number in problems 2 and 3?

2. 47,286,560 **3.** 296,317

For each number in problems 4–6 write either "odd" or "even."

4. 15 **5.** 196 **6.** 3567

7. Which of these is an even number?

3716 2345 2223

8. Which of these is an odd number?

45,678 56,789 67,890

9. Which of these numbers is not an odd number?

333,456 654,321 353,535

10. Which of these numbers is not an even number?

300 232 323

For problems 11–24 write the next three numbers in each sequence.

11. 9, 12, 15, ___, ___, ___, . . .

12. 16, 24, 32, ___, ___, ___, . . .

13. 120, 110, 100 ,___, ___, ___, . . .

14. 28, 24, 20, ___, ___, _, . . .

15. 55, 50, 45, ___, ___, ___, . . .

16. 18, 27, 36, ___, ___, ___, . . .

17. 36, 33, 30, ___, ___, ___, . . .

18. 18, 24, 30, ___, ___, ___, . . .

19. 14, 21, 28, ___, ___, ___, . . .

20. 66, 60, 54, ___, ___, ___, . . .

21. 48, 44, 40, ___, ___, ___, . . .

22. 99, 90, 81, ___, ___, ___, . . .

23. 88, 80, 72, ___, ___, ___, . . .

24. 84, 77, 70, ___, ___, ___, . . .

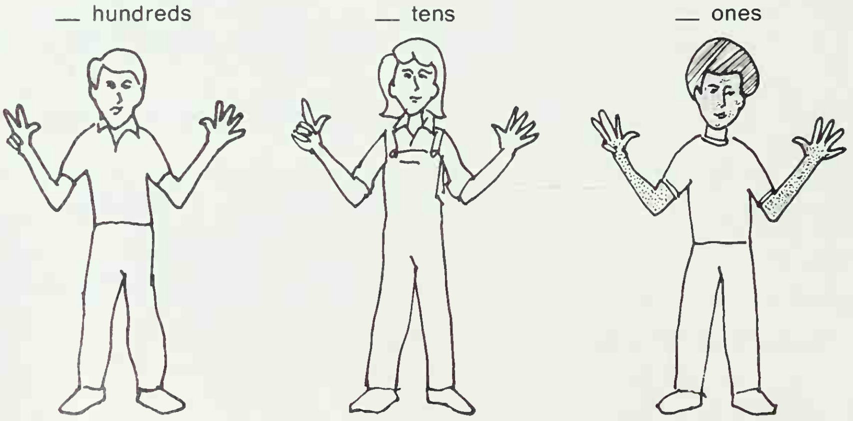
25. If all of the students in a class can form two equal lines of students, then the number of students in the class *could not* be how many?

a. 30 **b.** 31 **c.** 32

LESSON
3

Identifying Place Value through Hundreds: An Activity

Facts Practice: 100 Addition Facts (Test A in Test Booklet)



Place value is an important idea in our number system. The following activity will help us appreciate the meaning of place value.

Activity Three able counters should stand in front, facing the class with their hands up but closed, ready to count. The counter to the right of the class begins orally counting from 1 to 10, extending fingers through the count. At the count of 10 the second person unfolds one finger and says "one ten," and the first counter closes both fists and begins counting from 1 to 10 a second time, at the end of which the second person announces "two tens." This pattern is repeated until the second person says "ten tens." At that time the third person unfolds one finger and says "one hundred," and the second person closes both fists.

At this point headings may be written above the counters (as shown in the figure on page 6), and the counters may "pose" numbers for the class to read. For every posed number the blanks in the heading should be filled in, and the standard form of the number should also be written such as the following:

$$\underline{2}\text{ hundreds }\underline{4}\text{ tens }\underline{6}\text{ ones} = 246$$

Lesson The number 365 has three digits: 3, 6, and 5. The 3 does not stand for 3 **ones**. It stands for 3 **hundreds**. We know this by the place the 3 occupies. That place has a value of 100. Here we show the values of the three places used by the number 365.

hundreds' place	tens' place	ones' place
3	6	5

The number 365 means 3 hundreds plus 6 tens plus 5 ones.

Example Write the number which has a value of 1 hundred plus 7 tens plus 8 ones.

Solution We simply write the number which has a 1 in the hundreds' place, a 7 in the tens' place, and an 8 in the ones' place: **178**.

Practice **a.** Write the number which has a value of 6 hundreds, 2 tens, and 9 ones.

b. Write the number which has a value of 5 hundreds, no tens, and 2 ones.

c. Which digit shows the number of hundreds in 365?

d. How much is 3 hundreds plus 5 tens?

e. Ten tens equals how many hundreds?

Problem set 3

1. Write the number which has a value of 5 hundreds plus 7 tens plus 8 ones.

2. Write the number which has a value of 2 hundreds, 5 tens, and no ones.

3. Which digit shows the number of tens in 560?

4. Which digit shows the number of ones in 365?

5. Ten tens is the same as 1 what?

6. Which of the following is not odd?

365 653 536

7. Which of the following is not even?

1234 2345 3456

8. The greatest two-digit odd number is 99. What is the greatest two-digit even number?

9. The two teams have an equal number of players. The total number of players on both teams could not be which of the following?

a. 22 **b.** 25 **c.** 50

10. We can reach 12 counting by twos and counting by threes. We do not reach 12 counting by which of the following numbers?

a. 1 **b.** 4 **c.** 5 **d.** 6

For problems 11–20 write the next three numbers in the sequence.

11. 9, 12, 15, __, __, __, . . .

12. 54, 48, 42, __, __, __, . . .

13. 8, 16, 24, __, __, __, . . .

14. 80, 72, 64, __, __, __, . . .

15. 16, 20, 24, __, __, __, . . .

16. 40, 36, 32, __, __, __, . . .

17. 27, 36, 45, __, __, __, . . .

18. 81, 72, 63, __, __, __, . . .

19. 10, 20, 30, __, __, __, . . .

20. 33, 30, 27, __, __, __, . . .

21. What number has a value of 4 tens?

22. What number has a value of 5 hundreds?

23. The number 600 means 6 hundreds. The number 60 means 6 of what?

24. The number 80 means 8 tens. The number 800 means 8 of what?

25. The fifth number in the sequence 4, 8, 12, 16, . . . , is 20. What is the **ninth** number in this sequence?

LESSON 4

Comparing Whole Numbers

Facts Practice:	100 Addition Facts (Test A in Test Booklet)

Five **is greater than** four.
Five **is equal to** five.
Five **is less than** six.

These three statements describe the three relationships two numbers can have with each other. To describe the size relationship of two numbers is to **compare** them. The three sentences written above are comparison statements. We may use mathematical symbols to state the same comparisons, as we show here. When reading from left to right,

$5 > 4$ is read "Five is greater than four."
$5 = 5$ is read "Five is equal to five."
$5 < 6$ is read "Five is less than six."

Notice how we use the **comparison symbols >, =, and <** to state the comparisons. The symbols which we read as "greater than" and "less than" are actually one symbol which may point either to the left or to the right. We see that the symbol has two ends, a larger end and a smaller end, or point. When the symbol is properly placed between two numbers, the smaller end points to the smaller number.

Example 1 Write the following statement with digits and a comparison symbol instead of words:

Six is less than ten.

Solution We will translate the sentence from words into digits and a comparison symbol:

$$\mathbf{6 < 10}$$

Example 2 Compare the following numbers by replacing the circle with the proper comparison symbol:

12 ○ 10

Solution Since the two numbers are not equal, we must place the symbol > between the numbers so that the smaller end points to the smaller number.

$$12 > 10$$

Practice For problems (a)–(c) write the statement using mathematical symbols instead of words.

a. Twenty is less than thirty.

b. Twelve is greater than eight.

c. One hundred is equal to one hundred.

For problems (d)–(g) compare the two numbers by replacing the circle with the proper comparison symbol.

d. 36 ○ 63 **e.** 110 ○ 101

f. 90 ○ 90 **g.** 112 ○ 121

Problem set 4

1. Write the following statement with numbers and a comparison symbol instead of words.

"Four is less than ten."

2. Write the following statement with numbers and a comparison symbol.

"Fifteen is greater than twelve."

3. Compare the following numbers by replacing the circle with the proper comparison symbol:

7 ○ 10

4. Compare: 34 ○ 43

5. Write the number which has a value of 3 hundreds plus 6 tens plus 5 ones.

6. Which digit shows the number of hundreds in 675?

7. Which digit shows the number of ones in 983?

8. One hundred is the same as 10 what?

For each number in problems 9–11 write either "odd" or "even."

9. 36,275 **10.** 36,300 **11.** 5,396,428

12. The greatest two-digit odd number is 99. What is the greatest three-digit odd number?

13. We can reach 18 counting by twos and counting by threes. We do not reach 18 counting by which of the following numbers?

a. 1 **b.** 4 **c.** 6 **d.** 9

14. The fourth number in the sequence 6, 12, 18, . . . , is 24. What is the **ninth** number in this sequence?

For problems 15–22 write the next three numbers in the sequence.

15. 15, 20, 25, __, __, __, . . .

16. 20, 24, 28, __, __, __, . . .

17. 60, 70, 80, __, ___, ___, . . .

18. 106, 104, 102, ___, __, __, . . .

19. 0, 6, 12, __, __, __, . . .

20. 0, 7, 14, __, __, __, . . .

21. 40, 32, 24, __, _, _, . . .

22. 45, 36, 27, __, _, _, . . .

23. What number has a value of 9 tens?

24. What number has a value of 11 tens?

25. What is the **seventh** number of this sequence?

8, 16, 24, . . .

LESSON 5

Naming Whole Numbers through Hundreds

Facts Practice: 100 Addition Facts (Test A in Test Booklet)

If numbers are to be our "friends," we should get to know their names. Naming numbers is not difficult if we pay attention to place values. In order to name larger numbers, we must first be able to name numbers which have up to three digits. In this lesson we will practice naming three-digit numbers.

In an earlier lesson we looked at the number 365. Here we show what 365 means and how it is named.

365 means:	three hundreds +	six tens +	five ones
365 is named:	three hundred	sixty	five

We should be able to use words to name a number that we see, and we should be able to use digits to write a number that is named. The list below shows several examples of named numbers.

18	eighteen
80	eighty
81	eighty-one
108	one hundred eight
821	eight hundred twenty-one

When naming numbers with words, we remember two rules:

1. We do not use the word "and" when naming whole numbers. For example, we name the number 108, "one hundred eight," **not** "one hundred *and* eight."
2. We use a hyphen when using words to write the numbers from 21 to 99 which do not end with zero. For example, we write 21, "twenty-one," **not** "twenty one."

Practice*

a. Use words to name 563.

b. Name 101 by using words.

c. Use words to name 111.

d. Use digits to write two hundred forty-five.

e. Write four hundred twenty by using digits.

f. Use digits to write five hundred three.

---

* All lessons with practice sets starred with an asterisk (*) have corresponding drill sets in the appendix. The drill sets may be used as needed for extra practice.

Problem set 5

1. Use digits to write the number three hundred seventy-four.

2. Use words to name the number 623.

3. Use digits to write the number two hundred five.

4. Use words to name the number 109.

5. Write the following sentence using digits and a comparison symbol.

"One hundred fifty is greater than one hundred fifteen."

6. Compare: 346 ○ 436

7. Use digits to write the number which has a value of 5 hundreds plus 7 tens plus 9 ones.

8. Use words to name the number which has a value of 2 hundreds plus 4 tens plus 6 ones.

9. Which digit shows the number of tens in 567?

10. When counting by tens, what number comes after 90?

For each number in problems 11–13 write either "even" or "odd."

11. 363,636

12. 36,363

13. 2000

14. The greatest three-digit odd number is 999. What is the greatest three-digit even number?

15. We can reach 20 counting by twos and counting by tens. We do not reach 20 counting by which of the following numbers?

a. 1 **b.** 3 **c.** 4 **d.** 5

16. If there is an equal number of boys and girls in the room, then which could **not** be the number of students in the room?

a. 12 **b.** 29 **c.** 30 **d.** 44

For problems 17–24, write the next four numbers in each sequence.

17. 0, 9, 18, __, __, __, __, . . .

18. 18, 20, 22, __, __, __, __, . . .

19. 25, 30, 35, __, __, __, __, . . .

20. 6, 12, 18, __, __, __, __, . . .

21. 100, 90, 80, __, __, __, __, . . .

22. 90, 81, 72, __, __, __, __, . . .

23. 88, 80, 72, __, __, __, __, . . .

24. 7, 14, 21, __, __, __, __, . . .

25. What is the ninth number of this sequence?

3, 6, 9, . . .

LESSON
6

Practicing the Addition Algorithm

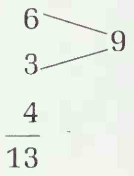
Facts Practice: 100 Addition Facts (Test A in Test Booklet)

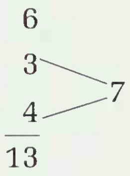
Adding one-digit numbers

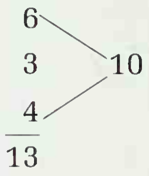
When we combine two or more numbers, we say that we **add** the numbers. Adding is a counting activity. We really count the numbers together. We have 5 fingers on one hand and 5 fingers on the other hand. If we put our hands together, we count 10 fingers. Of course, it is faster and easier just to remember that 5 plus 5 equals 10.

We should remember all the addition combinations from 0 + 0 to 9 + 9. These are called **basic addition facts** and should be **memorized**. You should practice timed written tests until you can remember the addition facts instantly.

The answer we get when we add is called the *sum*. We may add numbers in any order to find the sum. For example, the sum of 5 + 6 equals the sum of 6 + 5. If we are adding more than two numbers, we may still add in any order we like. Here are three ways to add 6, 3, and 4. We show the two numbers we added first. Sometimes we can find pairs of numbers that add up to 10. This makes the addition easier.

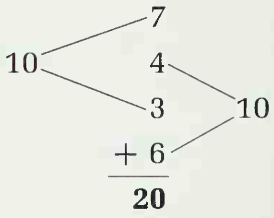






Example 1 What is the sum of 7, 4, 3, and 6?

Solution The "sum" is the answer when we add. We may add the numbers as they are written or align them in a column. Here we write the numbers in a column and add in an order that makes the work a little easier.



The addition algorithm

An **algorithm** is a procedure for getting an answer. Algorithms were invented to get answers quickly and easily. In this lesson we will practice a common addition algorithm.

When we add, we must be careful to add like things. As the saying goes, "You can't add apples and oranges and get oranges." So when we add numbers, we must be careful to add digits that have the same place value. Digits that are in the same column have the same place value.

When we add numbers with more than one digit, we add the right column first and move one column at a time to the left. This means that when we add whole numbers, we first add the ones, then add the tens, then add the hundreds, and so on.

$$\begin{array}{ccc} \text{Add ones} & \text{Add tens} & \text{Add hundreds} \\ \downarrow & \downarrow & \downarrow \\ \begin{array}{r} 176 \\ +\ 513 \\ \hline 9 \end{array} & \begin{array}{r} 176 \\ +\ 513 \\ \hline 89 \end{array} & \begin{array}{r} 176 \\ +\ 513 \\ \hline 689 \end{array} \end{array}$$

When we write the answer we must remember that we can write only one digit per column. If we add a column of numbers and get two digits, then we write down the last digit and carry the first digit to the next column. We show this by adding 36 and 87.

$$\begin{array}{r} 1\ \\ \left.\begin{array}{r} 36 \\ +\ 87 \end{array}\right\} 13 \\ \hline 3\ \end{array}$$

We begin by adding the ones' digits. The sum of 6 and 7 is the two-digit number 13. But 13 is the same as 1 ten and 3 ones. So we write the 3 in the ones' column under the 6 and 7 and carry the 1 to the tens' column.

$$\begin{array}{r} 1\ \ \\ 36 \\ +\ 87 \\ \hline 123 \end{array}$$

Then we add the 1 to the 3 and 8 to get 12 tens. We write the 2 in the tens' column and would carry the 1 to the hundreds' column if there were any digits there. However, there are no other hundreds, so we write the 1 in the hundreds' place of the answer. The sum of 36 and 87 is **123**.

Example 2 Find the sum of 462 and 58.

Solution We write the numbers in columns so that the last digits are in line one above the other. We begin by adding the digits in the ones' column and move one column at a time to the left, carrying the first digit

$$\begin{array}{r} 11\ \\ 462 \\ +\ \ 58 \\ \hline 520 \end{array}$$

of two-digit answers. We treat the empty place below the 4 as though it were a zero. We find that the sum of 462 and 58 is **520**.

Practice* Find the sum for each of these addition problems. While adding, look for combinations which add up to 10.

a. 8 + 6 + 2 =

b. 4 + 7 + 3 + 6 =

c. 9 + 6 + 4 =

d. 4 + 5 + 6 + 7 =

e. 7 + 3 + 4 =

f. 2 + 6 + 3 + 5 =

g. 6 + 7 + 5 =

h. 8 + 7 + 5 + 3 =

Use the addition algorithm to find the sum of each of these addition problems. When putting the numbers into columns, remember to line up the last digits one above the other.

i. 463 + 158 =

j. 674 + 555 =

k.
$$\begin{array}{r} 323 \\ 142 \\ +\ 365 \\ \hline \end{array}$$

l. 543 + 98 =

m. 47 + 485 =

n.
$$\begin{array}{r} 389 \\ 70 \\ +\ 151 \\ \hline \end{array}$$

Problem set 6

1. Use digits to write the number three hundred sixty-five.

2. Use words to name the number 212.

3. Which digit shows the number of hundreds in 274?

For each number in problems 4–6, write either "even" or "odd."

4. 1234

5. 12,345

6. 1,234,567

7. Use digits to write the number five hundred eight.

8. Use words to name the number 580.

Find the sum of each addition problem in problems 9–16. Look for combinations which add up to 10.

9. $1 + 6 + 9 =$

10. $7 + 6 + 4 =$

11. $8 + 3 + 1 + 7 =$

12. $4 + 5 + 6 + 7 =$

13. $\begin{array}{r} 436 \\ +\ 527 \\ \hline \end{array}$

14. $\begin{array}{r} 592 \\ +\ 408 \\ \hline \end{array}$

15. $\begin{array}{r} 963 \\ +\ \ 79 \\ \hline \end{array}$

16. $\begin{array}{r} 180 \\ +\ 747 \\ \hline \end{array}$

17. When all the books were put into two piles, there was one more book in one pile than in the other pile. The total number of books in both piles could not be which of the following?

a. 28 **b.** 29 **c.** 33 **d.** 55

Find the **eighth** number in each sequence in problems 18–21.

18. 10, 20, 30, . . .

19. 6, 12, 18, . . .

20. 7, 14, 21, . . .

21. 8, 16, 24, . . .

22. Compare: nine hundred sixteen ○ nine hundred sixty

23. Write the following sentence using digits and a comparison symbol.

"Six hundred ninety is greater than six hundred nine."

24. Compare: $5 + 5 + 5$ ○ $4 + 5 + 6$

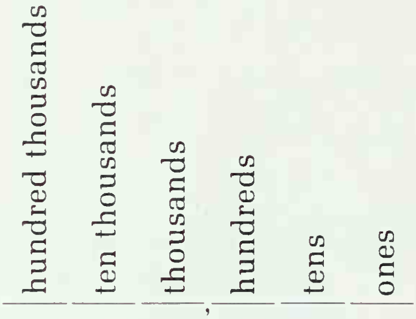
25. The smallest even two-digit whole number is 10. What is the smallest odd two-digit whole number?

LESSON 7

Writing Numbers through Hundred Thousands

Facts Practice: 100 Addition Facts (Test A in Test Booklet)

Place value The value of a digit depends upon its place in a number. The table below lists the values of the first six whole number places.



Writing numbers We have practiced naming whole numbers with up to three digits. In this lesson we begin naming whole numbers with up to six digits.

Commas are used to write whole numbers with more than three digits to make the numbers easier to read. To write commas in a whole number, we count digits from the right end of the whole number and place a comma after every three digits.

5 4 , 3 2 1

Count from the right. Insert a comma after three places.

The comma in this number marks the end of the thousands. To read this number, we read the number formed by the digits in front of the comma, and then say "thousand" when we get to the comma. Next we read the number formed by the last three digits.

54,321

fifty-four thousand, three hundred twenty-one

Notice that we write a comma after the word "thousand" when we use words to name the number. The list below shows samples of named numbers.

5,281	five thousand, two hundred eighty-one
27,050	twenty-seven thousand, fifty
125,000	one hundred twenty-five thousand
203,400	two hundred three thousand, four hundred

Example 1 Use words to name 52370.

Solution We begin by writing the number with a comma: 52,370. Then we name the number formed by the digits in front of the comma, write "thousand" and a comma, and then we name the number formed by the digits after the comma. We name 52,370 as **fifty-two thousand, three hundred seventy**.

Example 2 Using digits write one hundred fifty thousand, two hundred thirty-four.

Solution We use digits to write one hundred fifty and write a comma for the word "thousand." Then we use digits to write two hundred thirty-four: **150,234**

Practice* In problems (a)–(c) use words to name each number. *Hint:* Begin by putting the comma in place.

a. 36420

b. 12300

c. 4567

In problems (d)–(g) use digits to write each number.

d. sixty-three thousand, one hundred seventeen

e. two hundred fifty-six thousand, seven hundred

f. fifty thousand, nine hundred twenty-four

g. seven hundred fifty thousand

Problem set 7

1. Find the sum of 462 and 88.

2. Which digit is in the tens' place in 567?

3. Use digits to write the number seven hundred seven.

4. Use words to name the number 717,452.

5. Find the sum of 54 and 246.

Find the sum in problems 6–8.

6. $$\begin{array}{r} 463 \\ +\ 364 \\ \hline \end{array}$$

7. $$\begin{array}{r} 286 \\ +\ 414 \\ \hline \end{array}$$

8. $$\begin{array}{r} 709 \\ +\ 314 \\ \hline \end{array}$$

Find the **seventh** number in each sequence in problems 9–14.

9. 10, 20, 30, . . .

10. 5, 10, 15, . . .

11. 6, 12, 18, . . .

12. 7, 14, 21, . . .

13. 8, 16, 24, . . .

14. 9, 18, 27, . . .

15. Compare: two hundred fifty ○ two hundred fifteen

16. Compare: $3 + 8 + 7$ ○ $5 + 7 + 5$

Find the sum in problems 17–19.

17. $$\begin{array}{r} 436 \\ 72 \\ +\ \ 54 \\ \hline \end{array}$$

18. $$\begin{array}{r} 361 \\ 493 \\ +\ 147 \\ \hline \end{array}$$

19. $$\begin{array}{r} 506 \\ 79 \\ +\ 434 \\ \hline \end{array}$$

20. Write the following sentence using digits and a comparison symbol.

"Four hundred eight is less than four hundred eighty."

21. We can reach 24 by counting by twos and counting by threes. We do not reach 24 by counting by which of the following numbers?
a. 4 **b.** 5 **c.** 6 **d.** 8

For each number in problems 22–24, write "even" or "odd."

22. 1969 **23.** 1492 **24.** 1776

25. The smallest even three-digit whole number is 100. What is the smallest odd three-digit whole number?

LESSON 8

Learning Subtraction Facts and Vocabulary

Facts Practice: 100 Addition Facts (Test A in Test Booklet)

When we remove one number from another number, we **subtract**. Here we show 5 cents. If we remove, or take away, 3 cents, then we would be subtracting 3 from 5. The number sentence below the coins tells us that when we start with 5 and subtract 3, then 2 are left.

$$5 - 3 = 2$$

We read this number sentence, "Five minus three equals two." The dash (—) in front of the 3 is called a **minus sign**. **The minus sign tells us to subtract the number after the sign from the number in front of the sign.** Order matters when we subtract. The subtraction 5 − 3 means to start with 5 and subtract 3. We saw that we may add in any order since 5 + 3 is the same as 3 + 5. This is not true in subtraction since 5 − 3 is not the same as 3 − 5.

Subtraction problems are often written in columns, with one number above another number. In this form we start with the top number and subtract the bottom number. These two forms mean the same thing. Both tell us to start with 5 and subtract 3.

$$5 - 3 = \qquad \begin{array}{r} 5 \\ -\ 3 \\ \hline \end{array}$$

The answer we get when we subtract is called the **difference**. One way to find the difference is to count backward. To answer a subtraction question like 5 − 3, we could start at 5 and count backward three numbers, "4, 3, **2**." Another way to find a difference is to use objects, like fingers. We start with 5 fingers up and fold down 3, leaving 2. We think the best way is simply to **remember** the basic subtraction facts. Practice with timed written tests will help you to memorize the subtraction facts and will help you recall answers instantly.

Example 1 When 7 is subtracted from 12, what is the difference?

Solution The difference is the answer we get when we subtract. In this problem we start with 12 and subtract 7. If we write the numbers in a line, we write the 12 first. If we write the numbers in a column, we write the 12 on top and write the 7 below the 2 so that the digits with the same place values are in the same column. We subtract and find that the difference is **5**.

$$12 - 7 = 5 \qquad \begin{array}{r} 12 \\ -\ \ 7 \\ \hline 5 \end{array}$$

Example 2 What is 8 minus 3?

Solution The word "minus" means to take away. Here we are to find what is left when we take 3 away from 8. When we see the word "minus," we may put a **minus sign** (−) in its place. Using symbols, we write the problem and the answer this way:

$$8 - 3 = \mathbf{5}$$

Practice

a. 17 − 9 =
b. 15 − 9 =
c. 13 − 7 =
d. 17 − 8 =
e. 12 − 7 =
f. 13 − 8 =
g. 11 − 5 =
h. 16 − 8 =
i. 12 − 8 =

Problem set 8

1. Which digit is in the thousands' place in 3654?

2. List the five odd one-digit whole numbers.

3. When 7 is subtracted from 15, what is the difference?

4. When 56 is added to 560, what is the sum?

5. What is 7 minus 4?

6. What is sixty-four plus two hundred six?

7. Use words to name the number 812,000.

8. Use digits to write the number eight hundred two.

9. Write a two-digit odd number using the two digits 5 and 6.

10. Use words to name the number which has a value of 4 hundreds, 4 tens, and 4 ones.

Write the **ninth** number in each sequence in problems 11–13.

11. 6, 12, 18, . . .
12. 3, 6, 9, . . .

13. 4, 8, 12, . . .

14. Think of two odd numbers and add them together. Is the sum odd or even?

In problems 15–20, subtract to find the difference.

15. 18 − 9 =
16. 15 − 7 =
17. 12 − 5 =
18. 11 − 8 =
19. 14 − 6 =
20. 13 − 9 =

In problems 21–24, add to find the sum.

21. $36 + 403 + 97 =$

22. $572 + 386 + 38 =$

23. $47 + 135 + 70 =$

24. $590 + 306 + 75 =$

25. Look at this list of numbers. If the greatest odd number in this list is added to the smallest even number in this list, what is the sum?

364 287 428 273

LESSON 9

Practicing the Subtraction Algorithm

Facts Practice: 100 Subtraction Facts (Test B in Test Booklet)

We may find a subtraction answer by counting or by remembering combinations. When subtracting larger numbers, it is helpful to have a method. We remember that a method is called an algorithm. In this lesson we will practice an algorithm for subtraction.

When we subtract numbers with more than one digit, we start at the rightmost column and move to the left, subtracting within each column.

Subtract ones	Subtract tens	Subtract hundreds
↓	↓	↓
$\begin{array}{r} 467 \\ -\ 365 \\ \hline 2 \end{array}$	$\begin{array}{r} 467 \\ -\ 365 \\ \hline 02 \end{array}$	$\begin{array}{r} 467 \\ -\ 365 \\ \hline 102 \end{array}$

When subtracting in this manner, we often find a column in which we cannot subtract the way the numbers are written. We know that we can subtract 15 from 32, but looking at the ones' column we cannot subtract 5 from 2. The method for dealing with this situation is sometimes called **regrouping**, or **exchange**, or **borrowing**. This method changes the form of the top number by taking 1 ten from the tens' column and adding that ten to the ones' column, as we show. The 32 now has 2 tens and 12 ones. Some silly counting might make the idea clearer to us. Counting up from 27 we could say, "twenty-eight, twenty-nine, twenty-ten, twenty-eleven, twenty-twelve." Of course, "twenty-twelve" is really 32, but we make the number 32 "twenty-twelve" so that we can subtract.

$$\begin{array}{r} 32 \\ -\ 15 \\ \hline ? \end{array}$$

$$\begin{array}{rr} \overset{2}{\cancel{3}} & {}^{1}2 \\ -\ 1 & 5 \\ \hline 1 & 7 \end{array}$$

Since the value of every column is 10 times the value of the column to its right, we may follow this method whenever we come to a column where we cannot subtract. Study the examples and solutions below to see how this is done.

Example **a.**
$$\begin{array}{r} 346 \\ -\ 264 \\ \hline \end{array}$$
b. $219 - 73 =$
c.
$$\begin{array}{r} 600 \\ -\ 123 \\ \hline \end{array}$$

Solution **a.**
$$\begin{array}{rrr} \overset{2}{\cancel{3}} & {}^{1}4 & 6 \\ -\ 2 & 6 & 4 \\ \hline & 8 & 2 \end{array}$$
b.
$$\begin{array}{rrr} \overset{1}{\cancel{2}} & {}^{1}1 & 9 \\ - & 7 & 3 \\ \hline 1 & 4 & 6 \end{array}$$
c.
$$\begin{array}{rrr} \overset{5}{\cancel{6}} & {}^{1}\overset{9}{\cancel{0}} & {}^{1}0 \\ -\ 1 & 2 & 3 \\ \hline 4 & 7 & 7 \end{array}$$
or
$$\begin{array}{rr} \overset{59}{\cancel{60}} & {}^{1}0 \\ -\ 12 & 3 \\ \hline 47 & 7 \end{array}$$

Notice example (c). Since there are no tens in the tens' column, we must go to the hundreds' column to create some tens. We show a second way of dealing with this situation. We may think of 600 as 60 tens. Taking 1 of the tens leaves 59 tens. Some people think this is a neater and easier way to subtract across zeros.

Practice*

a. $\begin{array}{r} 496 \\ -\ 157 \\ \hline \end{array}$
b. $\begin{array}{r} 400 \\ -\ 136 \\ \hline \end{array}$
c. $\begin{array}{r} 315 \\ -\ 264 \\ \hline \end{array}$

d. $\begin{array}{r} 500 \\ -\ \ 63 \\ \hline \end{array}$
e. $\begin{array}{r} 435 \\ -\ \ 76 \\ \hline \end{array}$
f. $\begin{array}{r} 800 \\ -\ 406 \\ \hline \end{array}$

g. $86 - 48 =$
h. $132 - 40 =$
i. $203 - 47 =$

Problem set 9

1. List the five even one-digit whole numbers.

2. Which digit shows the number of tens in 596?

3. One hundred is equal to how many tens?

4. One ten is equal to how many ones?

5. When 7 is subtracted from 15, what is the difference?

6. What is eighty minus eighteen?

7. What is the sum of one hundred ninety and one hundred nineteen?

8. Write the following sentence using digits and a comparison symbol.

"Five hundred forty is greater than five hundred fourteen."

9. Using digits and symbols, the sentence "Three plus two equals five" can be written $3 + 2 = 5$. Use digits and symbols to write the following sentence.

"Sixty plus sixteen equals seventy-six."

10. Write a three-digit even number less than 200 using the three digits 1, 2, and 3.

11. $\begin{array}{r} 346 \\ -\ 178 \\ \hline \end{array}$
12. $\begin{array}{r} 56 \\ -\ 38 \\ \hline \end{array}$
13. $\begin{array}{r} 219 \\ -\ \ 73 \\ \hline \end{array}$
14. $\begin{array}{r} 600 \\ -\ 321 \\ \hline \end{array}$

15. $\begin{array}{r} 300 \\ -\ 124 \\ \hline \end{array}$ **16.** $\begin{array}{r} 500 \\ -\ 246 \\ \hline \end{array}$ **17.** $\begin{array}{r} 604 \\ -\ 318 \\ \hline \end{array}$ **18.** $\begin{array}{r} 415 \\ -\ 378 \\ \hline \end{array}$

19. $\begin{array}{r} 787 \\ 156 \\ +\ 324 \\ \hline \end{array}$ **20.** $\begin{array}{r} 573 \\ 90 \\ +\ 438 \\ \hline \end{array}$ **21.** $\begin{array}{r} 645 \\ 489 \\ +\ \ 65 \\ \hline \end{array}$ **22.** $\begin{array}{r} 429 \\ 85 \\ +\ 671 \\ \hline \end{array}$

Write the **ninth** number in each sequence in problems 23–25.

23. 7, 14, 21, . . .

24. 9, 18, 27, . . .

25. 8, 16, 24, . . .

LESSON
10
Solving Word Problems; Finding Missing Numbers

Facts Practice: 100 Subtraction Facts (Test B in Test Booklet)

Word problems Often mathematical problems come to us in word form. After we read and understand the problem, we use our arithmetic skills to help us solve it. Starting with this lesson, we will solve word problems like the following two examples.

Example 1 Gilbert lives 7 blocks from school. How many blocks does Gilbert walk when he walks to school and back?

Solution We carefully read the problem to find out what **facts** are given to us and what **question** is asked. Then we **plan** how to use the facts to answer the question. The fact that is given is that Gilbert lives 7 blocks from school. The question is, How many blocks does he walk going to school and back? We understand that when he walks to school and back, he travels the 7 blocks twice: once on the way to school and once on the way home. We plan to use addition to find the total distance.

$$7 \text{ blocks} + 7 \text{ blocks} = 14 \text{ blocks}$$

Notice that we used the word "blocks" while we added. We could have added just the numbers: $7 + 7 = 14$. But we must be sure to answer the question in the problem. The question asked is, How many blocks? So we answer **14 blocks.**

Example 2 Christie had 23 pencils. Then she lost 8 pencils. How many pencils did she have left?

Solution We carefully read the problem to find the facts and the question. There are two facts. Christie had 23 pencils. Then she lost 8 pencils. The question is, How many pencils does she have left? We understand that 8 pencils were removed from 23 pencils, so we plan to use subtraction to find the number of pencils left.

$$23 - 8 = 15$$

We answer the question, How many pencils? by answering **15 pencils**.

Missing numbers

Beginning with this lesson we will also answer questions like these:

$$8 + \square = 12 \qquad 8 - w = 3$$

The empty box stands for a missing number. To solve the problem we must find the number that will make the number sentence true. The missing number in the problem on the left is 4 because $8 + 4 = 12$. Instead of an empty box, a letter may be used to stand for a missing number. In the problem on the right, we are to find the number that the letter w stands for. We find that w stands for the number 5 because $8 - 5 = 3$.

Example 3 $34 + \square = 61$

Solution We may solve this problem by counting, but there is another way. When the missing number is part of an addition problem, we may find the number by subtracting the known number from the sum. In this problem the sum is 61 and the known number is 34. Subtracting, we find that the missing number is 27. Using 27 will make a true number sentence: $34 + \mathbf{27} = 61$.

$$\begin{array}{rrl} \overset{5}{\cancel{6}} & {}^{1}1 & \text{Sum} \\ -\ 3 & 4 & \text{Known number} \\ \hline 2 & 7 & \text{Missing number} \end{array}$$

Practice In these problems, each letter or box stands for a missing number. Find the missing number in each problem.

a. $16 + a = 30$

b. $\square + 12 = 31$

c. $7 - m = 3$

Problem set 10

1. Hortense lives 12 blocks from school. How many blocks does Hortense walk when she walks to school and back?

2. Christie had 42 pencils. Then she lost 11 pencils. How many pencils did she have left?

3. Use the three digits 4, 5, and 6 to make a three-digit odd number that is greater than 500.

4. Write the following sentence using digits and a comparison symbol.

"Six hundred thirteen is less than six hundred thirty."

5. $34 + \square = 61$

6. What is five hundred ten minus fifty-one?

7. Which digit shows the number of hundreds in 325,985?

8. We can reach 30 by counting by threes and by counting by tens. We do not reach 30 when counting by which of these numbers?

a. 2 **b.** 4 **c.** 5 **d.** 6

9. Think of one odd number and one even number and add them together. Is the sum odd or even?

10. Compare: $100 - 10 \bigcirc 100 - 20$

11. $\begin{array}{r} 363 \\ -\ 179 \\ \hline \end{array}$ **12.** $\begin{array}{r} 400 \\ -\ 176 \\ \hline \end{array}$ **13.** $\begin{array}{r} 570 \\ -\ 91 \\ \hline \end{array}$ **14.** $\begin{array}{r} 504 \\ -\ 175 \\ \hline \end{array}$

15. $\begin{array}{r} 367 \\ 48 \\ +\ 135 \\ \hline \end{array}$ **16.** $\begin{array}{r} 179 \\ 484 \\ +\ 201 \\ \hline \end{array}$ **17.** $\begin{array}{r} 305 \\ 897 \\ +\ 725 \\ \hline \end{array}$ **18.** $\begin{array}{r} 32 \\ 248 \\ +\ 165 \\ \hline \end{array}$

19. $463 - 85 =$

20. $432 + 84 + 578 =$

In problems 21 and 22, find the missing number that makes each number sentence true.

21. $8 + \square = 12$

22. $12 - r = 8$ $r =$

In problems 23–25, write the next four numbers in each sequence.

23. 3, 6, 9, 12, . . .

24. 4, 8, 12, 16, . . .

25. 6, 12, 18, 24, . . .

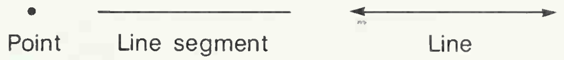
LESSON 11

Representing a Point, a Line, and a Segment

Facts Practice: 100 Subtraction Facts (Test B in Test Booklet)

In mathematics we study numbers. We also study shapes such as circles, squares, and triangles. The study of shapes is called **geometry**. The simplest shapes of geometry are the **point** and the **line**. A geometric point is like a dot, only smaller. With the most powerful microscope we could not see a geometric point. We make a dot with a pencil to mark the location of a point. The dot is not the point. The dot tells us where this point is.

A geometric line is a string of points in a row. A geometric line has no width because the points have no width. We cannot draw a geometric line because the lines we draw have width. But we can draw a line that tells where the geometric line is. When we do this, we say that what we have drawn "represents" a geometric line. To represent a geometric line, we draw a straight line with a pencil and a ruler and put arrowheads on both ends. The arrowheads show that the geometric line goes on and on in both directions because a geometric line has no ends. If we wish to represent a part of a geometric line, we do not put the arrowheads on the line we have drawn. A part of a geometric line is called a **line segment** or just a **segment**.



Example 1 Is it possible to draw a real geometric point?

Solution **No.** A geometric point is so small it cannot be seen. The dot we make on the paper tells us where the geometric point is.

Example 2 What is the difference between a line and a segment?

Solution A segment is a part of a line. A line goes on and on in both directions. A line does not have ends. A segment has two ends.

Practice

a. Draw a point. (By "draw" we mean represent.)

b. Draw a line segment.

c. Draw a line.

d. Another name for line segment is what?

e. If a line were drawn from Los Angeles to New York, would it be a line or a segment? Why?

f. If a line were drawn from "up" to "down," would it be a line or a segment? Why?

Problem set 11

1. Which of these represents a line segment?

a. 

b. 

c. 

2. Draw a line.

3. The Lees traveled 397 miles one day and 406 miles the next day. Altogether, how many miles did the Lees travel in 2 days?

4. Mike is reading a book which has 212 pages. He has finished page 87. How many more pages does he have to read?

5. Use the three digits 1, 2, and 3 to make the greatest possible even number that you can.

6. Compare: $8 + 7 + 6 \bigcirc 6 + 7 + 8$

7. Write the following sentence using digits and a comparison symbol.

> "Eight hundred twenty is greater than eight hundred twelve."

8. Write the following sentence using digits and symbols.

> "Forty minus fourteen equals twenty-six."

9. Think of two odd numbers and one even number. Add them all together. Is the sum odd or even?

10. Use digits to write the number which has a value of 1 hundred plus no tens plus 5 ones.

11. $\begin{array}{r} 872 \\ -\ \ 56 \\ \hline \end{array}$ **12.** $\begin{array}{r} 704 \\ -\ 136 \\ \hline \end{array}$ **13.** $\begin{array}{r} 800 \\ -\ 139 \\ \hline \end{array}$ **14.** $\begin{array}{r} 365 \\ -\ 285 \\ \hline \end{array}$

15. $\begin{array}{r} 578 \\ 36 \\ +\ \ \ 4 \\ \hline \end{array}$ **16.** $\begin{array}{r} 640 \\ 152 \\ +\ 749 \\ \hline \end{array}$ **17.** $\begin{array}{r} 365 \\ 294 \\ +\ 716 \\ \hline \end{array}$ **18.** $\begin{array}{r} 475 \\ 233 \\ +\ \ 76 \\ \hline \end{array}$

19. $317 - 58 =$

20. $433 + 56 + 8 =$

In problems 21 and 22, find the missing number that makes each number sentence true.

21. $7 + w = 15$ $w =$

22. $15 - \square = 7$

In problems 23–25, write the next four numbers in each sequence.

23. 9, 18, 27, 36, . . .

24. 8, 16, 24, 32, . . .

25. 7, 14, 21, 28, . . .

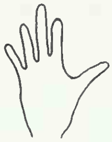
LESSON 12

Reading and Drawing Number Lines, Part 1

Facts Practice: 100 Subtraction Facts (Test B in Test Booklet)

There are many ways to represent numbers. To show the number "five," we could make tally marks, hold up five fingers, write the numeral 5, or count out five objects.

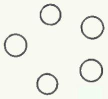
Tally marks



Fingers

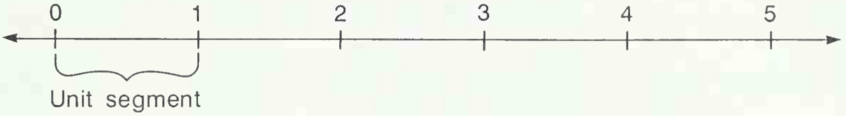
5

Numeral



Objects

Another way to represent numbers is with a number line. **A number line shows numbers as a certain distance from zero.** On the number line below, the distance from 0 to 1 is a segment of a certain length. The distance from 0 to 5 is five of those segments. The arrowheads show that the number line continues in both directions. Numbers less than zero are called **negative numbers**. We will talk about negative numbers in a later lesson.



Example 1 Draw a number line with whole numbers marked from 0 to 5.

Solution Begin by drawing a line. Make a mark for zero, and then make marks for the numbers 1, 2, 3, 4, 5. The whole-number marks should be **equally spaced**. Arrowheads should be drawn on the ends to show that the number line continues without end. When you have finished, your number line should look like the number line above.

The number line is a very useful way to represent numbers. We can use number lines to measure, to graph, and to show the time of day. To count on a number line, it is important to focus our attention more on the **segments** than on the number marks. To help us concentrate on the segments, we will answer questions like the following.

Example 2 How many unit segments are there from 2 to 5 on the number line?

Solution **A unit segment is the distance from 0 to 1 on the number line.** Looking at the number line on page 35, we see one unit segment from 2 to 3, another from 3 to 4, and a third from 4 to 5. The number of unit segments from 2 to 5 is **3**.

Practice

a. Find the sentence in the lesson which defines "unit segment" and copy that sentence on your paper.

b. Draw a number line with whole numbers marked and numbered from 0 to 10.

c. How many unit segments are there from 3 to 7 on the number line?

d. What whole number is 6 unit segments to the right of 2 on the number line?

Problem set 12

1. Draw a number line with whole numbers marked from 0 to 6.
2. How many unit segments are there from 2 to 7 on the number line?
3. This is a way to show the number 6 with tally marks: 𝍸 /. Use tally marks to show the number 7.
4. Gilbert weighs 94 pounds. Andy weighs 86 pounds. If they both step on the scale, what will they weigh together?

5. $\begin{array}{r} 862 \\ -\ \ 79 \\ \hline \end{array}$ **6.** $\begin{array}{r} 420 \\ -\ 137 \\ \hline \end{array}$ **7.** $\begin{array}{r} 506 \\ -\ \ 98 \\ \hline \end{array}$ **8.** $\begin{array}{r} 500 \\ -\ 136 \\ \hline \end{array}$

9. $\begin{array}{r} 248 \\ 514 \\ +\ \ 18 \\ \hline \end{array}$ **10.** $\begin{array}{r} 907 \\ 45 \\ +\ 653 \\ \hline \end{array}$ **11.** $\begin{array}{r} 367 \\ 425 \\ +\ 740 \\ \hline \end{array}$ **12.** $\begin{array}{r} 98 \\ 427 \\ +\ 813 \\ \hline \end{array}$

13. $38 + 427 + 9 =$ **14.** $580 - 94 =$

15. The number 57 is between which pair of numbers?
a. 40 and 50 **b.** 50 and 60 **c.** 60 and 70

16. Write the following sentence using digits and a comparison symbol.

"Eighteen is less than eighty."

17. Write the following sentence using digits and symbols.

"Eight plus ten equals eighteen."

18. Think of an odd number and an even number. Subtract the smaller number from the larger number. Is the answer odd or even?

In problems 19 and 20, find the missing number that makes each number sentence true.

19. $8 + \square = 15$ **20.** $12 - y = 5 \qquad y =$

21. Compare: $952 \bigcirc 947$

In problems 22–25, write the next six numbers in each sequence.

22. 2, 4, 6, . . . **23.** 3, 6, 9, . . .

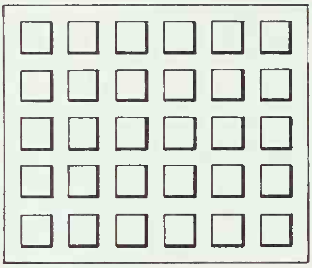
24. 4, 8, 12, . . . **25.** 5, 10, 15, . . .

LESSON 13

Multiplying to Perform Repeated Addition

Facts Practice: 100 Subtraction Facts (Test B in Test Booklet)

In a room there are 5 rows of desks with 6 desks in each row. How many desks are in the room?



There are many ways to find an answer to this question. One way is to count each desk by counting by ones. Another way is to count the desks in one row and then count the number of rows. Since there are 5 rows of 6 desks, we can add 5 sixes together as we show here:

$$6 + 6 + 6 + 6 + 6 =$$

We can also **multiply** to find the number of desks. Whenever we need to add the same number over and over, we may multiply. To find the sum of 5 sixes, we may multiply 5 and 6. We show two ways to write this.

$$5 \times 6 = \qquad \begin{array}{r} 6 \\ \times\ 5 \\ \hline \end{array}$$

The × is called a **times sign**. We read 5 × 6 by saying "five times six." Five times six means the total of 5 sixes. Multiplication is another way of adding the same number (the second number) the number of times shown by the first number.

In the picture above we see 5 rows of desks with 6 desks in each row. However, if we turn the book sideways, we see 6 rows of desks with 5 desks in each row. So we see that **6 fives is the same as 5 sixes**.

> Five sixes (5×6) means $6 + 6 + 6 + 6 + 6$, which equals 30.
>
> Six fives (6×5) means $5 + 5 + 5 + 5 + 5 + 5$, which also equals 30.

We see that the answer to 6×5 is the same as the answer to 5×6. This shows us that we may multiply in any order.

Example Change this addition problem to a multiplication problem.

$$7 + 7 + 7 + 7 =$$

Solution We are asked to change the addition problem into a multiplication problem. We are not asked to find the sum. We see 4 sevens added together. We can write 4 sevens as a multiplication problem by writing $\mathbf{4 \times 7}$, which is equal to 7×4.

Practice Write a multiplication problem for each of these addition problems.

a. $8 + 8 + 8 + 8 =$

b. $25 + 25 + 25 =$

c. $9 + 9 + 9 + 9 + 9 + 9 =$

d. $32 + 32 + 32 + 32 + 32 =$

Problem set 13

1. Draw a number line with whole numbers marked from 0 to 8.

2. How many unit segments are there from 3 to 7 on the number line?

3. This is a way to show the number 8 with tally marks: 𝍸///. Use tally marks to show the number 9.

4. Change this addition problem to a multiplication problem.

$$7 + 7 + 7 + 7 + 7 + 7 =$$

5. Write this addition problem as a multiplication problem.

$$25 + 25 + 25 + 25 + 25 =$$

6. Jim paddled the canoe down the river 25 miles each day for 5 days. How far did he travel in 5 days?

7. $\begin{array}{r} 300 \\ -\ 114 \\ \hline \end{array}$ **8.** $\begin{array}{r} 560 \\ -\ 284 \\ \hline \end{array}$ **9.** $\begin{array}{r} 203 \\ -\ \ 87 \\ \hline \end{array}$ **10.** $\begin{array}{r} 512 \\ -\ 123 \\ \hline \end{array}$

11. $\begin{array}{r} 432 \\ 27 \\ +\ 683 \\ \hline \end{array}$ **12.** $\begin{array}{r} 254 \\ 536 \\ +\ \ 75 \\ \hline \end{array}$ **13.** $\begin{array}{r} 387 \\ 496 \\ +\ 874 \\ \hline \end{array}$ **14.** $\begin{array}{r} 97 \\ 436 \\ +\ 468 \\ \hline \end{array}$

15. Write the following sentence using digits and symbols.

"Fifteen minus five equals ten."

16. Think of two even numbers and one odd number. Add them together. Is the sum odd or even?

17. $456 + 1376 =$ **18.** $5127 - 49 =$

19. $6 + 27 + 123 + 14 =$ **20.** $2510 - 432 =$

21. Compare: $3 + 3 + 3 + 3$ ◯ $4 + 4 + 4$

In problems 22–25, write the next six numbers in each sequence.

22. 6, 12, 18, . . . **23.** 7, 14, 21, . . .

24. 8, 16, 24, . . . **25.** 9, 18, 27, . . .

LESSON 14

Making a Multiplication Table

Facts Practice: 100 Subtraction Facts (Test B in Test Booklet)

Here we list together several sequences of numbers. Together these sequences form an important pattern.

ones	1	2	3	4	5	6
twos	2	4	6	8	10	12
threes	3	6	9	12	15	18
fours	4	8	12	16	20	24
fives	5	10	15	20	25	30
sixes	6	12	18	24	30	36

This pattern is sometimes called a **multiplication table**. From a multiplication table we can find the answer to questions like, "How much is 3 fours?" To discover the answer, we find a 3 from the first column and a 4 from the first row and look for the number where that column and row meet.

$$\begin{tikzcd}
 & 4 \arrow[d] \\
3 \arrow[r] & 12
\end{tikzcd}$$

The answer to a multiplication problem is called a **product**. From the table we see that the product of 3 and 4 is 12.

Activity The multiplication table above has 6 columns and 6 rows. Make a multiplication table with 10 columns and 10 rows. Be sure to line up the numbers carefully. Use your multiplication table to answer the practice questions.

Practice In a multiplication table, find where the row and column meet in problems (a)–(c) and write that number.

a.
$$\begin{tikzcd} & 4 \arrow[d] \\ 5 \arrow[r] & ? \end{tikzcd}$$

b.
$$\begin{tikzcd} & 2 \arrow[d] \\ 6 \arrow[r] & ? \end{tikzcd}$$

c.
$$\begin{tikzcd} & 6 \arrow[d] \\ 3 \arrow[r] & ? \end{tikzcd}$$

d. How much is 6 sevens?

e. How much is 9 tens?

f. How much is 8 nines?

g. What is the product of 8 and 4?

Problem set 14

1. Draw a number line with whole numbers marked and numbered from 0 to 10.

2. Use words to name the number 448.

3. Use digits to write the number eight hundred eighteen thousand, eighty.

4. This is a way to show the number 10 with tally marks: 𝍸𝍸. Use tally marks to show the number 11.

5. Janet is reading a 260-page book. She has read 85 pages. How many more pages does she have left to read?

6. $\square \times 10 = 40$

7. Write the following sentence using digits and a comparison symbol.

"Fifty-six is less than sixty-five."

8. Write the largest three-digit even number that has the digits 1, 2, and 3.

9. $\begin{array}{r} 4310 \\ -\ 154 \\ \hline \end{array}$ **10.** $\begin{array}{r} 301 \\ -\ 103 \\ \hline \end{array}$ **11.** $\begin{array}{r} 600 \\ -\ 364 \\ \hline \end{array}$ **12.** $\begin{array}{r} 4625 \\ -\ 1387 \\ \hline \end{array}$

13. $\begin{array}{r} 367 \\ 412 \\ +\ 501 \\ \hline \end{array}$ **14.** $\begin{array}{r} 573 \\ 96 \\ +\ 427 \\ \hline \end{array}$ **15.** $\begin{array}{r} 68 \\ 532 \\ +\ 176 \\ \hline \end{array}$ **16.** $\begin{array}{r} 436 \\ 789 \\ +\ 679 \\ \hline \end{array}$

17. $104 - 48 =$ **18.** $3140 - 1340 =$

19. $6 + 48 + 9 + 217 =$ **20.** $3714 + 56 + 459 =$

21. Compare: 64 + 46 ○ 100

22. What number is missing in this sequence?

. . . , 35, 42, 49, __, 63, . . .

23. How much is 9 tens?

24. How much is 7 fours?

25. What is the product of 6 and 9?

LESSON
15

Memorizing the Multiplication Facts

Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

Statements such as "3 times 4 is 12" are called **multiplication facts**. Since multiplication is used so often in mathematics, it is important to know the multiplication facts very well so that we can remember products quickly. Writing a sequence is too slow and looking at a chart is too slow. To be quick we must **memorize** the common multiplication facts. The facts which must be memorized are the 100 facts from 0 × 0 through 9 × 9.

Although there are 100 facts, the task of memorizing the facts is not as big as it may seem. Look at the outline of this multiplication table.

	0	1	2	3	4	5	6	7	8	9	
0	0	0	0	0	0	0	0	0	0	0	← zeros
1	—	1	2	3	4	5	6	7	8	9	← ones
2	—	—	4	6	8	10	12	14	16	18	36 facts to memorize
3	—	—	—	9	12	15	18	21	24	27	
4	—	—	—	—	16	20	24	28	32	36	
5	—	—	—	—	—	25	30	35	40	45	
6	—	—	—	—	—	—	36	42	48	54	
7	—	—	—	—	—	—	—	49	56	63	
8	—	—	—	—	—	—	—	—	64	72	
9	—	—	—	—	—	—	—	—	—	81	

Although there are 100 facts, we see that there are not 100 different things to learn. Since we can multiply in either direction, if we learn the answers above the stairstep line, we will know the answers below the line. That means there are only 55 things to learn. If we know that the product of zero and any number is zero, there are only 45 things left to learn. If we also know that when a number is multiplied by 1 the number is not changed, then there are only 36 things left to learn.

The remaining 36 facts from 2 × 2 through 9 × 9 should be practiced by **timed written tests** very often. If you learn the multiplication facts very well, they will be your friends as you learn mathematics. If you do not learn them well, they will become your enemies. It is worth the time and effort necessary to memorize these facts.

Practice The multiplication facts should be practiced on a daily basis until you can complete a 100-facts written test in 3 minutes with no more than three errors. Then you should continue to practice often so you do not forget.

Problem set 15

1. Draw a number line with whole numbers marked and numbered from 0 to 12.

2. Gilbert was the ninth person in line. How many people were in front of him?

3. This is a way to show the number 12 with tally marks: 𝍸𝍸//. Use tally marks to show the number 13.

4. Use words to name the number 555.

5. Use digits to write the number eight hundred eighty.

6. Khanh weighs 105 pounds. Sammy weighs 87 pounds. Sammy weighs how many pounds less than Khanh?

7. $3 \times 6 =$

8. $4 \times 8 =$

9. $7 \times 9 =$

10. $8 \times 10 =$

11. $\begin{array}{r} 3627 \\ -\ 819 \\ \hline \end{array}$

12. $\begin{array}{r} 600 \\ -\ 543 \\ \hline \end{array}$

13. $\begin{array}{r} 501 \\ -\ 256 \\ \hline \end{array}$

14. $\begin{array}{r} 510 \\ -\ 256 \\ \hline \end{array}$

15. $\begin{array}{r} 564 \\ 796 \\ +\ 287 \\ \hline \end{array}$

16. $\begin{array}{r} 951 \\ 96 \\ +\ 432 \\ \hline \end{array}$

17. $\begin{array}{r} 608 \\ 930 \\ +\ 762 \\ \hline \end{array}$

18. $\begin{array}{r} 436 \\ 218 \\ +\ 394 \\ \hline \end{array}$

19. $360 + 47 + 2518 =$

20. $4132 - 918 =$

21. Write the smallest three-digit even number that has the digits 1, 2, and 3.

22. Compare: $5 + 5 + 5$ ○ 3×5

23. Write the following sentence using digits and symbols.

"Twelve equals ten plus two."

24. What number is missing in this sequence?

. . . , 32, 40, 48, ___, 64, . . .

25. $60 = 6 \times \boxed{}$

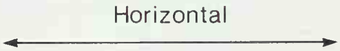
LESSON 16

Recognizing and Drawing Horizontal, Vertical, and Oblique Lines

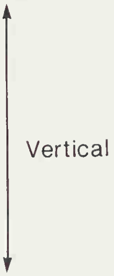
Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

We use many words to talk about directions. We use words such as up and down, left and right, north and south, and east and west. In this lesson we will practice using three words that describe the direction of a line. The words are **horizontal**, **vertical**, and **oblique**.

To understand the word "horizontal," it helps to think about the word **horizon**. The horizon is that line where the earth and sky seem to meet. The word horizontal means level with the horizon. A horizontal line is a level line that runs sideways. Here we show a horizontal line.



Vertical means straight up from the horizon. Vertical and horizontal lines make square corners with each other. A vertical line runs up and down. Here we show a vertical line.



We may use the words horizontal and vertical to describe things other than lines. We may even describe some arithmetic problems as written horizontally and vertically.

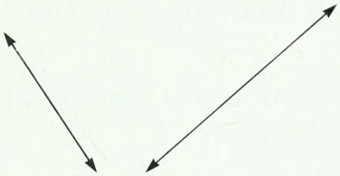
Written horizontally

$6 + 15 + 24 =$

$$\begin{array}{r} 6 \\ 15 \\ +\ 24 \\ \hline \end{array}$$

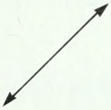
Written vertically

A line which is neither horizontal nor vertical is an oblique line. An oblique line is "slanted." Here we show two oblique lines.



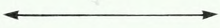
Example Which of these is a horizontal line?

a.



b.

c.



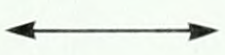
Solution A horizontal line is a level line. It does not go up or down. The horizontal line is choice (**c**).

Practice Use the words horizontal, vertical, or oblique to describe each of the following.

a.

b.

c.



d.

e. "level"

f. "slanted"

g. "straight up and down"

Draw each of the following.

h. A vertical line

i. An oblique line

j. A horizontal line

Problem set 16

1. Draw a horizontal line with only **even** numbers marked and numbered from 0 to 10.

2. Use tally marks to show the number 15.

3. Use words to name the number 205.

4. Use digits to write the number five thousand, fifteen.

5. What word is used to describe a line that goes straight up and down?

6. All the chairs were in 4 rows. There were 8 chairs in each row. How many chairs were there in all?

7. Jill had $24. She spent $8. Then how much money did Jill have left?

8. $3 \times 7 =$

9. $6 \times 7 =$

10. $3 \times 8 =$

11. $7 \times 10 =$

12. $\begin{array}{r} 347 \\ -\ 256 \\ \hline \end{array}$

13. $\begin{array}{r} 900 \\ -\ \ 92 \\ \hline \end{array}$

14. $\begin{array}{r} 418 \\ -\ 288 \\ \hline \end{array}$

15. $\begin{array}{r} 406 \\ -\ 278 \\ \hline \end{array}$

16. $\begin{array}{r} 357 \\ 946 \\ +\ 130 \\ \hline \end{array}$

17. $\begin{array}{r} 571 \\ 843 \\ +\ 682 \\ \hline \end{array}$

18. $\begin{array}{r} 365 \\ 52 \\ +\ 548 \\ \hline \end{array}$

19. $\begin{array}{r} 315 \\ 287 \\ +\ 198 \\ \hline \end{array}$

20. Think of two one-digit odd numbers. Multiply them. Is the product odd or even?

21. Which of these is a horizontal line?

a.

b.

c.

22. Write the following sentence using digits and symbols.

"Eighty-four is greater than forty-eight."

23. What number is missing in this sequence?

. . . , 24, 30, 36, __, 48, 54, . . .

24. Compare: $4 \times 3 \bigcirc 2 \times 6$

25. The letter y stands for what number in this number sentence?

$$36 + y = 63$$

LESSON 17

Multiplying by One-Digit Numbers

Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

We have practiced algorithms for adding and subtracting numbers. In this lesson we will begin practicing an algorithm for multiplying numbers.

When we multiply a number which has more than one digit, we start with the digit on the right and move to the left. We carefully line up the digits in the answer.

Multiply the ones	Multiply the tens	Multiply the hundreds
$\begin{array}{r} \downarrow \\ 201 \\ \times \quad 3 \\ \hline 3 \end{array}$	$\begin{array}{r} \downarrow \\ 201 \\ \times \quad 3 \\ \hline 03 \end{array}$	$\begin{array}{r} \downarrow \\ 201 \\ \times \quad 3 \\ \hline 603 \end{array}$

Multiplying in this order becomes important when we multiply a digit and get a two-digit answer. We will multiply 3 × 24 as we explain what to do.

We first multiply 3×4 to get 12. This is 12 ones, but we may write only one digit in the ones' column. We write the 2 below the line and write the 1 (which means 1 ten) above the next digit we are going to multiply.

$$\begin{array}{r} \overset{1}{2}4 \\ \times\ \ 3 \\ \hline 2 \end{array}$$

Next we multiply 3×2 to get 6 **and add the 1** to get 7. This is 7 **tens** from 3 times 2 tens plus 1 ten from the 12.

$$\begin{array}{r} \overset{1}{2}4 \\ \times\ \ 3 \\ \hline 72 \end{array}$$

Example 1 Find the product: $26 \times 7 =$

Solution We will change the form of the problem. We put the two-digit number on top and the one-digit number on the bottom and line up the last digits vertically.

$$\begin{array}{r} 26 \\ \times\ \ 7 \\ \hline \end{array}$$

We first multiply 7×6 and get 42. We write the 2 below the line and write the 4 above the next digit. Then we multiply 7×2 to get 14 and add the 4 to get 18. Since there are no more digits to multiply, we write the 18 below the line. The product of 26×7 is **182**.

$$\begin{array}{r} \overset{4}{2}6 \\ \times\ \ 7 \\ \hline 182 \end{array}$$

Example 2 $6 \times 325 =$

Solution We follow the same method when we multiply three-digit numbers. We multiply 6×5 to get 30. Then we multiply 6×2 to get 12 and add 3 to get 15. We write the 5 below the line and the 1 above the next digit. Then we multiply 6×3 and add the 1. The product of 6×325 is **1950**.

$$\begin{array}{r} \overset{1}{3}\overset{3}{2}5 \\ \times\ \ \ 6 \\ \hline 1950 \end{array}$$

Practice*

a. $36 \times 5 =$

b. $50 \times 8 =$

c. $7 \times 43 =$

d. $$\begin{array}{r} 340 \\ \times\ \ \ 8 \\ \hline \end{array}$$

e. $$\begin{array}{r} 768 \\ \times\ \ \ 4 \\ \hline \end{array}$$

f. $$\begin{array}{r} 506 \\ \times\ \ \ 6 \\ \hline \end{array}$$

g. $\begin{array}{r} 394 \\ \times\ \ 7 \\ \hline \end{array}$ **h.** $\begin{array}{r} 607 \\ \times\ \ 9 \\ \hline \end{array}$ **i.** $\begin{array}{r} 968 \\ \times\ \ 3 \\ \hline \end{array}$

Problem set 17

1. Draw a vertical line.

2. These tally marks represent what number? 𝍸 𝍸 |||

3. Rick read 3 books. Each book had 120 pages. How many pages did Rick read?

4. Jumbo weighs 8096 pounds. Tara weighs 6970 pounds. Jumbo weighs how many more pounds than Tara?

5. $\begin{array}{r} 24 \\ \times\ 3 \\ \hline \end{array}$ **6.** $\begin{array}{r} 36 \\ \times\ 4 \\ \hline \end{array}$ **7.** $\begin{array}{r} 45 \\ \times\ 5 \\ \hline \end{array}$ **8.** $\begin{array}{r} 56 \\ \times\ 6 \\ \hline \end{array}$

9. $\begin{array}{r} 325 \\ \times\ \ 6 \\ \hline \end{array}$ **10.** $\begin{array}{r} 432 \\ \times\ \ 9 \\ \hline \end{array}$ **11.** $\begin{array}{r} 246 \\ \times\ \ 7 \\ \hline \end{array}$ **12.** $\begin{array}{r} 364 \\ \times\ \ 8 \\ \hline \end{array}$

13. $\begin{array}{r} 316 \\ -\ 147 \\ \hline \end{array}$ **14.** $\begin{array}{r} 420 \\ -\ 375 \\ \hline \end{array}$ **15.** $\begin{array}{r} 604 \\ -\ 406 \\ \hline \end{array}$ **16.** $\begin{array}{r} 800 \\ -\ \ 73 \\ \hline \end{array}$

17. $3 + 625 + 15 + 9 =$ **18.** $9675 + 798 =$

19. Find the answer to this problem by multiplying instead of adding.

$$23 + 23 + 23 + 23 + 23 + 23 + 23 + 23 =$$

20. Find the product: $26 \times 7 =$

21. Think of two one-digit even numbers. Multiply them. Is the product odd or even?

22. Compare: 5×12 ○ 6×10

23. Write the following sentence using digits and symbols.

"Five hundred four is less than five hundred fourteen."

24. What number is missing in this sequence?

. . . , 21, 28, 35, __, 49, 56, . . .

25. Which digit shows the number of hundreds in 375?

LESSON
18

Multiplying Three Factors

> **Facts Practice:** 100 Multiplication Facts (Test C in Test Booklet)

In this lesson we will learn how to find the product when three or more numbers are multiplied.

$$9 \times 8 \times 7 =$$

Numbers which are multiplied together are called **factors**. In the problem above there are three factors. To do multiplication problems with three factors, we multiply two of the factors together. Then we multiply the product we get by the third factor.

First we multiply 9 × 8 to get 72. $\underbrace{9 \times 8} \times 7 =$

Then we multiply 72 × 7 to get 504. $72 \times 7 = 504$

We may multiply numbers in any order. Sometimes changing the order of the factors can make a problem easier to do.

Example 1 Find the product: $6 \times 3 \times 5 =$

Solution To find the product of three factors we first multiply two factors. Then we multiply that product by the third factor. We may choose an order of factors that makes the problem easier to do.

In this problem we choose to multiply 6 × 5 first; then we multiply by 3.

$$\begin{tikzcd}[column sep=tiny] & 30 & & \\ 6 \arrow[ur] & \times\ 3\ \times & 5 \arrow[ul] & = 30 \times 3 = \mathbf{90} \end{tikzcd}$$

Example 2 $5 \times 7 \times 12 =$

Solution The order in which we choose to multiply can change the difficulty of the problem. If we multiply 5 × 7 first, then we must multiply 35 × 12. If we multiply 5 × 12 first, then we can multiply 7 × 60. The second way is easier and can be done mentally. We will rearrange the factors to show the order we choose to multiply.

$$\begin{tikzcd}[column sep=tiny] & 60 & & \\ 5 \arrow[ur] & \times & 12 \arrow[ul] & \times\ 7 = 60 \times 7 = \mathbf{420} \end{tikzcd}$$

Practice* For problems (a)–(f), copy the problems down and multiply. Show which numbers you chose to multiply first.

a. $5 \times 7 \times 6 =$

b. $10 \times 9 \times 8 =$

c. $20 \times 9 \times 5 =$

d. $2 \times 2 \times 2 \times 2 =$

e. $3 \times 4 \times 25 =$

f. $4 \times 3 \times 2 \times 1 \times 0 =$

g. The answer to a multiplication problem is called the product. What do we call the numbers which are multiplied together?

Problem set 18

1. Draw a horizontal line and a vertical line that cross.

2. Use tally marks to show the number 14.

3. In one class there are 14 boys and 16 girls. How many more girls are in the class than boys?

4. In another class there are 17 boys and 14 girls. How many students are in the class?

5. 6 × 3 × 5 =

6. 5 × 7 × 12 =

7. 5 × 10 × 6 =

8. 9 × 7 × 11 =

9. $\begin{array}{r} 407 \\ \times\ \ 8 \\ \hline \end{array}$

10. $\begin{array}{r} 375 \\ \times\ \ 6 \\ \hline \end{array}$

11. $\begin{array}{r} 486 \\ \times\ \ 9 \\ \hline \end{array}$

12. $\begin{array}{r} 308 \\ \times\ \ 7 \\ \hline \end{array}$

13. $\begin{array}{r} 643 \\ \times\ \ 6 \\ \hline \end{array}$

14. $\begin{array}{r} 573 \\ \times\ \ 9 \\ \hline \end{array}$

15. $\begin{array}{r} 638 \\ \times\ \ 8 \\ \hline \end{array}$

16. $\begin{array}{r} 768 \\ \times\ \ 4 \\ \hline \end{array}$

17. 456 + 78 + 904 =

18. 34 + 75 + 123 + 9 =

19. 3670 − 793 =

20. 400 − 354 =

21. 37 + 37 + 37 + 37 + 37 + 37 =

22. Think of a one-digit odd number and one-digit even number. Multiply them. Is the product odd or even?

23. Compare: 8 × 8 ◯ 9 × 7

24. Write the following sentence using digits and symbols.

"Six times eight equals eight times six."

25. Twelve tens is 120. How much is 15 tens?

LESSON 19

Learning Basic Division Facts

Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

We can find division facts in a multiplication table because a division is a multiplication with one factor missing. The multiplication table gives us the product of two factors. We know how to find the product of 3 and 4 on the multiplication table.

$$\begin{array}{r} 4\;\; \\ \downarrow\;\; \\ 3 \longrightarrow \overline{\big|\,12} \end{array}$$

We will write this again without arrows and with one factor missing.

$$\begin{array}{r} ?\; \\ 3\,\overline{\big|\,12} \end{array}$$

To solve this problem we must find the missing factor. We need to know what number times 3 equals 12. Since we know the multiplication facts, we know that the missing factor is 4. We write our answer this way.

$$\begin{array}{r} 4\; \\ 3\,\overline{\big|\,12} \end{array}$$

Searching for a missing factor is called **division**. A division problem is like a miniature multiplication table. The product is inside the box. The two factors are outside the box. One factor is in front and the other is on top.

Example 1 What is the missing number in this problem? $\begin{array}{r} ?\; \\ 4\,\overline{)\,20} \end{array}$

Solution The symbol $\overline{)}$ is called a division box. It is sometimes drawn with a straight front like this, $\overline{|}$. When we find the missing number, we write the answer above the box. To find the missing number we think, "4 times what number equals 20?" We find that the missing number is **5**.

Example 2 $3\,\overline{)\,18}$

Solution This is the way division problems are often written. We are to search for the number which goes above the box. We think, "3 times what number equals 18?" We remember that $3 \times 6 = 18$, so the answer to the division problem is **6**.

$$\begin{array}{r} 6\; \\ 3\,\overline{)\,18} \end{array}$$

The division facts should be memorized along with the multiplication facts. **Frequent timed written tests** will help you memorize these facts.

Practice Find the missing number in each of these division facts.

a. $2\overline{)16}$ **b.** $4\overline{)24}$ **c.** $6\overline{)30}$ **d.** $8\overline{)56}$

e. $3\overline{)21}$ **f.** $5\overline{)30}$ **g.** $7\overline{)28}$ **h.** $9\overline{)36}$

Problem set 19

1. Draw a horizontal line and an oblique line that cross.

2. Room 15 collected 243 aluminum cans. Room 16 collected 487 cans. Room 17 collected 608 cans. How many cans did they collect in all?

3. There are 5 rows of desks with 6 desks in each row. How many desks are there in all?

4. Use words to name the number 458,720.

5. What is the missing number in this problem: $\begin{array}{r}?\\4\overline{)28}\end{array}$

6. $3\overline{)24}$ **7.** $6\overline{)18}$ **8.** $4\overline{)32}$ **9.** $5\overline{)40}$

10. $\begin{array}{r}483\\ \times\quad 7\\ \hline\end{array}$ **11.** $\begin{array}{r}659\\ \times\quad 8\\ \hline\end{array}$ **12.** $\begin{array}{r}706\\ \times\quad 4\\ \hline\end{array}$ **13.** $\begin{array}{r}460\\ \times\quad 9\\ \hline\end{array}$

14. $8 \times 10 \times 7 =$ **15.** $9 \times 8 \times 5 =$

16. $\begin{array}{r}6540\\ -\ 1918\\ \hline\end{array}$ **17.** $\begin{array}{r}4000\\ -\ 1357\\ \hline\end{array}$ **18.** $\begin{array}{r}2184\\ -\ 1915\\ \hline\end{array}$

19. $$\begin{array}{r} 907 \\ 415 \\ +\ 653 \\ \hline \end{array}$$

20. $$\begin{array}{r} 367 \\ 425 \\ +\ 740 \\ \hline \end{array}$$

21. $$\begin{array}{r} 427 \\ 98 \\ +\ 813 \\ \hline \end{array}$$

22. $356 + 248 + 67 =$

23. $86 + \square = 250$

24. Compare: $8 \times 6 \bigcirc 7 \times 7$

25. Write the following sentence using digits and symbols.

"Nine hundred eighty is greater than eight hundred ninety."

LESSON
20

Three Ways to Show Division

> **Facts Practice:** 90 Division Facts (Test E or F in Test Booklet)

We use different ways to show division. Here are three different ways to show "twelve divided by four."

$$4\overline{)12} \qquad 12 \div 4 \qquad \frac{12}{4}$$

In the first we use a division box. In the second we use a division sign. In the third we use a division bar. To solve longer division problems, we usually use the first form. In later math courses we will use the third form more often. We should be able to solve problems in any form, to read a problem in any form, and to change from one form to another.

Example 1 Use words to show how these problems are read.

a. $12 \div 6 =$ **b.** $\frac{12}{6}$ **c.** $6\overline{)12}$

Solution Every division symbol is read by saying "divided by." We read problem (a) from left to right: "twelve divided by six."

We read problem (b) from top to bottom: "twelve divided by six."

Problem (c) is written with a division box. To read a problem written with a division box, we begin by reading the number inside the box: "twelve divided by six."

We see that all three examples are read the same way. The examples are three different ways to show the same division, "**twelve divided by six**."

Example 2 Write this problem in the other two division forms. $15 \div 3$

Solution We read this problem, "fifteen divided by three." Fifteen is the number being divided.

To show division with a division bar, we write the number being divided on top. $\mathbf{\frac{15}{3}}$

To show division with a division box, we write the number being divided inside the box. $\mathbf{3\overline{)15}}$

Example 3 Divide: $\frac{15}{5} =$

Solution The bar is a way to show division; 5 times what number is 15? The answer is **3**.

Practice **a.** Show 10 divided by 2 in three different forms.

b. Use three different division forms to show 24 divided by 6.

Use words to show how the division problems in (c)–(e) are read.

c. $3\overline{)21}$

d. $12 \div 6$

e. $\frac{30}{5}$

Rewrite the division problems in (f)–(h) with a division box.

f. $63 \div 7$ **g.** $\frac{42}{6}$

h. 30 divided by 6

Find the answer to the following division problems.

i. $\frac{16}{2} =$ **j.** $\frac{42}{7} =$ **k.** $28 \div 4 =$ **l.** $36 \div 6 =$

Problem set 20

1. Draw a horizontal number line with even numbers marked and numbered from 0 to 12.
2. Debbie is the tenth person in line. How many people are in front of her?
3. Use tally marks to show the number 16.
4. Jim reads 40 pages per day. How many pages does Jim read in 6 days?
5. There are 806 students at Gidley School. If there are 397 girls, then how many boys are there?
6. What is the sum of five hundred twenty-six and six hundred eighty-four?
7. Use words to show how this problem is read: $6\overline{)24}$
8. Use words to show how this problem is read: $15 \div 3$
9. Divide: $\frac{15}{5} =$

10. $24 \div 8 =$

11. $4\overline{)36}$

12. $\frac{27}{3} =$

13. $\begin{array}{r} 2318 \\ \times \quad 6 \\ \hline \end{array}$

14. $\begin{array}{r} 4726 \\ \times \quad 8 \\ \hline \end{array}$

15. $\begin{array}{r} 3409 \\ \times \quad 7 \\ \hline \end{array}$

16. Compare: $5 \times 6 \times 7 \bigcirc 7 \times 6 \times 5$

17. $352 + 352 + 352 + 352 + 352 =$

18. $\begin{array}{r} 4000 \\ -\ 2468 \\ \hline \end{array}$

19. $\begin{array}{r} 1207 \\ -\quad 943 \\ \hline \end{array}$

20. $\begin{array}{r} 3185 \\ -\ 1358 \\ \hline \end{array}$

21. $\begin{array}{r} 3426 \\ 1547 \\ +\ 2684 \\ \hline \end{array}$

22. $\begin{array}{r} 4318 \\ 297 \\ +\quad 43 \\ \hline \end{array}$

23. $\begin{array}{r} 1306 \\ 490 \\ +\ 6075 \\ \hline \end{array}$

24. Write the following sentence using digits and symbols.

"Ten times two is greater than ten plus two."

25. What is the next number in this sequence?

. . . , 24, 18, 12, 6, _

LESSON 21

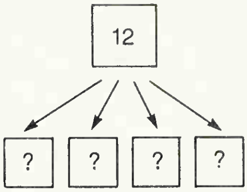
Solving Division Word Problems

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

When we divide a number, we separate the number into equal parts. The following problem requires us to separate 12 cookies into equal piles.

Problem: One dozen cookies are shared equally by 4 children. How many cookies does each child receive?

In this problem 12 cookies are divided into 4 groups. We are to find the number of cookies in each group.



We can solve problems like this by dividing. Here we show the division. The answer to the division is 3. We are careful to say 3 of what. Each child receives **3 cookies**.

$$\begin{array}{r} 3 \\ 4\overline{)12} \end{array}$$

Example 1 The coach separated the physical education class into 6 teams with the same number of players on each team. If there are 48 students in the class, how many are on each team?

Solution To separate a number into equal parts, we divide. In this problem we divide 48 by 6. So on each team there are **8 students**.

$$\begin{array}{r} 8 \\ 6\overline{)48} \end{array}$$

Example 2 Stan raked up 28 bags of leaves. If he can carry away 4 bags of leaves at a time, how many trips will he take to carry away all the bags?

Solution We saw that multiplication can be used to solve repeated addition problems. Here we will use **division** to solve a **repeated subtraction** problem. The beginning number is 28 bags. Four bags are subtracted each trip. After the first trip, 24 bags remain. After the second trip, 20 bags remain. After the third trip, 16 bags remain. We could continue to subtract until no bags remain. Another way to find the number of subtractions is to divide. We divide the beginning number by the amount subtracted each time. This way we find that the number of subtractions is 7. Stan will take **7 trips**.

$$\begin{array}{rl} 28 & \\ -\ 4 & \text{(first trip)} \\ \hline 24 & \\ -\ 4 & \text{(second trip)} \\ \hline 20 & \\ -\ 4 & \text{(third trip)} \\ \hline 16 & \end{array}$$

$$\begin{array}{r} 7 \text{ trips} \\ 4\overline{)28} \end{array}$$

Practice

a. Thirty desks are arranged in 6 equal rows. How many desks are in each row?

b. Twenty-one books are stacked in 3 equal piles. How many books are in each pile?

c. If 56 zebus were separated into 7 equal herds, then how many zebus would be in each herd?

d. Alex used a pay phone to call his friend. Every minute he must put 3 nickels into the phone. If he began with 18 nickels, how many minutes can he talk on the phone?

Problem set 21

1. The coach separated the PE class into 8 teams with the same number of players on each team. If there are 56 students in the class, how many are on each team?

2. Draw a vertical line and an oblique line that cross.

3. What is the sum of seven hundred sixty and ninety-seven?

4. Use words to show how this problem is read: $\frac{10}{2}$

5. Eight hundred dollars is how much more than four hundred eighty-seven dollars?

6. $8\overline{)72}$

7. $6\overline{)42}$

8. $9\overline{)36}$

9. $6\overline{)48}$

10. $56 \div 7 =$

11. $\frac{40}{5} =$

12. Compare: $24 \div 4 \bigcirc 30 \div 6$

13. $\begin{array}{r} 367 \\ \times \quad 8 \\ \hline \end{array}$

14. $\begin{array}{r} 504 \\ \times \quad 7 \\ \hline \end{array}$

15. $\begin{array}{r} 837 \\ \times \quad 9 \\ \hline \end{array}$

16. $6 \times 8 \times 10 =$

17. $7 \times 20 \times 4 =$

18. $\begin{array}{r} 3705 \\ -\ 2934 \\ \hline \end{array}$ **19.** $\begin{array}{r} 6318 \\ -\ 4568 \\ \hline \end{array}$ **20.** $\begin{array}{r} 5003 \\ -\ \ 876 \\ \hline \end{array}$

21. $\begin{array}{r} 4268 \\ 357 \\ +\ \ 842 \\ \hline \end{array}$ **22.** $\begin{array}{r} 965 \\ 243 \\ +\ 145 \\ \hline \end{array}$ **23.** $\begin{array}{r} 382 \\ 96 \\ +\ 182 \\ \hline \end{array}$

24. If a dozen items are divided into two equal groups, how many will be in each group?

25. What are the next three numbers in this sequence?

. . . , 50, 60, 70, 80, 90, ____, ____, ____, . . .

LESSON 22

Dividing Numbers by One Digit and Writing a Remainder

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Division and multiplication are closely related. We can use division to find missing factors. Then we can use multiplication to check our division.

Here we use multiplication to check a division answer. Instead of showing a separate multiplication, we can show the multiplication as part of the division problem. After dividing to get 7, we can multiply by 5 and write the product under the 35. This shows that there are exactly 7 fives in 35.

$$\begin{array}{r} 7 \\ 5\overline{)35} \end{array} \quad \text{since} \quad \begin{array}{r} 7 \\ \times\ 5 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 7 \\ 5\overline{)35} \\ 35 \\ \hline \end{array}$$

Not all division problems have an exact whole number answer. Look at this question:

If 5 children share 16 pennies, how many pennies will each child receive?

If we try to divide 16 into 5 equal groups, we find there is no whole number which is an exact answer.

$$\begin{array}{r} ? \\ 5\overline{)16} \end{array}$$

To answer this question we think, "How many fives are closest to but are not more than 16?" We answer that question with the number 3 and multiply to show that 3 fives is 15. Each child will get 3 pennies.

$$\begin{array}{r} 3 \\ 5\overline{)16} \\ 15 \end{array}$$

Now we subtract 15 from 16 to show how many pennies are left over. The amount left over after an uneven division is called the **remainder**. Here the remainder is 1.

$$\begin{array}{rl} 3 & \\ 5\overline{)16} & \\ -\ 15 & \\ \hline 1 & \text{(remainder)} \end{array}$$

How we deal with a remainder after uneven division depends upon the question we are asked to answer. For now, when we answer problems written with digits and division symbols, we will write the remainder at the end of our answer with a small r in front, as we show here.

$$\begin{array}{rl} 3 & \text{r } 1 \\ 5\overline{)16} & \\ -\ 15 & \\ \hline 1 & \end{array}$$

Example $50 \div 8 =$

Solution We rewrite the problem with a division box. How many eights are closest to but are not more than 50? We answer 6 and multiply 6 × 8 to get 48. We subtract to show the amount left over and write this remainder at the end of the answer.

$$\begin{array}{rl} 6 & \text{r } 2 \\ 8\overline{)50} & \\ -\ 48 & \\ \hline 2 & \end{array}$$

Practice* Divide and write the answer with a remainder.

a. $5\overline{)23}$ **b.** $6\overline{)50}$ **c.** $37 \div 8 =$

d. $4\overline{)23}$ **e.** $7\overline{)50}$ **f.** $40 \div 6 =$

g. $3\overline{)23}$ **h.** $9\overline{)50}$ **i.** $34 \div 9 =$

Problem set 22

1. Draw two horizontal lines. Be sure the lines stay the same distance apart.

2. Huck collected 32 night crawlers for fishing. If he put an equal number in each of his 4 pockets, how many did he put in each pocket?

3. Grandpa has 10 quarters. If he gives each of his 3 grandchildren 3 quarters, how many quarters will he have left?

4. What is the sum of eight hundred forty and four hundred eighteen?

5. $50 \div 8 =$ **6.** $20 \div 3 =$ **7.** $7\overline{)30}$

8. $\frac{63}{7} =$ **9.** $\frac{56}{8} =$ **10.** $\frac{42}{6} =$

11. $3 \times 7 \times 10 =$ **12.** $2 \times 3 \times 4 \times 5 =$

13. $\begin{array}{r} 394 \\ \times \quad 8 \\ \hline \end{array}$ **14.** $\begin{array}{r} 678 \\ \times \quad 4 \\ \hline \end{array}$ **15.** $\begin{array}{r} 649 \\ \times \quad 9 \\ \hline \end{array}$

16. $\begin{array}{r} 408 \\ \times \quad 7 \\ \hline \end{array}$ **17.** $\begin{array}{r} 3645 \\ \times \quad 6 \\ \hline \end{array}$ **18.** $\begin{array}{r} 3904 \\ \times \quad 4 \\ \hline \end{array}$

19. $387 + 426 + 95 =$ **20.** $462 + 5985 =$

21. $3615 - 2981 =$ **22.** $963 + a = 6000 \quad a =$

23. Use words to show how this problem is read: $4\overline{)12}$

24. Think of an odd number. Multiply it by 2. Is the product odd or even?

25. What is the next number in this sequence?

. . . , 50, 40, 30, 20, 10, _

LESSON 23

Adding and Subtracting Money

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

When we use numbers to talk about money, we use a dot to separate the dollars and cents. The dot is called a **decimal point**. We read the decimal point by saying "**and**." We use the symbol $ to tell us that the number means an amount of dollars.

$25.23 $10.00 $0.06

We read the number on the left as "twenty-five dollars and twenty-three cents." The middle number means ten dollars and zero cents. The number on the right means zero dollars and six cents. We do not read zero cents or zero dollars. So we read the middle number as "ten dollars" and read the right number as "six cents."

When we add or subtract money, we write the numbers with one decimal point exactly above the other decimal point and say we have **aligned** the decimal points. We put the decimal point in the answer exactly below the other decimal points. Then we add or subtract just as we would if the decimal points were not there.

Example 1 It cost Leo $2.13 to rent the movie. He gave the clerk $5.00. How much money should Leo get back?

Solution The clerk will take $2.13 from the $5.00 and will give back the rest. We align the decimal points and subtract. Leo will get back **$2.87**.

$$\begin{array}{r}
\$\,\overset{4}{\cancel{5}}\,.\,\overset{9}{{}^{1}\cancel{0}}\,0\\
-\ \$\,2\,.\,1\,3\\
\hline
\$\,2\,.\,8\,7
\end{array}$$

Five dollars means five dollars and no cents. So both of these numbers mean five dollars:

$5 $5.00

When we add or subtract dollars and cents, it is a good idea to use a decimal point and two zeros to write whole dollar amounts.

Example 2 Add: $5 + $8.75 + $10 + $.35

Solution We will rewrite the problem so that whole dollars are written with a decimal point and two zeros.

$5.00 + $8.75 + $10.00 + $.35

Next we set up the problem so that the decimal points line up vertically. Then we add and place the decimal point in the answer in line with the decimal points in the problem.

$$\begin{array}{r}
\$\ \ 5.00\\
8.75\\
10.00\\
+\qquad .35\\
\hline
\mathbf{\$24.10}
\end{array}$$

Practice*

a. $3.45 + $5 =

b. $5 − $1.73 =

c. $10 + $2 + $6.25 =

d. $10 − $6.87 =

e. $1.75 + $1.75 =

f. $5.25 − $3.17 =

g. $.50 + $.50 =

h. $20 − $8.98 =

Problem set 23

1. It cost $3.48 to rent the movie. Leo gave the clerk $5. How much money should Leo get back?

2. The burger cost $1.45, and the fries cost $.95. What was the cost of the burger and fries together?

3. A week is 7 days. How many days is 52 weeks?

4. Jim, Hector, and Julie divided the money equally. If there was $24 to start with, how much money did each receive?

5. When two hundred ninety-six is subtracted from four hundred, what is the difference?

6. Compare: $36 \div 4 \bigcirc 45 \div 5$

7. $40 \div 6 =$

8. $3\overline{)20}$

9. $60 = \square \times 10$

10. $\begin{array}{r} 308 \\ \times \quad 7 \\ \hline \end{array}$

11. $\begin{array}{r} 2514 \\ \times \quad 3 \\ \hline \end{array}$

12. $\begin{array}{r} 697 \\ \times \quad 8 \\ \hline \end{array}$

13. Use words to show how this problem is read: $7\overline{)35}$

14. $4 \times 3 \times 10 =$

15. $12 \times 2 \times 10 =$

16. $\begin{array}{r} 4035 \\ -\ 3587 \\ \hline \end{array}$

17. $\begin{array}{r} 5694 \\ -\ 1056 \\ \hline \end{array}$

18. $\begin{array}{r} 7000 \\ -\quad 753 \\ \hline \end{array}$

19. Add: $5 + $8.75 + $10.00 + $.35 =

20. $6.25 + $.85 + $4 + $12.30 =

21. Think of an even number. Multiply it by 2. Is the answer odd or even?

22. How many hours is it from 1 p.m. to 6 p.m.?

23. Draw two vertical lines. Be sure the lines stay the same distance apart.

24. Use words to name the number 212,500.

25. What are the next three numbers in this sequence?

. . . , 70, 80, 90, ____, ____, ____, . . .

LESSON
24
Solving Problems with Parentheses

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

The **operations** of arithmetic are addition, subtraction, multiplication, and division. When there is more than one operation in a problem, **parentheses** can show us the order for doing the operations. Parentheses separate a problem into parts. We do the part in the parentheses first. In the problem below, the parentheses tell us to add 5 + 4 before we multiply by 6.

First we do the work inside the parentheses.

$$6 \times \underbrace{(5 + 4)} =$$

Then we multiply.

$$6 \times \quad 9 \quad = 54$$

Example 1 $8 - (4 + 2) =$

Solution It takes two steps to find the answer to this problem. The parentheses show us which step to take first. We add 4 and 2 to get 6. Then we subtract 6 from 8 and get **2**.

$$8 - \underbrace{(4 + 2)} =$$

$$8 - \quad 6 \quad = 2$$

Example 2 Compare: $2 \times (3 + 4) \bigcirc (2 \times 3) + 4$

Solution The numbers and operations on both sides are the same, but the order for doing the operations is different. We do the operations on both sides in the proper order and find that the left-hand side is greater than the right-hand side. The correct comparison symbol is **>**.

$$2 \times \underbrace{(3 + 4)} \bigcirc \underbrace{(2 \times 3)} + 4$$

$$2 \times \quad 7 \quad \bigcirc \quad 6 \quad + 4$$

$$14 \quad > \quad 10$$

Practice* Solve these problems by doing the operations in the proper order.

a. $6 - (4 - 2) =$

b. $(8 \div 4) \div 2 =$

c. $(6 - 4) - 2 =$

d. $12 \div (4 - 1) =$

e. $8 \div (4 \div 2) =$

f. $(12 \div 4) - 1 =$

g. Name the four operations of arithmetic.

Problem set 24

1. How much money is 3 quarters plus 3 dimes?

2. When James was 5 years old, his dad was 39 years old. How old was his dad when James was born?

3. How many horseshoes are needed to shoe 25 horses?

4. Draw two vertical lines.

5. What is the sum of nine hundred fifty-six and ninety-eight?

6. Compare: $3 \times (4 + 5)$ ○ $(3 \times 4) + 5$

7. $30 - (20 + 10) =$

8. $(30 - 20) + 10 =$

9. $4 \times (6 \times 5) =$

10. $(4 \times 6) \times 5 =$

11. $60 \div 7 =$

12. $50 \div 6 =$

13. $5\overline{)44}$

14. $\begin{array}{r} 5036 \\ \times \quad 4 \\ \hline \end{array}$

15. $\begin{array}{r} 7408 \\ \times \quad 6 \\ \hline \end{array}$

16. $\begin{array}{r} 4637 \\ \times \quad 9 \\ \hline \end{array}$

17. $\begin{array}{r} 1408 \\ - \ 962 \\ \hline \end{array}$

18. $\begin{array}{r} 4730 \\ -\ 2712 \\ \hline \end{array}$

19. $\begin{array}{r} 3000 \\ - \quad 56 \\ \hline \end{array}$

20. $\$3.54 + \$12 + \$1.66 + \$.54 =$

21. $\$25.36 + \$16.45 + \$1.47 =$

22. Which digit shows the number of hundreds in 256?

23. How many hours is it from 2 p.m. to 6 p.m.?

24. What is the tenth number of this sequence?

3, 6, 9, 12, 15, . . .

25. The first three odd whole numbers are 1, 3, and 5. What is the eighth odd whole number?

LESSON
25

Listing the Factors of Whole Numbers

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

The factors of a number are all the whole numbers which can divide it evenly. The factors of 6 are 1, 2, 3, and 6 because any of these can divide 6 without leaving a remainder. The ability to find the factors of a number quickly is very useful when doing arithmetic with fractions.

Example 1 List the factors of 20.

Solution We are looking for all the numbers which divide 20 evenly. What numbers can be put in this box which will give an answer without a remainder?

$$\square\,\overline{)\,20}$$

One way to find out is to start with 1 and to try every number up to 20. If we do this, we find that the numbers which divide 20 evenly are **1**, **2**, **4**, **5**, **10**, **20**. These numbers are the factors of 20. These are the only numbers which divide 20 evenly. All other numbers leave a remainder.

Example 2 List the factors of 23.

Solution The only numbers which divide 23 evenly are **1** and **23**. Every number greater than 1 has at least two factors: the number 1 and the number itself.

Practice List the factors of each of these numbers.

a. 4
b. 3
c. 6
d. 5
e. 8
f. 11
g. 9
h. 12
i. 1
j. 14
k. 2
l. 15

Problem set 25

1. The Christmas tree farm planted 9 rows of trees with 24 trees in each row. How many trees were planted?

2. The haircut cost $6.75. Tony paid for it with a $10 bill. How much money should he get back?

3. Donna bought two cartons of milk for $1.12 each and a loaf of bread for $.89. How much did she spend?

4. List the factors of 20.

5. List the factors of 23.

6. Compare: $4 \times (6 \times 10)$ ○ $(4 \times 6) \times 10$

7. $6 \times (7 + 8) =$

8. $(6 \times 7) + 8 =$

9. List the factors of 18.

10. $55 \div 9 =$

11. $7\overline{)55}$

12. $55 \div 8 =$

13. $\begin{array}{r} 1234 \\ \times \quad 5 \\ \hline \end{array}$

14. $\begin{array}{r} 567 \\ \times \quad 8 \\ \hline \end{array}$

15. $\begin{array}{r} 987 \\ \times \quad 6 \\ \hline \end{array}$

16. $3126 - 1355 =$

17. $2001 - 1002 =$

18. $4387 + 124 + 96 =$

19. $3715 + 987 + 850 =$

20. \$6.75 + \$8 + \$1.36 + \$.48 =

21. What is the product of six hundred forty-seven and eight?

22. Use words to name the number 894,201.

23. 600 = 6 × ☐

24. What is the tenth number in this sequence?

5, 10, 15, 20, . . .

25. Think of a whole number. Multiply it by 2. Is the answer odd or even?

LESSON
26

Practicing the Division Algorithm

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

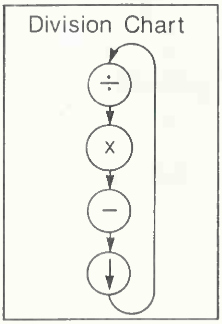
A **division algorithm** is a method for dividing large number combinations which have not been memorized. For example, we can easily memorize the answer to $5\overline{)35}$ but not the answer to $5\overline{)365}$. The division algorithm breaks down such large divisions into a series of smaller divisions that are easier to do. In each of the smaller problems we follow four steps. The four steps are **divide**, **multiply**, **subtract**, and **bring down**. As we do each step we write a number. Drawing this division chart a few times will help us remember the steps.

Step 1. Divide and write a number.

Step 2. Multiply and write a number.

Step 3. Subtract and write a number.

Step 4. Bring down the next digit.



Every time we bring down a digit we must divide again even if the answer when we divide is zero. We continue to divide, multiply, subtract, and bring down until there are no digits left to bring down. We will divide 365 by 5 to show the algorithm.

Example 1 Divide: $5\overline{)365}$

Solution We begin by breaking the division problem into a smaller problem. Starting from the first digit in 365, we try to find a number 5 will divide into at least once. Five will not divide into 3, but it will divide into 36. So our first smaller division in this example is $5\overline{)36}$.

$$5\overline{)36|5}$$

We divide and write 7 above the 6. Then we multiply and write 35 under the 36. Then we subtract and write 1 and bring down the 5 next to the 1.

$$\begin{array}{r} 7 \\ 5\overline{)365} \\ -35\downarrow \\ \hline 15 \end{array}$$

Now we begin a new division. This time we divide $5\overline{)15}$. We divide and write 3 on top. Then we multiply and write 15 below the 15. Then we subtract and write zero. Since there is no number to bring down, we are finished. There is no remainder. The number of fives in 365 is **73**. In other words, 5 × 73 equals 365. By multiplying, we can check to see that we divided correctly.

$$\begin{array}{r} 73 \\ 5\overline{)365} \\ -35\downarrow \\ \rightarrow\overline{)15} \\ -15 \\ \hline 0 \end{array} \qquad \begin{array}{r} \overset{1}{7}3 \\ \times\ \ 5 \\ \hline 365 \end{array}$$

Check

Example 2 Divide: $5\overline{)234}$

Solution We begin with the smaller division $5\overline{)23}$. We divide and write 4 above the 3 of 23. Then we multiply, subtract, and bring down.

$$\begin{array}{r} 4| \\ 5\overline{)23|4} \\ -20\downarrow \\ \hline 34 \end{array}$$

Now we begin the new division $5\overline{)34}$. We divide and write 6 on top. Then we multiply and subtract. Since there is no number to bring down, we are finished. The remainder is 4. The answer means that 234 is 46 fives plus 4.

$$\begin{array}{r} 46 \text{ r } 4 \\ 5\overline{)234} \\ -\ 20\downarrow \\ \hookrightarrow\overline{)34} \\ 30 \\ \hline 4 \end{array}$$

To check a division answer with a remainder takes two steps. First we multiply. Then we add the remainder to that answer. To check this problem, we multiply 46 and 5. Then we add 4 to the answer.

$$\begin{array}{rl} 46 & \\ \times \quad 5 & \\ \hline 230 & \\ +\quad 4 & \text{remainder} \\ \hline 234 & \text{check} \end{array}$$

Practice*

a. $4\overline{)365}$ **b.** $9\overline{)375}$ **c.** $3\overline{)465}$ **d.** $5\overline{)645}$

e. $7\overline{)365}$ **f.** $3\overline{)365}$ **g.** $2\overline{)546}$ **h.** $4\overline{)456}$

i. $8\overline{)365}$ **j.** $2\overline{)365}$ **k.** $4\overline{)564}$ **l.** $3\overline{)564}$

Problem set 26

1. The bike tire cost $2.98. Jena paid for the tire with a $5 bill. How much should she get back in change?

2. Sheila sent 3 dozen cupcakes to school for a party. How many cupcakes did she send?

3. What is the sum of three hundred forty-seven and eight hundred nine?

4. Draw two oblique line segments which cross.

5. List the factors of 16.

Divide.

6. $5\overline{)375}$ **7.** $4\overline{)365}$

8. $234 \div 6 =$ **9.** $432 \div 6 =$

10. $\frac{123}{3} =$

11. $\frac{576}{6} =$

12. $748 \times 4 =$

13. $609 \times 8 =$

14. $3480 \times 7 =$

15. $7 \times 8 \times 11 =$

16. $9374 - 4938 =$

17. $5010 - 624 =$

18. $3678 + 427 + 85 =$

19. $12.43 + $.68 + $10 =

20. $365 + 365 + 365 + 365 + 365 + 365 =$

21. $8 \times 90 = 8 \times (9 \times \boxed{})$

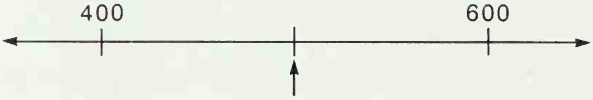
22. What are the next three numbers in this sequence?

. . . , 80, 90, 100, 110, ____, ____, ____, . . .

23. A checkerboard has 64 squares. The squares are in 8 rows. How many squares are in each row?

24. How much is 72 tens?

25. What number is halfway between 400 and 600?



LESSON
27

Solving Problems about Divisions of Time

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

We measure time by the movement of the earth. A **day** is the length of time it takes the earth to spin around on its axis once. We divide a day into 24 equal parts called **hours**. Each hour is divided into 60 equal lengths of time called **minutes**, and each minute is divided into 60 **seconds**.

Besides spinning on its axis, the earth also moves on a long journey around the sun. The time it takes to travel around the sun is a **year**. It takes the earth a little more than 365 days to travel around the sun, so every 4 years we add an extra day to our calendar and call that year a 366 "leap year." Ten years in a row is called a **decade**, and 100 years is called a **century**. The days of the year have been divided into 12 groups called **months**. Seven days in a row we call a **week**. A calendar lists the days of a month with the days of the week.

We will solve problems about these divisions of time in the problem sets which follow this lesson.

Example 1 A century is how many decades?

Solution A century is 100 years. A decade is 10 years. Since 10 tens equals 100, a century is **10 decades**.

Example 2 According to this calendar, June 8, 2014, is what day of the week?

JUNE 2014

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Solution Many calendars are designed so that the first day of the week is Sunday. On this calendar, June 8, 2014, is a **Sunday**, the second Sunday of the month of June.

Example 3 How many years were there from 1492 to 1620?

Solution To find the number of years from one date to another, we may subtract.* We subtract the earlier date from the later date. In this problem we subtract 1492 from 1620 and find that there were **128 years** from 1492 to 1620.

---

* Years have been numbered forward (A.D.) and backward (B.C.) from the birth of Jesus of Nazareth. In this book, all year dates should be considered years A.D.

Practice

a. Four centuries is how many years?

b. According to the calendar in Example 2, what is the date of the third Thursday in June?

c. How many years were there from 1066 to 1776?

d. A leap year lasts how many days?

Problem set 27

1. When \$.60 is subtracted from \$6, what is the difference?

2. There are 12 inches in a foot. How many inches are in 3 feet?

3. A century is how many decades?

4. In John's class there are 3 more girls than boys. There are 14 boys. How many girls are there?

5. List the factors of 21.

6. $9\overline{)234}$

7. $432 \div 9 =$

8. $8\overline{)304}$

9. $500 \div 7 =$

10. According to this calendar, June 26, 2014, is what day of the week?

JUNE 2014

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

11. $8 \times 7 \times 6 =$

12. $397 \times 4 =$

13. $879 \times 6 =$

14. $8 \times 1437 =$

15. $6175 - 5817 =$

16. $2000 - 684 =$

17. $456 \div (54 \div 9) =$

18. \$3.48 + \$24.95 + \$8 =

19. 3746 + 3625 + 529 + 78 =

20. Use words to name 68,200.

21. The number 387 is between which of these pairs of numbers?

a. 200 and 300 **b.** 300 and 400 **c.** 400 and 500

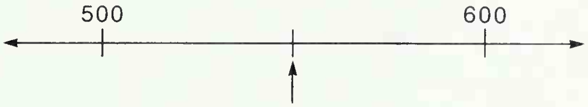
22. $6 \times 70 = 6 \times 7 \times \square$

23. What are the next three numbers in this sequence?

. . . , 200, 250, 300, 350, ___, ___, ___, . . .

24. How many years were there from 1517 to 1620?

25. What number is halfway between 500 and 600?



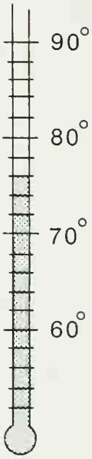
LESSON 28

Reading and Drawing Number Lines, Part 2

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

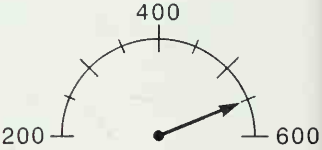
We have drawn horizontal number lines, but number lines may also be vertical or even curved. We have marked and labeled whole numbers on number lines, but it is not necessary to mark every whole number. Number lines may mark only some of the whole numbers. The location of the rest of the numbers must be figured out. In this lesson we will practice reading different kinds of number lines.

Example 1 What temperature is shown by this thermometer?



Solution Temperature is measured by a thermometer which may be marked as a vertical number line. On this number line, only every 10° is labeled, and there are five spaces between every 10°. That means every space equals 2°. We may mentally label the marks between by counting by twos. Counting up from 70°, we count 72, 74, 76. The thermometer shows a temperature of **76°**.

Example 2 To what mark on this scale is the arrow pointing?



Solution As we move toward the right around the curve, we see that the numbers grow larger. The arrow is past 400 and near 600. Halfway between 400 and 600 is a long mark which must mark 500. The arrow points halfway between 500 and 600, so it points to **550**.

Example 3 Draw a horizontal number line from zero to 500 with only zero and hundreds marked and labeled.

Solution A horizontal number line is drawn. Only the hundreds will be marked, so we will mark zero and 100, 200, 300, 400, and 500. These marks should be evenly spaced. The number line should look like this.

Practice Draw a number line from 0 to 100 with only zero and tens marked and labeled.

Problem set 28

1. On the first 3 days of their trip, the Smiths drove 408 miles, 347 miles, and 419 miles. Altogether how far did they drive in 3 days?

2. Tom is 5 feet tall. There are 12 inches in 1 foot. How many inches tall is Tom?

3. Five decades is how many years?

4. David is 3 years older than Andrew. If David is 12 years old, then how old is Andrew?

5. List the factors of 30.

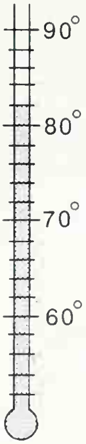
6. $864 \div 5 =$

7. $274 \div 4 =$

8. $608 \div 9 =$

9. $387 \div (18 \div 3) =$

10. What temperature is shown by this thermometer?

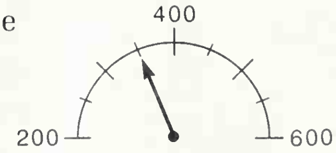


11. $$\begin{array}{r} 5260 \\ \times \quad 7 \\ \hline \end{array}$$

12. $$\begin{array}{r} 3874 \\ \times \quad 6 \\ \hline \end{array}$$

13. $$\begin{array}{r} 9063 \\ \times \quad 8 \\ \hline \end{array}$$

14. To what mark on this scale is the arrow pointing?



15. $386 + 4287 + 672 + 53 =$

16. Draw a horizontal number line from zero to 500 with only zero and hundreds marked and labeled.

17. The number 78 is between which of these pairs of numbers?

a. 60 and 70 **b.** 70 and 80 **c.** 80 and 90

18. Compare: 2319 ○ 2321

19. When three hundred ninety-seven is subtracted from four hundred five, what is the difference?

20. In Joshua's class there is one more boy than there are girls. Which could not be the number of students in Joshua's class?

a. 25 **b.** 27 **c.** 28 **d.** 29

21. How many years were there from 1776 to 1789?

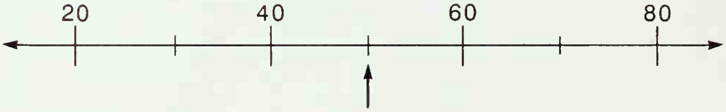
22. What are the next three numbers in this sequence?

. . . , 160, 170, 180, ____, ____, ____, . . .

23. Which digit shows the number of hundreds in 537?

24. Use words to name the number 327,040.

25. The arrow is pointing to what number on this number line?



LESSON 29

Reading and Writing Time from a Clock

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

The time of day can be shown by a clock with the hands pointing to places on a circular number line. The number line of a clock is actually two number lines in one. One number line is the hour scale. It has 12 marks, usually numbered, to show the hour of the day. The other number line is the minute scale. It has 60 smaller marks. These marks are not numbered. These marks show the minutes of the hour. These two scales are formed into one line and wrapped into a circle so that the ends are joined.

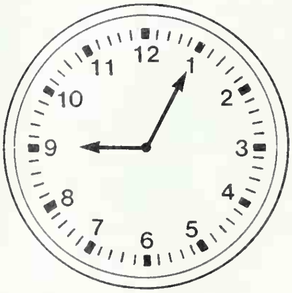
The two hands of the clock point to places on the number line to indicate the time of day. We "tell time" by reading the location on the number line to which the hands are pointing. With the shorter hand, we read from the hour scale, and with the longer hand we read from the minute scale.

When writing the time of day, we write the hour, a colon, and two digits to show the number of minutes after the hour. We write the time shown by the clock above as 1:45.

A full day is 24 hours long, but most clocks show only 12 hours. Noon is the midpoint of the day. The 12 hours before noon are known as **a.m.** The 12 hours after noon are known as **p.m.** When stating the time of day, the labels "a.m." and "p.m." should be used.

Example If it is morning, what time is shown by this clock?

Solution The clock shows 5 minutes after the ninth hour. The proper form is hour, colon, two digits for the minutes, and then a.m. or p.m. The time indicated is **9:05 a.m.**



Practice* **a.** Write the time which is 2 minutes after eight in the evening.

b. Write the time that is 15 minutes before nine in the morning.

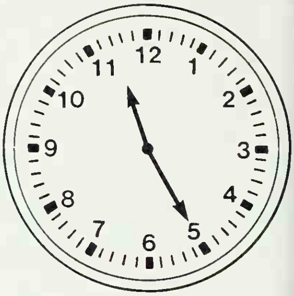
c. Write the time that is 20 minutes after noon.

d. Write the time that is 30 minutes after midnight.

e. Write the time that is a quarter after nine in the morning.

f. If it is morning, what time is shown by the clock?

g. What time would be shown by the clock 2 hours later?



Problem set 29

1. How many years were there from 1620 to 1776?

2. Jenny had $1873. She earned $200 more for passing GO. Then how much money did she have?

3. Two centuries is how many years?

4. Dan separated the 52 cards into 4 equal piles. How many cards were in each pile?

5. List the factors of 24.

6. $\frac{543}{3} =$

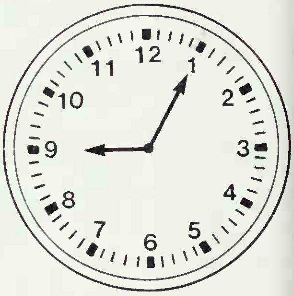
7. $\frac{600}{8} =$

8. $528 \div (28 \div 7) =$

9. $700 \div 6 =$

10. If it is evening, what time is shown by this clock?

11. Write the time that is 30 minutes after noon.



12. $48 + 48 + 48 + 48 + 48 + 48 =$

13. According to this calendar, May 10, 2042, is what day of the week?

MAY 2042

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

14. What is the largest three-digit even number that has the digits 5, 6, and 7?

15. $\begin{array}{r} 4387 \\ 2965 \\ +\ 4943 \\ \hline \end{array}$ **16.** $\begin{array}{r} 6375 \\ -\ 4688 \\ \hline \end{array}$ **17.** $\begin{array}{r} 4010 \\ -\ \ 563 \\ \hline \end{array}$

18. $\begin{array}{r} 3408 \\ \times\ \ \ \ 7 \\ \hline \end{array}$ **19.** $\begin{array}{r} 356 \\ \times\ \ \ 8 \\ \hline \end{array}$ **20.** $\begin{array}{r} 487 \\ \times\ \ \ 9 \\ \hline \end{array}$

21. What time is 5 minutes before nine in the morning?

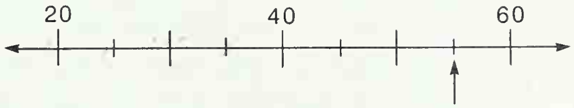
22. Which digit shows the number of tens in 714?

23. How many years were there from 1776 to 1787?

24. What are the next three numbers in this sequence?

. . . , 400, 500, 600, 700, ____, ____, _____, . . .

25. The arrow is pointing to what number on this number line?



LESSON 30

Multiplying by Multiples of 10 and 100

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Whole numbers that end with zero are **multiples of 10**. These numbers are multiples of 10:

10, 20, 30, 40, 50, 60, . . .

Any multiple of 10 can be written as a number times 10, as we show here:

$20 = 2 \times 10$
$30 = 3 \times 10$
$40 = 4 \times 10$
and so on

When we multiply another number by a multiple of 10, we may multiply by the digit(s) in front of the zero and then multiply by 10. We will show this by multiplying 25 × 30.

$$\begin{tikzcd}[column sep=tiny]
\text{The problem:} & 25 & \times & & 30 \arrow[dl] \arrow[dr] & & = \\
\text{We think:} & 25 \arrow[dr] & \times & 3 \arrow[dl] & \times & 10 & = \\
\text{We multiply } 25 \times 3\text{:} & & 75 & & \times & 10 & = \\
\text{Then we multiply } 75 \times 10\text{:} & & 75 & & \times & 10 & = 750
\end{tikzcd}$$

The last multiplication placed a zero after the 75. So when we multiply by a multiple of 10, we may multiply by the digit(s) in front of the zero and then place a zero on the end of that answer.

When we write a problem vertically, we may show this by writing the numbers so that the multiple of 10 is on the bottom and the zero "hangs out" to the right. Here we write 25 times 30 vertically. We multiply 25 times 3. Then we bring down the zero (multiply by 10) and find that 25 × 30 is 750.

$$\begin{array}{r} \overset{1}{2}5 \\ \times\ 3\underset{\downarrow}{0} \\ \hline 750 \end{array}$$

We may use a similar method to multiply by **multiples of 100**. Multiples of 100 end with two zeros. When we multiply by multiples of 100, we write the problems so that two zeros "hang out" to the right. We show this by multiplying 25 × 300.

We write the problem with 300 on the bottom with zeros out to the right. We multiply 25 times 3 hundreds and get 75 hundreds. We write 7500.

$$\begin{array}{r} \overset{1}{2}5 \\ \times\ 3\underset{\downarrow}{0}\underset{\downarrow}{0} \\ \hline 7500 \end{array}$$

Example 37 × 40 =

Solution We write the problem so that the number ending with zero is on the bottom. We let the zero hang out to the right. Then we multiply 37 by 4 and find that 37 × 40 = **1480**.

$$\begin{array}{r} {}^{2} \\ 37 \\ \times\ 4\overset{}{0} \\ \hline 148\underset{}{\overset{\downarrow}{0}} \end{array}$$

Practice* **a.** 34 × 20 =

b. 50 × 48 =

c. 34 × 200 =

d. 500 × 36 =

e. 55 × 30 =

f. 125 × 30 =

g. 55 × 300 =

h. 125 × 300 =

i. 60 × 45 =

j. 235 × 40 =

k. 400 × 37 =

l. 143 × 200 =

Problem set 30

1. Ruben, Martin, and James equally shared 1 dozen cookies. Each of the boys had how many cookies?

2. Michael had $841 before he had to pay a $75 luxury tax. Then how much money did he have?

3. What year came one century after 1776?

4. The sheet of stamps had 10 rows of stamps with 10 stamps in each row. How many stamps were in the sheet?

5. List the factors of 10.

6. 37 × 60 =

7. 28 × 300 =

8. 50 × 46 =

9. 60 × 73 =

10. 26 × 3 × 40 =

11. 763 × (1000 − 200) =

12. What is the place value of the 5 in 356?

13. Write the time that is 30 minutes before noon.

14. What is the product of thirty-eight and forty?

15. Use words to name the number 944.

16. $$\begin{array}{r} 4637 \\ 2843 \\ +\ 6464 \\ \hline \end{array}$$

17. $$\begin{array}{r} 4618 \\ -\ 2728 \\ \hline \end{array}$$

18. $$\begin{array}{r} 6000 \\ -\ 763 \\ \hline \end{array}$$

19. $364 \div 8 =$

20. $5\overline{)364}$

21. $\dfrac{364}{7} =$

22. Think of an even number. Multiply it by 2. Now add 1. Is the final answer odd or even?

23. According to this calendar, what is the date of the third Sunday in May 1957?

MAY 1957

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

24. The number 356 is between which pair of numbers?
a. 340 and 350 **b.** 350 and 360 **c.** 360 and 370

25. What are the next three numbers in this sequence?

. . . , 800, 900, 1000, 1100, ____, ____, ____, . . .

LESSON
31

Naming a Fraction of a Whole Shape or Group

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

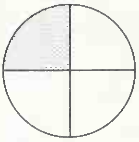
A fraction is a part of a whole. The "whole" may be a single thing such as a whole pie or a whole inch, or the "whole" may be a group such as a whole class or a whole bag of marbles.

It takes two numbers to write a fraction: a top number and a bottom number. The bottom number, called the **denominator**, tells the number of **equal** parts in the whole. The top number, called the **numerator**, tells how many of the parts are counted.

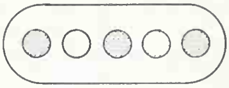
Sometimes fractions are written with a slanted line instead of with a horizontal line. Slanted-line fractions take up less space and are used in some books for this reason. In this book we will not use slanted-line fractions because they sometimes cause mistakes. We recommend that you not use slanted-line fractions. When a fraction is written with a slanted line, the first number is the numerator and the second number is the denominator. Both the following mean one fourth:

$$\frac{1}{4} \qquad 1/4$$

Only the first form will be used in this book.

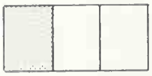


This whole "pie" has been cut into 4 equal parts. One of the parts is shaded. The fraction of the pie which is shaded is $\frac{1}{4}$. Three of the parts are not shaded. The fraction of the pie which is not shaded is $\frac{3}{4}$.



The whole group in the oval has 5 equal members. Three of the members are shaded. The fraction of the group which is shaded is $\frac{3}{5}$. Two of the members are not shaded. The fraction of the group which is not shaded is $\frac{2}{5}$.

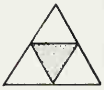
Example What fraction of this rectangle is **not** shaded?



Solution The rectangle has been divided into 3 equal parts, so 3 is the bottom of the fraction. The question asked us to count the parts which were not shaded, so 2 is the top of the fraction. The fraction of the rectangle which is **not** shaded is $\frac{2}{3}$.

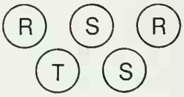
Practice **a.** What is the name for the top number of a fraction?

b. What is the name for the bottom number of a fraction?



c. What fraction of the triangle is shaded?

d. What fraction of the triangle is not shaded?



e. What fraction of the circles has an R inside?

f. What fraction of the circles has a T inside?

g. What fraction of the circles does not have an S inside?

h. Is $\frac{1}{2}$ of this rectangle shaded?

Problem set 31

1. Draw two oblique lines that stay the same distance apart.

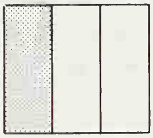
2. There were 100 stamps in the sheet. Thai has used 36 of them. How many stamps are left?

3. What year came one decade after 1802?

4. What is the product of four hundred seventeen and thirty?

5. List the factors of 25.

6. What fraction of this rectangle is not shaded?



7. What fraction of the triangle is shaded?

8. What number is the denominator in the fraction $\frac{2}{3}$?

9. Write the time that is fifteen minutes before eight in the morning.

10. $\begin{array}{r} 2893 \\ -\ 1946 \\ \hline \end{array}$

11. $\begin{array}{r} 3010 \\ -\ 1342 \\ \hline \end{array}$

12. $\begin{array}{r} 28 \\ 54 \\ 75 \\ 91 \\ +\ 26 \\ \hline \end{array}$

13. $\begin{array}{r} 764 \\ \times\ \ 30 \\ \hline \end{array}$

14. $\begin{array}{r} 908 \\ \times\ \ 60 \\ \hline \end{array}$

15. $6\overline{)744}$

16. 362 ÷ 5 =

17. $4\overline{)898}$

18. $42.37 + $7.58 + $.68 + $15 =

19. (48 × 6) − 9 =

20. 6 × 30 × 12 =

21. From February 1 to September 1 is how many months?

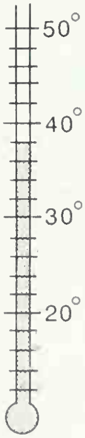
22. What is the sum of six hundred five and five hundred ninety-seven?

23. Which of these numbers is between 360 and 370?
a. 356 **b.** 367 **c.** 373

24. What are the next three numbers in this sequence?

. . . , 250, 260, 270, 280, ___, ___, ___, . . .

25. What temperature is shown by this thermometer?



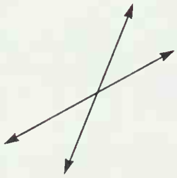
LESSON 32

Drawing Pairs of Lines: Parallel, Intersecting, Perpendicular

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

When we draw two straight lines on the same flat surface, then either those lines will cross or they will not cross. Lines which go in the same direction and stay the same distance apart are called **parallel lines**. Thinking of train tracks can give us the idea of parallel lines. Here are pairs of parallel lines and parallel line segments.

When lines cross, we say that they intersect. Lines that cross are called **intersecting lines**. Here are pairs of intersecting lines and intersecting line segments.

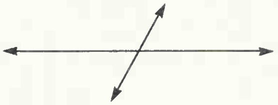


As we look at the third pair of lines, we see that they intersect in a special way. Where they intersect, "square corners" are formed. Intersecting lines which form square corners have a special name. These lines are called **perpendicular lines**.

Activity Pair off with a partner. Draw a line segment. Then have your partner draw one line segment parallel to your segment and another segment perpendicular to your segment. Repeat the activity with the roles reversed.

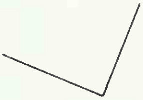
Example 1 Draw a pair of intersecting lines which are not perpendicular.

Solution We are to draw two lines which cross but do not form square corners. Many arrangements are possible.

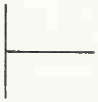


Example 2 Which of the following do *not* appear to be perpendicular segments?

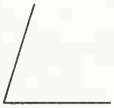
a.



b.



c.



Solution Segments that are perpendicular meet and form square corners. The segments in (a) appear to be perpendicular. (You may need to turn the page slightly to help you see that.) The segments in (b) also appear to be perpendicular. The segments that do not appear to be perpendicular are those in choice **(c)**.

Practice **a.** Draw a line.

b. Draw a segment.

c. Draw two parallel segments.

d. Draw two perpendicular lines.

e. Draw two segments that intersect but are not perpendicular.

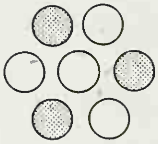
Problem set 32

1. Draw a pair of intersecting lines which are perpendicular.

2. Lani bought a kaleidoscope for $4.19. If she paid for it with a $10 bill, how much money should she get back?

3. How many hours are there in 7 days?

4. What fraction of the circles is shaded?



5. List the factors of 19.

6. $$\begin{array}{r} 1638 \\ -\ \ 947 \\ \hline \end{array}$$

7. $$\begin{array}{r} 1000 \\ -\ \ 576 \\ \hline \end{array}$$

8. $\frac{280}{5} =$

9. $$\begin{array}{r} 792 \\ 488 \\ 42 \\ 96 \\ 5 \\ 28 \\ +\ \ 49 \\ \hline \end{array}$$

10. $$\begin{array}{r} 476 \\ \times\ \ 80 \\ \hline \end{array}$$

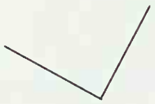
11. $$\begin{array}{r} 968 \\ \times\ \ 60 \\ \hline \end{array}$$

12. $8\overline{)1943}$

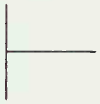
13. Write the time that is thirty minutes before midnight.

14. In which figure do the segments **not** appear to be perpendicular?

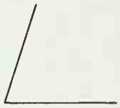
a.



b.



c.



15. $287 + 287 + 287 + 287 + 287 =$

16. \$96 + \$128.13 + \$27.49 + \$67.05 =

17. $328 \div (32 \div 8) =$

18. $648 - (600 + 48) =$

19. Think of an odd number. Multiply it by 2. Now add 1. Is the final answer odd or even?

20. What year came one century after 1789?

21. If it is afternoon, what time is shown by this clock?

22. What number is the denominator of the fraction $\frac{2}{3}$?

23. Use words to name the number 123,400.

24. What are the next three numbers in this sequence?

. . . , 1200, 1300, 1400, _____, _____, _____, . . .

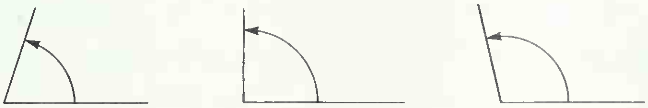
25. Copy this number line and draw an arrow to show where 75 would be.

LESSON 33

Drawing Angles

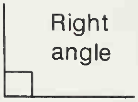
Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

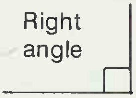
When lines or segments intersect, angles are formed. Here we show three angles.



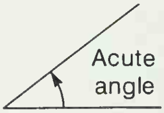
An **angle** is an "opening" between intersecting lines. We see by the drawings that the amount of the opening may be small or large. We have different names for angles depending upon how open they are.

An angle which is like the corner of a square is called a **right angle**. "Right angle" does not mean that the angle opens to the right. A right angle may open in any direction. "Right angle" simply means square corner. A little square drawn in the angle indicates that the angle is a right angle.

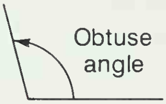




An angle which is open less than a right angle is called an **acute angle**. Some remember this as "a cute" little angle.

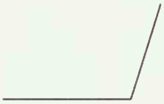


An angle which is open more than a right angle is called an **obtuse angle**.



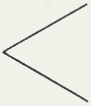
Example Which of these angles appears to be a right angle?

a.



b.

c.



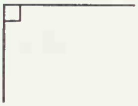
Solution A right angle matches the corner of a square. Angle *a* is open too wide, and angle *c* is not open wide enough. The only right angle is **angle b**.

Practice Draw an example of each angle named in problems (a)–(c).

a. acute angle **b.** obtuse angle **c.** right angle

Name each angle shown in problems (d)–(f).

d.



e.

f.

Problem set 33

1. Sal is 8 inches taller than Sammy. If Sal is 63 inches tall, how tall is Sammy?
2. Hank said that the horse trough holds 18 buckets of water. If a bucket holds 3 gallons, how many gallons does the trough hold?

3. Draw a horizontal line segment and a vertical line segment that intersect.

4. How many seconds are there in 1 hour?

5. Paul chopped a tree that was 52 feet tall into 4 logs of equal length. How many feet long was each log?

6. $$\begin{array}{r} 5637 \\ 3428 \\ +\ \ 975 \\ \hline \end{array}$$

7. $$\begin{array}{r} 5286 \\ -\ 4319 \\ \hline \end{array}$$

8. $$\begin{array}{r} 4000 \\ -\ 3956 \\ \hline \end{array}$$

9. $$\begin{array}{r} 67 \\ 72 \\ 43 \\ 91 \\ 48 \\ 19 \\ 648 \\ +\ 976 \\ \hline \end{array}$$

10. $1234 \div 5 =$

11. $$\begin{array}{r} 596 \\ \times\ \ 600 \\ \hline \end{array}$$

12. $\frac{4656}{8} =$

13. $407 \times 80 =$

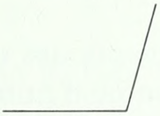
14. $9 \times 12 \times 20 =$

15. $936 \div 7 =$

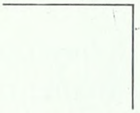
16. $936 \div (36 \div 9) =$

17. Which of these angles appears to be a right angle?

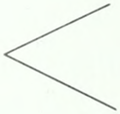
a.



b.

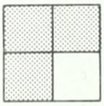


c.



18. List the factors of 18.

19. What fraction of the rectangle is shaded?



20. How many years were there from 1776 to 1976?

21. According to this calendar, July 17, 2025, is what day of the week?

JULY 2025

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

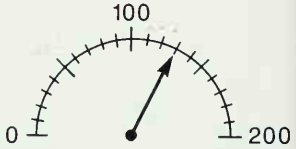
22. What is the name for the bottom number of a fraction?

23. What is the sum of seven hundred eighty-nine and one hundred eighteen?

24. What are the next three numbers in this sequence?

. . . , 650, 660, 670, ___, ___, ___, . . .

25. To what number on this scale is the arrow pointing?



LESSON 34

Rounding Numbers Using a Number Line

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Two of the following statements use **exact numbers**, while the other two statements use **rounded numbers**. Can you tell which statements use rounded numbers?

- About 600 people attended the homecoming game.
- The attendance at the game was 614.
- The price of the shoes was $48.97.
- The shoes cost about $50.

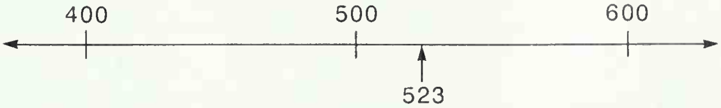
The first statement and the last statement use rounded numbers. Rounded numbers are often used in place of exact numbers because rounded numbers are easy to understand and easy to work with. When we change an exact number into a rounded number, we **round** the number. Rounding numbers is an important mathematical skill which we will practice in this lesson.

When we round a number, we find another number to which the number is **close**. Looking at the number line below can give us the idea of rounding.

To round the number 67, we name another number to which it is close. We do not just pick **any** number. We would not round 67 to 68! **When rounding whole numbers, we choose numbers close in size that end with one or more zeros.** On the number line we see that 67 falls between the round numbers 60 and 70. When rounding, we pick the **closest** round number. Since 67 is closer to 70, we round to 70 and say that 67 is about 70. We have rounded 67 to the nearest ten.

Example Round 523 to the nearest hundred.

Solution When we round a number to the nearest hundred, we name the "hundred number" to which it is closest. The hundred numbers are the numbers we say when we count by hundreds: 100, 200, 300, 400, and so on. We use a number line marked off with hundreds to picture this problem.



Placing 523 on the number line, we see that it falls between the hundred numbers 500 and 600. Since 523 is closer to 500 than it is to 600 we round 523 to **500**.

Practice* For each problem below, sketch a number line to show your work. Round the numbers in problems (a)–(d) to the nearest ten.

a. 72 **b.** 87 **c.** 49 **d.** 93

Round the numbers in problems (e)–(h) to the nearest hundred.

e. 685 **f.** 420 **g.** 776 **h.** 307

Problem set 34

1. Draw a pair of vertical parallel lines.

2. Round 537 to the nearest hundred.

3. Round 78 to the nearest ten.

4. When the school voted for president, Jeremy had 119 votes and Tina had 142 votes. Tina won by how many votes?

5. Sharon was standing in a line that had 10 people in it. If there were 5 people in front of her, then how many people were behind her?

6. Draw an acute angle.

7. List the factors of 7.

8. At which of these times are the hands of a clock perpendicular?

a. 6:00 **b.** 3:30 **c.** 9:00

9.
$$\begin{array}{r} 3428 \\ 976 \\ +\ 2084 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 3526 \\ -\ 1617 \\ \hline \end{array}$$

11.
$$\begin{array}{r} 1000 \\ -\ \ \ 86 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 499 \\ 25 \\ 43 \\ 756 \\ 67 \\ 94 \\ +\ \ 32 \\ \hline \end{array}$$

13.
$$\begin{array}{r} 563 \\ \times\ \ \ 90 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 286 \\ \times\ \ \ 70 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 479 \\ \times\ \ 800 \\ \hline \end{array}$$

16. $3\overline{)1122}$

17. $576 \div 6 =$

18. $8\overline{)2735}$

19. \$64.23 + \$5.96 + \$17 + (\$1 − \$.16) =

20. From March 1 to December 1 is how many months?

21. What fraction of the circle is shaded?

22. Which word means "parallel to the horizon"?
a. vertical **b.** oblique **c.** horizontal

23. Write the time that is a quarter after one in the afternoon.

24. Draw a horizontal number line from zero to 50 with only zero and tens marked and labeled.

25. What are the next three numbers in this sequence?

. . . , 2400, 2500, 2600, ____, ____, ____, . . .

LESSON
35

Dividing with Zeros in the Quotient

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

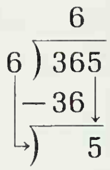
The answer to a division problem is called a **quotient**. Sometimes when we divide, one or more of the digits in the quotient is a zero. When this happens, we may continue to follow the four steps: divide, multiply, subtract, and bring down.

Example 1 Divide: $6\overline{)365}$

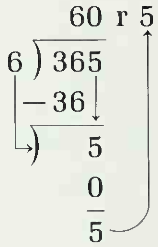
Solution We begin by breaking the division problem into a smaller problem: $6\overline{)36}$.

$6\overline{)36|5}$

Then we divide, multiply, subtract, and bring down. When we subtract, we get zero, which we may or may not write, and we bring down the 5. Since there is a number to bring down, we divide again. The new division is $6\overline{)5}$.

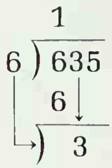


Since we cannot divide 5 by 6 even once, we write a zero in the answer, multiply by zero, and subtract. Since there is no other number to bring down, the division is finished and the remainder is 5. Our answer is **60 r 5**.

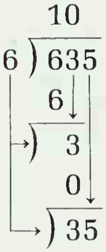


Example 2 Divide: $6\overline{)635}$

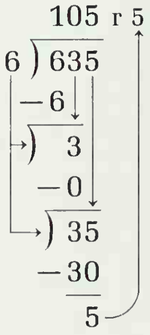
Solution We begin by breaking the division problem into a smaller problem. We can divide $6\overline{)6}$, so we divide, multiply, subtract, and bring down. The next division is $6\overline{)3}$.



Since the number we are dividing is less than the number we are dividing by, we write a zero in the quotient, then multiply, then subtract and bring down. The next division is $6\overline{)35}$.



We divide 35 by 6, multiply, and subtract. Since there is no other number to bring down, the division is finished and the remainder is 5. When we divide 635 into 6 equal parts, there are 105 in each part with 5 "left over." Our answer is **105 r 5**.



Practice* a. $3\overline{)61}$ b. $6\overline{)242}$ c. $3\overline{)121}$ d. $4\overline{)1628}$

e. $4\overline{)122}$

f. $5\overline{)525}$

g. $2\overline{)618}$

h. $6\overline{)4981}$

i. $5\overline{)301}$

j. $4\overline{)824}$

k. $7\overline{)566}$

l. $8\overline{)4818}$

Problem set 35

1. Draw a horizontal line. Draw another line which is perpendicular to the first line.

2. Round 468 to the nearest hundred.

3. How many minutes are in 1 day?

4. What year was one century after 1849?

5. In one year Henrietta laid 10 dozen eggs. How many eggs is that?

6. When Morgan finished page 127 of a 300-page book, he still had how many pages to read?

7. $6\overline{)365}$

8. $6\overline{)635}$

9. $5\overline{)536}$

10. $5\overline{)653}$

11. $4\overline{)436}$

12. $4\overline{)643}$

13. Round 83 to the nearest ten.

14. $345 + 57 + 760 + 398 + 762 + 584 + 70 =$

15. $3004 - (3000 - 4) =$

16. $593 \times 40 =$

17. $95 \times 500 =$

18. $\$12 + \$8.75 + \$.96 =$

19. $\$20 - \$12.46 =$

20. $8 \times 30 \times 15 =$

21. $6 \times 7 \times 8 \times 9 =$

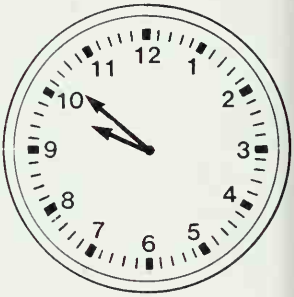
22. What are the next three numbers in this sequence?

. . . , 460, 470, 480, ___, ___, ___, . . .

23. What fraction of the square is shaded?

24. If two segments that intersect are perpendicular, then what kind of an angle do they form?
a. acute **b.** right **c.** obtuse

25. If it is morning, what time is shown on this clock?



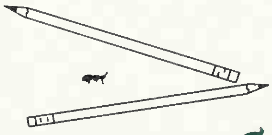
LESSON
36

Drawing Segments to Close in an Area

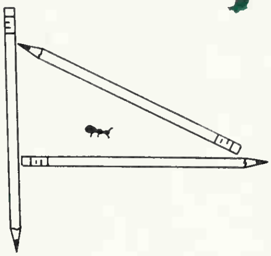
Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Tom used some pencils to surround an ant which was crawling on his desk. What is the fewest number of pencils he could have used?

We see that one pencil could not surround an ant. If Tom put a pencil on one side, the ant could crawl the other way.

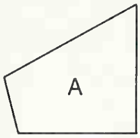


We see that two pencils also could not surround an ant. There is still an opening which would allow the ant to crawl away.



Tom must have used at least three pencils to surround the ant. He may have used more.

Activity On a piece of paper, draw an ant—or just the letter *A*—and try to surround it by drawing straight line segments. Be sure you close in an area so that there is no way of escape. Do this several times. Try to close in an area with three segments, with four segments, with five segments, and with six segments.



Practice

a. Is it possible to close in an area with two segments?

b. Is it possible to close in an area with eight segments?

c. Write an *A* on your paper and surround it with four segments.

d. Write an *A* on your paper and surround it with three segments.

e. Draw two parallel segments on your paper and write an *A* between them. Then surround the *A* by using two more segments.

Problem set 36

1. Draw a pair of oblique parallel lines.

2. In three games Sherry's bowling scores were 109, 98, and 135. What was her total score for all three games?

3. What is the product of nine hundred nineteen and ninety?

4. Round 251 to the nearest hundred.

5. How many years were there from 1886 to 1986?

6. List the factors of 28.

7. Write an *A* on your paper and surround it with three line segments.

8. $432 \div 4 =$

9. $423 \div 6 =$

10. $243 \div 8 =$

11. $2001 \div 4 =$

12. $1020 \div 5 =$

13. $423 \div (42 \div 6) =$

14. Round 51 to the nearest ten.

15. $$\begin{array}{r} 4657 \\ 285 \\ +\ 1223 \\ \hline \end{array}$$

16. $$\begin{array}{r} 3165 \\ -\ 1635 \\ \hline \end{array}$$

17. $$\begin{array}{r} 1000 \\ -\ \ 893 \\ \hline \end{array}$$

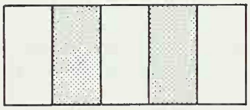
18. $$\begin{array}{r} 24 \\ 56 \\ 17 \\ 73 \\ 25 \\ +\ 19 \\ \hline \end{array}$$

19. $$\begin{array}{r} 436 \\ \times\ \ 70 \\ \hline \end{array}$$

20. $$\begin{array}{r} 857 \\ \times\ \ 7 \\ \hline \end{array}$$

21. $$\begin{array}{r} 600 \\ \times\ 900 \\ \hline \end{array}$$

22. What fraction of the rectangle is **not** shaded?



23. What time is a quarter to three in the afternoon?

24. From November 1 of one year to March 1 of the next year is how many months?

25. What are the next three numbers in this sequence?

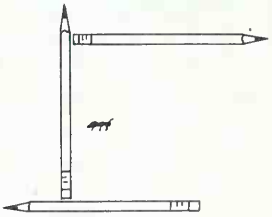
. . . , 1900, 2000, 2100, ____, ____, ____, . . .

LESSON 37

Drawing Lines to Close in a Four-Sided Area

> **Facts Practice:** 90 Division Facts (Test E or F in Test Booklet)

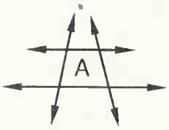
Sharon found an ant crawling on her desk. She placed two pencils on her desk parallel to each other with the ant between. Altogether, how many pencils will she need to surround the ant?



We remember that Tom was able to surround an ant by using three pencils. But none of his pencils was parallel to another. We see that this time three pencils will not surround the ant. Sharon will need four pencils.

Activity For each activity (a)–(d), begin by drawing a pair of parallel horizontal lines on a piece of paper and draw an ant—or the letter *A*—between the lines. Then surround the ant with two more lines, following the directions given below. The first one is shown.

a. Close in the area with two lines which get closer together at the top.



b. Close in the area with two lines which get closer together at the bottom.

c. Close in the area with two lines which are perpendicular to the first pair of lines.

d. Close in the area with a pair of parallel lines which intersect the first pair but are not perpendicular to the first pair.

Practice

a. Draw a pair of parallel segments, then close in an area by drawing another pair of segments perpendicular to the first pair.

b. Draw a pair of parallel segments, then close in an area with another pair of parallel segments which are not perpendicular to the first pair.

c. Draw a pair of parallel segments, then close in an area with two segments which are not parallel to each other.

Problem set 37

1. Draw a pair of horizontal parallel lines and write an *A* between them. Surround the *A* with a pair of vertical parallel lines.

2. Del is 6 years older than his sister. If Del is 13 years old, then how old is his sister?

3. How many days is a dozen weeks?

4. Round 586 to the nearest hundred.

5. Use words to name the number 305.

6. $\frac{564}{8} =$

7. $\frac{654}{6} =$

8. $\frac{456}{9} =$

9. $876 \div 8 =$

10. $611 \div 3 =$

11. $1032 \div 4 =$

12. $346 + 2875 + 74 + 458 + 932 + 45 =$

13. $5386 - 4957 =$

14. \$75 + \$1.24 + \$.76 =

15. \$100 − \$20.63 =

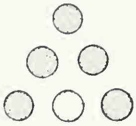
16. 438 × 60 =

17. 60 × 700 =

18. 828 ÷ (28 ÷ 7) =

19. 7 × 40 × 14 =

20. What fraction of the circles is shaded?



21. Round 56 to the nearest ten.

22. What number is the numerator of the fraction $\frac{3}{8}$?

23. Think of a whole number. Multiply it by 2. Now add 1. Is the final answer odd or even?

24. According to this calendar, what is the date of the second Tuesday in January 1929?

JANUARY 1929

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

25. What are the next three numbers in this sequence?

. . . , 470, 480, 490, ____, ____, ____, . . .

LESSON
38

Drawing Polygons

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Tom's and Sharon's teacher told them that when they surrounded an ant with pencils they had formed polygons. A

polygon is a shape made by line segments which close in an area. Each of these shapes is a polygon.

The line segments which form a polygon are called **sides**. A polygon may have three or more sides. Polygons are named by the number of sides they have. A three-sided polygon is called a **triangle**. A four-sided polygon is called a **quadrilateral**. There are many types of quadrilaterals. Squares and rectangles are types of quadrilaterals. We will learn the names of other polygons in another lesson. In this lesson we will practice drawing some polygons.

Example 1 Draw a triangle which has two perpendicular sides.

Solution We begin by drawing two perpendicular line segments. Then we close the triangle by drawing the third side.

Example 2 Draw a quadrilateral which has only one pair of parallel sides.

Solution A quadrilateral is a four-sided polygon. We begin by drawing one pair of parallel line segments. Then we close the quadrilateral by connecting the endpoints. Notice that if we make the first two segments the same length, the other two sides will be parallel. But if we make the first two segments different lengths, the other two sides will not be parallel.

Practice

a. Find a definition for "polygon" in the lesson and copy that definition on your paper.

b. A quadrilateral is a polygon with how many sides?

c. Draw a five-sided polygon.

d. Draw a six-sided polygon.

e. Draw a quadrilateral with two pairs of parallel sides.

f. Draw a quadrilateral which has no parallel sides. (Begin by drawing two nonparallel segments, then connect those with two nonparallel segments.)

Problem set 38

1. Draw a pair of horizontal parallel lines and write an *A* between them. Then surround the *A* by drawing a pair of oblique parallel lines.

2. The first flag of the United States had 13 stars. How many more stars does our present flag have?

3. Joe walked 488 feet going to the end of the pier and back. How long is the pier?

4. A quadrilateral is a polygon with how many sides?

5. Round 67 to the nearest ten.

6. What year was one century before 1620?

7. List the factors of 17.

8. Draw a triangle which has two perpendicular sides.

9.
$$\begin{array}{r} 4207 \\ 6035 \\ +\ 1863 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 3615 \\ -\ 2946 \\ \hline \end{array}$$

11.
$$\begin{array}{r} 1000 \\ -\ \ 981 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 76 \\ 98 \\ 15 \\ 832 \\ 46 \\ 328 \\ 64 \\ +\ \ 75 \\ \hline \end{array}$$

13. $\begin{array}{r} 368 \\ \times \quad 40 \\ \hline \end{array}$ **14.** $\begin{array}{r} 540 \\ \times \quad 70 \\ \hline \end{array}$ **15.** $\begin{array}{r} 700 \\ \times \quad 800 \\ \hline \end{array}$

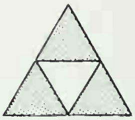
16. Draw a quadrilateral which has one pair of parallel sides.

17. $\frac{420}{6} =$ **18.** $\frac{624}{6} =$ **19.** $\frac{2835}{7} =$

20. $10 − ($3.65 + $4 + $.97) =

21. 496 + 496 + 496 + 496 + 496 + 496 + 496 =

22. What fraction of the large triangle is not shaded?

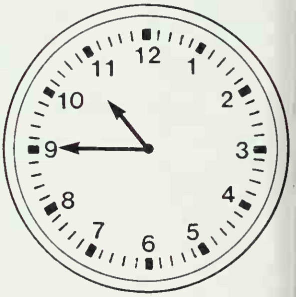


23. What are the next three numbers in this sequence?

. . . , 1600, 1700, 1800, _____, _____, _____, . . .

24. What part of a building is perpendicular to the floor?
a. a wall **b.** the ceiling **c.** the roof

25. If it is morning now, what time will be shown by this clock in 2 hours?

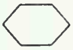
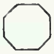


LESSON 39

Naming Polygons

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

We remember that a shape which closes in an area with straight lines is called a polygon. Polygons are named by the number of sides they have. The chart names some common polygons.

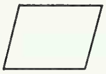
SHAPE	NUMBER OF SIDES	NAME OF POLYGON
	3	triangle
	4	quadrilateral
	5	pentagon
	6	hexagon
	8	octagon

Notice that a four-sided polygon is a **quadrilateral**. There are different kinds of quadrilaterals. Squares, rectangles, parallelograms, and trapezoids are names of certain kinds of quadrilaterals which we will study later.

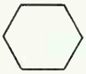
Example 1 Which of these shapes is not a quadrilateral?

a.

b.



c.



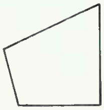
d.

Solution A quadrilateral is a polygon with four sides. The shape which does not have four sides is choice **(c)**.

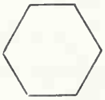
Sometimes we close in areas by using smooth curves. A circle is one kind of smooth curve that we use to close in an area. Since a circle does not close in an area with straight lines, a circle is not a polygon.

Example 2 Which of these shapes is not a polygon?

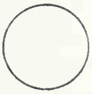
a.



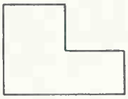
b.



c.

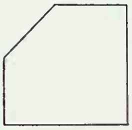


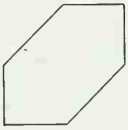
d.

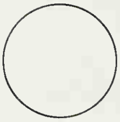


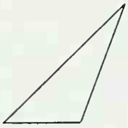
Solution A polygon is formed by straight lines. A circle is a smooth curve. So the shape which is not a polygon is choice **(c)**.

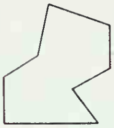
Practice Name each of the shapes in (a)–(e).

a.


b.


c.


d.


e.


Problem set 39

1. Draw a pair of horizontal parallel line segments. Make both segments the same length.

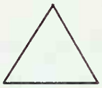
2. When $.05 is subtracted from $5, what is the difference?

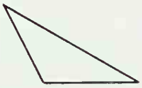
3. Jason has one week to read a 336-page book. How many pages should he read each day to finish the book on time?

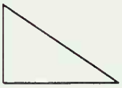
4. A fortnight is 2 weeks. How many days is a fortnight?

5. Round 780 to the nearest hundred.

6. Which triangle has one obtuse angle?

a.


b.


c.


7. How many years were there from 1776 to 1976?

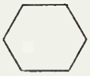
8. What time is 30 minutes before noon?

9. What is the name for the top number of a fraction?

10. Which of these shapes is not a quadrilateral?

a.


b.


c.


d.


11. What is the name for a five-sided polygon?

12. $\begin{array}{r} 763 \\ \times \quad 800 \\ \hline \end{array}$ **13.** $\begin{array}{r} 2408 \\ \times \quad 6 \\ \hline \end{array}$ **14.** $\begin{array}{r} 976 \\ \times \quad 40 \\ \hline \end{array}$ **15.** $\begin{array}{r} 400 \\ \times \quad 50 \\ \hline \end{array}$

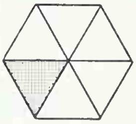
16. $\begin{array}{r} 9898 \\ 3625 \\ 497 \\ +\ 8764 \\ \hline \end{array}$ **17.** $\begin{array}{r} 5818 \\ -\ 4747 \\ \hline \end{array}$ **18.** $\begin{array}{r} 1010 \\ -\quad 918 \\ \hline \end{array}$ **19.** $\frac{763}{7} =$

20. $368 \div 9 =$ **21.** $6 \overline{)4248}$ **22.** $8 \overline{)1000}$

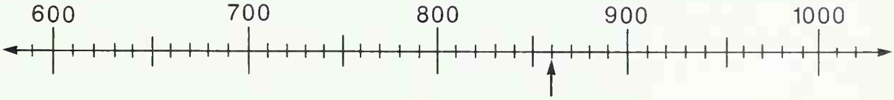
23. What are the next three numbers in this sequence?

. . . , 2700, 2800, 2900, ____, ____, ____, . . .

24. What fraction of the hexagon is shaded?



25. To what number on this number line is the arrow pointing?



ESSON
0

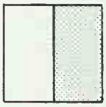
Drawing Pictures to Represent Fractions

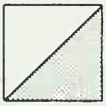
Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

In Lesson 31 we used pictures to represent fractions. A picture can help us to understand the meaning of a fraction. In this lesson we will practice drawing pictures to represent fractions.

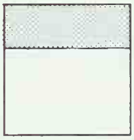
Example 1 Draw a square and shade $\frac{1}{2}$ of it three different ways.

Solution The denominator of this fraction tells us to cut the square into 2 equal parts. The numerator of the fraction tells us to shade 1 of the parts. There are many ways to do this. Here we show three different ways:





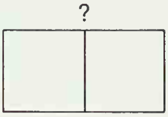
The important thing to remember when drawing pictures of fractions is to divide the picture into **equal** parts. The square below has been cut into two parts, but the parts are not equal. Therefore, this picture does not represent $\frac{1}{2}$.

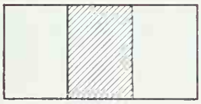


This does not represent $\frac{1}{2}$.

Example 2 Draw a rectangle and shade $\frac{1}{3}$ of it.

Solution After we draw the rectangle, we must cut it into 3 equal parts. If we begin by cutting it in half, we will not be able to cut it into 3 equal parts. We must plan ahead. To form 3 parts, we must make 2 equally spaced cuts. We show two different ways to shade $\frac{1}{3}$ of a rectangle.

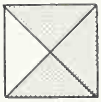




Practice* **a.** Draw a circle and shade $\frac{1}{4}$ of it.

b. Draw a rectangle and shade $\frac{2}{3}$ of it.

c. This square represents the fraction $\frac{3}{4}$. Show another way to shade $\frac{3}{4}$ of a square.



d. This circle represents the fraction $\frac{1}{3}$. Draw a circle and shade $\frac{2}{3}$ of it.

Problem set 40

1. Draw a pair of horizontal parallel line segments. Make the lower segment longer than the upper segment.

2. Draw a rectangle and shade $\frac{1}{2}$ of it three different ways.

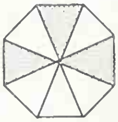
3. When Bill cleaned his room, he found 39 marbles, 20 baseball cards, a toothbrush, 4 pencils, and part of a peanut butter sandwich. How many items did he find?

4. Draw a rectangle and shade $\frac{1}{3}$ of it.

5. What year was one decade before 1932?

6. List the factors of 40.

7. What fraction of the octagon is **not** shaded?



8. From May 1 of one year to February 1 of the next year is how many months?

9. Round 49 to the nearest ten.

10. Draw an *A* on your paper. Surround it with three line segments. Make two of the segments perpendicular.

11. $\begin{array}{r} 3651 \\ 7415 \\ +\ 2594 \\ \hline \end{array}$

12. $\begin{array}{r} 3040 \\ -\ 2950 \\ \hline \end{array}$

13. $\begin{array}{r} 9000 \\ -\ 2030 \\ \hline \end{array}$

14. $\begin{array}{r} 43 \\ 956 \\ 29 \\ 467 \\ 94 \\ +\ 30 \\ \hline \end{array}$

15. $\begin{array}{r} 592 \\ \times\ 90 \\ \hline \end{array}$

16. $\begin{array}{r} 475 \\ \times\ 80 \\ \hline \end{array}$

17. $\begin{array}{r} 720 \\ \times\ 400 \\ \hline \end{array}$

18. $\frac{840}{8} =$

19. $\frac{760}{4} =$

20. $\frac{1224}{6} =$

21. $60 \times (235 \div 5) =$

22. $42 \times 30 \times 7 =$

23. \$20 − (\$3.48 + \$12 + \$4.39) =

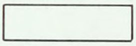
24. What are the next three numbers in this sequence?

. . . , 560, 570, 580, ____, ____, ____, . . .

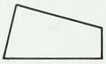
25. Which of these shapes is not a polygon?

a.

b.



c.



d.

e.

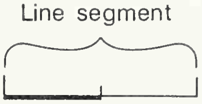
LESSON 41

Identifying a Fraction of a Segment

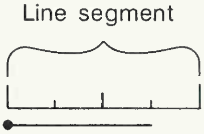
Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

A fraction may be used to name part of a whole or part of a group. A fraction also may be used to name part of a line segment.

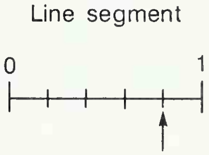
This line segment has been divided into 2 equal parts. One of the parts is darkened. The fraction of the line segment that is darkened is $\frac{1}{2}$.



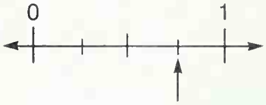
This line segment has been divided into 4 equal parts. The pin is 3 of the parts long. The length of the pin is $\frac{3}{4}$ of the length of the line segment.



This line segment is part of a number line. It is the distance from 0 to 1. This segment has been divided into 5 smaller segments. Each of the smaller segments is $\frac{1}{5}$ of the distance from 0 to 1. Moving to the right, we pass over 4 of the smaller segments before we get to the arrow. The arrow is pointing to the mark which represents the fraction $\frac{4}{5}$.



Example Here is part of a number line. The arrow is pointing to what fraction on this number line?

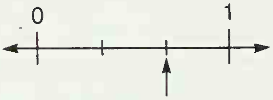


Solution The distance from 0 to 1 on this number line is a segment which has been divided into 4 smaller segments. Each of the smaller segments is $\frac{1}{4}$ of the distance between 0 and 1. Moving from zero toward 1, we pass over 3 of the smaller segments before we reach the arrow. Thus the arrow is pointing to the fraction $\frac{3}{4}$.

Practice a. This lesson concentrates on the idea that a fraction can name part of which of the following?

(1) a pie (2) a rectangle (3) a group
(4) a line segment

Use this number line to answer questions (b)–(d) below.

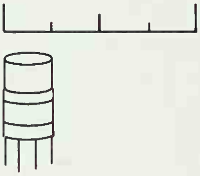


b. The line segment from 0 to 1 has been divided into how many equal parts?

c. Moving to the right, how many parts do we pass over before reaching the arrow?

d. The arrow is pointing to the mark which represents what fraction on the number line?

e. What fraction of this line segment is the width of the pencil eraser?



Problem set 41

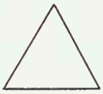
1. Draw a pair of horizontal parallel line segments. Make the upper segment longer than the lower segment.

2. What is the product of six hundred seventy and eighty?

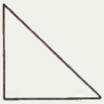
3. This whole line segment has been divided into how many equal parts?

4. The used-car salesman bought a car for $725 and sold it for $1020. How much profit did he make on the car?

5. Which triangle has three acute angles?

a.


b.


c.


6. Round 649 to the nearest hundred.

7. In 2 hours the 3 boys picked a total of 1347 cherries. If they share the cherries evenly, then each boy will get how many cherries?

8. Draw a circle and shade $\frac{3}{4}$ of it.

9. How many days are in a "leap year"?

10. What is the name for an eight-sided polygon?

11. 3647 + 92 + 429 =

12. 3518 − 1853 =

13. 4 × 6 × 8 × 10 =

14. 3518 ÷ 7 =

15. \$4.76 + \$12 + \$.97 =

16. \$100 − \$87.23 =

17. 786 × 900 =

18. 6315 ÷ 9 =

19. 2957 ÷ 8 =

20. 375 × (640 ÷ 8) =

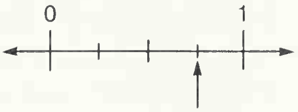
21. Every four-sided polygon is which of the following?
a. a square **b.** a rectangle **c.** a quadrilateral

22. What are the next three numbers in this sequence?

. . . , 1800, 1900, 2000, _____, _____, _____, . . .

23. What fraction of the whole line segment has been darkened?

24. Here is part of a number line. The arrow is pointing to what fraction on this number line?



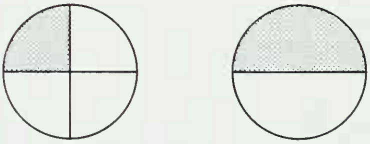
25. If it is 9:45 a.m., what time will it be in 4 hours?

LESSON 42

Comparing Fractions by Drawing Pictures

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

One fourth of the circle on the left is shaded. One half of the circle on the right is shaded.



$\frac{1}{4}$ is less than $\frac{1}{2}$

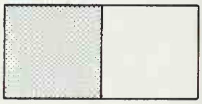
We see that less of the circle is shaded when $\frac{1}{4}$ is shaded than when $\frac{1}{2}$ is shaded because $\frac{1}{4}$ is a smaller fraction than $\frac{1}{2}$. In this lesson we will begin **comparing** fractions. To compare fractions, we will draw **pictures** of the fractions and compare the pictures. Drawing pictures is helpful because pictures show us what the fractions mean.

Example Draw pictures to compare these fractions: $\frac{1}{2} \bigcirc \frac{1}{3}$

Solution If we try to compare the fractions the way they are written, we might think that $\frac{1}{3}$ is greater than $\frac{1}{2}$ because 3 is greater than 2. By drawing pictures we see that $\frac{1}{3}$ is actually less than $\frac{1}{2}$.

To begin we draw two **identical** shapes. We choose to draw two equal-sized rectangles, and we label the rectangles $\frac{1}{2}$ and $\frac{1}{3}$. Next we divide the rectangles into the number of parts shown by the denominator, and we shade in the number of parts shown by the numerator. Then we compare. We see that more of the rectangle is shaded when $\frac{1}{2}$ is shaded

$\frac{1}{2}$



$\frac{1}{3}$

than when $\frac{1}{3}$ is shaded. So our answer is

$$\frac{1}{2} > \frac{1}{3}$$

Practice Compare each pair of fractions by first drawing pictures to represent each fraction. When drawing pictures of any two fractions, be sure to draw the shapes the same size.

a. $\frac{1}{2}$ ○ $\frac{2}{3}$

b. $\frac{1}{2}$ ○ $\frac{2}{4}$

c. $\frac{1}{3}$ ○ $\frac{1}{4}$

d. $\frac{2}{3}$ ○ $\frac{3}{4}$

Problem set 42

1. Draw a pair of horizontal parallel line segments of the same length. Make a quadrilateral by connecting the ends of the segments.

2. How many years is five centuries?

3. What fraction of the whole segment has been darkened?

4. What is the product of four hundred sixteen and sixty?

5. Draw pictures to compare these fractions: $\frac{1}{4}$ ○ $\frac{1}{3}$

6. Draw a triangle which has one right angle.

7. Round 84 to the nearest ten.

8. List the factors of 35.

9.
$$\begin{array}{r} 9318 \\ 4287 \\ +\ 6795 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 3000 \\ -\ 875 \\ \hline \end{array}$$

11.
$$\begin{array}{r} 4304 \\ -\ 3452 \\ \hline \end{array}$$

12. $\begin{array}{r} 46 \\ 23 \\ 97 \\ 15 \\ 24 \\ 55 \\ +\ 55 \\ \hline \end{array}$

13. $\begin{array}{r} 638 \\ \times\ \ 60 \\ \hline \end{array}$

14. $\begin{array}{r} 947 \\ \times\ \ 80 \\ \hline \end{array}$

15. $\begin{array}{r} 640 \\ \times\ 700 \\ \hline \end{array}$

16. $\frac{648}{8} =$

17. $\frac{720}{9} =$

18. $\frac{624}{6} =$

19. $\frac{1236}{4} =$

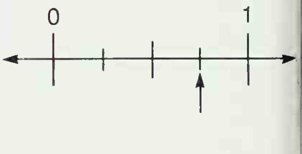
20. $563 \div 7 =$

21. $4718 \div 9 =$

22. $3000 \div 8 =$

23. What time is 20 minutes before midnight?

24. Here is part of a number line. The arrow is pointing to what fraction on this number line?



25. According to this calendar, what is the date of the third Saturday in April 1901?

APRIL 1901

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

LESSON 43

Adding and Subtracting Like Fractions

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

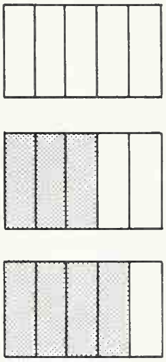
In this lesson we will practice adding and subtracting fractions

When we add fractions, we count together the number of parts of the same size. The numerator (top number) shows the number of parts. The denominator (bottom number) shows the size of the parts.

We will show with pictures the answer when we add $\frac{3}{5}$ and $\frac{1}{5}$.

We draw a rectangle and divide it into five parts. Each of the parts equals one fifth of the rectangle. We shade in 3 parts of the rectangle for the fraction $\frac{3}{5}$.

Next we shade in 1 more part for the fraction $\frac{1}{5}$. Now 4 fifths are shaded. We see that $\frac{3}{5}$ plus $\frac{1}{5}$ equals $\frac{4}{5}$.



When we add $\frac{3}{5}$ and $\frac{1}{5}$, we add the numerators (the number of parts), but we do not add the denominators (the size of the parts). The same is true when we subtract. We subtract the numerators but not the denominators.

$\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$ Add the numerators.
Leave the denominators unchanged.

$\frac{3}{5} - \frac{1}{5} = \frac{2}{5}$ Subtract the numerators.
Leave the denominators unchanged.

When the numerator of a fraction is zero, then no parts are counted and the fraction equals zero.

$\frac{3}{5} - \frac{3}{5} = \frac{0}{5} = 0$ The answer is 0.

When we add and subtract fractions, we add and subtract parts of the same size. Since the denominator shows the size of the parts, we only add and subtract fractions with equal denominators. Fractions with equal denominators are said to have **common denominators**. We call fractions that have common denominators **like fractions**. We can add and subtract fractions if they are like fractions.

Example 1 Add: $\frac{4}{17} + \frac{3}{17} =$

Solution We first check the denominators to see if they are equal. These fractions have common denominators so we can add. We add the numerators, leave the denominator unchanged, and get $\frac{7}{17}$.

$$\frac{4}{17} + \frac{3}{17} = \mathbf{\frac{7}{17}}$$

Example 2 Subtract: $\frac{7}{8} - \frac{4}{8} =$

Solution We can subtract because the denominators are equal. We subtract the numerators and get $\frac{3}{8}$.

$$\frac{7}{8} - \frac{4}{8} = \mathbf{\frac{3}{8}}$$

Practice*

a. $\frac{2}{7} + \frac{3}{7} =$

b. $\frac{24}{100} + \frac{17}{100} =$

c. $\frac{8}{10} - \frac{5}{10} =$

d. $\frac{1}{8} + \frac{4}{8} =$

e. $\frac{2}{3} - \frac{1}{3} =$

f. $\frac{24}{25} - \frac{24}{25} =$

Problem set 43

1. Draw a pair of horizontal parallel line segments. Make the lower segment longer than the upper segment. Connect the endpoints of the segments to form a quadrilateral.

2. If 1 pie is shared equally by 6 people, then each person will get what fraction of the pie?

3. One hundred forty students were divided equally into 5 classes. How many students were in each class?

4. The arrow points to what fraction on this number line?

5. Draw two circles of the same size. Shade in $\frac{1}{4}$ of one circle and $\frac{1}{3}$ of the other circle.

6. $\frac{5}{17} + \frac{2}{17} =$

7. $\frac{3}{5} + \frac{1}{5} =$

8. $\frac{11}{16} + \frac{4}{16} =$

9. $\frac{7}{8} - \frac{4}{8} =$

10. $\frac{3}{5} - \frac{1}{5} =$

11. $\frac{11}{16} - \frac{4}{16} =$

12.
$$\begin{array}{r} 785 \\ 964 \\ 287 \\ +\ 846 \\ \hline \end{array}$$

13.
$$\begin{array}{r} 7106 \\ -\ 3754 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 384 \\ \times\quad 60 \\ \hline \end{array}$$

15. $769 \times 800 =$

16. $\frac{2448}{8} =$

17. $\frac{4320}{9} =$

18. $20 − ($1.45 + $6.23 + $8) =

19. 3742 + 3742 + 3742 + 3742 + 3742 =

20. Compare: $\frac{1}{4} \bigcirc \frac{1}{3}$

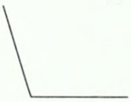
21. Round 688 to the nearest hundred.

22. How many years were there from 1215 to 1776?

23. Which of these angles appears to be an obtuse angle?

a.

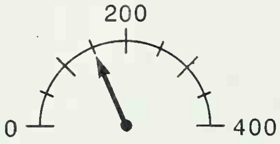

b.


c.


24. What are the next three numbers in this sequence?

. . . , 60, 70, 80, ___, ___, ___, . . .

25. To what number on this scale is the arrow pointing?



LESSON 44

Practicing "Short Division"

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

We have learned a division algorithm in which we follow four steps: divide, multiply, subtract, and bring down. This algorithm is sometimes called "long division." In this lesson we will practice a shortened form of this algorithm. The shortened form is sometimes called "short division."

When we do short division, we follow four steps, but we do not write down every number. Instead we keep some of the numbers "in our head." We will show this by doing the same division problem both ways.

Long division **Short division**

We begin both divisions by dividing $4\overline{)5}$. We write 1 in the answer, and then we multiply. In short division we keep the multiplication answer in our head. Then we subtract. **In short division we write the subtraction answer in front of the next digit.** Here we write a small 1 in front of the 6 to make it 16. In short division we do not bring down this digit; instead we "bring up" the subtraction answer. Now we divide $4\overline{)^{1}6}$ and write 4. We multiply and subtract in our head and find that there is no remainder.

Example $5\overline{)842}$

Solution We will use short division to find the answer. First we divide and write 1 in the answer. Then we multiply and subtract in our head to get 3. We bring up the 3 and write it in front of the next digit. Next we divide $5\overline{)34}$. We continue to divide, multiply, subtract, and bring up. We bring up the last subtraction answer as the remainder.

$$\begin{array}{r} 1\ \ 6\ \ 8 \text{ r } 2 \\ 5\overline{)8\ {}^{3}4\ {}^{4}2} \end{array}$$

Practice Use short division to find the answers to these divisions.

a. $3\overline{)435}$ **b.** $6\overline{)500}$ **c.** $4\overline{)563}$

d. $4\overline{)500}$ **e.** $7\overline{)800}$ **f.** $5\overline{)836}$

g. $5\overline{)600}$ **h.** $3\overline{)616}$ **i.** $6\overline{)858}$

Problem set 44

1. Draw a pair of horizontal parallel line segments. Make the upper segment longer than the lower segment. Connect the ends of the segments to make a quadrilateral.

2. If a birthday cake is cut into 10 equal pieces, then each piece is what fraction of the whole cake?

3. What year was two centuries after 1492?

4. Which of these is greatest? $\frac{3}{4}, \frac{5}{4}, \frac{4}{4}$

5. Draw two circles of the same size. Shade in $\frac{1}{2}$ of one circle and $\frac{2}{3}$ of the other circle.

6. Compare: $\frac{1}{2} \bigcirc \frac{2}{3}$

7. Use short division to find the answer to this division.

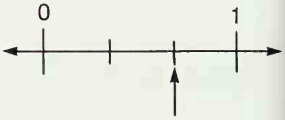
$5\overline{)937}$

8. $\frac{5}{10} + \frac{4}{10} =$

9. $\frac{1}{2} - \frac{1}{2} =$

10. $\frac{5}{7} - \frac{2}{7} =$

11. The arrow points to what fraction on this number line?



12. 3784 + 2693 + 429 + 97 + 856 + 907 =

13. 3106 − 528 =

14. 8000 − 756 =

15. 804 × 700 =

16. 60 × 43 × 8 =

17. 4008 ÷ 4 =

18. 4228 ÷ 7 =

19. 9635 ÷ 8 =

20. 793 ÷ 6 =

21. \$10 − (\$4.56 + \$3 + \$1.29) =

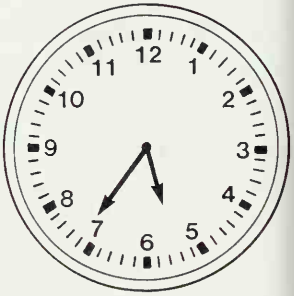
22. Round 98 to the nearest ten.

23. Draw a triangle which has one obtuse angle.

24. What are the next three numbers in this sequence?

. . . , 100, 110, 120, 130, ____, ____, ____, . . .

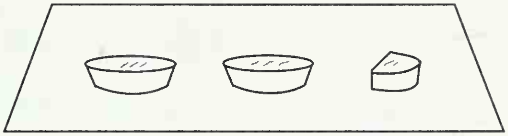
25. If it is evening, what time will be shown by this clock in 30 minutes?



ESSON
45

Identifying Pictures of Mixed Numbers

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)



The picture above shows some pies on a shelf. We see two whole pies and one half of another pie. There are two and one half pies on the shelf. Using digits we write two and one half this way:

$$2\frac{1}{2}$$

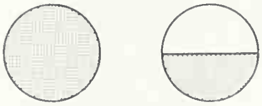
This number has two parts, a whole-number part and a fraction part. The two parts are brought together to make one number. This kind of number is called a **mixed number** because it is a "mix" of a whole number and a fraction.

We should be able to name mixed numbers using either words or digits, and we should be able to recognize and make pictures of mixed numbers.

Example 1 Use words to name the mixed number $7\frac{3}{4}$.

Solution The whole-number part is "seven." The fraction part is "three fourths." We connect the whole-number name to the fraction name with the word "and." We write our answer **seven and three fourths**.

Example 2 Use a mixed number to name the number of shaded circles shown here.



Solution We see two circles. One circle is completely shaded and represents the whole number 1. Half of the second circle is shaded.

It represents the fraction $\frac{1}{2}$. Together, the number of shaded circles can be named with the mixed number

$$1\frac{1}{2}$$

Practice Use words to write these mixed numbers.

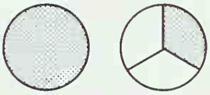
a. $6\frac{1}{4}$ **b.** $2\frac{2}{3}$ **c.** $1\frac{3}{10}$

Use digits to write these mixed numbers.

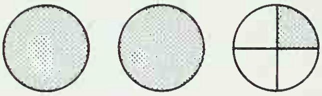
d. six and seven eighths **e.** ten and one tenth

Write mixed numbers to name the number of shaded circles in diagrams (f) and (g).

f.



g.



Draw and shade circles to represent the mixed numbers named in problems (h) and (i).

h. three and one half **i.** one and three fourths

Problem set 45

1. Draw a pentagon.

2. A rattlesnake's rattle shakes about 50 times each second. How many times would it shake in 1 minute?

3. Jim weighed 98 pounds before dinner and 101 pounds after dinner. How many pounds did Jim gain during dinner?

4. Use words to name the mixed number $7\frac{5}{8}$.

5. Which of these is greatest? $\frac{4}{5}, \frac{6}{5}, \frac{5}{5}$

6. Draw a rectangle. Shade $\frac{2}{5}$ of the rectangle.

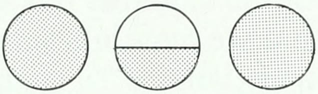
7. $\frac{3}{10} + \frac{4}{10} =$

8. $\frac{4}{6} + \frac{1}{6} =$

9. $\frac{7}{10} - \frac{4}{10} =$

10. $\frac{5}{6} - \left(\frac{5}{6} - \frac{1}{6}\right) =$

11. Use a mixed number to name the number of shaded circles shown here.



12. Round 151 to the nearest hundred.

13. The arrow points to what fraction on this number line?

14. Compare: $\frac{1}{4} \bigcirc \frac{1}{5}$

15.
$$\begin{array}{r} 1873 \\ 3426 \\ +\ 2634 \\ \hline \end{array}$$

16.
$$\begin{array}{r} 9138 \\ -\ 4237 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 6010 \\ -\ 543 \\ \hline \end{array}$$

18.
$$\begin{array}{r} 936 \\ 47 \\ 18 \\ 493 \\ 71 \\ +\ 82 \\ \hline \end{array}$$

19.
$$\begin{array}{r} 346 \\ \times\ 80 \\ \hline \end{array}$$

20.
$$\begin{array}{r} 725 \\ \times\ 90 \\ \hline \end{array}$$

21.
$$\begin{array}{r} 670 \\ \times\ 700 \\ \hline \end{array}$$

22. $4\overline{)1620}$

23. $8\overline{)1760}$

24. $9\overline{)4273}$

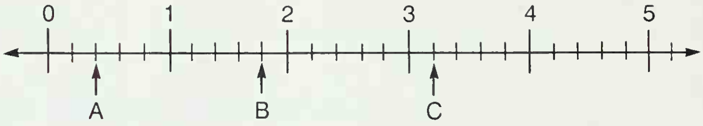
25. Which word names an angle that is smaller than a right angle?

a. acute **b.** right **c.** obtuse

LESSON 46

Identifying Mixed Numbers on the Number Line

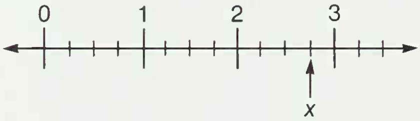
Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)



On this number line we have named the whole-number points, and we have labeled some points between the whole numbers with letters. To name these points with numbers, we may use fractions or mixed numbers. We see that the segments between the whole numbers have been divided into smaller segments. Counting, we find that there are five small segments between two whole numbers. Each small segment is one fifth of a whole-number segment.

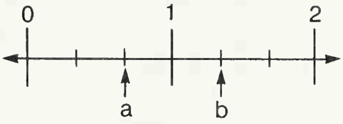
When we name a point on a number line, we say how far it is from 0 (zero). Point *A* is 2 small segments from zero. We name that point $\frac{2}{5}$. Traveling from 0 to the point at arrow *B*, we move 1 whole-number segment plus 4 small segments. The small segments are fifths, so we name point *B* with the **mixed number** $1\frac{4}{5}$. Traveling from 0 to *C*, we move 3 whole-number segments plus 1 small segment. The number for point *C* is $3\frac{1}{5}$.

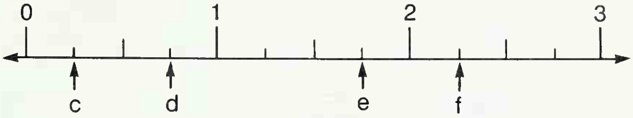
Example What mixed number names point x on the number line?



Solution Point x is more than 2 but less than 3. The whole-number segment between 2 and 3 is divided into 4 smaller segments, which are fourths. From 0 to *x* are 2 whole-number segments plus 3 smaller segments. The mixed number which names that point is $\mathbf{2\frac{3}{4}}$.

Practice* Use a fraction or a mixed number to name every point marked with an arrow on these number lines.





Problem set 46

1. Draw a hexagon.

2. Captain Hook heard the alarm go off at 6 a.m. and got up quickly! If he had fallen asleep at 11 p.m., how many hours of sleep did he get?

3. Joshua has $28.75. How much more money does he need to buy a $34.18 skateboard?

4. Anita's grandfather has lived for seven decades. Seven decades is how many years?

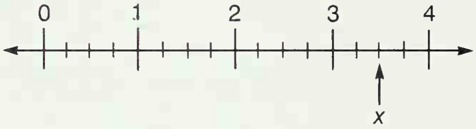
5. Draw a rectangle. Shade one sixth of it.

6. List the factors of 29.

7. Use words to name the mixed number $5\frac{2}{3}$.

8. Use a mixed number to name the number of shaded circles shown here.

9. What mixed number names point x on this number line?



10. $\frac{1}{7} + \frac{2}{7} + \frac{3}{7} =$

11. $\frac{5}{8} - \frac{2}{8} =$

12. 35 + 7 + 863 + 9489 + 766 =

13. 752 − (356 + 97) =

14. 40 × (200 − 34) =

15. 560 ÷ (56 ÷ 7) =

16. $\frac{3}{5} + \left(\frac{2}{5} - \frac{1}{5}\right) =$

17. $\frac{3}{5} - \left(\frac{2}{5} + \frac{1}{5}\right) =$

18. 5760 ÷ 8 =

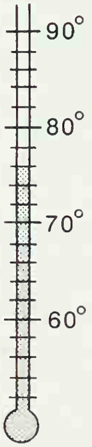
19. 4263 ÷ 7 =

20. Counting by tens, the number 158 is closest to which of the following?

a. 150 **b.** 160 **c.** 100 **d.** 200

21. Draw a triangle which has three acute angles.

22. What month is 10 months after June?



23. What time is 7 minutes before seven in the morning?

24. What are the next three numbers in this sequence?

. . . , 120, 130, 140, ____, ____, ____, . . .

25. What temperature is shown on this thermometer?

ESSON
7

Adding and Subtracting Whole Numbers, Fractions, and Mixed Numbers

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

Adding We have studied whole numbers, fractions, and mixed numbers. All of these may be added together. When adding these numbers, we must remember to add whole numbers to whole numbers and fractions to fractions.

Example 1 $6\frac{1}{3} + 1\frac{1}{3} =$

Solution We add whole numbers to whole numbers and fractions to fractions. We add the fractions $\frac{1}{3}$ and $\frac{1}{3}$ to get $\frac{2}{3}$. We add the whole numbers 1 and 6 to get 7.

$$\begin{array}{r} 6\frac{1}{3} \\ +\ 1\frac{1}{3} \\ \hline \mathbf{7\frac{2}{3}} \end{array}$$

Example 2 $5 + 1\frac{1}{2} =$

Solution We add whole numbers to whole numbers and fractions to fractions. There is no fraction to add to $\frac{1}{2}$. One half plus zero is one half. The whole numbers are 5 and 1, whose sum is 6.

$$\begin{array}{r:l} 5 & \\ +\ 1 & \frac{1}{2} \\ \hline \mathbf{6} & \mathbf{\frac{1}{2}} \end{array}$$

Example 3 $1 + \frac{1}{2} =$

Solution We add whole numbers to whole numbers and fractions to fractions. There is no fraction to add to $\frac{1}{2}$ and no whole number to add to 1. We write the whole number and fraction together to make the mixed number $\mathbf{1\frac{1}{2}}$.

Subtracting When we subtract whole numbers, fractions, and mixed numbers, we subtract whole numbers from whole numbers and fractions from fractions. Since order matters when we subtract, we must be careful to write the numbers in the correct order.

Example 4 $3\frac{1}{2} - \frac{1}{2} =$

Solution If we choose to write the problem vertically, we must write the first number on top. When we subtract the fractions, we find the answer is $\frac{0}{2}$, which is zero. When we subtract the whole numbers, the answer is 3. If we subtract $\frac{1}{2}$ from $3\frac{1}{2}$, the answer is **3**.

$$\begin{array}{r} 3\frac{1}{2} \\ -\ \frac{1}{2} \\ \hline 3\frac{0}{2} \end{array} = \mathbf{3}$$

Practice* **a.** $3\frac{1}{2} + 2 =$ **b.** $3\frac{2}{4} - \frac{1}{4} =$ **c.** $4\frac{1}{3} - 3\frac{1}{3} =$

d. $3 + 2\frac{1}{2} =$ **e.** $6\frac{2}{3} - 3 =$ **f.** $3\frac{1}{2} - 3 =$

g. $3\frac{2}{4} + \frac{1}{4} =$ **h.** $2\frac{1}{2} - \frac{1}{2} =$ **i.** $\frac{3}{4} + 2 =$

Problem set 47

1. Draw a pair of vertical parallel line segments of the same length. Connect the ends of the segments to make a quadrilateral.

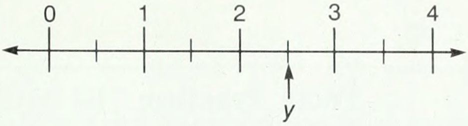
2. Angela poured 32 ounces of juice equally into 4 cups. How many ounces of juice were in each cup?

3. A stick 100 centimeters long broke into two pieces. One of the pieces was 48 centimeters long. How long was the other piece?

4. Draw a square. Shade all but one fourth of it.

5. Round 158 to the nearest ten.

6. What mixed number names point y on this number line?



7. $5 + 2\frac{1}{2} =$ **8.** $6\frac{1}{5} + 1\frac{1}{5} =$ **9.** $1 + \frac{1}{3} =$

10. $3\frac{1}{2} - \frac{1}{2} =$ **11.** $1\frac{3}{5} + 3\frac{1}{5} =$ **12.** $5\frac{3}{7} - 1\frac{1}{7} =$

13. Use words to name the mixed number $4\frac{3}{10}$.

14. $\begin{array}{r} 408 \\ \times \quad 70 \\ \hline \end{array}$ **15.** $\begin{array}{r} 967 \\ \times \quad 60 \\ \hline \end{array}$ **16.** $\begin{array}{r} 970 \\ \times \quad 900 \\ \hline \end{array}$

17. $\begin{array}{r} 347 \\ 523 \\ 768 \\ +\ 242 \\ \hline \end{array}$ **18.** $\begin{array}{r} 4286 \\ -\ 3977 \\ \hline \end{array}$ **19.** $\begin{array}{r} 9013 \\ -\ 3608 \\ \hline \end{array}$

20. $\frac{567}{9} =$ **21.** $7\overline{)890}$ **22.** $6\overline{)484}$ **23.** $4\overline{)8035}$

24. What are the next three numbers in this sequence?

. . . , 220, 230, 240, ___, ___, ___, . . .

25. According to this calendar, February 2047 would begin on what day of the week?

JANUARY 2047

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

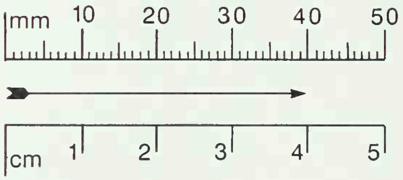
LESSON 48

Reading Lengths on a Metric Scale

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Inches, feet, yards, and miles are commonly used to measure distances in the United States. These words came to us from England. These units were used in the English system of units. But England does not use these units any more. No other big country in the world uses these units any more. All the other countries have changed to the units called the Système International, or SI for short. Some people call the **SI system** the **metric system**. In this system we use centimeters and millimeters to measure small distances.

Here we show a centimeter scale and a millimeter scale. The words "centimeter" and "millimeter" are abbreviated **cm** and **mm**.

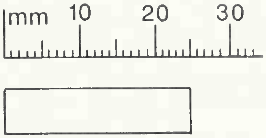


The centimeter scale is divided into segments 1 centimeter long. The millimeter scale has been divided into smaller segments 1 millimeter long. A longer mark is used to mark every 10 millimeters. Notice that **10 millimeters equals 1 centimeter**. The arrow is 4 centimeters long. It is also 40 millimeters long.

Example 1 The distance across a nickel is about 2 centimeters. Two centimeters is how many millimeters?

Solution We remember that 1 centimeter equals 10 millimeters, so 2 centimeters equals **20 millimeters**.

Example 2 How long is this side of the rectangle?



Solution The millimeter scale marks each millimeter. Every 10 millimeters is marked with a longer mark. We count two longer marks plus five shorter marks and find the length is **25 mm**.

Practice

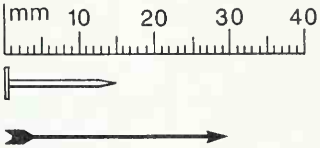
a. One centimeter is how many millimeters?

b. How many millimeters is 5 centimeters?

c. Write the abbreviations for centimeter and millimeter.

d. How many millimeters long is the nail?

e. How many **centimeters** long is the arrow?



Problem set 48

1. Draw a quadrilateral which has four right angles.

2. In her pocket Sallie has 3 pennies, 2 nickels, a dime, 3 quarters, and a half dollar. How much money is in her pocket?

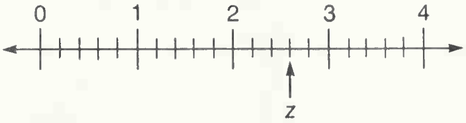
3. One hundred thirty-eight kindergarteners climbed on three buses to go to the zoo. If there were the same number of children on each bus, how many children were on each bus?

4. The distance across a nickel is about 2 centimeters. Two centimeters is how many millimeters?

5. What year was two decades after 1620?

6. List the factors of 50.

7. What mixed number names point z on this number line?



8. $3\frac{3}{4} - 1\frac{2}{4} =$

9. $4\frac{1}{2} - \frac{1}{2} =$

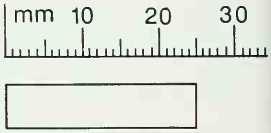
10. $5\frac{1}{4} - 4 =$

11. $7\frac{1}{10} + 3\frac{2}{10} =$

12. $5\frac{1}{6} + 3 =$

13. $8\frac{3}{8} + \frac{4}{8} =$

14. How long is the measured side of the rectangle?



15. $352 + 4287 + 593 + 7684 + 9856 =$

16. $3627 - 429 =$

17. $9104 - (2000 - 66) =$

18. $491 \times 700 =$

19. $60 \times 8 \times 37 =$

20. $3175 \div 5 =$

21. $2964 \div 8 =$

22. Draw a circle. Shade all but one fourth of it.

23. Counting by tens, the number 256 is closest to which of the following?

a. 240 **b.** 250 **c.** 260 **d.** 300

24. What are the next three numbers in this sequence?

. . . , 25, 50, 75, 100, ____, ____, ____, . . .

25. If it is morning, what time will be shown by this clock in 30 minutes?

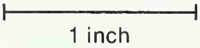
LESSON
49

Reading an Inch Ruler to the Nearest Fourth of an Inch

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

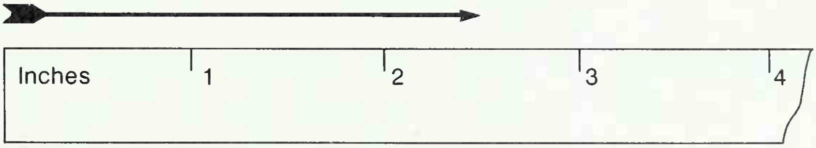
To measure small lengths in the metric system, we use centimeters and millimeters. To measure small lengths in the U.S. Customary system (the English system), we use inches.

An inch is a unit of length this long:



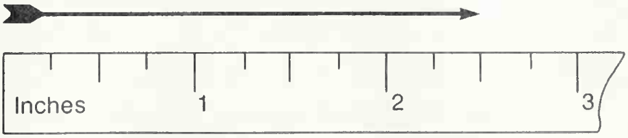
When we measure the length of something, we count how many "inch units" it takes to reach across its length.

We often use a tape measure or ruler for measuring lengths. A ruler is usually 12 inch units placed next to each other, numbered, and marked into a board. Here we show part of a ruler.



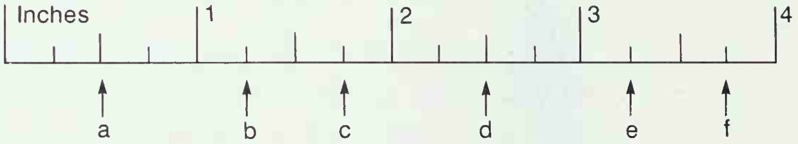
We notice that inch marks are farther apart than centimeter marks and much farther apart than millimeter marks. With this ruler we cannot measure as accurately as we can with a centimeter or millimeter ruler. The closer the marks are on a ruler, the more accurately we can measure. To make an inch ruler more accurate, we divide the inches into fractions. In this lesson we will practice reading from an inch ruler that has been divided into fourths.

Example How many inches long is the arrow?



Solution The marks on this ruler divide each inch into four smaller segments. Each small segment is one fourth of an inch long. Measuring the arrow, we see that its length is 2 full inches plus 2 small segments, that is, $2\frac{2}{4}$ inches. However, there is another way to name the fraction $\frac{2}{4}$. We see that the mark at the end of the arrow is **halfway** between 2 and 3. It is the two-and-one-half-inch mark. Notice on the ruler that the half-inch marks are slightly longer than the quarter-inch marks. The length of the arrow is **$2\frac{1}{2}$ inches**.

Practice Name the mark on the ruler to which each lettered arrow is pointing.



Problem set 49

1. Draw a rectangle with all sides the same length.

2. Julie paid $10 and got back $2.47. How much did she spend?

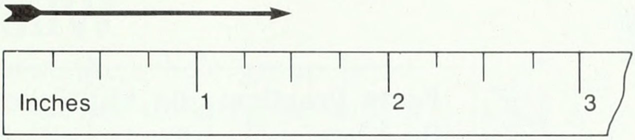
3. Draw two circles. Shade one and three fourths of them.

4. The theater was filled all 4 nights. If 2500 attended in all, then how many attended each night?

5. Round 256 to the nearest ten.

6. Ten millimeters equals how many centimeters?

7. How many inches long is the arrow?



8. $3\frac{1}{3} + 1\frac{1}{3} =$ **9.** $4\frac{1}{4} + 2 =$ **10.** $3 + \frac{3}{4} =$

11. $5\frac{3}{8} - 2 =$ **12.** $6\frac{3}{4} - 1\frac{2}{4} =$ **13.** $5\frac{1}{2} - 1\frac{1}{2} =$

14. $$\begin{array}{r} 8793 \\ 3516 \\ 4297 \\ +\ 6874 \\ \hline \end{array}$$

15. $$\begin{array}{r} 5026 \\ -\ 1387 \\ \hline \end{array}$$

16. $$\begin{array}{r} 6109 \\ -\ 4937 \\ \hline \end{array}$$

17. $\frac{9637}{9} =$

18. $$\begin{array}{r} 234 \\ \times\ \ 600 \\ \hline \end{array}$$

19. $$\begin{array}{r} 4287 \\ \times\ \ \ 5 \\ \hline \end{array}$$

20. $$\begin{array}{r} 9314 \\ \times\ \ \ 70 \\ \hline \end{array}$$

21. $\frac{3416}{8} =$

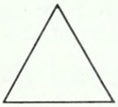
22. What are the next three numbers in this sequence?

. . . , 330, 340, 350, ___, ___, ___, . . .

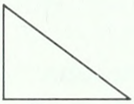
23. What time is twenty-five minutes before noon?

24. Which of these triangles appears to have one right angle?

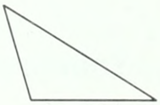
a.



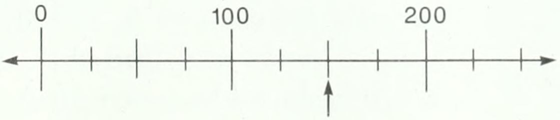
b.



c.



25. To what number on this number line is the arrow pointing?



LESSON
50

Finding a Fraction of a Whole Number, Part 1

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Fractions may be used to name part of a group. Look at these statements:

- Debbie scored $\frac{1}{3}$ of her team's points.
- The teacher was pleased that $\frac{1}{2}$ of her students earned an A on the test.
- Pepper ate $\frac{1}{4}$ of the fish filets.

These statements tell information about a part of a group. These statements do not tell **how many** points Debbie scored or **how many** students earned A's or **how many** fish filets Pepper ate, but we can figure out **how many** if we know how many there are in the whole group.

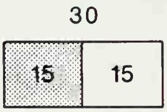
Example 1 Debbie scored $\frac{1}{3}$ of her team's 36 points. How many points did Debbie score?

Solution The team scored 36 points. So in this problem the whole group totals 36. Debbie scored $\frac{1}{3}$ of the total. We divide 36 into 3 equal parts and find that each of the 3 parts contains 12 points. Debbie scored **12 points.**

$$\begin{array}{r} 12 \\ 3\,\overline{)\,36} \end{array}$$

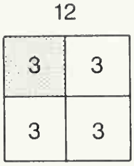
Example 2 The teacher was pleased that $\frac{1}{2}$ of her 30 students earned an A on the test. How many students earned an A?

Solution In this problem the whole group totals 30. The 30 students are divided into 2 equal parts. The students in 1 part earned an A. The students in the other part did not earn an A. We divide 30 into 2 equal parts and find that the number of students that earned an A was **15.**



Example 3 Bill's cat, Pepper, ate $\frac{1}{4}$ of the dozen fish filets. How many fish filets did Pepper eat?

Solution In this problem the whole group is 12. We find $\frac{1}{4}$ of 12 by dividing 12 into 4 equal parts. In each part there are 3 filets. Pepper ate one of the parts, so Pepper ate **3 fish filets**.



Practice*

a. What is $\frac{1}{3}$ of 15?

b. What is $\frac{1}{2}$ of 48?

c. One fifth of the 30 students in the class played in the band. How many students from the class played in the band?

Problem set 50

1. Draw a pentagon.

2. The theater had 625 seats. If 139 seats were empty, how many seats were filled?

3. This line segment is 4 centimeters long. How many millimeters long is it?

4. What year was two centuries before 1976?

5. Debbie scored $\frac{1}{3}$ of her team's 48 points. How many points did Debbie score?

6. Seven thousand passengers arrived on 8 ships. If each ship carried an equal number of passengers, how many passengers were on each ship?

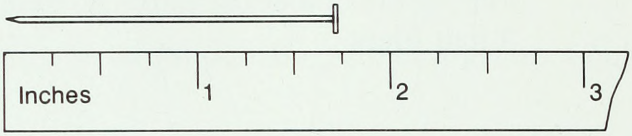
7. What is $\frac{1}{4}$ of 60?

8. Round 256 to the nearest hundred.

9. Draw a rectangle. Shade all but two fifths of it.

10. What month is 8 months after September?

11. How many inches long is the nail?



12. $3\frac{3}{7} + 2 + \frac{2}{7} =$

13. $3\frac{3}{5} - \left(2\frac{2}{5} - 1\right) =$

14. $5 + \left(3\frac{2}{3} - \frac{1}{3}\right) =$

15. $6\frac{5}{12} - \left(4 + 1\frac{4}{12}\right) =$

16. 1396 + 727 + 854 + 4685 =

17. 97 + ☐ = 512

18. 938 × 800 =

19. 54 × 7 × 60 =

20. 5445 ÷ 9 =

21. 3205 ÷ 8 =

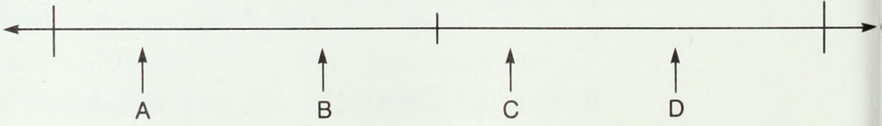
22. \$20 − (\$15.37 − \$12) =

23. 4826 + 4826 + 4826 + 4826 =

24. What number should be written in place of this square?

24 × 500 = 24 × 5 × ☐

25. Which arrow could be pointing to 1375 on this number line?

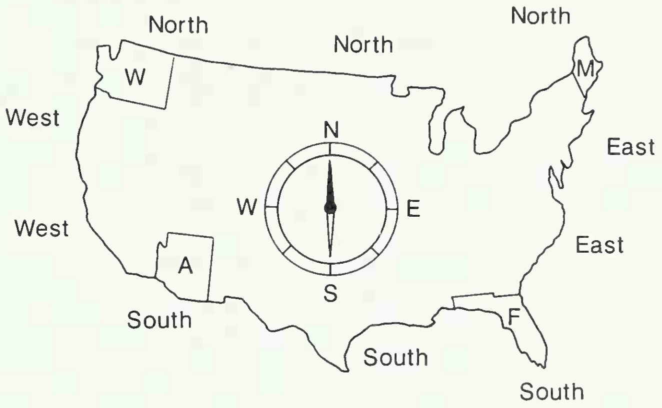


ESSON
1

Practicing the Directions of the Compass

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

Four of the words used to name directions are **north**, **south**, **east**, and **west**. A good way to remember these directions is to think of a map of the United States. North is at the top. South is at the bottom.



East is on the right, and west is on the left. Sometimes we combine the direction words. The M stands for Maine. We see that Maine is both north and east. So we say that Maine is in the northeast. The letters W, A, and F on the map stand for the states of Washington, Arizona, and Florida. We see that Washington is in the northwest, Arizona is in the southwest, and Florida is in the southeast.

Example 1 If you are facing south and lift your left arm out to the side, in which direction will your arm be pointing?

Solution Until you get used to these questions, try thinking this way. Imagine yourself at the center of the United States facing south. As you lift your left arm, you should be able to "see" that it will point to the E for **east**.

Example 2 The original 13 colonies were located along which coast of the United States?

a. south **b.** east **c.** west

Solution The early colonists sailed west to reach this continent but did not travel far inland. Instead they settled along the east coast of this country. So our answer is **(b)** for **east**.

Practice

a. If you face the rising sun, what direction is to your right? (*Hint*: The sun rises in the east and sets in the west.)

b. Dan traveled north on Elm Street and turned left on Main Street. Then, in what direction was he going?

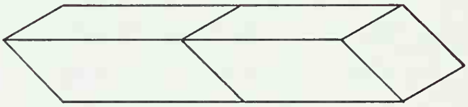
c. Sheila flew from Oklahoma to South Dakota. In what direction did she fly? (Look on a map.)

Problem set 51

1. Draw a pair of parallel oblique lines.

2. Matt has 30 cents worth of dimes and nickels in his hand. If he has the same number of dimes as nickels, how many coins does he have?

3. This eraser is 60 millimeters long. How many centimeters long is it?



4. What number is $\frac{1}{5}$ of 30?

5. Round 366 to the nearest ten.

6. If you are facing south and lift your right arm out to the side, in what direction will your arm be pointing?

7. Draw a circle. Shade all but one third of it.

8. $3\frac{3}{10} + 3\frac{3}{10} + 3\frac{3}{10} =$

9. $5 + 1\frac{3}{8} + \frac{2}{8} =$

10. $6\frac{2}{3} - \left(4\frac{2}{3} - 1\right) =$

11. $\boxed{} - 5 = 23$

12. $\begin{array}{r} 435 \\ \times\ \ 800 \\ \hline \end{array}$

13. $\begin{array}{r} 860 \\ \times\ \ 90 \\ \hline \end{array}$

14. $\begin{array}{r} 900 \\ \times\ \ 70 \\ \hline \end{array}$

15. $\begin{array}{r} 36 \\ 47 \\ 28 \\ 49 \\ 53 \\ +\ 62 \\ \hline \end{array}$

16. $\begin{array}{r} 5016 \\ -\ 3854 \\ \hline \end{array}$

17. $\begin{array}{r} 2901 \\ -\ 1397 \\ \hline \end{array}$

18. $\frac{3663}{9} =$

19. $\$20 - (\$4.36 + \$5 + \$1.29) =$

20. $547 \div 6 =$

21. $3228 \div 4 =$

22. $1000 \div 7 =$

23. What are the next three numbers in this sequence?

. . . , 2800, 2900, 3000, _____, _____, _____, . . .

24. To what mixed number on the number line is this arrow pointing?

25. According to this calendar, what would be the date of the first Monday in September 2019?

AUGUST 2019

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

LESSON 52

Simplifying Mixed Measures

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Sometimes two units are used to name a measure. Here we show three examples.

John is **5 feet 4 inches** tall.

Tracy ran a quarter mile in **1 minute 15 seconds**.

The melon weighed **3 pounds 8 ounces**.

In this lesson we will practice changing measures named with two units into measures named with one unit.

Example 1 John is 5 feet 4 inches tall. How many inches tall is John?

Solution Five feet 4 inches means 5 feet **plus** 4 inches. Before we can add, we first change 5 feet to inches. Since 1 foot equals 12 inches, we multiply 5 times 12 inches.

$$\text{5 feet} = 5 \times \text{12 inches}$$
$$\text{5 feet} = \text{60 inches}$$

Now we add 60 inches and 4 inches.

$$\text{60 inches} + \text{4 inches} = \text{64 inches}$$

John is **64 inches** tall.

Example 2 Tracy ran a quarter mile in 1 minute 15 seconds. What was her time in seconds?

Solution One minute 15 seconds means 1 minute **plus** 15 seconds. We first change 1 minute to seconds. Then we add.

$$\text{1 minute} = \text{60 seconds}$$
$$\text{60 seconds} + \text{15 seconds} = \text{75 seconds}$$

Tracy ran a quarter mile in **75 seconds**.

Example 3 One pound equals 16 ounces. The melon weighed 3 pounds 8 ounces. How many ounces did the melon weigh?

Solution Three pounds 8 ounces means 3 pounds **plus** 8 ounces. We change pounds to ounces first.

$$3 \text{ pounds} = 3 \times 16 \text{ ounces}$$
$$3 \text{ pounds} = 48 \text{ ounces}$$

Now we add.

$$48 \text{ ounces} + 8 \text{ ounces} = 56 \text{ ounces}$$

The melon weighed **56 ounces**.

Practice

a. Change 6 feet 2 inches to inches.
b. Change 3 minutes 20 seconds to seconds.
c. Change 2 hours 30 minutes to minutes.
d. Change 2 pounds 12 ounces to ounces.
(1 pound = 16 ounces)

Problem set 52

1. When the students got on the buses to go to the picnic, there were 36 on one bus, 29 on another bus, and 73 on the third bus. Altogether, how many students were on the three buses?

2. What year was two decades before 1932?

3. Jenny was riding her bike east and made a left turn. Then in what direction was she going?

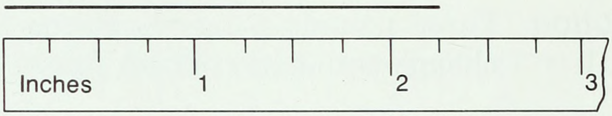
4. Change 5 feet 6 inches to inches.

5. The 7 in 374,021 means which of the following?
a. 7 **b.** 70 **c.** 70,000

6. From March 1 of one year to May 1 of the next year is how many months?

7. Draw a rectangle. Shade three eighths of it.

8. How long is the line segment?



9. $4 + 3\frac{3}{4} =$

10. $3\frac{3}{5} + 1\frac{1}{5} =$

11. $2\frac{3}{8} + \frac{2}{8} =$

12. $5\frac{1}{3} - \left(5\frac{1}{3} - \frac{1}{3}\right) =$

13. $2\frac{1}{2} - \frac{1}{2} =$

14. $3\frac{5}{9} - 1\frac{1}{9} =$

15. $\begin{array}{r} 48{,}748 \\ 37{,}145 \\ +\ 26{,}498 \\ \hline \end{array}$

16. $\begin{array}{r} 63{,}142 \\ -\ 17{,}936 \\ \hline \end{array}$

17. $\begin{array}{r} 563 \\ \times\ \ 700 \\ \hline \end{array}$

18. $\begin{array}{r} 4729 \\ \times\ \ \ 8 \\ \hline \end{array}$

19. $\begin{array}{r} 9006 \\ \times\ \ 80 \\ \hline \end{array}$

20. $\frac{3456}{8} =$

21. 1836 ÷ 9 =

22. 1405 ÷ 7 =

23. $18 - \square = 6$

24. In Andy's slice of watermelon there were 60 seeds. If he swallowed $\frac{1}{5}$ of the seeds, how many did he swallow?

25. If it is evening, what time will be shown by this clock in $3\frac{1}{2}$ hours?

LESSON
3

Reading and Writing Whole Numbers in Expanded Notation

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

One way to name numbers is to name the place value of each digit. The number 3256 could be named

3 thousands plus 2 hundreds plus 5 tens plus 6 ones

We could use numbers instead of words to name the same number if we write

$$(3 \times 1000) + (2 \times 100) + (5 \times 10) + (6 \times 1)$$

This method of naming numbers is called **expanded notation. When we write a number in expanded notation**, **we write a digit times its place value**, plus the next digit times its place value, and so on.

Example 1 Write the number 5600 in expanded notation.

Solution The number 5600 is 5 thousands plus 6 hundreds plus no tens plus no ones. We write 5 times its place value plus 6 times its place value. Since there are no tens or ones we write only

$$(5 \times 1000) + (6 \times 100)$$

Example 2 Write the standard number for $(3 \times 100) + (2 \times 1)$.

Solution The "standard number" means the usual way of writing numbers. We are to write the number which has a 3 in the hundreds' place and a 2 in the ones' place.

100s	10s	1s
3	0	2

Note that we use a zero to hold the tens' place, and get **302**.

Practice* Write in expanded notation.

a. 56

b. 5040

c. 5280

Write the standard numbers for these expanded notations.

d. (6 × 1000) + (4 × 10)

e. (5 × 100) + (7 × 10)

f. (8 × 10,000) + (4 × 1000)

g. (9 × 1000) + (3 × 100) + (2 × 1)

Problem set 53

1. Use words to name the mixed number $4\frac{7}{10}$.

2. Albert is 6 years older than Jorge. If Albert is 21, then how old is Jorge?

3. If you face the rising sun, what direction is to your right?

4. The 6 in 356,287 means which of the following?
a. 6 **b.** 356 **c.** 6000 **d.** 6287

5. The new pencil was 19 centimeters long. How many millimeters long was it?

6. Draw a circle. Shade one sixth of it.

7. Which digit is in the ten-thousands' place in 356,287?

8. Round 287 to the nearest ten.

9. Write the standard number for (5 × 100) + (2 × 1).

10. Write the number 4700 in expanded notation.

11. $$\begin{array}{r} 98{,}572 \\ 42{,}156 \\ 37{,}428 \\ +\ 16{,}984 \\ \hline \end{array}$$

12. $$\begin{array}{r} 52{,}160 \\ -\ 32{,}436 \\ \hline \end{array}$$

13. $$\begin{array}{r} 10{,}000 \\ -\quad 1{,}746 \\ \hline \end{array}$$

14. $$\begin{array}{r} 3478 \\ \times\quad 6 \\ \hline \end{array}$$

15. $$\begin{array}{r} 6549 \\ \times\quad 60 \\ \hline \end{array}$$

16. $$\begin{array}{r} 8037 \\ \times\quad 90 \\ \hline \end{array}$$

17. $3647 \div 6 =$

18. $5408 \div 9 =$

19. $1000 \div 6 =$

20. $3\frac{1}{3} + \left(4\frac{1}{3} - 2\right) =$

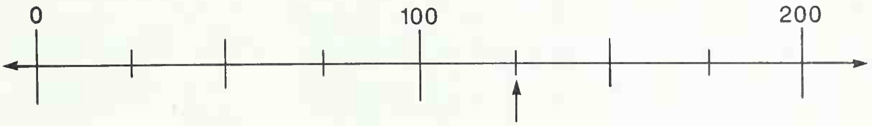
21. $6 \times 800 = 6 \times 8 \times \boxed{}$

22. $10 − ($6 + $1.47 + $.93) =

23. How many years is one fourth of a century?

24. What time is 1 minute before midnight?

25. To what number on this number line is the arrow pointing?



ESSON
4

Finding Information to Solve Problems

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Part of the process of solving problems is finding the information needed to solve the problem. We may find information in graphs, tables, books, or other places. In this lesson we will practice problems which require us to look for the information necessary to solve the problems.

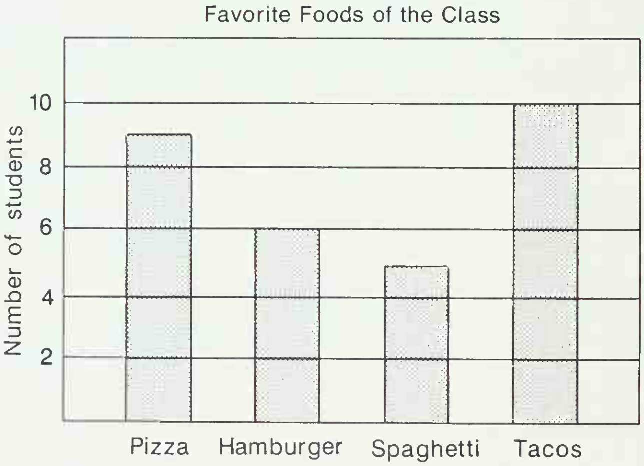
Example 1 Read this information. Then answer the question.

> In the first 6 games the Rio Vista football team won 4 games and lost 2 games. They won their next game by a score of 28 to 20. The team plays 10 games in all.

In the first 7 games, how many games did the Rio Vista football team win?

Solution More information is given than is needed to answer the question. We sort through the information until we find the information necessary to answer the question. We are asked to find how many of the first 7 games were won by the team. We are told that the team won 4 of the first 6 games. We are also told that the team won the next game (that is, the seventh game). Thus the team **won 5** of their first 7 games.

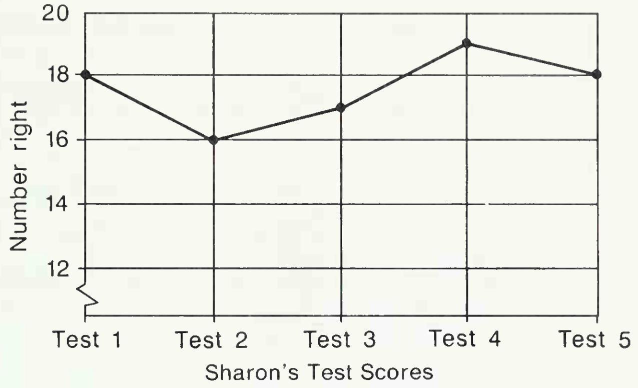
Example 2 Use this graph to answer the question.



Pizza was the favorite food of how many students in the class?

Solution This **bar graph** shows how many students in the class chose certain foods as their favorite food. The bar for pizza ends halfway between the line for 8 and the line for 10. Halfway between 8 and 10 is 9. Thus pizza was the favorite food of **9 students**.

Example 3 Use this graph to answer the question.



There are 20 questions on each test. How many questions did Sharon miss on Test 3?

Solution This **line graph** shows the number of answers Sharon had right on each of her first 5 tests. We see that on Test 3 Sharon had 17 answers right. We subtract 17 from 20 and find that Sharon missed **3 questions** on Test 3.

Problem set 54

1. Draw a pair of horizontal parallel lines. Make a quadrilateral by crossing the horizontal lines with a pair of oblique parallel lines. Shade the area closed in by the lines.

2. James was walking south and then he turned right. In what direction was he walking after he turned?

3. If Jenny missed $\frac{1}{5}$ of the 25 questions, how many questions did she miss?

4. The 7 in 754,238 means which of the following?
a. 700,000 **b.** 700 **c.** 7 **d.** 754

5. Forty years is how many decades?

6. Write the standard number for $(6 \times 1000) + (4 \times 100)$.

7. Use words to name 63250.

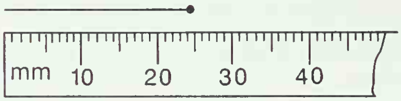
8. Round 370 to the nearest hundred.

9. What is the place value of the 5 in 754,238?

10. Draw a rectangle. Shade five eighths of it.

11. Using digits write one hundred forty-six thousand, two hundred thirty-four.

12. How long is the pin?



13. $\begin{array}{r} 342{,}579 \\ +\ 416{,}919 \\ \hline \end{array}$ **14.** $\begin{array}{r} 40{,}138 \\ -\ 39{,}275 \\ \hline \end{array}$ **15.** $\begin{array}{r} 3986 \\ \times\quad 90 \\ \hline \end{array}$

16. $30 \times 400 =$ **17.** $4000 - 8 =$

18. $528 \div 7 =$ **19.** $5408 \div 9 =$

20. $6\frac{3}{10} + 4\frac{4}{10} + 5 =$ **21.** $3\frac{9}{10} - \left(1\frac{1}{10} + \frac{7}{10}\right) =$

22. $3675 + 3675 + 3675 + 3675 =$

23. The three boys weigh 87 pounds, 121 pounds, and 103 pounds. The boy who weighs most weighs how many pounds more than the boy who weighs least?

24. When Tina was born, she weighed 7 pounds 2 ounces. How many ounces did Tina weigh at birth?
(1 pound = 16 ounces)

25. Use words to name the mixed number $3\frac{9}{10}$.

LESSON 55

Solving Two-Step Word Problems

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

Many of the problems we face in mathematics take more than one step to solve. In an earlier lesson we solved two-step problems which were written with parentheses. It takes two steps to solve 10 − (6 − 3). We first find the value within the parentheses. Then we subtract this value from 10. In this lesson we will begin to solve two-step **word** problems. For a while we will mark the two-step problems with a check (✓).

Example ✓ Bill is 5 years older than Robert. Robert is 3 years older than Sally. Sally is 15 years old. How old is Bill?

Solution This is a two-step problem. We cannot find out Bill's age in one step. We must first find out the age of Robert so that we will be able to figure out the age of Bill. The problem tells us that Robert is 3 years older than Sally and that Sally is 15 years old. By adding, we find that Robert is 18 years old. We have finished the first step. The problem tells us that Bill is 5 years older than Robert. We found that Robert is 18 years old, so we can add 5 to find that Bill is **23 years old**.

Practice ✓**a.** The bus could carry 80 students. The 32 students from Room 8 and the 29 students from Room 12 got on the bus. How many more students can the bus carry? (*Note:* ✓ means two steps.)

✓**b.** Doreen collected 37 aluminum cans for school, and her brother collected 21. They decided to divide the cans evenly, so they put the cans into one big pile, and from that they made two equal piles. How many cans were in each pile?

Problem set 55

1. Draw a quadrilateral which has one pair of sides which are parallel and one pair of sides which are not parallel.

✓ 2. Bill is 10 years older than Robert. Robert is 5 years older than Sally. Sally is 15 years old. How old is Bill?

3. Jessica's age is $\frac{1}{3}$ of her dad's age. If her dad is 36 years old, how old is Jessica?

4. On a map, north is usually toward the top. What direction is to the left side of a map?

5. Think of an odd number. Multiply it by 5. What is the last digit of the product?

6. Write the standard number for $(5 \times 100) + (6 \times 1)$.

7. Use words to name 1234.

8. Round 234 to the nearest ten.

9. Use digits to write twenty-five thousand, three hundred.

10. Draw a circle. Shade five sixths of it.

11. $5\frac{2}{8} + 6 + \frac{3}{8} =$

12. $8\frac{5}{6} - \left(3\frac{5}{6} - 3\right) =$

13. $342 + 5874 + 63 + 285 + 8 + 96 + 87 =$

14. $4201 - 2014 =$

15. $1000 - \square = 1$

16. $800 \times 50 =$

17. $30 \times 8 \times 25 =$

18. $1205 \div 6 =$

19. $7637 \div 8 =$

20. $20 − ($12 + $4.76 + $2.89 + $.34) =

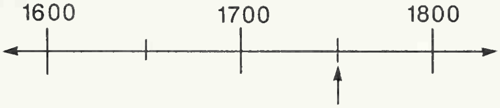
21. Use words to name the number 150,000.

22. What are the next three numbers in this sequence?

. . . , 900, 1000, 1100, _____, _____, _____, . . .

23. Which place does the zero hold in 203,456?

24. To what number on the number line is the arrow pointing?



25. According to this calendar, what was the date of the first Sunday in December 1941?

NOVEMBER 1941

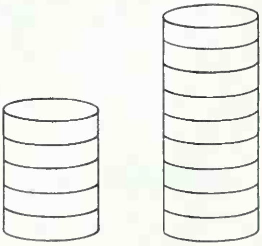
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

LESSON 56

Making Groups Even to Find an Average

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

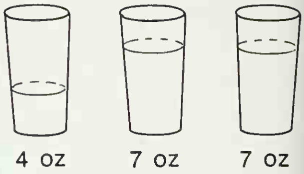
Here are two stacks of nickels. In one stack there are 5 nickels and in the other stack there are 9 nickels. If some nickels were moved from the taller stack to the shorter stack so that the stacks were even, then how many nickels would be in each stack?



One way to answer this question is to **find the total** number of nickels, **then divide** the total into two equal groups. Since there are 5 nickels in one stack and 9 nickels in the other stack, there are 14 nickels in all. Dividing 14 nickels into 2 equal groups, we find that there would be 7 nickels in each stack.

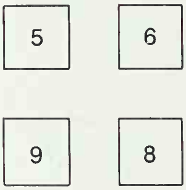
When we even up the number of members in groups, we are finding the **average** number of members in the groups.

Example If water is poured from glass to glass until the amount of water in each of these glasses is the same, then how many ounces of water will be in each glass?



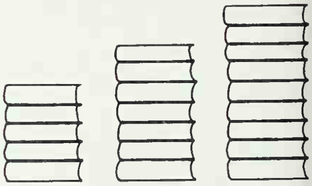
Solution We see that we need to pour water from the fuller glasses into the glass that has least until the level of water in the 3 glasses is even. The **total amount** of water will not change. We add and find that the total amount of water is 18 ounces. We **divide** this total equally among the 3 glasses and find that each glass will contain **6 ounces** of water.

Practice **a.** The number of players on the four squads was 5, 6, 9, and 8. If the squads were changed so that there were the same number of players on each squad, how many players would each squad have?



b. When the class lined up, there were 11 students in one line and 17 students in the other line. If the lines were made even, how many students would be in each line?

c. This picture shows three stacks of books. If the stacks were made even, how many books would be in each stack?

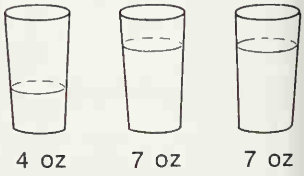


Problem set 56

1. Draw a quadrilateral so that the sides which intersect are perpendicular.

✓ 2. Kim is 5 years older than Thi. Miguel is 2 years older than Thi. Miguel is 13 years old. How old is Kim?

✓ 3. If water was poured from glass to glass until the amount of water in each of these glasses was the same, then how many ounces of water would be in each glass?



4. How many minutes is $\frac{1}{5}$ of an hour?

5. How many minutes are there in 2 hours 15 minutes?

6. Four hundred years is how many centuries?

7. Use digits to write fifty-four thousand, nine hundred nineteen.

8. Draw a rectangle. Shade seven eighths of it.

✓ **9.** There were 15 children in one line and 11 children in another line. If some children moved from the longer line to the shorter line so that there were the same number of children in each line, then how many children would be in each line?

10. $342 + 67 + 918 + 897 + 42 =$

11. $5387 - 2759 =$

12. $3428 \times 60 =$

13. $7 \times 57 \times 10 =$

14. $(4 + 7 + 7) \div 3 =$

15. $(5 + 6 + 9 + 8) \div 4 =$

16. $4206 \div 7 =$

17. $6024 \div 6 =$

18. $1000 \div 9 =$

19. $18 \div \square = 6$

20. $1\frac{1}{7} + 2\frac{2}{7} + 3\frac{3}{7} =$

21. $9\frac{9}{10} - \left(7\frac{7}{10} - 5\frac{5}{10}\right) =$

22. What month is 10 months after July?

23. Counting by hundreds, 1236 is closest to which of the following numbers?
a. 1100 **b.** 1200 **c.** 1300 **d.** 1000

Read this information. Then answer questions 24 and 25.

From Sara's house, Arcadia Park is 4 miles north, Legg Lake is 5 miles south, the ocean is 32 miles west, and the mountain cabin is 98 miles east.

24. Sara's family went to the ocean one Saturday. They left home at 9 a.m. and returned home at 4 p.m. Altogether, how far did they travel in going to the ocean and back home?

25. How far is it from Arcadia Park to Legg Lake?

LESSON 57

Multiplying by Two-Digit Numbers

> **Facts Practice:** 48 Uneven Divisions (Test G in Test Booklet)

When we multiply by two digits, we really multiply twice. We first multiply by the ones' digit. Then we multiply by the tens' digit.

$$\begin{array}{r} 43 \\ \times\ 12 \\ \hline \end{array} \quad \text{is the same as} \quad \begin{array}{r} 43 \\ \times\ \ 2 \\ \hline 86 \end{array} \quad \begin{array}{c} \text{plus} \\ \\ + \end{array} \quad \begin{array}{r} 43 \\ \times\ 10 \\ \hline 430 \end{array} = 516$$

We do not need to separate a two-place multiplication problem into two problems before we start. We can do the problem all at once.

Example Multiply: $\begin{array}{r} 43 \\ \times\ 12 \\ \hline \end{array}$

Solution First we multiply by the bottom digit on the right. This is the ones' digit, and in this problem the ones' digit is 2.

$$\begin{array}{r} 43 \\ \times\ 12 \\ \hline 86 \end{array}$$

We get 86, and we write the 86 so the 6 is in the ones' column under the 2. Next we multiply by the tens' digit, which is 1. We get 43 tens, and we write the 43 so that the 3 is in the tens' column under the 1. Then we add.

$$\begin{array}{r} 43 \\ \times\ 12 \\ \hline 86 \\ 43 \\ \hline 516 \end{array} \qquad \text{or} \qquad \begin{array}{r} 43 \\ \times\ 12 \\ \hline 86 \\ 430 \\ \hline 516 \end{array} \leftarrow \begin{array}{l} \text{A zero may be} \\ \text{written here} \end{array}$$

Note: When we multiplied by the 1 we were really multiplying by 10. We show this in the problem to the right by writing a zero behind the 43. The 430 comes from multiplying 43 times 10. The final answer is the same whether the zero is written in or not. It is not necessary to write this zero.

Practice*

a. $\begin{array}{r} 32 \\ \times\ 12 \\ \hline \end{array}$ **b.** $\begin{array}{r} 62 \\ \times\ 23 \\ \hline \end{array}$ **c.** $\begin{array}{r} 48 \\ \times\ 64 \\ \hline \end{array}$

d. $\begin{array}{r} 46 \\ \times\ 22 \\ \hline \end{array}$ **e.** $\begin{array}{r} 47 \\ \times\ 34 \\ \hline \end{array}$ **f.** $\begin{array}{r} 87 \\ \times\ 63 \\ \hline \end{array}$

g. $\begin{array}{r} 35 \\ \times\ 13 \\ \hline \end{array}$ **h.** $\begin{array}{r} 56 \\ \times\ 37 \\ \hline \end{array}$ **i.** $\begin{array}{r} 76 \\ \times\ 67 \\ \hline \end{array}$

Problem set ✓
57

1. Jayne is reading a 320-page book. She read 47 pages the first day, 76 pages the second day, and 68 pages the third day. How many more pages does she have to read?

2. To mail the letter Shannon used one 22-cent stamp and three 17-cent stamps. How many cents did it cost to mail the letter?

3. John ate $\frac{1}{4}$ of the 60 raisins. How many raisins did he eat?

4. Write $(1 \times 1000) + (1 \times 1)$ as a standard number.

5. Compare: $\frac{1}{2}$ of 10 ○ $\frac{1}{3}$ of 12

6. Use words to name 1760.

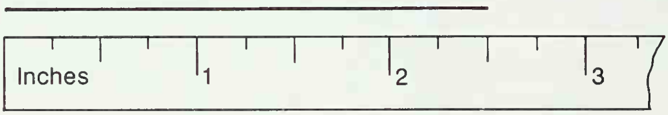
7. Draw a circle. Shade all but one sixth of it.

8. Use digits to write sixty-two thousand, four hundred ninety.

9. Counting by hundreds, 2376 is closest to which number?

a. 2200 **b.** 2300 **c.** 2400 **d.** 2000

10. How long is the line segment?



11. Here are two stacks of coins. If some coins were taken from the taller stack and added to the shorter stack until the stacks were even, how many coins would be in each stack?

12. $\begin{array}{r} 43 \\ \times\ 12 \\ \hline \end{array}$ **13.** $\begin{array}{r} 72 \\ \times\ 31 \\ \hline \end{array}$ **14.** $\begin{array}{r} 48 \\ \times\ 24 \\ \hline \end{array}$ **15.** $\begin{array}{r} 96 \\ \times\ 53 \\ \hline \end{array}$

16. $\begin{array}{r} 8762 \\ 3624 \\ 4795 \\ +\ 8473 \\ \hline \end{array}$ **17.** $\begin{array}{r} 1000 \\ -\ 992 \\ \hline \end{array}$ **18.** $\begin{array}{r} 600 \\ \times\ \ 50 \\ \hline \end{array}$ **19.** $\frac{600}{8} =$

20. $4136 \div 4 =$ **21.** $4275 \div 9 =$

22. $3 + \frac{1}{4} + 2\frac{2}{4} =$

23. $\left(5\frac{5}{8} - 3\frac{3}{8}\right) - 1\frac{1}{8} =$

24. $(1 + 2 + 3 + 4 + 5) \div 5 =$

25. In the running long jump, Cynthia jumped 16 feet 9 inches. How many inches did she jump? (1 foot = 12 inches)

LESSON
58

Identifying Place Value through Hundred Millions

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

The table below shows the value of the first nine whole-number places.

hundred millions	ten millions	millions		hundred thousands	ten thousands	thousands		hundreds	tens	ones
___	___	___	,	___	___	___	,	___	___	___

Drawing the place value chart another way emphasizes the repeating pattern of place values.

MILLIONS			millions' comma	THOUSANDS			thousands' comma	UNITS (ONES)		
hundreds	tens	ones		hundreds	tens	ones		hundreds	tens	ones
___	___	___		___	___	___		___	___	___

We see that the repeating pattern of **ones**, **tens**, **hundreds** continues through the thousands and millions.

Example 1 Which digit shows the number of hundred millions in 987,654,321?

Solution Moving from right to left, the pattern of ones, tens, hundreds continues through the thousands and millions. The digit in the hundred-millions' place is **9**.

Example 2 In the number 12,345,678 the 2 means what?

a. 2 million **b.** 2000 **c.** 2

Solution The value of a digit depends upon its place in the number. Here the 2 means 2 **millions**. The correct choice is **(a)**.

Practice* In problems (a)–(d) name the value of the place held by the zero in each number.

a. 345,052

b. 20,315,682

c. 1,057,628

d. 405,176,284

e. Which digit is in the ten-millions' place in 675,283,419?

f. In which of the following numbers does the 7 have a value of seventy thousand?
(1) 370,123,429 (2) 1,372,486 (3) 4,703,241

g. Write the value of the 1 in 321,987,654.

Problem set ✓
58

1. Debbie baked 5 dozen cookies and gave 24 to a friend. How many cookies did she have left?

2. Marco weighs 120 pounds. His little brother weighs one half as much. How much does his brother weigh?

3. On a map, north is usually toward the top. What direction is to the right side of the map?

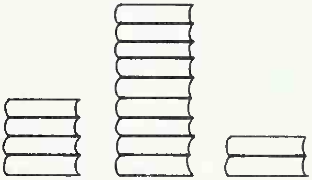
4. From the year 1492 to the year 1992 is how many centuries?

5. Write the standard number for (1 × 100) + (4 × 10) + (8 × 1).

6. Draw a rectangle. Shade all but three eighths of it.

7. Use words to name 250,000.

✓ **8.** This picture shows three stacks of books. If the stacks were made even, how many books would there be in each stack?



9. Which digit shows the number of hundred millions in 789,456,321?

10. Round 1236 to the nearest hundred.

11. Name the value of the place held by the zero in 102,345,678.

12. $\begin{array}{r} 57 \\ \times\ 22 \\ \hline \end{array}$ **13.** $\begin{array}{r} 83 \\ \times\ 47 \\ \hline \end{array}$ **14.** $\begin{array}{r} 67 \\ \times\ 89 \\ \hline \end{array}$ **15.** $\begin{array}{r} 96 \\ \times\ 46 \\ \hline \end{array}$

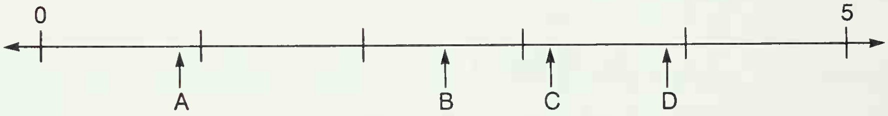
16. $\begin{array}{r} 8437 \\ 3429 \\ 5765 \\ +\ 9841 \\ \hline \end{array}$ **17.** $\begin{array}{r} 2638 \\ -\ 1957 \\ \hline \end{array}$ **18.** $\begin{array}{r} 3041 \\ -\ 2975 \\ \hline \end{array}$

19. $\frac{4328}{4} =$ **20.** $\frac{5678}{9} =$ **21.** $\frac{7840}{4} =$

22. $\frac{3}{10} + 2 + 1\frac{4}{10} =$ **23.** $5\frac{3}{4} - \left(2\frac{3}{4} - 2\right) =$

24. $\$10 - (\$1.43 + \$2 + \$2.85 + \$.79) =$

25. Which arrow could be pointing to $3\frac{9}{10}$ on this number line?



LESSON 59

Naming Numbers through Hundred Millions

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

We have practiced naming whole numbers that have up to six digits. In this lesson we begin naming numbers that have up to nine digits. Again we will use commas to help us name numbers.

To place commas, we count digits from the right side of the whole number and write a comma after every three digits.

$$8\ 7\ ,\ 6\ 5\ 4\ ,\ 3\ 2\ 1$$

This places a comma after the millions' place and after the thousands' place. When reading a number with two commas, we say "million" when we come to the first comma and "thousand" when we come to the second comma.

$$\underbrace{8\ \ 7\ \ ,}_{\text{“million”}}\ \underbrace{6\ \ 5\ \ 4\ \ ,}_{\text{“thousand”}}\ 3\ \ 2\ \ 1$$

Using words we name this number:

> eighty-seven million, six hundred fifty-four thousand, three hundred twenty-one

Example 1 Use words to name 1345200.

Solution We first put the commas in the number: 1,345,200. Then we name the number as **one million**, **three hundred forty-five thousand**, **two hundred**.

Example 2 Use digits to write one hundred thirty-four million, six hundred fifty-two thousand, seven hundred.

Solution **134,652,700**

Practice* For problems (a) and (b) use words to name each number.

a. 21462300

b. 196500000

For problems (c)–(e) use digits to write each number.

c. nineteen million, two hundred twenty-five thousand, five hundred

d. seven hundred fifty million, three hundred thousand

e. two hundred six million, seven hundred twelve thousand, nine hundred thirty-four

Problem set✓ 59

1. Mark bought a chain for $3.60 and a lock for $4. How much should he get back in change from a $10 bill?

2. Draw a quadrilateral using two pairs of parallel line segments.

3. If $\frac{1}{3}$ of the 30 students earned A's on the test, then how many students earned A's?

4. Use words to name 51698502.

5. In the number 123,456,789, the 2 means which of the following?

a. 2 million **b.** 20 million **c.** 200 million

6. Use digits to write two hundred forty-six million, six hundred fifty-two thousand, nine hundred.

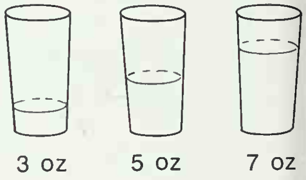
7. Write the standard number for the following.

$$(8 \times 1000) + (4 \times 100) + (6 \times 10) + (3 \times 1)$$

8. Round 2376 to the nearest hundred.

✓ **9.** It is 8 blocks from Beverlee's house to school. How many blocks does she ride her bike traveling to school and back for 5 days?

✓**10.** If water was poured from glass to glass until the amount of water in each of these glasses was the same, then how many ounces of water would be in each glass?



11. $3\frac{5}{8} + \left(2\frac{3}{8} - 1\frac{1}{8}\right) =$

12. $3\frac{5}{8} - \left(2\frac{3}{8} + 1\frac{1}{8}\right) =$

13. $\begin{array}{r} 382 \\ \times\ 35 \\ \hline \end{array}$

14. $\begin{array}{r} 671 \\ \times\ 73 \\ \hline \end{array}$

15. $\begin{array}{r} 790 \\ \times\ 84 \\ \hline \end{array}$

16. $\begin{array}{r} 8956 \\ 3428 \\ 5916 \\ +\ 4684 \\ \hline \end{array}$

17. $\begin{array}{r} 6315 \\ -\ 4126 \\ \hline \end{array}$

18. $\begin{array}{r} 7010 \\ -\ 173 \\ \hline \end{array}$

19. $6\overline{)5405}$

20. $8\overline{)7654}$

21. $3\overline{)6000}$

22. What are the next three numbers in this sequence?

. . . , 1210, 1220, 1230, _____, _____, _____, . . .

23. Use words to name the mixed number $5\frac{3}{8}$.

24. $a - 7 = 5$ $a =$

25. If it is evening now, what time will be shown by this clock in $3\frac{1}{2}$ hours?

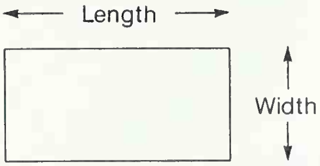
LESSON
60

Calculating the Perimeter of Polygons; Identifying Parts of Circles

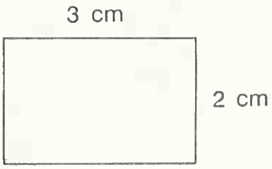
Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Perimeter When line segments close in an area, a polygon is formed. We can calculate the distance around a polygon. Since each of the line segments which form a polygon has a length, we can add these lengths together to find the distance around the polygon. The distance around a polygon is called the **perimeter**. We can find the perimeter of a polygon by adding the lengths of its sides.

We should note that the word "length" has more than one meaning. We have used length to mean the measure of a segment. But length may also mean the longer dimension of a rectangle. We use "width" to mean the shorter dimension of a rectangle.



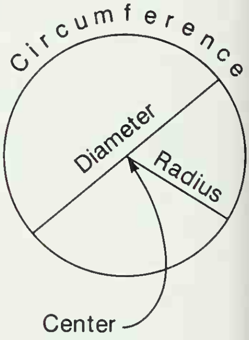
Example What is the perimeter of this rectangle?



Solution We see a rectangle with a length of 3 cm and a width of 2 cm. We are asked to find its perimeter. The perimeter is the distance around it. The four sides measure 2 cm, 3 cm, 2 cm, and 3 cm. We add these together and find that the perimeter is **10 cm**.

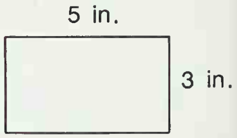
$$2 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} + 3 \text{ cm} = \mathbf{10 \text{ cm}}$$

Circles A circle is a smooth curve. The length of the curve is its **circumference**. So the perimeter of a circle is called the circumference. The **center** is the "middle point" enclosed by the circle. The **radius** is the distance from the center to the curve. The **diameter** is the distance across the circle through the center. Thus **the diameter of a circle is twice the radius**.



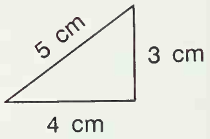
Practice **a.** What is the *length* of this rectangle?

b. What is the *width* of this rectangle?



c. What is the perimeter of this rectangle?

d. What is the perimeter of this triangle?



e. What do we call the perimeter of a circle?

f. What do we call the distance across a circle?

g. If the radius of a circle is 6 inches, then what is the diameter of the circle?

h. What is the perimeter of this square?

Note: The drawings in this lesson and in the problem sets may not be the actual size indicated by the units used in the problem. In most cases the drawings will be smaller than the size indicated so that the drawings will fit on the page.

Problem set 60

✓ 1. The goose laid 3 dozen golden eggs. Jack took 15 eggs. How many golden eggs were left for the giant?

✓ 2. There were 13 players on one team and 9 players on the other team. If some of the players from one team join the other team so that there are the same number of players on each team, how many players will be on each team?

3. Name the value of the place held by the zero in 420,375,861.

4. From November 1 of one year to September 1 of the next year is how many months?

5. Draw a rectangle. Shade three sixths of it.

6. Which factors of 8 are also factors of 12?

7. From the year 1820 to 1890 was how many decades?

8. Use digits to write nineteen million, four hundred ninety thousand.

9. $6 + \left(4\frac{2}{3} - 2\right) =$

10. $4\frac{2}{3} - \left(2\frac{2}{3} + 2\right) =$

11. $300 \times 200 =$

12. $800 \times 70 =$

13. $50 \times \boxed{} = 500$

14. $\begin{array}{r} 564 \\ \times\ 78 \\ \hline \end{array}$

15. $\begin{array}{r} 865 \\ \times\ 74 \\ \hline \end{array}$

16. $\begin{array}{r} 983 \\ \times\ 76 \\ \hline \end{array}$

17. $$\begin{array}{r} 6314 \\ -\ 4287 \\ \hline \end{array}$$

18. $$\begin{array}{r} 3106 \\ -\ 875 \\ \hline \end{array}$$

19. $$\begin{array}{r} 6809 \\ 4356 \\ 2718 \\ +\ 1497 \\ \hline \end{array}$$

20. $\frac{3165}{5} =$

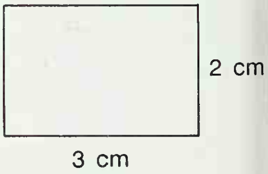
21. $\frac{4218}{6} =$

22. 5361 ÷ 9 =

23. Counting by tens, 1236 is closest to which number?
a. 1230 **b.** 1240 **c.** 1200 **d.** 1300

24. What is the **length** of this rectangle?

25. What is the **perimeter** of this rectangle?



LESSON 61

Dividing by Multiples of 10

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

In this lesson we will begin to divide by two-digit numbers that are multiples of 10. We will divide by numbers such as 10, 20, 30, 40, 50, and so on. In later lessons we will practice dividing by other two-digit numbers.

We will continue to follow the four steps of the division algorithm: divide, multiply, subtract, and bring down. The divide step is more difficult when dividing by two-digit numbers because we have not memorized two-digit multiplication facts. To help us divide by a two-digit number we may think of dividing by the first digit only.

To help us divide this, → $30\overline{)75}$

we may think this: ⟶ $3\overline{)7}$

We use the answer to the easier division for the answer to the more difficult division. Since $3\overline{)7}$ is 2, we use 2 as the division answer. We complete the division by doing the multiply and subtract steps.

$$\begin{array}{r} 2 \text{ r } 15 \\ 30\overline{)\quad 75} \\ -\,60 \\ \hline 15 \end{array}$$

Notice where we placed the 2 in our division answer.

$$\begin{array}{r} 2 \\ 30\overline{)75} \end{array}$$

A 2 above the 7 means there are two 30s in 7! **INCORRECT!**

$$\begin{array}{r} 2 \\ 30\overline{)75} \end{array}$$

The 2 above the 5 means there are two 30s in 75. This is the correct place.

It is important to place the digits in the quotient properly.

Example $30\overline{)454}$

Solution We follow the four steps: divide, multiply, subtract, and bring down. We begin by dividing $30\overline{)45}$. If we are unsure, we may think $3\overline{)4}$ to help us with the divide step. We divide and write 1 above the 5 of 454. Then we multiply, subtract, and bring down. Since we brought down a digit, we divide again. This time we divide $30\overline{)154}$. To help us divide **we may mentally remove the last digit from each number** and think $3\overline{)15}$.

$$\begin{array}{r} \mathbf{15 \text{ r } 4} \\ 30\overline{)\quad 454} \\ -\,30 \\ \hline 154 \\ -\,150 \\ \hline 4 \end{array}$$

Practice*

a. $30\overline{)420}$

b. $60\overline{)725}$

c. $40\overline{)480}$

d. $20\overline{)321}$

e. $50\overline{)610}$

f. $10\overline{)345}$

Problem set✓ 61

1. Betty went to the store with $3.25. She bought a box of cereal for $1.18 and a half gallon of milk for $1.02. How much money did Betty have left?

2. A yard is 36 inches. How many inches is $\frac{1}{3}$ of a yard?

3. Round 1236 to the nearest ten.

4. The 7 in 987,654,321 means which of the following?
   a. 700 **b.** 7 million **c.** 700,000

5. Draw two circles. Shade $\frac{1}{2}$ of one and $\frac{2}{4}$ of the other.

6. Use words to name 3,150,000.

7. Which factors of 9 are also factors of 12?

8. Use digits to write ninety-eight million, two hundred eighty-five thousand, six hundred eighteen.

9. $30\overline{)454}$

10. $40\overline{)560}$

11. $50\overline{)760}$

12. $500 \times 400 =$

13. $563 \times 46 =$

14. $68 \times 432 =$

15. $25\frac{1}{4} + 8\frac{2}{4} =$

16. $36\frac{2}{3} - 17\frac{2}{3} =$

17. $2947 \div 8 =$

18. $7564 \div (90 \div 10) =$

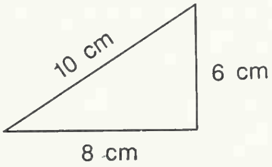
19. $$\begin{array}{r} 12{,}345 \\ -\ \ 6{,}789 \\ \hline \end{array}$$

20. $$\begin{array}{r} 365 \\ 247 \\ 483 \\ +\ 279 \\ \hline \end{array}$$

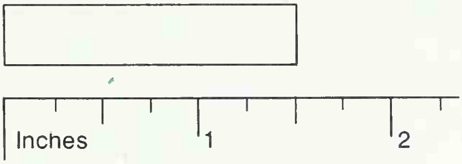
21. What number is missing in this division problem?

$$? \overline{)\,36}^{\;4}$$

22. What is the perimeter of this triangle?

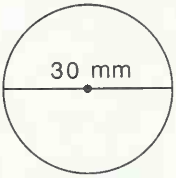


23. What is the length of the rectangle?



24. What year was five decades after 1896?

25. If the diameter of this circle is 30 millimeters, then what is the radius of the circle?



LESSON 62

Multiplying by Three-Digit Numbers, Part 1

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

When we multiply by a three-digit number, we actually multiply three times. We multiply by the ones' digit, then we multiply by the tens' digit, then we multiply by the hundreds' digit.

$$\begin{array}{r}234\\ \times\ 123\\ \hline\end{array}\ \text{equals}\ \begin{array}{r}234\\ \times\quad 3\\ \hline 702\end{array}\ \text{plus}\ \begin{array}{r}234\\ \times\quad 20\\ \hline 4680\end{array}\ \text{plus}\ \begin{array}{r}234\\ \times\quad 100\\ \hline 23{,}400\end{array} = 28{,}782$$

$$702 + 4680 + 23{,}400 = 28{,}782$$

We do not need to separate a three-digit multiplication problem into three problems before we start. We may do all the multiplication within the same problem.

Example Multiply:

$$\begin{array}{r}234\\ \times\ 123\\ \hline\end{array}$$

Solution

$$\begin{array}{rl}234 & \\ \times\ 123 & \\ \hline 702 & \leftarrow \text{We first multiply 234 by the 3 of 123.}\\ 468\underline{0} & \leftarrow \text{Then we multiply by the 20 of 123.}\\ 234\underline{00} & \leftarrow \text{Then we multiply by the 100 of 123.}\\ \hline 28{,}782 & \leftarrow \text{We add the three products to find the total product.}\end{array}$$

$\left.\begin{array}{l}\text{(20 of 123)}\\ \text{(100 of 123)}\end{array}\right\}$ The zeros need not be written.

The multiplication problems in the problem sets are designed to provide frequent practice on basic multiplication combinations. Three-by-three multiplication provides valuable practice with basic facts in a convenient, compact form.

Practice Find each product.

a. $\begin{array}{r}346\\ \times\ 354\\ \hline\end{array}$ **b.** $\begin{array}{r}487\\ \times\ 634\\ \hline\end{array}$ **c.** $\begin{array}{r}357\\ \times\ 468\\ \hline\end{array}$ **d.** $\begin{array}{r}849\\ \times\ 687\\ \hline\end{array}$

e. $\begin{array}{r}403\\ \times\ 768\\ \hline\end{array}$ **f.** $\begin{array}{r}670\\ \times\ 953\\ \hline\end{array}$ **g.** $\begin{array}{r}948\\ \times\ 482\\ \hline\end{array}$ **h.** $\begin{array}{r}705\\ \times\ 678\\ \hline\end{array}$

Problem set✓
62

1. Carlos bought a hamburger for \$1.65 and a drink for \$.70. He paid for the food with a \$5 bill. How much should he get back in change?

2. There are 276 pages in the book. If Martin has read one half of the book, then how many pages has he read?

3. Round 1362 to the nearest ten.

4. Which digit in 98,765,432 is in the ten millions' place?

5. A yard is 36 inches. How many inches is 2 yards 3 inches?

6. Draw a circle. Shade all but one third of it.

7. Use digits to write six hundred seventy-nine million, five hundred forty-two thousand, five hundred.

8. $60\overline{)720}$

9. $70\overline{)850}$

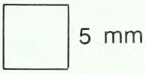
10. $80\overline{)980}$

11. $\begin{array}{r} 234 \\ \times\ 123 \\ \hline \end{array}$

12. $\begin{array}{r} 375 \\ \times\ 426 \\ \hline \end{array}$

13. $\begin{array}{r} 604 \\ \times\ 789 \\ \hline \end{array}$

14. What is the perimeter of this square?



15. $400 \times 800 =$

16. $60 \times 500 =$

17. $900 \times 90 =$

18. $\begin{array}{r} 300 \\ 400 \\ +\ 500 \\ \hline \end{array}$

19. $\begin{array}{r} 6000 \\ -\ 2000 \\ \hline \end{array}$

20. $\frac{400}{20} =$

21. $6\frac{5}{11} + 5\frac{4}{11} =$

22. $3\frac{2}{3} - 3 =$

23. $7\frac{2}{3} - \left(3\frac{1}{3} - 3\right) =$

Read this information. Then answer questions 24 and 25.

The Arroyo High School stadium can seat 3000 fans. Two thousand, one hundred fifty fans came to the first game. Arroyo won by a score of 35 to 28. Tickets to watch the game cost $2 each.

24. Altogether, how much money was paid by the fans who came to the first game?

25. At the second game all but 227 seats were filled with fans. How many fans came to the second game?

LESSON
63

Multiplying by Three-Digit Numbers, Part 2

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

When we multiply by a three-digit number that has a zero as one of its digits, we may find the product by doing two multiplications instead of three.

If we are multiplying by a number that ends with a zero, we may write the problem so that the zero "hangs out" to the right. We show this by multiplying 243 by 120.

$$\begin{array}{r} 243 \\ \times\ \ 120 \\ \hline 486\overset{\downarrow}{0} \\ 243\underline{\underline{00}} \\ \hline 29160 \end{array}$$

We multiply by the 20 of 120.
Then we multiply by the 100 of 120. (The two zeros do not need to be written.)
We add the two products to find the total product.

When we multiply by a three-digit number that has a zero as its middle digit, we set up the problem by lining up the last digits. Here we multiply 243 by 102 to show this kind of problem.

$$\begin{array}{r} 243 \\ \times\ 102 \\ \hline 486 \\ 2430 \\ \hline 24786 \end{array}$$

First we multiply by the 2 of 102. To multiply by the 0 tens of 102, we may write a 0 on the second line below it. Then we multiply by the 100 of 102 and add to find the total product.

Practice*

a. $\begin{array}{r} 234 \\ \times\ 240 \\ \hline \end{array}$ b. $\begin{array}{r} 125 \\ \times\ 240 \\ \hline \end{array}$ c. $\begin{array}{r} 230 \\ \times\ 120 \\ \hline \end{array}$ d. $\begin{array}{r} 304 \\ \times\ 120 \\ \hline \end{array}$

e. $\begin{array}{r} 234 \\ \times\ 204 \\ \hline \end{array}$ f. $\begin{array}{r} 125 \\ \times\ 204 \\ \hline \end{array}$ g. $\begin{array}{r} 230 \\ \times\ 102 \\ \hline \end{array}$ h. $\begin{array}{r} 304 \\ \times\ 102 \\ \hline \end{array}$

Problem set ✓ 63

1. Diana and her sister want to buy a radio for $30. Diana has $12, and her sister has $7. How much more money do they need?

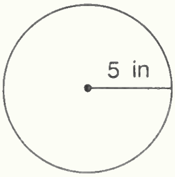
2. How many seconds equal one sixth of a minute?

3. The Smiths traveled from San Francisco to Washington, D.C. In what direction did they travel?

✓ 4. When the students got on the buses to go to the picnic, there were 36 on one bus, 29 on another bus, and 73 on the third bus. If students are moved so that there are the same number on each bus, how many students will be on each bus?

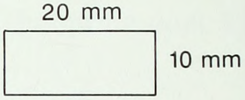
5. Which digit is in the ten-thousands' place in 123,456,789?

6. The radius of this circle is 5 inches. What is the diameter of the circle?



7. Use digits to write the number three hundred forty-five million, six hundred fourteen thousand, seven hundred eighty-four.

8. What is the perimeter of this rectangle?



9. $900 \times 40 =$

10. $700 \times 400 =$

11. $234 \times 320 =$

12. $345 \times 203 =$

13. $468 \times 386 =$

14. $\square \div 5 = 6$

15. $4317 \div 6 =$

16. $2703 \div 9 =$

17. $8608 \div 8 =$

18.
$$\begin{array}{r} 79{,}089 \\ 37{,}865 \\ 29{,}453 \\ +\ 16{,}257 \\ \hline \end{array}$$

19.
$$\begin{array}{r} 43{,}218 \\ -\ 32{,}461 \\ \hline \end{array}$$

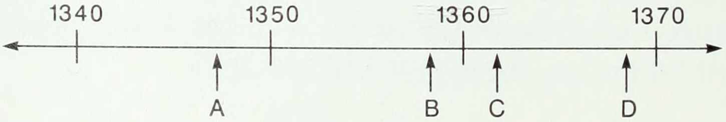
20.
$$\begin{array}{r} 10{,}000 \\ -\quad 456 \\ \hline \end{array}$$

21. $3\frac{5}{6} - 1\frac{5}{6} =$

22. $4\frac{1}{8} + 6 =$

23. $10\frac{7}{10} - \frac{4}{10} =$

24. Which arrow could be pointing to 1362?



25. Use words to name the mixed number $7\frac{1}{10}$.

LESSON 64

Learning the Terms Divisor, Dividend, Quotient

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

There are three numbers involved in every division problem:

1. The number which is being divided: $\mathbf{15} \div 3 = 5$
2. The number by which it is divided: $15 \div \mathbf{3} = 5$
3. The answer to the division: $15 \div 3 = \mathbf{5}$

These numbers are called the **dividend**, **divisor**, and **quotient**. In the example above, the dividend is 15, the divisor is 3, and the quotient is 5. The location of these numbers in a division problem is shown in the three forms below.

Form 1

$$\text{divisor}\overset{\text{quotient}}{\overline{\smash{)}\text{dividend}}}$$

Form 2

$$\frac{\text{dividend}}{\text{divisor}} = \text{quotient}$$

Form 3

$$\text{dividend} \div \text{divisor} = \text{quotient}$$

Example 1 If 4 is the divisor and 8 is the quotient, what is the dividend?

Solution Study the form and set up the problem. The missing number is **32**.

$$4\overset{8}{\overline{\smash{)}\,?}}$$

Example 2 Which number in this problem is the divisor? $6 \div 3 = 2$

Solution The divisor is the number that we divide by. Form 3 shows that the divisor in this problem is **3**.

Practice a. The divisor is 6; the quotient is 3. What is the dividend?

b. The dividend is 8; the quotient is 2. What is the divisor?

c. The dividend is 15; the divisor is 5. What is the quotient?

In each problem below tell whether 12 is the divisor, the dividend, or the quotient.

d. $12 \div 4 = 3$

e. $24 \div 2 = 12$

f. $48 \div 12 = 4$

g. $\frac{12}{2} = 6$

h. $\frac{24}{12} = 2$

i. $\frac{36}{3} = 12$

j. $\begin{array}{r} 3 \\ 12\overline{)36} \end{array}$

k. $\begin{array}{r} 2 \\ 6\overline{)12} \end{array}$

l. $\begin{array}{r} 12 \\ 5\overline{)60} \end{array}$

Problem set 64

1. There are 12 inches in a foot. A person 5 feet 4 inches tall is how many inches tall?

2. How many years is 10 centuries?

3. What word is used to name the perimeter of a circle?

4. Use words to name the mixed number $10\frac{7}{10}$.

5. How many minutes is one third of an hour?

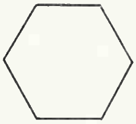
6. In the late afternoon, in what direction are the shadows pointing?

7. If 4 is the divisor and 12 is the quotient, what is the dividend?

8. What is the value of the place held by the zero in 321,098,765?

9. Which factors of 15 are also factors of 20?

10. What is the perimeter of this hexagon, if each side is 3 cm long?



11. $3\frac{2}{3} - \left(2\frac{1}{3} + 1\frac{1}{3}\right) =$

12. $3\frac{1}{3} + \left(2\frac{2}{3} - 1\frac{1}{3}\right) =$

13. $40\,\overline{)\,520}$

14. $8\,\overline{)\,3161}$

15. Which number in this problem is the divisor? $6 \div 3 = 2$

16.
$$\begin{array}{r} 4315 \\ -\ 2879 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 423 \\ \times\ 302 \\ \hline \end{array}$$

18.
$$\begin{array}{r} 99 \\ 36 \\ 42 \\ 75 \\ 64 \\ 98 \\ +\ 17 \\ \hline \end{array}$$

19.
$$\begin{array}{r} 345 \\ \times\ \ 360 \\ \hline \end{array}$$

20.
$$\begin{array}{r} 604 \\ \times\ 598 \\ \hline \end{array}$$

21. $\frac{10}{10} - \frac{9}{10} =$

22. $4\frac{3}{3} - \frac{1}{3} =$

23. $5\frac{2}{2} - 1\frac{1}{2} =$

24. From May 1 of one year to August 1 of the next year is how many months?

25. If it is morning, what time will be shown by this clock in 2 hours and 20 minutes?

LESSON 65

Dividing and Writing Quotients with Fractions

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

Sometimes we need to write the answer to a division problem as a mixed number.

> If two children share 5 cookies equally, how many cookies will each receive?

This is a division problem. We are to divide 5 into 2 equal parts. If we divide, we find the answer is 2 with a remainder of 1. That is, each child will receive 2 cookies and there will be 1 extra cookie. Can that extra cookie be divided? We can take the extra cookie and divide it into 2 equal parts—in halves. Then each child will receive $2\frac{1}{2}$ cookies.

$$\begin{array}{r} 2 \text{ r } 1 \\ 2\,\overline{)\,5} \\ 4 \\ \hline 1 \end{array}$$

$$1 \div 2 = \frac{1}{2}$$

In earlier lessons we have written answers to uneven divisions with remainders. But now we see we can write a remainder as a fraction as we did when we divided the remainder cookie into halves. **To write a remainder as a fraction, we simply make the remainder the numerator of the fraction and make the divisor the denominator of the fraction.**

Example 1 Divide and write the quotient with a fraction: $3\,\overline{)\,50}$

Solution We divide and find that the division is uneven. Instead of writing a remainder, we make the remainder the numerator of the fraction and we make the divisor the denominator of the fraction. The quotient is $\mathbf{16\frac{2}{3}}$.

$$\begin{array}{r} 16\frac{2}{3} \\ 3\,\overline{)\,50} \\ 3 \\ \hline 20 \\ 18 \\ \hline 2 \end{array}$$

Example 2 A 15-inch string of licorice is cut into 4 equal lengths. How long is each length?

Solution We divide 15 inches by 4 and find that the division is uneven. That is, the answer is not a whole number of inches. The answer is more than 3 inches but less than 4 inches. The answer is 3 inches plus a fraction. To find the fraction, we write the remainder as the numerator of the fraction and write the divisor as the denominator of the fraction. We find that the length of each piece of licorice is **$3\frac{3}{4}$ inches.**

$$\begin{array}{r} 3\frac{3}{4} \\ 4\overline{)15} \\ \underline{12} \\ 3 \end{array}$$

In the problem sets that follow, we will continue to write answers to uneven divisions with remainders, unless a problem asks that an answer be written with a fraction.

Practice* Divide and write each answer with a fraction.

a. $4\overline{)17}$ **b.** $20 \div 3 =$ **c.** $\frac{16}{5} =$

d. $5\overline{)49}$ **e.** $21 \div 4 =$ **f.** $\frac{49}{10} =$

g. $6\overline{)77}$ **h.** $43 \div 10 =$ **i.** $\frac{31}{8} =$

Problem set✓ 65

1. Martin bought 8 baseball cards for 15 cents each. If he paid $2, how much did he get back in change?

2. A 21-inch long string of licorice is cut into 4 equal lengths. How long is each length?

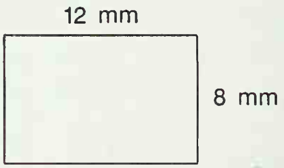
3. Sarah used $\frac{1}{5}$ of a sheet of stamps to mail cards. If there are 100 stamps in a whole sheet, then how many stamps did Sarah use?

4. Round 1776 to the nearest hundred.

5. In which of these numbers does the 5 have a value of 500,000?

a. 186,542,039 **b.** 347,825,516 **c.** 584,371,269

6. What is the perimeter of this rectangle?



7. $30\overline{)640}$ **8.** $40\overline{)922}$ **9.** $50\overline{)800}$

10. $\begin{array}{r} 7200 \\ -\ 1400 \\ \hline \end{array}$ **11.** $125 \times 80 =$

12. $700 \div 10 =$ **13.** $\begin{array}{r} 679 \\ \times\ 489 \\ \hline \end{array}$ **14.** $\begin{array}{r} 8104 \\ -\ 5647 \\ \hline \end{array}$

15. $\begin{array}{r} 286 \\ 635 \\ 178 \\ 46 \\ +\ 62 \\ \hline \end{array}$ **16.** $\frac{4228}{7} =$ **17.** $\frac{4635}{9} =$

18. $\frac{5}{5} - \frac{1}{5} =$ **19.** $3\frac{3}{3} - \frac{1}{3} =$ **20.** $4\frac{6}{6} - 2\frac{5}{6} =$

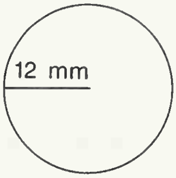
21. Divide and write the quotient with a fraction: $3\overline{)62}$

22. What is the denominator of the fraction in $6\frac{3}{4}$?

23. In a division problem, if the divisor is 3 and the quotient is 9, what is the dividend?

24. What year was five centuries before 1500?

25. If the radius of this circle is 12 millimeters, then what is the diameter of the circle?

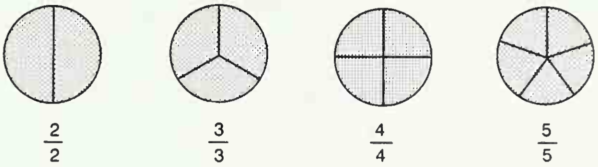


LESSON
66

Recognizing and Naming Fractions Equal to 1

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

We know that two halves make a whole. Similarly it takes **three** thirds or **four** fourths or **five** fifths to make one whole.



We see that each of these is a "whole pie," yet we can use fractions to name each one. Notice that the numerator and the denominator are the same when we name a "whole pie." This is a very important idea in mathematics. Whenever the numerator and denominator are the same, the fraction is equal to 1.

Example 1 Write a fraction equal to 1 which has a denominator of 4.

Solution A fraction equal to 1 which has a denominator of 4 would also have a numerator of 4, so we write $\frac{4}{4}$.

Example 2 $\frac{1}{4} + \frac{3}{4} =$

Solution We add and find that the sum is $\frac{4}{4}$. We should always write our answers in simplest form. The simplest name for $\frac{4}{4}$ is **1**.

$$\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = \mathbf{1}$$

Example 3 Compare: $4\frac{3}{3} \bigcirc 5$

Solution The mixed number $4\frac{3}{3}$ means $4 + \frac{3}{3}$. But $\frac{3}{3}$ is equal to 1. So $4 + \frac{3}{3}$ equals $4 + 1$, which is 5.

$$4\frac{3}{3} = 5$$

Example 4 $1\frac{1}{2} + 1\frac{1}{2} =$

Solution We add and find that the sum is $2\frac{2}{2}$. The mixed number $2\frac{2}{2}$ means $2 + \frac{2}{2}$. Since $\frac{2}{2}$ is equal to 1, $2 + \frac{2}{2}$ equals $2 + 1$, which is **3**.

$$1\frac{1}{2} + 1\frac{1}{2} = 2\frac{2}{2} = \mathbf{3}$$

Practice

a. Write a fraction equal to 1 which has a denominator of 3.

b. Compare: $\frac{4}{4} \bigcirc 1$

c. $\frac{3}{10} + \frac{7}{10} =$

d. Compare: $5\frac{4}{4} \bigcirc 6$

e. $3\frac{3}{5} + 2\frac{2}{5} =$

f. How many fraction names for 1 are there?

Problem set 66

1. There are 60 seconds in a minute. Three minutes and 24 seconds is how many seconds?

✓ **2.** Brady's mom baked 5 dozen cookies, and Brady ate one tenth of them. How many cookies did he eat?

3. Draw a quadrilateral which has a pair of horizontal parallel line segments of different lengths.

4. Which factors of 8 are also factors of 20?

5. Round 2181 to the nearest ten.

✓ **6.** Maria stood on two scales at the same time. The scale under her right foot read 46 pounds, and the scale under her left foot read 60 pounds. If she balances her weight equally on both scales, how much will each scale read?

7. $\frac{1}{4} + \frac{3}{4} =$ **8.** $1\frac{1}{3} + 2\frac{2}{3} =$ **9.** $2\frac{5}{8} + \frac{3}{8} =$

10. $\frac{4}{4} - \frac{1}{4} =$ **11.** $4\frac{3}{3} - 1\frac{1}{3} =$ **12.** $2\frac{8}{8} - \frac{3}{8} =$

13. $\begin{array}{r} 98{,}789 \\ 41{,}286 \\ +\ 18{,}175 \\ \hline \end{array}$ **14.** $\begin{array}{r} 47{,}150 \\ -\ 36{,}247 \\ \hline \end{array}$ **15.** $\begin{array}{r} 368 \\ \times\ 479 \\ \hline \end{array}$

16. Use words to name the mixed number $8\frac{9}{10}$.

17. Divide and write the quotient with a fraction: $\frac{15}{4}$

In problems 18–20 write the answer with a remainder.

18. $30\overline{)546}$ **19.** $40\overline{)687}$ **20.** $60\overline{)850}$

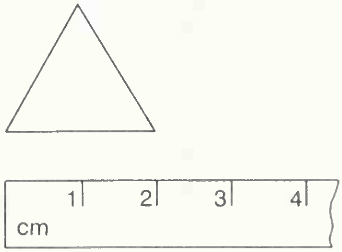
21. $507 \times 360 =$ **22.** $(900 - 300) \div 30 =$

23. Which of these mixed numbers is not equal to 3?

a. $2\frac{3}{3}$ **b.** $3\frac{2}{2}$ **c.** $2\frac{4}{4}$ **d.** $2\frac{8}{8}$

24. Write a fraction equal to 1 which has a denominator of 5.

25. Each side of this triangle is the same length. What is the perimeter of the triangle?



LESSON 67

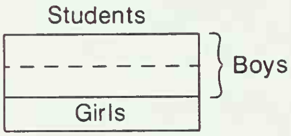
Finding a Fraction to Complete a Whole

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

Sometimes we are given one part of a whole and need to know the other part of the whole. For example:

> One third of the students are girls. What fraction of the students are boys?

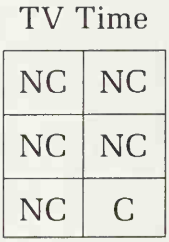
We begin to answer questions like this by thinking of the entire group as a whole. We draw the rectangle below to represent the whole group of students. The problem states that $\frac{1}{3}$ of the students are girls, so we divide the rectangle into three parts and label one of the parts "girls."



We know that the students are only boys and girls, since none of them are goats or chickens. The fraction of the students that is not girls must be boys. Since the girls take up 1 of the 3 parts, the boys must take up 2 of the 3 parts. Thus, two thirds of the students are boys.

Example Bob found that commercials take up one sixth of TV time. What fraction of TV time is not taken up by commercials?

Solution We begin by thinking of TV time as a whole. We draw a rectangle to show this. The problem uses the fraction $\frac{1}{6}$, so we divide the rectangle into six equal parts. We label one part "C" for commercial and the other parts "NC" for not commercial. We see that the fraction of TV time that is not commercial (NC) is $\frac{5}{6}$.



Practice a. Kent has read one fourth of his book. What fraction of his book is left to read?

b. Five eighths of the gymnasts were able to do a back handspring. What fraction of the gymnasts were unable to do a back handspring?

c. If three fifths of the spectators were rooting for the home team, then what fraction of the spectators were not rooting for the home team?

Problem set 67

✓ 1. In one class there are three more girls than boys. There are 14 boys. How many students are in the class?

✓ 2. Calvin bought two bicycle tubes for \$2.39 each and a tire for \$4.49. The tax was \$.56. If he paid \$10, how much money should he get back?

3. From the years 1800 to 1900 was how many decades?

4. The diameter of Kitty's bicycle wheel is 24 inches. What is the radius of the wheel?

5. Round 487 and 326 to the nearest hundred. Then add the rounded numbers together. What is their sum?

6. $\frac{\square}{7} = 1$

7. $4 = 3\frac{\square}{4}$

8. What is the perimeter of this square field?

9. $\frac{1}{6} + \frac{2}{6} + \frac{3}{6} =$

10. $3\frac{3}{5} + 1\frac{2}{5} =$

11. $\frac{8}{8} - \frac{1}{8} =$

12. $4\frac{5}{5} - 1\frac{2}{5} =$

13. $\begin{array}{r} 3524 \\ -\ 1462 \\ \hline \end{array}$

14. $\begin{array}{r} 578 \\ \times\ 467 \\ \hline \end{array}$

15. $\frac{3672}{9} =$

16. Divide and write the quotient with a fraction: $\frac{23}{10}$

17. Selby found that commercials take up one eighth of TV time. What fraction of TV time is not taken up by commercials?

18. $374 \times 360 =$

19. $643 \div 40 =$

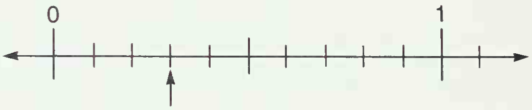
20. $60 \times (800 \div 40) =$

21. $20 \overline{)1340}$

22. Compare: $\frac{4}{4} \bigcirc \frac{5}{5}$

23. Write a fraction equal to 1 which has a denominator of 8.

24. The arrow points to what fraction on the number line?



25. If the time is 11:35 a.m., how many minutes is it until noon?

LESSON 68

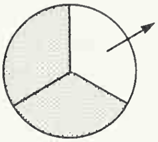
Subtracting a Fraction from 1

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

We recall that there are many different fractions that are equal to 1. Any fraction with the same numerator and denominator is equal to 1. We can use this knowledge to help us solve problems when a fraction is subtracted from 1.

Example 1 $1 - \frac{1}{3} =$

Solution We can show this problem with a picture that represents the whole pie. If we remove one third of the pie, how much of the pie is still in the pan?



Before we can remove a third, we first slice the pie into three thirds. Then we can "subtract" one third.

Using numbers we solve the problem this way: $1 - \frac{1}{3} =$

$$\begin{array}{ccc} 1 & - & \frac{1}{3} \; = \\ \downarrow & & \downarrow \\ \frac{3}{3} & - & \frac{1}{3} \; = \end{array}$$

We change the 1 to the fraction $\frac{3}{3}$:

Then we subtract and get $\mathbf{\frac{2}{3}}$.

We could have chosen any name for 1, such as $\frac{2}{2}$ or $\frac{4}{4}$ or $\frac{3682}{3682}$, but we chose $\frac{3}{3}$ because it had the same denominator as the other fraction. Remember, we can only add and subtract fractions when their denominators are the same.

Example 2 $\frac{2}{5} + \square = 1$

Solution To solve this problem we will first change the 1 to a fraction equal to 1 that has the same denominator as $\frac{2}{5}$. The denominator of $\frac{2}{5}$ is 5, so we change the 1 to $\frac{5}{5}$. We see that $\frac{3}{5}$ must be added to $\frac{2}{5}$ to get $\frac{5}{5}$. Thus the missing number in this problem is $\mathbf{\frac{3}{5}}$.

$$\begin{array}{c} \frac{2}{5} + \square = 1 \\ \hphantom{\frac{2}{5} + \square = {}} \downarrow \\ \frac{2}{5} + \square = \frac{5}{5} \\[1em] \frac{2}{5} + \mathbf{\frac{3}{5}} = \frac{5}{5} \end{array}$$

Practice **a.** $1 - \frac{1}{4} =$ **b.** $1 - \frac{1}{8} =$ **c.** $\frac{3}{8} + \square = 1$

d. $1 - \frac{2}{3} =$ **e.** $\frac{3}{4} + \square = 1$ **f.** $\frac{3}{10} + \square = 1$

Problem set 68

1. There are 12 inches in a foot. A person 6 feet 3 inches tall is how many inches tall?

2. One sixth of the class was absent. What fraction of the class was present?

3. How many years were there from 1056 to 1215?

4. Write the standard number for $(7 \times 1000) + (4 \times 10)$.

5. Round 56 and 23 to the nearest ten. Multiply the rounded numbers together. What is their product?

6. Which of these does not equal 5?

a. $4 + 1$ **b.** $4\frac{5}{5}$ **c.** $5\frac{4}{4}$ **d.** $4\frac{3}{3}$

7. Which factors of 12 are also factors of 16?

8. If each side of an octagon is 10 inches long, then what is the perimeter of the octagon?

9. $1 - \frac{1}{5} =$ **10.** $1 - \frac{3}{4} =$ **11.** $\frac{2}{7} + \square = 1$

12. $\frac{1}{10} + \frac{2}{10} + \frac{3}{10} + \frac{4}{10} =$ **13.** $5\frac{3}{4} + 4\frac{1}{4} =$

14. $\begin{array}{r} 4263 \\ -\ 1784 \\ \hline \end{array}$ **15.** $\begin{array}{r} 5000 \\ -\ 1934 \\ \hline \end{array}$ **16.** $\begin{array}{r} 58 \\ 39 \\ 24 \\ 16 \\ 52 \\ +\ 11 \\ \hline \end{array}$

17. $\begin{array}{r} 389 \\ \times\ 470 \\ \hline \end{array}$

18. $\dfrac{5445}{9} =$

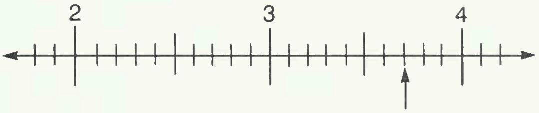
19. Divide and write the quotient with a fraction: $\dfrac{25}{6}$

20. $894 \div 40 =$

21. $943 \div 30 =$

22. $(800 - 300) \times 20 =$

23. On this number line, the arrow is pointing to what mixed number?



24. Write a fraction equal to 1 which has a denominator of 10.

25. What month is 15 months after November?

LESSON
69

Estimating Arithmetic Answers

> **Facts Practice:** 48 Uneven Divisions (Test G in Test Booklet)

We have used arithmetic to find exact answers. For some problems finding an exact answer takes many steps and may take a long time. In this lesson we will practice a way to "get close" to an exact answer quickly. Trying to get close to an exact answer is called **estimating**. To **estimate** we use rounded numbers to make the arithmetic easier. We may even do the arithmetic mentally ("in our head"). If we estimate the answer before we calculate, we can tell if our exact answer "makes sense." Estimating first will cut down on our errors by helping us discover when our exact answers are very, very wrong. Thus

Instead of adding 413 + 296 to get the exact answer of 709, we might add 400 + 300 to get the estimated answer of 700.

Since we used rounded numbers, our answer is not exact, but it is close.

Example 1 Estimate the product of 29 and 21.

Solution We estimate to find out **about** how much an answer will be. Estimating is a quick way to get close to an exact answer. To estimate, we round the numbers **before** we do the work. The numbers 29 and 21 round to 30 and 20, which we can multiply mentally. So our answer is **600**.

Practice* Estimate each answer by rounding the numbers before doing the arithmetic. **Often you will be able to do the work mentally, but for this practice show how you rounded the numbers.**

a. 89 + 72
90 + 70 = 160 (example)

b. 58 × 23

c. 585 + 312

d. 38 × 19

e. 91 − 28

f. 29 × 312

g. 685 − 391

h. 59 ÷ 29

i. 703 − 497

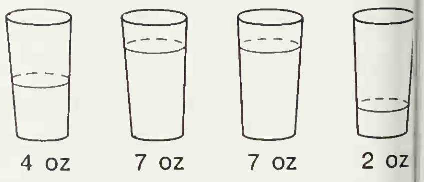
j. 89 ÷ 31

Problem set 69

1. Mrs. Smith baked 6 dozen cookies for the party. There were 20 cookies left over. How many cookies were eaten?

2. A millennium is 1000 years. A millennium is how many centuries?

3. If the amount of water in each glass is made the same, how many ounces of water will be in each glass?



4. If one third of a circle is shaded, what fraction of the circle is not shaded?

5. Estimate the product of 39 and 41. Show your work.

6. $1 - \frac{1}{10} =$ **7.** $1 - \frac{3}{8} =$ **8.** $\frac{4}{5} + \square = 1$

9. $3\frac{1}{3} + 1\frac{2}{3} =$ **10.** $6\frac{10}{10} - \frac{1}{10} =$ **11.** $8 = 7\frac{\square}{6}$

12. Estimate the sum of 586 and 317 by rounding the numbers to the nearest hundred before adding.

13.
$$\begin{array}{r} 89{,}786 \\ 36{,}428 \\ 57{,}814 \\ +\ 91{,}875 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 35{,}042 \\ -\ 17{,}651 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 428 \\ \times\ 396 \\ \hline \end{array}$$

16. $4735 \div 5 =$ **17.** $8 \times 43 \times 602 =$

18. Divide and write the quotient with a fraction: $\frac{15}{8}$

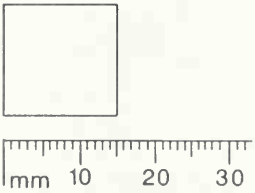
19. $967 \div 60 =$ **20.** $875 \div 40 =$

21. Which of these does not equal 6?

a. $5\frac{2}{2}$ **b.** $6\frac{1}{1}$ **c.** $5 + 1$ **d.** $5\frac{10}{10}$

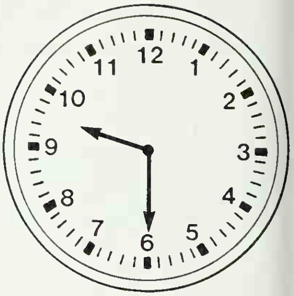
22. \$100 − (\$24 + \$43.89 + \$8.67 + \$.98) =

23. The perimeter of this square is how many millimeters?



24. Think of an even number. Multiply it by 5. What number is the last digit of the product?

25. If it is morning, what time will be shown by this clock in 3 hours and 20 minutes?



LESSON 70

Subtracting a Fraction from a Whole Number Greater than 1

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

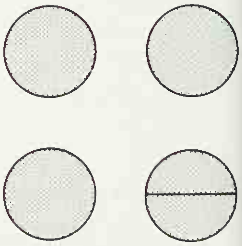
When we subtract a fraction from 1, we change the 1 to a fraction name for 1. Then we can subtract. If the problem is $1 - \frac{1}{3}$, we change the 1 to $\frac{3}{3}$ so that the denominators will be the same, then we subtract.

We change from this form $1 - \frac{1}{3} =$

to this form $\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$

In this lesson we will subtract fractions from whole numbers greater than 1.

Imagine you are a baker with 4 whole pies on the shelf. If someone asked for half a pie, you would have to cut one of the pies into 2 halves. While both halves were still in the pan, you would have 4 pies, but you could call those pies $3\frac{2}{2}$ pies.



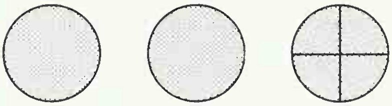
We use this idea to subtract a fraction from a whole number. We take 1 from the whole number and write it as a fraction with the same denominator as the fraction being subtracted. We will answer the problem $4 - \frac{1}{2}$ to show this.

We change from this form $4 - \frac{1}{2} =$

to this form $3\frac{2}{2} - \frac{1}{2} = 3\frac{1}{2}$

Example 1 Name the number of shaded circles **(a)** as a whole number and **(b)** as a mixed number.

Solution **(a)** We see **3** circles.



(b) Since one of the circles is divided in fourths, we can also say that there are two whole circles and four fourths of a circle, which we write as the mixed number $\mathbf{2\frac{4}{4}}$.

Example 2 $5 - \frac{1}{3} =$

Solution We think of 5 as being 4 + 1, which we can write as $4\frac{3}{3}$. Now we can subtract.

$$\begin{array}{ccccc} 5 & - & \frac{1}{3} & = & \\ \downarrow & & \downarrow & & \\ 4\frac{3}{3} & - & \frac{1}{3} & = & \mathbf{4\frac{2}{3}} \end{array}$$

Practice*

a. $1 - \frac{1}{4} =$ b. $3 - \frac{3}{4} =$ c. $4 - 2\frac{1}{4} =$

d. $2 - \frac{1}{4} =$ e. $4 - 1\frac{1}{2} =$ f. $6 - 1\frac{2}{3} =$

Problem set 70

1. A 100-centimeter stick broke into 3 pieces. One piece was 24 centimeters long, and another was 34 centimeters long. How long was the third piece?

2. Bill's pencil was 6 inches long. While doing his homework, Bill used up $1\frac{1}{2}$ inches of his pencil. Then how long was his pencil?

3. Isabel can make 4 hamburgers from 1 pound of meat. How many hamburgers can she make from 5 pounds of meat?

4. In the 4 stacks of math books there were 18, 19, 24, and 23 books. If the stacks were made even, how many books would be in each stack?

5. Estimate the sum of 398 and 487 by rounding to the nearest hundred before adding.

6. Which factors of 14 are also factors of 21?

7. The distance around the earth at the equator is like what measurement of a circle?
a. radius **b.** diameter **c.** circumference

8. What is the sum of five million, two hundred eighty-four thousand and six million, nine hundred eighteen thousand, five hundred?

9. $7 - \frac{1}{3} =$

10. $6 - 2\frac{1}{2} =$

11. $8 - 3\frac{3}{4} =$

12. $\frac{8}{9} + \left(\frac{2}{9} - \frac{1}{9}\right) =$

13. $5\frac{3}{4} - \left(3\frac{2}{4} + 1\frac{1}{4}\right) =$

14. $\begin{array}{r} 43{,}716 \\ -\ 19{,}537 \\ \hline \end{array}$

15. $\begin{array}{r} 687 \\ \times\ 794 \\ \hline \end{array}$

16. $\frac{1472}{8} =$

17. Divide and write the quotient with a fraction: $\frac{20}{9}$

18. $20\overline{)951}$

19. $50\overline{)2560}$

20. $50 \times (400 + 400) =$

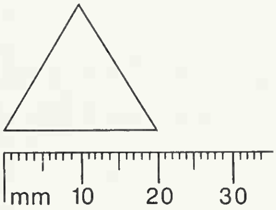
21. $(400 + 400) \div 40 =$

22. $4736 + 2849 + 351 + 78 =$

23. If one eighth of the class was absent, what fraction of the class was present?

24. If the time is 12:48 p.m., how many minutes is it until 1 p.m.?

25. Each side of this triangle is the same length. What is the perimeter of this triangle?

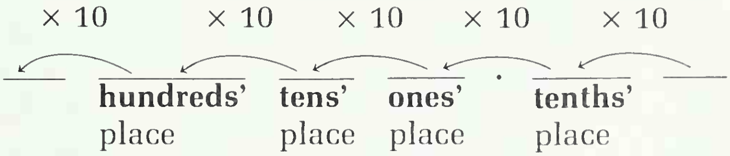


ESSON
1

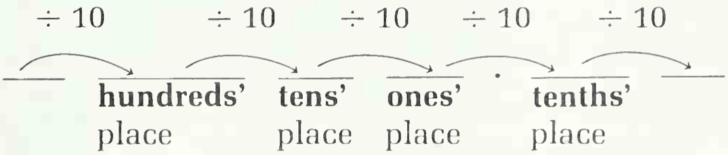
Writing Tenths in Decimal Form

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

Our number system is called the **decimal system**. "Decimal" means based on the number 10. We can use the 10 digits of our number system to write any whole number. We can do this because the decimal number system uses the idea of place value. Every place has a value 10 times greater than the value of the place to its right.



We may also say that every place has a value **one tenth** of the value of the place to its left.



If we divide 100 into 10 parts, we get tens. If we divide 10 into 10 parts, we get ones. If we continue this pattern to the right of the ones' place, we see that the decimal system can also be used to name fractions. If we divide the number 1 into 10 parts, we get the fraction **tenths**. So we call the place to the right of the ones' place the **tenths' place**. When we use the decimal system to name a fraction, we write a period, called a **decimal point**, between the ones' place and the tenths' place. Digits written to the right of a decimal point name fractions. Fractions named with decimal numbers are sometimes called **decimal fractions**.

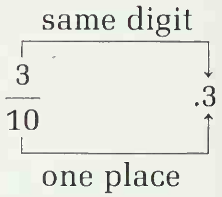
We have written fractions with numerators and denominators. These fractions are called **common fractions**. In this lesson we will write fractions as decimal fractions. Here are two ways to write the fraction one tenth.

1. One tenth as a common fraction, $\frac{1}{10}$
2. One tenth as a decimal fraction, .1

The common fraction $\frac{1}{10}$ and the decimal fraction .1 are both named "one tenth" and are equal in value.

Example Write the fraction three tenths as a common fraction. Then write it as decimal fraction.

Solution We write the common fraction three tenths this way, $\frac{3}{10}$. A fraction with a denominator of 10 can be written as a decimal number with one digit after the decimal point. The numerator of the fraction becomes the digit after the decimal point. We write the decimal fraction three tenths as **.3**.



Practice Complete the chart of equivalent decimals and fractions.

Decimal form	a.	.1	c.	.2	e.	.7	g.	.9
Fraction form	$\frac{3}{10}$	b.	$\frac{4}{10}$	d.	$\frac{5}{10}$	f.	$\frac{6}{10}$	h.

Problem set 71

1. What is the sum of one hundred sixteen thousand, five hundred twenty-one and two hundred fifty-three thousand, four hundred seventy-nine?

2. Terry wants to buy a new camera that costs $30.63. She has $17.85. How much more money does she need?

3. In the auditorium there were 30 rows of seats with 16 seats in each row. If there were 21 empty seats, how many seats were filled?

4. Jeremy is reading a 324-page book. If he plans to finish the book in 6 days, how many pages should he read each day?

5. Estimate the product of 68 and 52.

6. If three tenths of the bowling pins were up, what fraction of the bowling pins were down?

7. Write a decimal number equal to the fraction $\frac{7}{10}$.

8. Write a fraction equal to the decimal number .9.

9. Which digit in 45,329 is in the same place as the 6 in 1687?

10. Divide 25 by 8 and write the quotient with a fraction.

11. Which factors of 20 are also factors of 30?

12. What time is $1\frac{1}{2}$ hours before noon?

13. Think of an odd number. Divide it by 2. What is the remainder?

14. $\begin{array}{r} 36{,}012 \\ -\ 15{,}365 \\ \hline \end{array}$

15. $\begin{array}{r} 479 \\ \times\ 346 \\ \hline \end{array}$

16. $\frac{8765}{5} =$

17. $\begin{array}{r} 434 \\ 26 \\ 558 \\ 947 \\ 623 \\ +\ \ 65 \\ \hline \end{array}$

18. $3045 \div 6 =$

19. $60\overline{)1586}$

20. $\begin{array}{r} 7 \\ -\ 3\frac{2}{3} \\ \hline \end{array}$

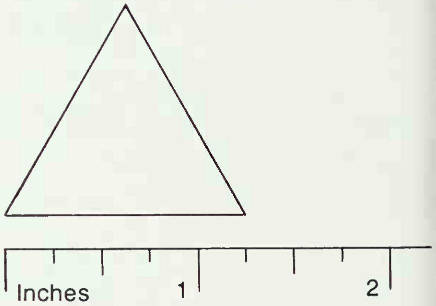
21. $\begin{array}{r} 1\frac{1}{3} \\ +\ 2\frac{2}{3} \\ \hline \end{array}$

22. $\begin{array}{r} 4 \\ -\ 3\frac{3}{4} \\ \hline \end{array}$

23. $5 \times 4 \times 3 \times 2 \times 1 \times 0 =$

24. Draw a pentagon.

25. The sides of this triangle are equal in length. What is the perimeter of the triangle?



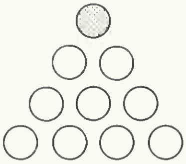
LESSON 72

Naming Fractional Parts with Decimal Fractions—Tenths

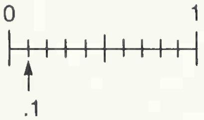
Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

We have used fractions to name parts of a whole, parts of a group, and parts of a segment. Each of these can also be named using decimal numbers. Each picture at the top of page 211 represents the fraction one tenth and may be named with the decimal number .1.

.1 of the rectangle
is shaded.



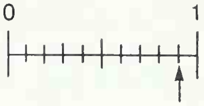
.1 of the group
is shaded.



Example 1 A part of this shape is shaded. Name the shaded part twice, once as a fraction and again as a decimal number.

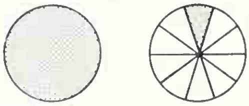
Solution The rectangle is sliced into 10 equal strips. Three of the 10 strips are shaded. We are told to name the shaded part both as a fraction and as a decimal number, which we write as $\mathbf{\frac{3}{10}}$ and **.3**.

Example 2 Name the point on the number line marked by the arrow as a fraction and as a decimal number.



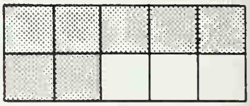
Solution The distance from 0 to 1 is divided into 10 smaller segments. Each segment is $\frac{1}{10}$ of the unit segment. From zero to the arrow is 9 small segments. Thus the arrow marks the fraction nine tenths, which we write as $\mathbf{\frac{9}{10}}$ and **.9**.

Example 3 Name the number of shaded circles as a mixed number and as a decimal number.



Solution We see all of one circle is shaded and one tenth of another circle is shaded. We write one and one tenth as a mixed number as $\mathbf{1\frac{1}{10}}$. We write one and one tenth as a decimal number by writing the whole number and then the decimal fraction, **1.1**.

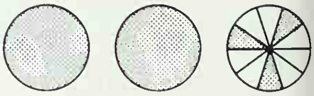
Practice The four points on the number line on page 212 are marked with an arrow. Name each of the four points two ways, once as a fraction and once as a decimal number.



Use this rectangle to do problems (e) and (f).

e. Name the shaded part of the rectangle as a fraction and as a decimal number

f. Name the part of the rectangle that is not shaded both as a fraction and as a decimal number.



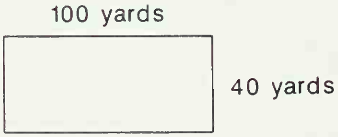
g. Name the number of shaded circles both as a mixed number and as a decimal number.

Problem set 72

1. Draw a quadrilateral with one pair of horizontal segments and one pair of vertical segments.

2. The players were divided into 10 teams with 12 players on each team. If all the players are divided into 8 equal teams instead of 10, then how many players will be on each team?

3. This is a drawing of a field that is 100 yards long and 40 yards wide. What is its perimeter?



4. A yard is 36 inches. How many inches is one fourth of a yard?

5. Tom's school starts at 8:30 a.m. If it is now 7:45 a.m., how many minutes does he have until school starts?

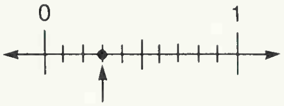
6. Estimate the sum of 672 and 830 by rounding to hundreds before adding.

7. A part of this shape is shaded. Name the shaded part twice, once as a fraction and once as a decimal number.

8. Write a decimal number equal to the fraction $\frac{4}{10}$.

9. Write a fraction equal to the decimal number .7.

10. Name the point on the number line marked by the arrow both as a fraction and as a decimal number.



11. The number 9 has three different factors. The number 10 has how many different factors?

12. Divide and write the quotient as a mixed number: $\frac{15}{4}$

13. Write the largest odd number that uses each of the digits 3, 4, and 5 only once.

14. Five hundred is how much more than three hundred ninety-five?

15. $\begin{array}{r} 36{,}195 \\ 17{,}436 \\ +\ 42{,}374 \\ \hline \end{array}$

16. $\begin{array}{r} 41{,}026 \\ -\ 39{,}543 \\ \hline \end{array}$

17. $\begin{array}{r} 608 \\ \times\ 479 \\ \hline \end{array}$

18. $2637 \div 4 =$

19. $40\overline{)3360}$

20. $\frac{3360}{20} =$

21. $3\frac{3}{8} + 5\frac{5}{8} =$

22. $5 - 3\frac{3}{8} =$

23. $3\frac{3}{4} - 3 =$

24. $6 \times 42 \times 20 =$

25. \$20 − (\$5.63 + \$12) =

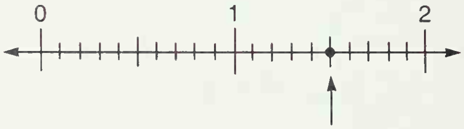
LESSON 73

Naming Points on a Number Line with Decimal Numbers

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

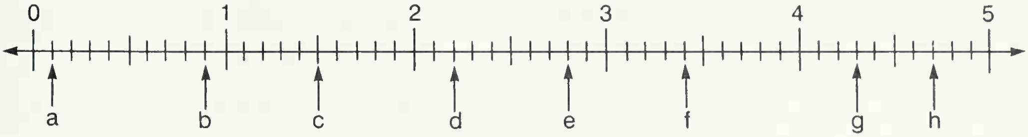
Every point on the number line can be "named" with a number. We see on this number line the points for the whole numbers 0, 1, and 2. We also see points between these whole numbers. We can name these points with fractions. The distance between 0 and 1 has been divided into 10 equal lengths. The first arrow is pointing to a mark that is three of those lengths past the zero. It is pointing to a mark which is $\frac{3}{10}$ of the distance from 0 to 1. We may name that mark as the fraction $\frac{3}{10}$ or as the decimal number .3. The second arrow is pointing to a mark which is 7 of the 10 spaces past the 1. We may name that mark with the mixed number $1\frac{7}{10}$. To name this point as a decimal number we write 1.7. In the problem sets we will practice naming points on a number line with decimal numbers.

Example Use a decimal number to name the point on the number line marked by the arrow.



Solution The distance between the whole numbers on the number line is divided into 10 small segments. Each segment represents one tenth. The arrow points five tenths past the 1, or **1.5**.

Practice Write a decimal number to name each point marked by an arrow on the number line at the top of page 215.



Problem set 73

1. Draw a pair of parallel line segments that are neither horizontal nor vertical.

2. What is the total cost of 3 pounds of grapes at $.45 per pound and 2 pounds of bananas at $.39 per pound?

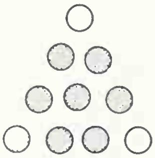
3. Before the sale there were one thousand, two hundred items on the shelf. After the sale there were four hundred nineteen items on the shelf. How many items were sold?

4. Jason ran around the block. If the block is 200 yards long and 60 yards wide, then how far did he run?

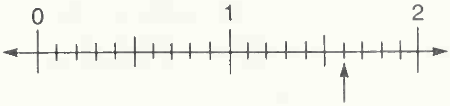
5. The distance that you move when you take one big step is about a meter. A classroom door is about how many meters wide?

6. One dozen records cost $72. At that rate, what would 4 records cost?

7. Name the fraction of the circles shaded as a fraction and as a decimal number.



8. Use a decimal number to name the point on the number line marked by the arrow.



9. Divide 12 by 5 and write the quotient as a mixed number.

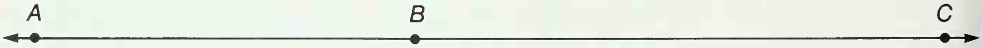
10. List the factors of 18 that are also factors of 30.

11. The years 1984, 1988, and 1992 are leap years. What is the next leap year after 1992?

12. Write the standard numeral for the following:

$$(6 \times 1000) + (5 \times 10) + (3 \times 1)$$

13. Points *A*, *B*, and *C* lie in order on a straight line. The line segment from point *A* to point *B* is 5 centimeters long. The segment from *B* to *C* is 7 centimeters. How long is the segment from *A* to *C*?



14.
$$\begin{array}{r} 10{,}000 \\ -\quad 684 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 439 \\ \times\ 648 \\ \hline \end{array}$$

16. $\frac{3654}{6} =$

17.
$$\begin{array}{r} 476 \\ 54 \\ 823 \\ 795 \\ 227 \\ +\quad 15 \\ \hline \end{array}$$

18. 46,528 ÷ 7 =

19. $60\overline{)7563}$

20.
$$\begin{array}{r} 8\frac{3}{4} \\ -\ 3\frac{3}{4} \\ \hline \end{array}$$

21.
$$\begin{array}{r} 2\frac{3}{10} \\ +\ 4\frac{7}{10} \\ \hline \end{array}$$

22.
$$\begin{array}{r} 4 \\ -\ 3\frac{1}{3} \\ \hline \end{array}$$

23. Compare: 12 ÷ 3 ○ 120 ÷ 30

Use this graph to answer questions 24 and 25. Notice that each x stands for ten dollars.

Money Earned in Fund Raiser

STUDENT	MONEY EARNED			
Debbie	x	x	x	x
Mark	x	x	x	
Vera	x	x	x	
John	x	x	x	x

Each x = $10.

24. Altogether, how much money was earned by Vera and John?

25. Debbie earned how much more than Vera?

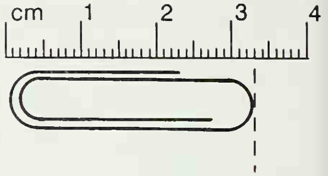
LESSON 74

Reading a Centimeter Scale to the Nearest Tenth

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

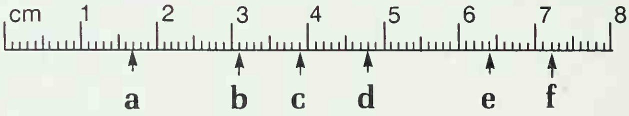
Each centimeter on the scale above has been divided into 10 smaller segments. Each of these segments is one tenth of a centimeter. To find the length of the pin shown, we find the mark on the scale which is closest to the end of the pin. We see that the end of the pin is 3 small segments more than 2 centimeters. So, the length of the pin is $2\frac{3}{10}$ centimeters. When measuring in the metric system, we write fractions in decimal form. Using digits, the length of the pin is 2.3 cm.

Example Find the length of the paper clip to the nearest tenth of a centimeter.



Solution The paper clip is between 3 and 4 centimeters long. It is 3 centimeters plus a fraction. The marks on the scale divide each centimeter into fractions which are tenths of centimeters. The length of the paper clip is three tenths more than 3 centimeters. We write metric measures with decimal numbers. The length is **3.3 cm**.

Practice The arrows point to which numbers on the centimeter scale?



Problem set 74

1. How many tens are in 100?

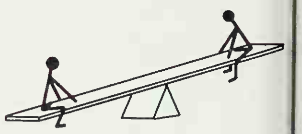
2. What number is next in this sequence?

   2450, 2550, 2650, ____

3. Estimate the difference of 794 and 312 by rounding to the nearest hundred before you subtract.

4. If 4 of them weigh 20 pounds, then how much would 6 of them weigh?

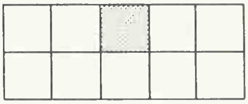
5. When one end of the seesaw is 9 inches above the ground, the other end is 21 inches above the ground. How far are the ends above the ground when the seesaw is level?



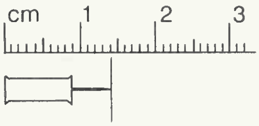
6. Compare: $\frac{3}{2} \bigcirc \frac{4}{4}$

7. Which digit in 4318 is in the same place as the 7 in 96,275?

8. Name the shaded part of the rectangle as a fraction and as a decimal number.



9. Find the length of this tack to the nearest tenth of a centimeter.



10. Write the fraction $\frac{8}{10}$ as a decimal number.

11. Divide 53 by 10 and write the quotient as a mixed number.

12. Four times a number n can be written $4n$. If $4n = 20$, then n equals what number?

13. Segment AB is 40 millimeters long. Segment BC is 35 millimeters long. How long is segment AC?

14. $$\begin{array}{r} 87{,}864 \\ 46{,}325 \\ +\ 39{,}784 \\ \hline \end{array}$$

15. $$\begin{array}{r} 34{,}125 \\ -\ 16{,}086 \\ \hline \end{array}$$

16. $$\begin{array}{r} 40{,}000 \\ -\ 39{,}857 \\ \hline \end{array}$$

17. $\frac{5628}{6} =$

18. $$\begin{array}{r} 807 \\ \times\ 479 \\ \hline \end{array}$$

19. $$\begin{array}{r} 700 \\ \times\ 800 \\ \hline \end{array}$$

20. $3\frac{2}{3} - \left(2\frac{1}{3} + 1\right) =$

21. $4 - \left(2 + 1\frac{1}{4}\right) =$

22. $36 \times 60 \times 7 =$

23. \$20 − (\$8 + \$2.07) =

Read this information. Then answer questions 24 and 25.

There are 16 players on the Norwood softball team. Ten players are in the game at one time. The rest of the players are substitutes. The team won 7 of its first 10 games.

24. The Norwood softball team has how many substitutes?

25. If the team played 12 games in all, what is the largest number of games the team could have won?
a. 12 **b.** 10 **c.** 9 **d.** 7

LESSON
75

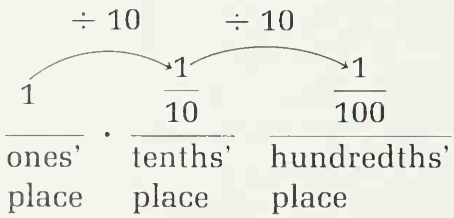
Writing Hundredths in Decimal Form

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

There are two ways to write the fraction one hundredth.

1. One hundredth as a common fraction, $\frac{1}{100}$
2. One hundredth as a decimal fraction, .01

Note that in the decimal fraction, we placed the 1 **two places** to the right of the decimal point. So we have placed the 1 in the **hundredths' place**. We remember that the value of each place is one tenth of the value of the place to its left. Dividing 1 into 10 parts, we get tenths, the first place to the right of the decimal point. Dividing a tenth into 10 parts, we get hundredths, the second place to the right of the decimal point.



A common fraction with a denominator of 100 can be written as a decimal fraction with two digits after the decimal point. The digits of the numerator of the common fraction become the digits of the decimal fraction. Sometimes another zero is needed. Study these examples:

$$\frac{3}{100} = .03 \qquad \frac{30}{100} = .30 \qquad \frac{97}{100} = .97$$

Notice that when the fraction has only one digit in the numerator, we still must write two digits after the decimal point. In the first example above, we write the 3 in the second place and a 0 in the first place.

Example 1 Write twelve hundredths as a common fraction and again as a decimal number.

Solution We write twelve hundredths as a common fraction this way, $\frac{12}{100}$. A common fraction with a denominator of 100 can be written as a decimal number with two digits after the decimal point, as **.12**.

$$\overset{\text{same digits}}{\frac{12}{100} = \underbrace{.12}_{\text{two places}}}$$

Example 2 Write the fraction $\frac{7}{100}$ as a decimal number.

Solution A fraction with a denominator of 100 can be written as a decimal fraction with two digits after the decimal point. We may not write .7, because this is seven tenths. We may not write .70, because this is seventy hundredths. Instead we write the 7 in the second place and put a zero in the first place. We write seven hundredths this way: **.07**

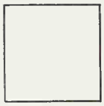
Practice Complete this chart.

Common fraction	$\frac{2}{100}$	**b.**	$\frac{5}{100}$	**d.**
Decimal fraction	**a.**	.09	c.	.01

Problem set 75

1. The books were divided into 4 piles with 15 books in each pile. If the books are divided into 5 equal piles instead of 4, then how many books will be in each pile?

2. A loop of string 20 inches long is made into the shape of a square. How long is each side of the square?



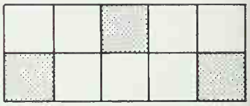
3. Sandy rented 2 movies for \$2.13 each. She paid for them with a \$10 bill. How much money did she get back?

4. On the baseball field the bases are 90 feet apart. When Hank hit a home run, how far did he run?

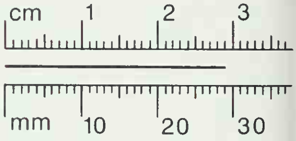
5. Write the fraction twenty-one hundredths as a common fraction and again as a decimal fraction.

6. Write the fraction $\frac{9}{100}$ as a decimal number.

7. Use both a fraction and a decimal number to name the part of this rectangle that is **not** shaded.



8. Write the length of this segment as a number of centimeters and again as a number of millimeters.

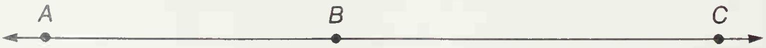


9. Write the decimal number .03 as a fraction.

10. Divide 81 by 10 and write the quotient as a mixed number.

11. Five times a number m can be written $5m$. If $5m = 30$, then m equals what number?

12. Segment AB is $1\frac{1}{2}$ inches long. Segment BC is 2 inches long. How long is segment AC?



13. $\begin{array}{r} 3415 \\ 7809 \\ +\ 8776 \\ \hline \end{array}$

14. $\begin{array}{r} 20{,}101 \\ -\ 19{,}191 \\ \hline \end{array}$

15. $\begin{array}{r} 985 \\ \times\ 768 \\ \hline \end{array}$

16. $\begin{array}{r} 488 \\ 46 \\ 797 \\ 49 \\ 666 \\ +\ \ 54 \\ \hline \end{array}$

17. $\frac{7848}{9} =$

18. $\frac{3640}{70} =$

19. $\frac{1650}{30} =$

20. $10 - \left(3 + 1\frac{1}{3}\right) =$

21. $3\frac{1}{4} + \left(2 - 1\frac{1}{4}\right) =$

22. $24 \times 8 \times 50 =$

23. $15 \times 16 = (10 \times 16) + (\square \times 16)$

Use this menu to answer questions 24 and 25.

24. What is the total cost of one taco, two nachos, and one small drink?

25. Sam paid for 2 burritos with a $5 bill. How much money should he get back?

MENU

Taco	$1.20
Nachos	$ .90
Burrito	$1.05
Drinks	
Regular	$ .80
Small	$ .50

Prices include sales tax

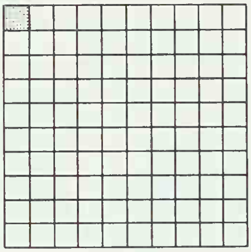
LESSON 76

Naming Fractional Parts with Decimal Fractions—Hundredths

Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

When a whole is divided into 10 parts, we can name the parts with a decimal fraction that has one place after the decimal point. When a whole is divided into **100 parts**, we can name the parts with a decimal fraction that has **two** places after the decimal point.

A decimal fraction with two places after the decimal point is like a fraction with a denominator of 100. Both mean that the whole has been divided into 100 parts. The shaded square below is a drawing that represents the fraction one hundredth.

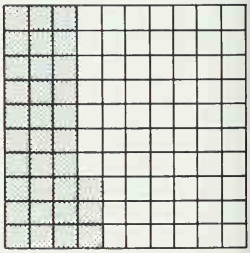


The square is divided into 100 parts. One part is shaded, and this part is **one hundredth** of the square. We can write one hundredth as a common fraction or as a decimal fraction.

One hundredth as a common fraction, $\frac{1}{100}$

One hundredth as a decimal fraction, .01

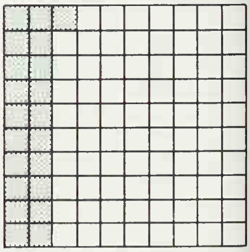
Example Name the fraction of the square that is shaded as a common fraction and as a decimal fraction.



Solution Thirty-three of the hundred parts are shaded. As a common fraction we write thirty-three hundredths $\frac{33}{100}$. As a decimal fraction we write it this way: **.33**

Practice

a. What common fraction names the shaded part of this square?



b. What decimal fraction names the shaded part of this square?

c. What common fraction names the unshaded part of this square?

d. What decimal fraction names the unshaded part of this square?

Problem set 76

1. It takes Phil 20 minutes to walk to school. What time should he leave for school if he wants to arrive at 8:10 a.m.?

2. Every day Donna swims 40 lengths of a pool that is 25 meters long. How far does Donna swim each day?

3. What is the next number in this sequence?

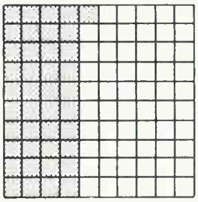
   9876, 9866, 9856, ____

4. Use words to name the mixed number $2\frac{3}{10}$.

5. If each side of a hexagon is 4 inches long, then what is the perimeter of the hexagon?

6. William found $30,000 of misplaced money. The grateful owner gave William one tenth of the money as a reward. How much money did William get?

7. Name the fraction of the square that is shaded as a common fraction and as a decimal fraction.

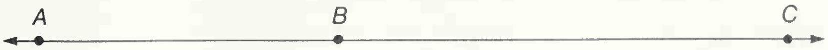


8. Divide and write the quotient of $\frac{35}{8}$ as a mixed number.

9. Use a common fraction and a decimal fraction to name the point marked by the arrow on this number line.

10. List the factors of 12 that are also factors of 20.

11. The length of segment AC is 10 centimeters. If segment AB is 4 centimeters, how long is segment BC?



12. $\frac{12}{25} + \frac{12}{25} =$

13. $3\frac{5}{8} - 1 =$

14. $5 - 3\frac{5}{8} =$

15. $\begin{array}{r} 68{,}085 \\ 42{,}357 \\ +\ 76{,}983 \\ \hline \end{array}$

16. $\begin{array}{r} 31{,}060 \\ -\ 19{,}363 \\ \hline \end{array}$

17. $\begin{array}{r} 3426 \\ \times\ \ 78 \\ \hline \end{array}$

18. $\frac{36{,}012}{6} =$

19. $40\overline{)960}$

20. $3989 \div 9 =$

21. $17 \times 30 \times 9 =$

22. $100 − ($90 + $9 + $.01) =

23. Write the following sentence using digits and math symbols.

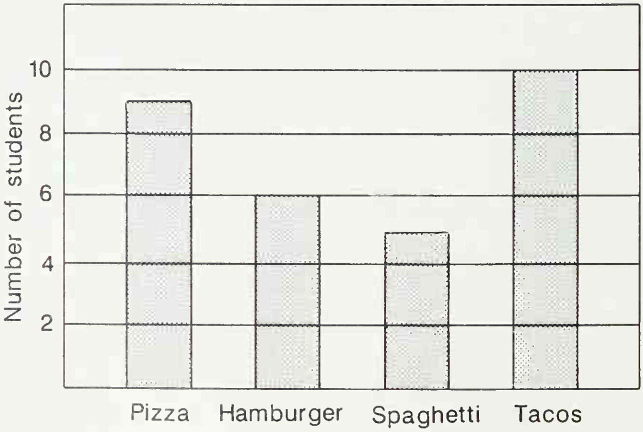
"Five times one equals five plus zero."

Use the graph to answer questions 24 and 25.

24. Altogether, how many students liked either pizza or spaghetti best?

25. Which foods were the favorites of more than 6 students?

Favorite Foods of the Class



LESSON 77

Identifying Decimal Place Value through Hundredths

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

To name parts of a whole we use fractions. We have seen that fractions may be written in more than one way. Common fractions are written with a numerator and a denominator as follows:

$$\frac{3}{10}$$

But fractions may also be written using decimal numbers. The fraction part of a decimal number is the part written to the right of the decimal point. Here we show some decimal numbers.

.3 6.4 12.95

The fraction part of these decimal numbers is .3, .4, and .95.

The chart below shows the value of some places to the right of the decimal point. Notice that the names of these places end with the letters "-ths." The letters "-ths" at the end of a number mean that the number is a **denominator**. "Tenths" does not mean 10, it means over 10, or divided by 10. "Hundredths" does not mean 100, it means over 100, or divided by 100.

Place Value Chart

Place name →	tens	ones	tenths	hundredths
Place value →	10	1	$\frac{1}{10}$	$\frac{1}{100}$
Place →	____	____	. ____	____
Money value of place →	$10 bills	$1 bills	dimes	pennies

The last row of the chart gives the money value of the place. The first place to the right of the decimal point is the tenths' place. Since a dime is one tenth of a dollar, we may think of this as the dimes' place. The second place to the right of the decimal point is the hundredths' place. Since a penny is one hundredth of a dollar, we may think of this as the pennies' place.

Example 1 Which digit in 12.3 is in the tenths' place?

Solution Looking at the chart, we see that the tenths' place is one place to the right of the decimal point. The digit in the tenths' place is the **3**.

Example 2 Which digit in 3.125 is in the same place as the 7 in 48.67?

Solution To find place values in decimal numbers, we must **pay attention to the decimal point**, not to the end of the number. The 7 is two places to the right of the decimal point. It is in the hundredths' place. In 3.125, the digit in the hundredths' place is the **2**.

Practice Name the place occupied by the 5 in each number below.

a. 25.34 **b.** 54.32

c. 23.54 **d.** 23.45

e. Which of these numbers has a 3 in the same place as the 3 in 6.375?

23.47 138.4 42.35

f. In which of these numbers does the 5 occupy the place with the greatest value?

15.67 17.56 14.75

Problem set 77

1. Draw a triangle that has an obtuse angle.

2. What year was five centuries before 1992?

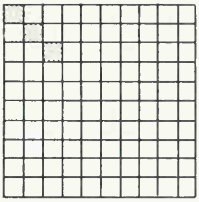
3. Cordelia has read $\frac{1}{3}$ of a 240-page book. How many pages has she read?

4. If 3 tickets cost $12, how many tickets can be bought for $20?

5. Estimate the sum of 6270 and 4916 by rounding both numbers to the nearest thousand before you add.

6. A number is **divisible** by 4 if it can be divided evenly by 4. The numbers 8, 20, and 32 are all divisible by 4. What number between 10 and 20 is divisible by both 4 and 6?

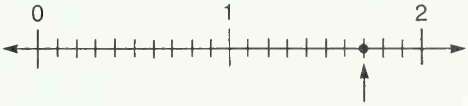
7. Use a fraction and a decimal number to name the shaded part of this square.



8. Which digit in 16.43 is in the tenths' place?

9. Which digit in 93.6 is in the same place as the 4 in 4.25?

10. Name the point on the number line marked by the arrow as a mixed number and as a decimal number.



11. The number 15 has how many different factors?

12. Six times a number y can be written $6y$. If $6y = 60$, then y equals what number?

13. The length of segment RT is 100 millimeters. If segment RS is 30 millimeters, how long is segment ST?

14.
$$\begin{array}{r} 87{,}906 \\ 71{,}425 \\ +\ 57{,}342 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 407 \\ \times\ 819 \\ \hline \end{array}$$

16. $\frac{876}{6} =$

17. $600 \div (60 \div 6) =$

18. $40\overline{)5860}$

19. Divide and write the quotient with a fraction: $5\overline{)236}$

20. $341 + 5716 + 98 + 492 + 1375 =$

21. $7 \times 6 \times 5 \times 4 =$

22. $5\frac{1}{4} + \left(3 - 1\frac{1}{4}\right) =$

23. $3\frac{1}{6} + 2\frac{2}{6} + 1\frac{3}{6} =$

24. $20\overline{)300}$

25. Compare: $365 \times 1 \bigcirc 365 \div 1$

LESSON 78

Reading and Writing Decimal Numbers through Hundredths

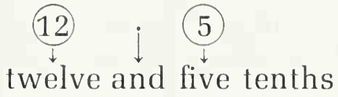
Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

To read a decimal number that has digits on both sides of the decimal point, we mentally break the number into two parts: the whole-number part and the fraction part. The whole-number part is to the left of the decimal point. The fraction part is to the right of the decimal point.

To read this decimal number ——————→ 12.5

We mentally break it into two parts like this → ⑫ · ⑤

We read the whole-number part first. We say "and" at the decimal point. Then we read the fraction part. To read the fraction part, we read the digits as though they named a whole number. Then we say the place value of the last digit. The last digit of 12.5 is 5. It is in the **tenths'** place.



Example 1 Use words to name the decimal number 12.25.

Solution We break the number into two parts. We name the whole-number part, then write "and," and then name the fraction part. **Then we write the place value of the last digit**, which in this case is hundredths. We write **twelve and twenty-five hundredths**.

⑫ · ㉕

Example 2 Use digits to write the decimal number ten and twelve hundredths.

Solution We write the whole number 10, and then we write a decimal point to stand for the word "and." The last word is "hundredths," which means that there are two digits to the right of the decimal point. The 12 is written in those two places, **10.12**.

Practice* Use words to name each decimal number in problems (a)–(d).

a. 8.9
b. 24.42
c. 125.1
d. 100.75

Use digits to write the decimal numbers named in problems (e)–(h).

e. twenty-five and fifty-two hundredths

f. thirty and one tenth

g. seven and eighty-nine hundredths

h. two hundred thirty-four and five tenths

Problem set 78

1. The ceiling was covered with square tiles. There were 30 rows of tiles with 30 tiles in each row. How many tiles covered the ceiling?

2. Carlos gave the clerk $10 for a book that cost $6.95 plus $.42 tax. How much money should he get back?

3. Silvia emptied a jar of 1000 pennies and put them into rolls holding 50 pennies each. How many rolls did she fill?

4. The distance around the school track is $\frac{1}{4}$ mile. How many times must Steve run around the track to run 1 mile?

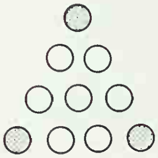
5. A number is **divisible** by 3 if it can be divided by 3 and not have a remainder. What even number between 20 and 30 is divisible by 3?

6. List the numbers that are factors of both 10 and 15.

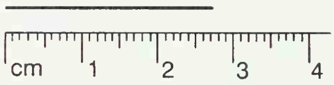
7. Draw two circles. Shade $\frac{1}{2}$ of one circle and $\frac{3}{6}$ of the other circle.

8. Which digit in 56,132 is in the same place as the 8 in 489,700?

9. Use a fraction and a decimal number to name the fraction of the circles that is **not** shaded.



10. Give the length of this segment to the nearest tenth of a centimeter.



11. Which digit in 67.89 is in the hundredths' place?

12. The length of segment LN is 4 inches. If segment MN is $1\frac{1}{2}$ inches, how long is segment LM?

13. Use words to name the decimal number 10.5.

14. Use digits to write the decimal number fifteen and twelve hundredths.

15. $\frac{3744}{8} =$

16. $\begin{array}{r} 30{,}000 \\ -\ 29{,}925 \\ \hline \end{array}$

17. $\begin{array}{r} 973 \\ \times\ 536 \\ \hline \end{array}$

18. $\begin{array}{r} 8746 \\ 954 \\ 6027 \\ 488 \\ 6517 \\ +\quad 79 \\ \hline \end{array}$

19. $\begin{array}{r} 65 \\ \times\quad 10 \\ \hline \end{array}$

20. $5\overline{)960}$

21. $\frac{5430}{30} =$

22. $7 - \left(3 + 1\frac{1}{3}\right) =$

23. $5\frac{2}{3} + \left(3\frac{1}{3} - 2\right) =$

Read this information. Then answer questions 24 and 25.

In the school election for president, Tammy got 239 votes, Samantha got 168 votes, and Ruben got 197 votes.

24. The winner received how many more votes than the person who came in second?

25. One other person ran for president and got 95 votes. Altogether, how many votes were cast for president?

LESSON 79

Counting Decimal Places; Writing Equivalent Decimal Numbers

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

Decimal places

When talking about decimal numbers, we may use the term "decimal places." **By decimal places we mean the number of digits to the right of the decimal point.** For example, the number 1.234 is written with three decimal places. The number

15.2 is written with one decimal place. Amounts of money are usually written with two decimal places.

Example 1 Which of these numbers is written with two decimal places?

24.5 8.56 .765

Solution We pick the number that has two digits to the right of the decimal point, **8.56**.

Equivalent decimal numbers We may add decimal places to a number without changing the value of the number by attaching one or more zeros to the right of the last decimal place. For example, we may write .3 as .30. The zero does not change the value of the number because it does not change the place value of the 3. In both numbers 3 is in the tenths' place. Thus, three tenths and thirty hundredths are equal in value.

Example 2 Write 12.6 with three decimal places.

Solution The number 12.6 is written with one decimal place. By attaching two zeros, we can write it with three decimal places, **12.600**.

Example 3 Compare: 12.6 ○ 12.600

Solution When we compare decimal numbers, we must pay close attention to place value. We use the decimal point to find place values. We see that the whole-number parts of these two numbers are the same. The fraction parts look different, but we must think about place values. If we add two 0s to 12.6 so that 12.6 has three decimal places, we see that the numbers are the same:

12.600 ○ 12.600

Since the numbers are equal, the correct comparison symbol is =.

Practice Write each of the numbers in problems (a)–(c) with three decimal places.

a. 1.2 **b.** 4.08 **c.** .50000

Compare.

d. 50 ○ 500

e. .4 ○ .04

f. .50 ○ .500

g. .2 ○ .20000

Problem set 79

1. Each side of a 1-foot square is 1 foot long. What is the perimeter of a 1-foot square?

2. Columbus landed in the Americas in 1492. The Pilgrims landed in 1620. This was how many years after Columbus landed?

3. Estimate the product of 307 and 593 by rounding both numbers to the nearest hundred before you multiply.

4. Three times a number n can be written $3n$. If n equals the number 5, then what number does $3n$ equal?

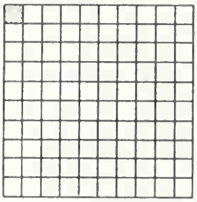
5. Mike has read $\frac{1}{3}$ of his book. What fraction of his book does he still have to read?

6. Draw a circle. Shade one eighth of it.

7. Divide 100 by 7 and write the quotient as a mixed number.

8. Which digit in 12.3 is in the tenths' place?

9. Use a common fraction and a decimal fraction to name the part of this square that is shaded.



10. Which digit in 98.765 is in the same place as the 2 in 1.23?

11. The length of segment QR is 3 centimeters. The length of segment RS is twice QR. How long is segment QS?

12. Use words to name the decimal number 16.21.

13. Write 1.5 with two decimal places.

14. Compare: 3.6 ○ 3.60

15. $\begin{array}{r} 307 \\ \times\ 593 \\ \hline \end{array}$

16. $\frac{765}{5} =$

17. $60\overline{)8730}$

18. $3517 + 9636 + 48 + 921 + 8576 + 50{,}906 =$

19. $2\frac{3}{10} + 1\frac{3}{10} + \frac{3}{10} =$

20. $9\frac{4}{8} + \left(4 - 1\frac{7}{8}\right) =$

21. $40 \times 50 \times 60 =$

22. $100 − ($84.37 + $12) =

23. Write the following sentence using digits and symbols.

"Two thirds is less than three fourths."

Use this graph to answer questions 24 and 25.

24. How many liked either soccer or football best?

25. What was the second most favorite sport?

Favorite Sports of 100 Children

ESSON
30

Writing Money in Two Forms: As Cents and as Dollars

Facts Practice: 100 Multiplication Facts (Test C in Test Booklet)

There are two different ways to write amounts of money:

1. As a number of cents, such as 25¢.
2. As a number of dollars, such as \$.25.

When we write money as a number of cents, we write a cent sign, ¢, after the number. A penny is 1 cent and can be written 1¢. Thirty-five cents is written as 35¢. Fifty-eight cents is written as 58¢. We can also write these amounts of money with a dollar sign in front and then a decimal fraction if we remember that a penny is one hundredth of a dollar. We can write 1¢ as \$.01. We can write 35¢ as \$.35 and 58¢ as \$.58. We can use either the \$ sign or the ¢ sign to write these values. We use one sign or the other sign.

Example 1 Write 5 cents in two forms: first as a number of cents and second as a fraction of a dollar.

Solution **5¢, \$.05**

Example 2 \$1.56 + 75¢ =

Solution When the two forms of writing money are in the same problem, we usually rewrite the numbers so that all money amounts are in the same form before we solve the problem. Sums of money equal to a dollar or more are usually written with a dollar sign. To find the answer, we write 75¢ in dollar form, \$.75, and then we add to get **\$2.31**.

$$\begin{array}{r} \$1.56 \\ + \quad .75 \\ \hline \mathbf{\$2.31} \end{array}$$

Practice For problems (a)–(d), write the amount of money in two forms: first as a number of cents and second as a fraction of a dollar.

a. two cents

b. fifty cents

c. twenty-five cents

d. nine cents

For problems (e)–(h), solve and write the answer in the form shown after each equals sign.

e. 36¢ + 24¢ = $___

f. $1.38 − 70¢ = __¢

g. $.25 − 5¢ = $___

h. $1 − 8¢ = __¢

Problem set 80

1. What is the total cost of a $7.98 notebook plus 49¢ tax?

2. In room 7 there are 6 rows of desks with 5 desks in each row. There are 4 books in each desk. How many books are in all the desks?

3. Martin is twice as old as his sister. If Martin is 12, how old will his sister be next year?

4. How many half dollars does it take to total $5?

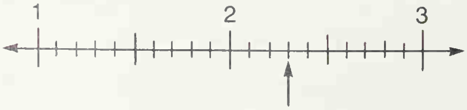
5. Louisa put her nickel collection into rolls that hold 40 nickels each. She filled 15 rolls and had 7 nickels left over. Altogether, how many nickels did Louisa have?

6. The number 7 has how many different factors?

7. Draw two circles. Shade $\frac{4}{8}$ of one circle and $\frac{1}{2}$ of the other circle.

8. In the number 34.65 which digit is in the ones' place?

9. Use a mixed number and a decimal number to name the place on this number line marked by the arrow.



10. Which digit in 1.234 is in the same place as the 7 in 58.67?

11. Use digits to write the decimal number ten and one tenth.

12. Write six cents in two forms: first as a number of cents and second as a fraction of a dollar.

13. Segment *AB* measures 50 millimeters. Segment *BC* is half of *AB*. How long is segment *AC*?

14.
$$\begin{array}{r} \$4.23 \\ .75 \\ +\ \ 6.87 \\ \hline \end{array}$$

15.
$$\begin{array}{r} \$60.10 \\ -\ \ 48.37 \\ \hline \end{array}$$

16.
$$\begin{array}{r} 984 \\ \times\ 156 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 746 \\ 652 \\ 537 \\ 895 \\ 71 \\ +\ \ 39 \\ \hline \end{array}$$

18. $\$1.75 + 36¢ = \$\_\_\_$

19. $\$1.15 - \$.80 = \_\_¢$

20. $76 \times 40 \times 8 =$

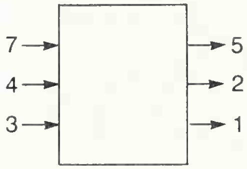
21. $3900 \div 50 =$

22. $\frac{13}{100} + \frac{14}{100} =$

23. $7 - \left(6\frac{3}{5} - 1\frac{1}{5}\right) =$

Read this information. Then answer questions 24 and 25.

Matthew invented a machine to change numbers. When he puts a 7 into the machine, a 5 comes out. When he puts a 4 in the machine, a 2 comes out. When he puts a 3 in the machine, a 1 comes out.



24. What does the machine do to the numbers Matthew puts into the machine?

- **a.** It adds 2.
- **b.** It subtracts 2.
- **c.** It divides by 2.
- **d.** It multiplies the number.

25. If Matthew puts in a 10, what number will come out?

LESSON 81 Multiplying and Dividing Money

Facts Practice: 90 Division Facts (Test E or F in Test Booklet)

When we divide money written in dollar form, we write the answer with a dollar sign and two digits after the decimal point.

If the amount of money is not written in dollar form, we will first write it in dollar form before we multiply or divide.

Example 1 Multiply:

$$\begin{array}{r} \$\ .75 \\ \times \quad 7 \\ \hline \end{array}$$

Solution We multiply the numbers just as we would multiply whole numbers. Then we place the decimal point in the answer two places from the end. Then we write a dollar sign in front.

$$\begin{array}{r} \$\ .75 \\ \times \quad 7 \\ \hline \mathbf{\$5.25} \end{array}$$

Example 2 Olive bought 9 cans of spinach for 49¢ each. What was the cost of all 9 cans?

Solution To find the cost of 9 cans, we may multiply 49¢ by 9. We will change 49¢ to dollar form, $.49, before we multiply.

$$\begin{array}{r} \$\ .49 \\ \times \quad 9 \\ \hline \mathbf{\$4.41} \end{array}$$

Example 3 Divide: $6\overline{)\$2.34}$

Solution We divide as we would divide whole numbers, carefully writing the digits of the answer in the proper places. **We write the decimal point in the answer straight up from the decimal point in the dividend.** Then we write a dollar sign in front.

$$\begin{array}{r} \mathbf{\$\ .39} \\ 6\overline{)\$2.34} \\ \underline{1\,8} \\ 54 \\ \underline{54} \\ 0 \end{array}$$

Practice*

a. $1.35 × 4 =

b. 65¢ × 7 =

c. $0.15 × 10 =

d. 18¢ × 20 =

e. $6.24 ÷ 4 =

f. $12.05 ÷ 5 =

g. $7.20 ÷ 10 =

h. $1.14 ÷ 6 =

Problem set 81

1. Reggie bought a dozen candy bars for 20¢ each. What was the total cost of the candy bars?

2. What is the total price for 4 cartons of ice cream that cost \$2.50 for each carton?

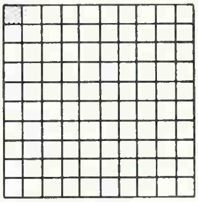
3. Four times a number *m* can be written 4*m*. If *m* equals 7, then what does 4*m* equal?

4. Mary has read $\frac{1}{3}$ of a 240-page book. How many pages does she still have to read?

5. One meter equals 100 centimeters. Five meters equals how many centimeters?

6. Use words to name the decimal number 12.25.

7. Use both a fraction and a decimal number to name the part of this square which is **not** shaded.



8. List the factors of 16.

9. Use digits to write the decimal number ten and twelve hundredths.

10. Which digit in 436.2 is in the ones' place?

11. Divide and write the quotient with a fraction: $\frac{15}{8} =$

12. Segment *FH* measures 90 millimeters. If *GH* is 35 millimeters, how long is segment *FG*?

13. \$10.35 + \$5.18 + 8¢ + \$11 + 97¢ =

14. $\begin{array}{r} \$80.00 \\ -\ 72.47 \\ \hline \end{array}$

15. $\begin{array}{r} \$4.97 \\ \times\quad 6 \\ \hline \end{array}$

16. $\begin{array}{r} 375 \\ \times\ 548 \\ \hline \end{array}$

17. $7\overline{)\$40.53}$

18. $60\overline{)5340}$

19. $6000 \div 30 =$

20. $3\frac{3}{8} + 1\frac{1}{8} + 4\frac{4}{8} =$

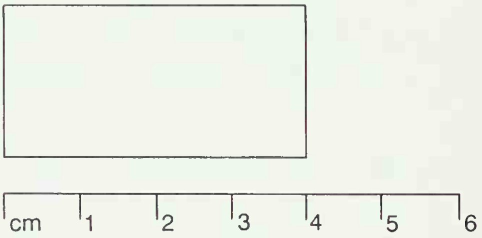
21. $7\frac{3}{4} - \left(5 - 1\frac{1}{4}\right) =$

22. $3625 + 493 + 1037 + 58 + 4672 + 986 =$

23. $4\frac{1}{10} + 5\frac{1}{10} + 10\frac{1}{10} =$

24. $10 - \left(4 + 1\frac{1}{8}\right) =$

25. This rectangle is half as wide as it is long. What is the perimeter of the rectangle?



LESSON
82

Adding and Subtracting Decimal Numbers, Part 1

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

Since Lesson 23 we have practiced adding and subtracting money. When we add or subtract money, we write the numbers so that the decimal points are in a line vertically. The decimal point in the answer is placed in line below the other decimal points, as we show here.

$$\begin{array}{r} \$3.45 \\ +\ \ 1.25 \\ \hline \$4.70 \end{array} \qquad \begin{array}{r} \$3.45 \\ -\ \ 1.25 \\ \hline \$2.20 \end{array}$$

We use the same rule when we add or subtract any decimal numbers. We keep the decimal points in line. This way we add and subtract digits with the same place value.

$$\begin{array}{rcl} 2 & . & 4 \\ +\,1 & \downarrow & 3 \\ \hline 3 & \downarrow & 7 \end{array} \qquad \begin{array}{rcl} 2 & \cdot & 4 \\ -\,1 & \downarrow & 3 \\ \hline 1 & \downarrow & 1 \end{array}$$

See how the decimal points stay in a straight line!

Example 1

$$\begin{array}{r} 4.3 \\ 12.5 \\ +\ \ 7.6 \\ \hline \end{array}$$

Solution We keep the decimal points in line in the problem and answer. We add the digits column by column, just as we would add whole numbers or money.

$$\begin{array}{r} 4.3 \\ 12.5 \\ +\ \ 7.6 \\ \hline \mathbf{24.4} \end{array}$$

Example 2

$$\begin{array}{r} 6.37 \\ -\ 4.2\ \ \\ \hline \end{array}$$

Solution As we saw in Lesson 79, we may attach zeros to the end of a decimal number without changing the value of the number. We may attach a zero to 4.2 so that there are no empty places in the problem. Then we subtract.

$$\begin{array}{r} 6.37 \\ -\ 4.20 \\ \hline \mathbf{2.17} \end{array}$$

Note: Attaching zeros may make the problem easier to work. However, it is not necessary to attach zeros as long as it is remembered that an empty place has the same value as a zero in that place.

Practice Add.

a.
$$\begin{array}{r} 3.4 \\ 6.7 \\ +\ 11.3 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 4.63 \\ 2.5 \\ +\ .46 \\ \hline \end{array}$$

c.
$$\begin{array}{r} 9.62 \\ 12.5 \\ +\ 3.7 \\ \hline \end{array}$$

Subtract.

d.
$$\begin{array}{r} 3.64 \\ -\ 1.46 \\ \hline \end{array}$$

e.
$$\begin{array}{r} 5.37 \\ -\ 1.6 \\ \hline \end{array}$$

f.
$$\begin{array}{r} .436 \\ -\ .2 \\ \hline \end{array}$$

Problem set 82

1. Ben bought a sheet of 35¢ stamps. The sheet had 5 rows of stamps with 8 stamps in each row. How much did the sheet of stamps cost?

2. Cynthia is half the age of her brother, but she is 2 years older than her sister. If Cynthia's brother is 18 years old, how old is her sister?

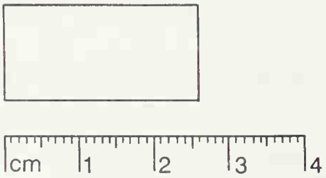
3. Morten was asked to run to the fence and back. It took him 23.4 seconds to run to the fence and 50.9 seconds to run back. How many seconds did the whole trip take?

4. The classroom floor is covered with square tiles. There are 30 rows of tiles with 40 tiles in each row. Altogether, how many tiles cover the floor?

5. Draw two circles. Shade $\frac{2}{8}$ of one circle and $\frac{1}{4}$ of the other circle.

6. Use digits to write the decimal number twenty-four and three tenths.

7. To the nearest tenth of a centimeter, what is the length of this rectangle?



8. List the numbers that are factors of both 16 and 20.

9. Three times a number y can be written $3y$. If $3y = 12$, then what number does $2y$ equal?

10. The length of segment AC is 85 millimeters. If AB is 37 millimeters, how long is segment BC?

11. $\begin{array}{r} 24.3 \\ +\ 8.9 \\ \hline \end{array}$

12. $\begin{array}{r} 53.46 \\ -\ 5.7 \\ \hline \end{array}$

13. $\begin{array}{r} \$6.48 \\ \times\ 9 \\ \hline \end{array}$

14. $\begin{array}{r} 5.35 \\ 12.7 \\ 3.64 \\ 5.87 \\ 9.42 \\ 6.03 \\ +\ 7.21 \\ \hline \end{array}$

15. $\$5 - 5¢ =$

16. $5\overline{)\$8.60}$

17. $20\overline{)\$8.60}$

18. $\begin{array}{r} 378 \\ \times\ 296 \\ \hline \end{array}$

19. $\begin{array}{r} 800 \\ \times\ 500 \\ \hline \end{array}$

20. $\frac{9870}{30} =$

21. $12 + 1\frac{1}{2} =$

22. $12 - 1\frac{1}{2} =$

23. $\frac{49}{99} + \frac{49}{99} =$

Read this information. Then answer questions 24 and 25.

Gilbert did yard work on Saturday. He worked for $2\frac{1}{2}$ hours in the morning and $1\frac{1}{2}$ hours in the afternoon. He was paid \$3.50 for every hour he worked.

24. How many hours did Gilbert work in all?

25. How much money was Gilbert paid in all?

LESSON 83

Converting Units of Length

Facts Practice: 48 Uneven Divisions (Test G in Test Booklet)

The chart below lists some common units of length used in the U.S. Customary System* and in the metric system. The chart also gives the number of units needed to equal larger units of length.

Equivalence Table for Units of Length

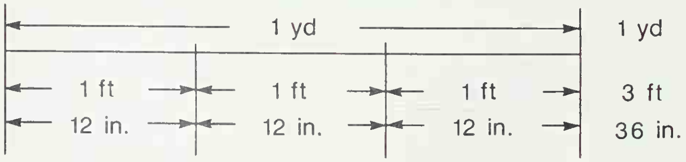
U.S. CUSTOMARY SYSTEM	METRIC SYSTEM
12 inches = 1 foot 3 feet = 1 yard 5280 feet = 1 mile 1760 yards = 1 mile	10 millimeters = 1 centimeter 1000 millimeters = 1 meter 100 centimeters = 1 meter 1000 meters = 1 kilometer
A meter is a little longer than a yard.	

Example 1 The star player on the basketball team is 197 centimeters tall. This is nearly how many meters tall?

Solution The chart shows that 100 centimeters equals 1 meter. The prefix "cent-" can help us remember this fact because there are **100 cents** in $1. Since 197 centimeters is nearly 200 centimeters, the height of the basketball player is nearly **2 meters**.

Example 2 Two yards is the same length as how many inches?

Solution The chart shows us that 1 yard equals 3 feet and that each foot equals 12 inches.



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* The units of the U.S. Customary System (USCS) originated in England. This system of measure was called the English system for many years. England has now converted to the metric system, and the United States is the only large country still using this system. Thus the system is often called the U.S. Customary System.

Thus, 1 yard equals 36 inches. Two yards is twice that much. Two yards equals **72 inches**.

Practice

a. How many yards are in one fourth of a mile?

b. Fifty millimeters is how many centimeters?

c. Tom's height is 5 feet 1 inch. How many inches tall is he?

d. A 10K race is a 10-kilometer race. How many meters is 10 kilometers?

Problem set 83

1. Gizmos come in a carton. A carton holds 6 packages. Each package holds 10 small boxes. Each small box holds 12 gizmos. How many gizmos come in a carton?

2. When the decimal number two and three tenths is added to three and five tenths, what is the sum?

3. Bacchus bought 7 pounds of grapes for $3.43. What was the price for 1 pound of grapes?

4. Compare: $1 \bigcirc \frac{3}{3}$

5. One of the players on the basketball team is 2 meters tall. Two meters is how many centimeters?

6. Use a fraction and a decimal number to name the point marked by the arrow on this number line.

7. Joanne ran the 100-meter dash in 11.02 seconds. Use words to name the decimal number 11.02.

8. Three yards is the same length as how many inches?

9. Segment RT measures 4 inches. If RS is $2\frac{1}{4}$ inches long, how long is ST?

10. $$\begin{array}{r} 7 \\ +\ 1\frac{3}{4} \\ \hline \end{array}$$

11. $$\begin{array}{r} 3\frac{5}{12} \\ -\ 3\frac{5}{12} \\ \hline \end{array}$$

12. $$\begin{array}{r} 4 \\ -\ 2\frac{1}{4} \\ \hline \end{array}$$

13. $$\begin{array}{r} 16.2 \\ 27.35 \\ +\ 9.4 \\ \hline \end{array}$$

14. $$\begin{array}{r} 30.1 \\ -\ 14.2 \\ \hline \end{array}$$

15. $$\begin{array}{r} \$12.98 \\ \times\ \ \ \ 4 \\ \hline \end{array}$$

16. $6\overline{)\$45.54}$

17. $\dfrac{4384}{8} =$

18. $$\begin{array}{r} 704 \\ \times\ 987 \\ \hline \end{array}$$

19. \$12 + 84¢ + \$6.85 + 9¢ + \$8 + \$98.42 + \$55.26 =

20. Divide and write the quotient with a fraction: $\dfrac{18}{5}$

21. If $3n = 21$, then what number does n equal?

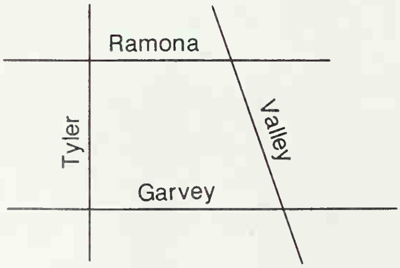
22. Write a decimal number equal to 2.5 that has three decimal places.

23. The perimeter of a certain square is 24 inches. How long is each side of the square?

Look at this map. Then answer questions 24 and 25.

24. Which street is parallel to Ramona?

25. Which street is perpendicular to Garvey?



LESSON
84

Changing Improper Fractions to Whole or Mixed Numbers

> **Facts Practice:** 100 Multiplication Facts (Test C in Test Booklet)

A fraction may be less than 1, equal to 1, or greater than 1. A fraction that is equal to 1 or is greater than 1 is called an **improper fraction**. An improper fraction has a numerator equal to or greater than the denominator.

$$\begin{array}{ccc}\text{Less than 1} & \text{Equal to 1} & \text{Greater than 1}\\ \frac{3}{4} & \multicolumn{2}{c}{\underbrace{\frac{4}{4}\qquad\qquad\qquad\frac{5}{4}}_{\text{Improper fractions}}}\end{array}$$

Every improper fraction can be changed either to a whole number or to a mixed number. We convert an improper fraction into a whole number or mixed number by doing the division shown by the fraction line. A fraction line is the same as a division bar. The fraction $\frac{4}{4}$ may be thought of as 4 divided by 4. The fraction $\frac{5}{4}$ may be thought of as 5 divided by 4. If we actually divide, the answer will be a whole number or a mixed number.

$$\frac{4}{4} \rightarrow \begin{array}{r} 1 \\ 4\overline{)4} \\ \underline{4} \\ 0 \end{array} \qquad\qquad\qquad \frac{5}{4} \rightarrow \begin{array}{r} 1\frac{1}{4} \\ 4\overline{)5} \\ \underline{4} \\ 1 \end{array}$$

The fraction $\frac{4}{4}$ equals 1. The fraction $\frac{5}{4}$ equals $1\frac{1}{4}$.

Example 1 Compare: Any improper fraction ○ $\frac{99}{100}$

Solution Any improper fraction is equal to or greater than 1. The fraction $\frac{99}{100}$ is slightly less than 1. Therefore, any improper fraction is greater than $\frac{99}{100}$. We replace the circle with the symbol >.

Thus our answer is

$$\text{Any improper fraction} > \frac{99}{100}$$

Example 2 Write the fraction $\frac{8}{5}$ as a mixed number.

Solution If the numerator is equal to or greater than the denominator, the fraction is equal to or greater than 1. The fraction line is a division sign. We may read the fraction $\frac{8}{5}$ as 8 divided by 5. We divide and write the remainder as a fraction:

$$\mathbf{1\frac{3}{5}}$$

Practice Convert each improper fraction into a whole number or a mixed number.

a. $\frac{2}{2}$ **b.** $\frac{5}{2}$ **c.** $\frac{5}{3}$ **d.** $\frac{9}{4}$

e. $\frac{3}{2}$ **f.** $\frac{3}{3}$ **g.** $\frac{6}{3}$ **h.** $\frac{10}{3}$

i. $\frac{4}{2}$ **j.** $\frac{4}{3}$ **k.** $\frac{7}{3}$ **l.** $\frac{15}{4}$

Problem set 84

1. Name the coin that is equal to half of a half dollar.

2. A number is divisible by 2 if it can be divided by 2 without a remainder. What is the greatest two-digit number that is divisible by 2?

3. In which of these numbers does the 5 have the greatest value?
   a. 34.56 **b.** 35.64 **c.** 53.46 **d.** 64.35

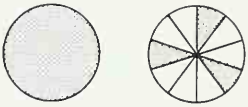
4. Use the digits 2, 3, and 4 once each to make the greatest three-digit odd number possible.

5. When the decimal number two and twenty-five hundredths is added to six and seventeen hundredths, what is the sum?

6. The number 30 has how many different factors?

7. Which digit in 16.34 is in the same place as the 2 in 2.875?

8. Name the number of shaded circles as a mixed number and as a decimal number.



9. Write the fraction $\frac{7}{5}$ as a mixed number.

10. How many yards is one half of a mile?

11. Change the improper fraction $\frac{10}{3}$ to a mixed number.

12. Compare: Any improper fraction ○ $\frac{9}{10}$

13. Segment XY measures 3.2 centimeters. Segment YZ measures 4.7 centimeters. What is the length of segment XZ?

14. (345 + 57 + 219) ÷ 3 =

15. \$10 − (36¢ + \$1.42) =

16. $\begin{array}{r} 37.6 \\ 98.4 \\ +\ 76.8 \\ \hline \end{array}$

17. $\begin{array}{r} 430.10 \\ -\ 396.27 \\ \hline \end{array}$

18. $\begin{array}{r} \$20.46 \\ \times \quad\ 5 \\ \hline \end{array}$

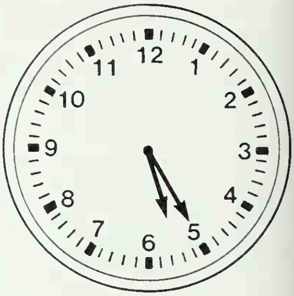
19. $8\overline{)\$10.00}$

20. $\frac{3600}{50} =$

21. $\begin{array}{r} 398 \\ \times\ 746 \\ \hline \end{array}$

22. $9 + 1\frac{1}{3} =$ **23.** $1 - \frac{3}{3} =$ **24.** $10 - 1\frac{1}{10} =$

25. If it is morning, what time will be shown by the clock in $6\frac{1}{2}$ hours?



LESSON 85 Changing Improper Mixed Numbers to Whole or Mixed Numbers

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

In the preceding lesson we practiced changing improper fractions to whole numbers or to mixed numbers. In arithmetic, we usually do not leave a fraction answer written as an improper fraction. When the answer to an arithmetic problem is an improper fraction, we usually convert it to a whole number or a mixed number.

Example 1 $\frac{3}{5} + \frac{4}{5} =$

Solution We add and find that the sum is the improper fraction $\frac{7}{5}$. We can convert the improper fraction to a mixed number by dividing.

$$\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = \mathbf{1\frac{2}{5}}$$

When adding mixed numbers, the fraction part of the answer may be an improper fraction.

$$1\frac{2}{3} + 2\frac{2}{3} = 3\frac{4}{3} \leftarrow \text{Improper fraction}$$

When an improper fraction is part of a mixed number, we convert the improper fraction into a whole number or mixed number, then we **add** it to the whole-number part of the answer.

$$3\frac{4}{3} = 3 + \frac{4}{3} = 3 + 1\frac{1}{3} = \mathbf{4\frac{1}{3}}$$

Example 2 Simplify the mixed number $6\frac{3}{2}$.

Solution We simplify improper fractions by changing them to whole numbers or to mixed numbers. The fraction in $6\frac{3}{2}$ is an improper fraction. We divide and find that $\frac{3}{2}$ equals $1\frac{1}{2}$. We add this $1\frac{1}{2}$ to the 6 to get $7\frac{1}{2}$.

$$6\frac{3}{2} = 6 + \frac{3}{2} = 6 + 1\frac{1}{2} = \mathbf{7\frac{1}{2}}$$

Practice* Convert each improper mixed number in problems (a)–(h) to a whole number or mixed number.

a. $5\frac{2}{2}$ **b.** $7\frac{4}{2}$ **c.** $2\frac{5}{3}$ **d.** $9\frac{5}{4}$

e. $6\frac{3}{2}$ **f.** $1\frac{4}{3}$ **g.** $3\frac{3}{3}$ **h.** $10\frac{8}{8}$

Simplify each answer in problems (i)–(l).

i. $\frac{4}{5} + \frac{4}{5} =$ **j.** $6\frac{2}{3} + 3\frac{1}{3} =$

k. $\frac{5}{8} + \frac{3}{8} =$ **l.** $7\frac{4}{8} + 8\frac{7}{8} =$

Problem set 85

1. Robin bought 10 arrows for 49¢ each and a package of bow wax for $2.39. How much did she spend in all?

2. On the shelf there are three stacks of books. In the three stacks there are 12, 13, and 17 books. If the number of books in each stack were made the same, how many books would be in each stack?

3. Look at these four numbers. What is the difference when the smallest number is subtracted from the largest number?

   3216 3261 3126 3162

4. What is the largest four-digit even number that has the digits 1, 2, 3, and 4 used only once each?

5. When the decimal number three and six tenths is subtracted from five and two tenths, what is the difference?

6. Compare: $\frac{2}{2} \bigcirc \frac{3}{3}$

7. Simplify the mixed number $4\frac{5}{4}$.

8. Name the point on the number line marked by the arrow with a mixed number and with a decimal number.

9. Daniel ran a 5-kilometer race in 15 minutes and 45 seconds. How many meters did he run?

10. The length of segment PQ is $1\frac{1}{4}$ inches. Segment QR is $1\frac{3}{4}$ inches. How long is segment PR?

11. $$\begin{array}{r} 600.4 \\ -\ 596.7 \\ \hline \end{array}$$

12. $$\begin{array}{r} 9.275 \\ -\ 7.45 \\ \hline \end{array}$$

13. $$\begin{array}{r} \$30.75 \\ \times\ \ \ \ \ 8 \\ \hline \end{array}$$

14. $$\begin{array}{r} 75.2 \\ 84.3 \\ 962.6 \\ 41.7 \\ 12.4 \\ +\ \ 89.2 \\ \hline \end{array}$$

15. $$\begin{array}{r} 506 \\ \times\ 478 \\ \hline \end{array}$$

16. $\frac{4690}{70} =$

17. $\frac{\$20.01}{3} =$

18. $36 \times 9 \times 80 =$

19. $10 + $8.16 + 49¢ + $2 + 5¢ =

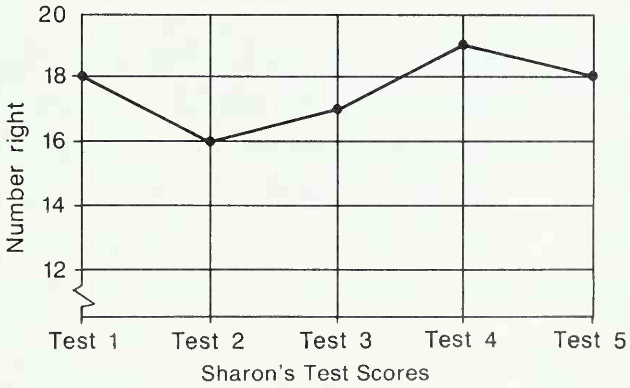
20. $\frac{4}{5} + \frac{4}{5} =$

21. $\frac{5}{9} + \frac{5}{9} =$

22. $5\frac{2}{3} + 6\frac{2}{3} =$

23. If each side of a square is 1 foot, then the perimeter of the square is how many inches?

Use this graph to answer questions 24 and 25.



24. How many answers did Sharon get right on her best test?

25. There are 20 questions on each test. How many did Sharon miss on Test 2?

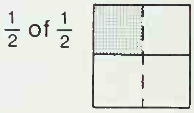
LESSON 86

Multiplying Fractions

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

We have added and subtracted fractions. In this lesson we will multiply fractions. When we add and subtract fractions, we count how many of the same size parts there are. When we multiply fractions, the sizes of the parts change. Consider this multiplication problem. How much is one half of one half?

On the right we draw a diagram of one half. To find one half of one half, we cut the half in half. We see that the answer is one fourth.



Written out, the problem looks like this.

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

We find the answer to a fraction multiplication problem by multiplying the numerators to get the new numerator and multiplying the denominators to get the new denominator. We will use this method to find two thirds of four fifths.

Example 1 $\frac{2}{3} \times \frac{4}{5} =$

Solution We multiply the numerators. We multiply the denominators.

$$\frac{2}{3} \times \frac{4}{5} = \mathbf{\frac{8}{15}}$$

Example 2 What is one half of three fourths?

Solution We write the problem with digits and write a multiplication sign for the word "of."

We multiply the numerators. We multiply the denominators. $\frac{1}{2} \times \frac{3}{4} = \mathbf{\frac{3}{8}}$

Practice* a. $\frac{1}{3} \times \frac{2}{3} =$

b. $\frac{3}{5} \times \frac{1}{2} =$

c. $\frac{2}{3} \times \frac{2}{3} =$

d. $\frac{5}{6} \times \frac{1}{4} =$

e. $\frac{1}{2} \times \frac{3}{3} =$

f. What is three fourths of one half?

g. What is one half of one third?

h. What is two fifths of two thirds?

i. What is one fourth of three fourths?

Note: Reducing fractions will be taught in Lesson 98. Until we get to that lesson, fraction answers will not be reduced.

Problem set 86

1. As the troop hiked, they kept the morning sun to their left. In what direction were they headed?

2. The troop hiked 57 miles in 3 days. The troop averaged how many miles per day?

3. When the decimal number six and thirty-four hundredths is subtracted from nine and twenty-six hundredths, what is the difference?

4. Which factors of 6 are also factors of 12?

5. If $3n = 18$, then what number does $4n$ equal?

6. When the largest two-digit even number is added to the smallest three-digit odd number, what is the sum?

7. Compare: $\frac{4}{4} \bigcirc \frac{3}{2}$

8. What is one half of one fourth?

9. How much is one half of one half?

10. The length of segment AC is 78 millimeters. If BC is 29 millimeters, what is the length of segment AB?

11. $$\begin{array}{r} 87{,}437.8 \\ 5{,}696.4 \\ +\quad 275.9 \\ \hline \end{array}$$

12. $$\begin{array}{r} 6.003 \\ -\ 4.39 \\ \hline \end{array}$$

13. $$\begin{array}{r} \$16.08 \\ \times\quad 9 \\ \hline \end{array}$$

14. $8\overline{)\$36.00}$

15. $\dfrac{7600}{50} =$

16. $$\begin{array}{r} 638 \\ \times\ 517 \\ \hline \end{array}$$

17. $$\begin{array}{r} 3\frac{1}{3} \\ +\ 1\frac{2}{3} \\ \hline \end{array}$$

18. $$\begin{array}{r} 1\frac{2}{3} \\ +\ 1\frac{2}{3} \\ \hline \end{array}$$

19. $$\begin{array}{r} 4 \\ -\ 1\frac{2}{5} \\ \hline \end{array}$$

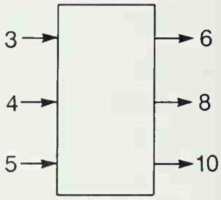
20. $\dfrac{1}{2} \times \dfrac{3}{5} =$

21. $\dfrac{1}{3} \times \dfrac{2}{3} =$

22. $\dfrac{5}{6} \times \dfrac{5}{6} =$

Read this information. Then answer questions 23, 24, and 25.

Matthew has a machine that changes numbers. He fixed the machine so that when he puts in a 3, a 6 comes out. When he puts in a 4, an 8 comes out. When he puts in a 5, a 10 comes out.



23. What does the machine do to the numbers that are put into it?

a. It adds 3.
b. It doubles the number.
c. It divides by 2.
d. It multiplies by 3.

24. If Matthew puts in a 12, what number will come out?

25. Matthew put in a number and 20 came out. What number did Matthew put in the machine?

LESSON 87

Converting Units of Weight

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

As you grow, there is more and more "of you." How do you measure how much of you there is?

When you go to the doctor for a checkup, the doctor measures many things about you. The doctor measures your height. The doctor measures your temperature. The doctor measures your blood pressure. The doctor measures your heart rate. To measure how **much** of you there is, the doctor has you step on a scale. Your weight* describes how much of you there is. To measure the weight of things, we often use units like ounces, pounds, tons, grams, and kilograms. The table below lists some common units of weight in the English system and in the metric system. Many people call the English system the U.S. Customary System. The chart also gives the number of units needed to equal the next larger unit.

Equivalence Table for Units of Weight

U.S. CUSTOMARY UNITS	METRIC UNITS
16 ounces = 1 pound 2000 pounds = 1 ton	1000 grams = 1 kilogram
A kilogram is a little more than 2 pounds.	

Example 1 Most large elephants weigh about 4 tons. How many pounds is that?

Solution One ton is 2000 pounds. Four tons is 4 times 2000 pounds. A large elephant weighs about **8000 pounds**.

---

* There is a technical difference between the terms "weight" and "mass" that will be clarified in other coursework. In this book we will use the word weight to include the meaning of both terms.

Example 2 The watermelon weighed 6 kilograms. How many grams did the watermelon weigh?

Solution One kilogram equals 1000 grams. Six kilograms is 6 times 1000 grams. The watermelon weighed **6000 grams**.

Practice

a. One half of a pound is how many ounces?

b. If a pair of tennis shoes weighs about 1 kilogram, then one tennis shoe weighs about how many grams?

c. Ten pounds of potatoes weigh how many ounces?

d. Sixteen tons is how many pounds?

Problem set 87

1. Samuel Clemens turned 74 in 1909. In what year was he born?

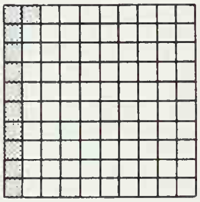
2. Add the decimal number sixteen and nine tenths to twenty-three and seven tenths. What is the sum?

3. The number 19 has how many different factors?

4. How much is one third of one fourth?

5. A VW Bug weighs about one ton. How many pounds is 1 ton?

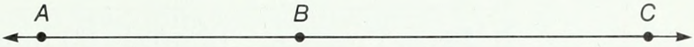
6. Use a fraction and a decimal number to name the shaded part of this square.



7. A 2-pound box of cereal weighs how many ounces?

8. Three kilograms is how many grams?

9. AB is 3.5 centimeters. BC is 4.6 centimeters. Find AC.



10. $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} =$ **11.** $\frac{3}{3} + \frac{2}{2} =$ **12.** $3\frac{5}{8} + 4\frac{6}{8} =$

13. $463 + 2875 + 2489 + 8897 + 7963 =$

14. $\frac{1}{2} \times \frac{5}{6} =$ **15.** $\frac{2}{3} \times \frac{3}{2} =$ **16.** $\frac{1}{2} \times \frac{2}{2} =$

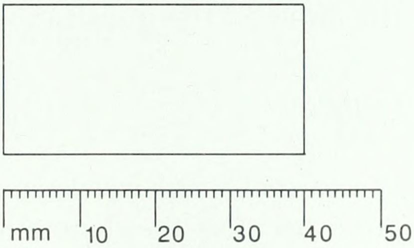
17. $\begin{array}{r} 401.3 \\ -\ 264.7 \\ \hline \end{array}$ **18.** $\begin{array}{r} \$5.67 \\ \times\ \ \ \ 8 \\ \hline \end{array}$ **19.** $\begin{array}{r} 347 \\ \times\ 249 \\ \hline \end{array}$

20. $50 \times (500 \times 300) =$

21. $(\$5 + 4¢) \div 6 =$

22. $64{,}275 \div 8 =$ **23.** $60\overline{)3780}$

Look at this drawing. Then answer questions 24 and 25.



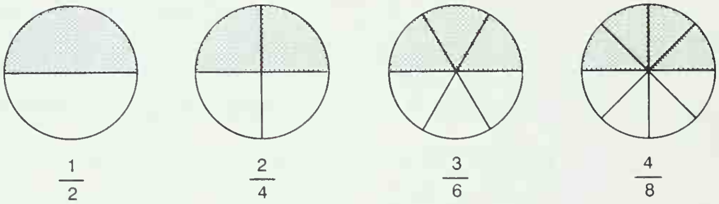
24. How long is this rectangle?

25. If this rectangle is half as wide as it is long, then what is the perimeter of the rectangle?

LESSON 88

Identifying Equivalent Fractions

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)



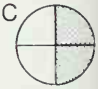
Although we can see that the same amount of each circle is shaded, we can use different fractions to name the shaded part of each circle. We can use $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{4}{8}$. These fractions all name the same amount. Different fractions which name the same amount are called **equivalent fractions**. The word "equivalent" means **equal in value**. The fractions $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{4}{8}$ are all equivalent fractions because they all name the same amount. This idea that the same amount can be named many different ways is very useful in mathematics.

Example 1 Which of these is equivalent to

?

A


B


C


Solution Equivalent fractions name the same amount. By looking at the circles we see that the circle with the same amount shaded as the circle in the question is circle **B**.

Example 2 Compare: $\frac{1}{2} \bigcirc \frac{2}{4}$

Solution We cannot compare these fractions by looking at the numerators because the denominators are different. Looking at the circles at the top of the page, we see that $\frac{1}{2}$ and $\frac{2}{4}$ are two ways to name the same number. The fractions are equivalent. We show that quantities are equal or equivalent by using an equals sign.

$$\frac{1}{2} = \frac{2}{4}$$

Practice

a. What do we call different fractions which name the same amount?

b. Which two fractions are equivalent? $\frac{2}{4}, \frac{3}{6}, \frac{1}{3}$

c. $\frac{1}{3} = \frac{2}{6}$ (true or false?)

d. Compare: $\frac{3}{6} \bigcirc \frac{4}{8}$

e. Compare: $\frac{1}{2} \bigcirc \frac{4}{6}$

Problem set 88

1. One half of the students are girls. One half of the girls have long hair. What fraction of the students are girls with long hair?

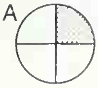
2. Friendly Fred bought a car for $860 and sold it for $1300. How much profit did he make?

3. Heather read a 316-page book in 4 days. She averaged reading how many pages per day?

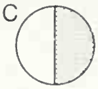
4. The pickup truck could carry $\frac{1}{2}$ ton. How many pounds is $\frac{1}{2}$ ton?

5. The baby kitten weighed one half of a pound. How many ounces did it weigh?

6. Which of these is equivalent to  ?

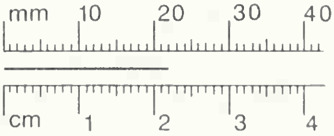
A 

B 

C 

7. How much is one half of one third?

8. Name the length of this segment twice: first as a number of millimeters and second as a number of centimeters.



9. List the numbers that are factors of both 6 and 8.

10. LN is 64 millimeters. LM is 39 millimeters. Find MN.

11. $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} =$

12. $\frac{3}{3} - \frac{2}{2} =$

13. $9\frac{4}{10} + 4\frac{9}{10} =$

14.
$$\begin{array}{r} 43.625 \\ 5.78 \\ +\ 16.942 \\ \hline \end{array}$$

15.
$$\begin{array}{r} \$40.00 \\ -\ \ 13.48 \\ \hline \end{array}$$

16.
$$\begin{array}{r} \$20.50 \\ \times\ \ \ \ \ \ 8 \\ \hline \end{array}$$

17. $9\overline{)\$56.70}$

18.
$$\begin{array}{r} 375 \\ \times\ 842 \\ \hline \end{array}$$

19. $80\overline{)4650}$

20. Divide and write the quotient as a mixed number: $\frac{98}{5}$

21. $\frac{3}{4} \times \frac{1}{2} =$

22. $\frac{3}{2} \times \frac{3}{4} =$

23. $\frac{1}{3} \times \frac{2}{2} =$

Read this information. Then answer questions 24 and 25.

It is 1.5 miles from Sandra's house to school. It takes Sandra 30 minutes to walk to school and 12 minutes if she rides her bike.

24. How far does Sandra travel going to school and back in 1 day?

25. If Sandra leaves her house at 7:55 a.m. and rides her bike, at what time will she get to school?

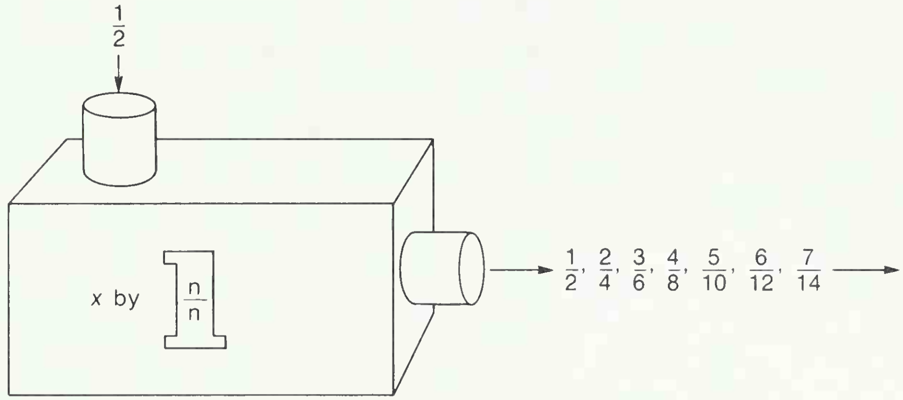
LESSON 89

Finding Equivalent Fractions by Multiplying by 1

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

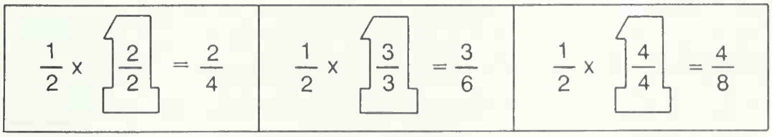
In the preceding lesson we saw that the same fraction may be named many different ways. The fractions $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{4}{8}$ all name the same number. They are equivalent fractions.

In this lesson we will practice a method for making equivalent fractions. To make equivalent fractions we will use the name-changer machine.



Name-Changer Machine

The name-changer machine takes a fraction and multiplies it by a fraction name for 1. We know that when we multiply a number by 1, the size of the number is not changed. However, if we multiply a number by a fraction that is equal to 1, the answer will be a different name for the same number.



The fractions $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{4}{8}$ are equivalent fractions. They were formed by multiplying $\frac{1}{2}$ by different fraction names for 1.

Example 1 By what name for 1 should $\frac{3}{4}$ be multiplied to make $\frac{6}{8}$?

$$\frac{3}{4} \times \boxed{\frac{?}{?}} = \frac{6}{8}$$

Solution To change the name of $\frac{3}{4}$ to $\frac{6}{8}$, we multiply by $\frac{2}{2}$. The fraction $\frac{2}{2}$ is equal to 1, and when we multiply by 1 we do not change the value of the number. Therefore, $\frac{3}{4} = \frac{6}{8}$. The fractions are equivalent.

Example 2 Write a fraction equal to $\frac{2}{3}$ that has a denominator of 12.

$$\frac{2}{3} = \frac{?}{12}$$

Solution We may change the name of a fraction by multiplying by a fraction name for 1. To make the 3 a 12, we must multiply by 4. So the fraction name for 1 which we will use is $\frac{4}{4}$. We multiply $\frac{2}{3} \times \frac{4}{4}$ to make the equivalent fraction $\frac{8}{12}$.

$$\frac{2}{3} \times \boxed{\frac{}{4}} = \frac{}{12}$$

$$\frac{2}{3} \times \boxed{\frac{4}{4}} = \frac{8}{12}$$

Practice* What name for 1 is used to make these equivalent fractions?

a. $\frac{3}{4} \times \boxed{\frac{?}{?}} = \frac{9}{12}$

b. $\frac{2}{3} \times \boxed{\frac{?}{?}} = \frac{4}{6}$

c. $\frac{1}{3} \times \boxed{\frac{?}{?}} = \frac{4}{12}$

Find the numerator to complete the equivalent fractions in problems (d)–(f).

d. $\frac{1}{3} = \frac{?}{9}$ **e.** $\frac{2}{3} = \frac{?}{15}$ **f.** $\frac{3}{5} = \frac{?}{10}$

Problem set 89

1. Mr. MacDonald bought 1 ton of hay for his cow, Geraldine. Every day Geraldine ate 50 pounds of hay. At this rate, 1 ton of hay will last how many days?

2. A duckbill platypus is about $1\frac{1}{2}$ feet long. One and one half feet is how many inches?

3. Sam bought 3 shovels for his hardware store for $6.30 each. He sold them for $10.95 each. How much profit did Sam make on all 3 shovels?

4. Add the decimal number ten and fifteen hundredths to twenty-nine and eighty-nine hundredths. What is the sum?

5. By what name for 1 should $\frac{2}{3}$ be multiplied to make $\frac{6}{9}$?

$$\frac{2}{3} \times \boxed{\frac{?}{?}} = \frac{6}{9}$$

6. Draw a rectangle that has all sides the same length.

7. List the numbers that are factors of both 9 and 12.

8. Write a fraction equal to $\frac{3}{4}$ that has a denominator of 12.

9. AC is 9.1 centimeters. BC is 4.2 centimeters. Find AB.

10. $1\frac{1}{5} + 2\frac{2}{5} + 3\frac{3}{5} =$

11. $5 - \left(3\frac{5}{8} - 3\right) =$

12. $10 − 10¢ =

13. $10 ÷ 4 =

14. 9 × 64¢ = $____

15.
$$\begin{array}{r} 9863.2 \\ 7775.46 \\ +\ \ 897.5 \\ \hline \end{array}$$

16.
$$\begin{array}{r} 30.10 \\ -\ 21.73 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 408 \\ \times\ 748 \\ \hline \end{array}$$

18. $7\overline{)43{,}859}$

19. $\frac{6552}{9} =$

20. $80\overline{)4137}$

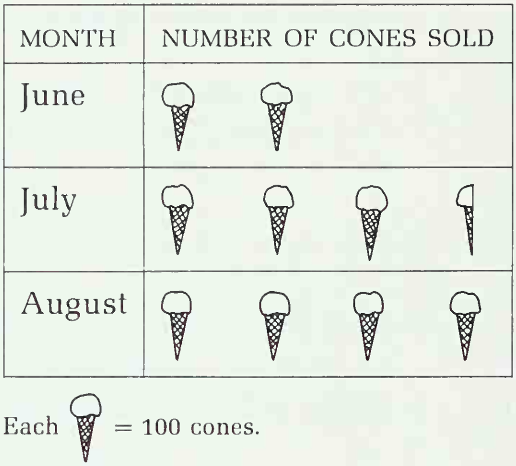
21. $\frac{1}{2}$ of $\frac{1}{5} =$

22. $\frac{3}{4} \times \frac{2}{2} =$

23. $\frac{3}{5} \times \frac{5}{3} =$

This graph shows the number of ice cream cones sold at the snack bar. Use the information in the graph to answer questions 24 and 25.

Ice Cream Cone Sales



24. The number of cones sold in July was how many?
a. $3\frac{1}{2}$ **b.** 300 **c.** 305 **d.** 350

25. Altogether, how many cones were sold during June, July, and August?

LESSON
90

Identifying Prime Numbers

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

We have practiced listing the factors of whole numbers. Some whole numbers have many factors. Other whole numbers have only a few factors. In one special group of whole numbers, each number has exactly two factors. Here we list the first 10 counting numbers and their factors. Which of these numbers have exactly **two** factors?

NUMBER	FACTORS
1	1
2	1, 2
3	1, 3
4	1, 2, 4
5	1, 5
6	1, 2, 3, 6
7	1, 7
8	1, 2, 4, 8
9	1, 3, 9
10	1, 2, 5, 10

There are four numbers in this list which have exactly two factors. The four numbers are 2, 3, 5, and 7. These numbers are called **prime numbers**. **A prime number is a whole number which has exactly two factors.** We often think of a prime number as a number which cannot be divided evenly by any other number except itself and 1. Listing prime numbers will quickly give us a feel for which numbers are prime numbers.

Example The first three prime numbers are 2, 3, and 5. What are the next three prime numbers?

Solution A prime number cannot be divided evenly by any number except itself and 1. We will list the next several whole numbers and scratch out those which can be divided by some other number.

~~6~~, 7, ~~8~~, ~~9~~, ~~10~~, 11, ~~12~~, 13, ~~14~~, ~~15~~, ~~16~~, 17, ~~18~~

The numbers which are not scratched out are prime numbers. The next three prime numbers after 5 are **7**, **11**, **13**.

Practice List all the prime numbers less than 50. (*Hint:* There are 15 of them.)

Problem set 90

1. The student store buys one dozen pencils for 96¢ and sells them for 20¢ each. How much profit does the store make on a dozen pencils?

2. A VW Bug weighs about 1 ton. If its 4 wheels carry the weight evenly, then each wheel carries about how many pounds?

3. List the numbers that are factors of both 8 and 12.

4. The first five prime numbers are 2, 3, 5, 7, and 11. What are the next three prime numbers?

5. By what name for 1 should $\frac{3}{4}$ be multiplied to make $\frac{9}{12}$?

$$\frac{3}{4} \times \boxed{\frac{?}{?}} = \frac{9}{12}$$

6. By what name for 1 should $\frac{5}{6}$ be multiplied to make $\frac{10}{12}$?

7. Think of a prime number. How many different factors does it have?

8. Compare: $\frac{3}{4} \times 1 \bigcirc \frac{3}{4}$

9. One mile is 1760 yards. How many yards is $\frac{1}{8}$ mile?

10. XZ is 84 millimeters. XY equals YZ. Find XY.

11. \$8.43 + 68¢ + \$15 + 5¢ + \$12.87 + \$.05 + \$.15 =

12.
$$\begin{array}{r} 6.505 \\ -\ 1.4 \\ \hline \end{array}$$

13. \$12 − 12¢ =

14.
$$\begin{array}{r} \$18.07 \\ \times \quad\ 6 \\ \hline \end{array}$$

15. $6\overline{)\$76.32}$

16.
$$\begin{array}{r} 375 \\ \times\ 248 \\ \hline \end{array}$$

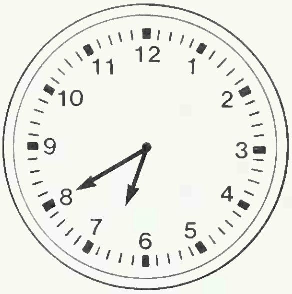
17. $70\overline{)4791}$

18. Divide 365 by 7 and write the quotient as a mixed number.

19. $\frac{3}{4} \times \frac{3}{4} =$ **20.** $\frac{3}{2} \times \frac{3}{2} =$ **21.** $\frac{6}{6} \times \frac{7}{7} =$

22. $3\frac{2}{3} + 1\frac{2}{3} =$ **23.** $5 - \frac{1}{5} =$ **24.** $\frac{7}{10} - \frac{7}{10} =$

25. If it is evening, what time will be shown by the clock in $6\frac{1}{2}$ hours?



LESSON 91

Finding the Greatest Common Factor of Two Numbers

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

We have practiced finding the factors of whole numbers. In this lesson we will practice finding the **greatest common factor** of two numbers. **The greatest common factor of two numbers is the largest whole number which is a factor of both numbers.** The letters **GCF** are sometimes used to stand for the term greatest common factor.

It may be easier to find the greatest common factor if we take the words in reverse order: factor, common, greatest. We will search in this reverse order to find the greatest common factor of 12 and 18.

1. **Factor.** To find the greatest common factor of 12 and 18, we will first list all the factors of 12 and 18.

NUMBER	FACTORS
12	①, ②, ③, 4, ⑥, 12
18	①, ②, ③, ⑥, 9, 18

2. **Common.** After listing all the factors, we look for the factors that 12 and 18 have "in common." That is, we look for numbers which are factors of **both** 12 and 18. In our list we have circled the numbers which are factors of both 12 and 18. These are called **common factors**. The numbers 12 and 18 have four common factors.
3. **Greatest.** Finally, we search for the greatest of the common factors. Greatest means largest. The largest of the factors that 12 and 18 have in common is 6.

Example Find the greatest common factor (GCF) of 8 and 20.

Solution To find the greatest common factor, we may think, "factor, common, greatest." We will first find the factors, then the common factors, then the greatest of the common factors. The factors of 8 and 20 are listed below with the common factors circled.

8	①, ②, ④, 8
20	①, ②, ④, 5, 10, 20

There are three common factors. The greatest of the three common factors is **4**.

Practice* Find the greatest common factor (GCF) of each pair of numbers.

a. 6 and 9
b. 6 and 12
c. 15 and 21
d. 6 and 10
e. 12 and 15
f. 7 and 10

Problem set 91

1. In 3 games, Sherry's bowling scores were 109, 98, and 135. Her highest score was how much more than her lowest score?

2. The total price of 5 pounds of bananas was $1.95. What was the price per pound?

3. Nathan is 5 feet 4 inches tall. How many inches is 5 feet 4 inches?

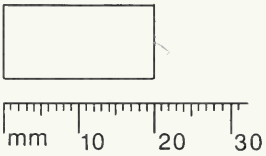
4. When twenty-six and five tenths is subtracted from thirty-two and six tenths, what is the difference?

5. Compare: $\frac{3}{2} \times \frac{1}{2} \bigcirc \frac{3}{4}$

6. List all the prime numbers between 20 and 30.

7. Find the greatest common factor (GCF) of 6 and 10.

8. What is the length of this rectangle?



9. If the width of this rectangle is 9 mm less than the length, then what is the perimeter of the rectangle?

10. QR is 48 millimeters. Segment RS is one half as long as segment QR. Find QS.

11. $\begin{array}{r} \$98.89 \\ 46.37 \\ 29.50 \\ +\ 17.34 \\ \hline \end{array}$

12. $\begin{array}{r} 80.19 \\ -\ 75.6 \\ \hline \end{array}$

13. $\begin{array}{r} \$56.42 \\ \times\ \ \ \ 6 \\ \hline \end{array}$

14. $6\overline{)\$87.00}$

15. $\begin{array}{r} 706 \\ \times\ 438 \\ \hline \end{array}$

16. $40\overline{)2438}$

17. Divide 5280 by 9 and write the quotient as a mixed number.

18. $10 − ($5.80 + 28¢) =

19. $5\frac{3}{5} + \left(4 - 1\frac{3}{5}\right) =$

20. $\frac{1}{2} \times \frac{3}{3} =$

21. $\frac{4}{3} \times \frac{4}{3} =$

22. $\frac{10}{7} \times \frac{7}{10} =$

23. From September 1 of one year to June 1 of the next year is how many months?

Read this information. Then answer questions 24 and 25.

Jenny has a paper route. She delivers papers to 30 customers. At the end of the month she gets $6.50 from each customer. She pays the newspaper company $135 each month for the newspapers.

24. How much money does Jenny get each month from all of her customers?

25. How much profit does she make each month for her work?

LESSON 92

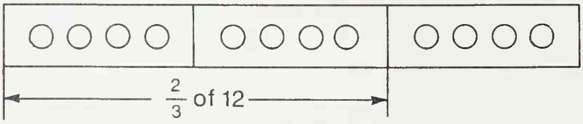
Finding a Fraction of a Whole Number, Part 2

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

One of the most important and useful skills in mathematics is the ability to solve fractional-part problems. The following is an example of this type of problem.

$$\text{What is } \frac{2}{3} \text{ of 12?}$$

The denominator of $\frac{2}{3}$ means that the group of 12 is to be divided into 3 equal parts. We have drawn a diagram that shows a group of 12 divided into 3 equal parts. We see that there are 4 in each part.

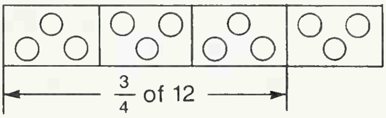


The numerator of $\frac{2}{3}$ means that we count 2 of the parts. The total for 2 of the parts is 8. We say that $\frac{1}{3}$ of 12 is 4, and $\frac{2}{3}$ of

12 is 8. With practice, you will be able to solve many problems like these mentally.

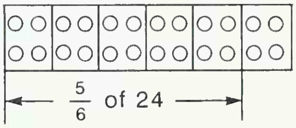
Example 1 What number is $\frac{3}{4}$ of 12?

Solution The denominator of $\frac{3}{4}$ means that the group is divided into 4 equal parts. We divide 12 by 4 and find that there are 3 in each part. The numerator of $\frac{3}{4}$ means that 3 of the parts are counted. We count how many there are in 3 parts and find 9. Three fourths of 12 is **9**.



Example 2 What number is $\frac{5}{6}$ of 24?

Solution The denominator of $\frac{5}{6}$ means that the group is divided into 6 equal parts. We divide 24 by 6 and find that there are 4 in each part. The numerator of $\frac{5}{6}$ means that 5 of the parts are counted. By multiplying, we find how many there are in 5 of the parts. We find that $\frac{5}{6}$ of 24 is **20**.



Practice* **a.** What is $\frac{1}{3}$ of 15? **b.** What is $\frac{2}{3}$ of 15?

c. What is $\frac{1}{5}$ of 15? **d.** What is $\frac{3}{5}$ of 15?

e. What is $\frac{1}{4}$ of 16? **f.** What is $\frac{3}{4}$ of 16?

g. What is $\frac{1}{6}$ of 18? **h.** What is $\frac{5}{6}$ of 18?

i. What is $\frac{1}{4}$ of 20? **j.** What is $\frac{3}{4}$ of 20?

Problem set 92

1. Javier was paid $22.50 for working on Saturday. He worked from 8 a.m. to 2 p.m. He earned how much money per hour?

2. Estimate the product of 396 and 507 by rounding to the nearest hundred before you multiply.

3. What is the next number in this sequence?

   . . . , 3452, 3552, 3652, ____

4. Most adults are between 5 and 6 feet tall. The height of most cars is about how many feet?
   a. 4 to 5 feet **b.** 8 to 10 feet **c.** 40 to 50 feet

5. When sixty-five and fourteen hundredths is subtracted from eighty and forty-eight hundredths, what is the difference?

6. If each side of an octagon is 12 inches, what is the perimeter of the octagon?

7. Which of these numbers is not a prime number?
   a. 11 **b.** 21 **c.** 31 **d.** 41

8. Find the greatest common factor (GCF) of 20 and 30.

9. How many inches is $\frac{1}{4}$ of a foot?

10. *AC* is 4 inches. *BC* is $\frac{3}{4}$ inch. Find *AB*.

11. What number is $\frac{1}{6}$ of 12?

12. What number is $\frac{5}{6}$ of 12?

13. $\frac{5}{7} + \frac{3}{7} =$

14. $\frac{4}{4} - \frac{2}{2} =$

15. $\frac{2}{3} \times \square = \frac{6}{9}$

16.
$$\begin{array}{r} 976.5 \\ 470.4 \\ 436.7 \\ +\ 98.6 \\ \hline \end{array}$$

17.
$$\begin{array}{r} \$40.00 \\ -\ 32.85 \\ \hline \end{array}$$

18.
$$\begin{array}{r} \$8.47 \\ \times\ \ 7 \\ \hline \end{array}$$

19. $6\overline{)43{,}715}$

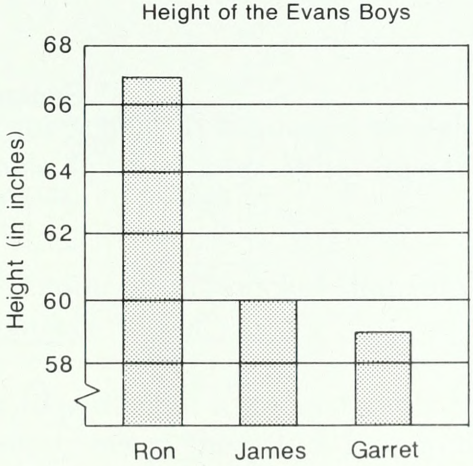
20. $\frac{2640}{30} =$

21.
$$\begin{array}{r} 367 \\ \times\ 418 \\ \hline \end{array}$$

22. $6\frac{2}{3} + \left(5 - 3\frac{1}{3}\right) =$

23. $18.64 ÷ 4 =

Use this graph to answer questions 24 and 25.



24. How many inches does Garret need to grow to be as tall as Ron?

25. Which boy is exactly 5 feet tall?

LESSON 93

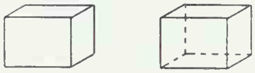
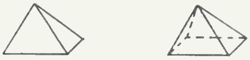
Recognizing and Naming Geometric Solids

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

We have practiced identifying geometric shapes such as triangles, rectangles, and circles. These are "flat" shapes and are called **plane figures**. They take up a certain amount of area, but they do not take up space. Objects that take up space are things like baseball bats, houses, horses, and people. In this lesson we will identify some geometric shapes that take up space.

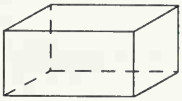
Geometric shapes that take up space are called **solids**, even though the objects we know that are similar to these shapes may not be "solid." We could make models of these shapes with clay, but we have difficulty drawing them because solids have **depth** and the surface of paper does not. To give a feeling of depth when drawing these shapes, we create **optical illusions** by the angles that we use or the extra lines we include.

Geometric Solids

SHAPE	NAME
	Cube
	Rectangular solid
	Pyramid
	Cylinder
	Sphere
	Cone

The flat surfaces of solids are called **faces**. A cube has six faces. A die (singular of dice) is a cube. The six faces of a die are numbered with dots.

Example 1 **a.** Name this shape.
b. How many faces does it have?



Solution This shape is a **rectangular solid**. It has **six faces**.

Example 2 What is the shape of a basketball?

Solution A basketball is not a circle. A circle is a "flat" shape (a plane figure), but a basketball takes up space. A basketball is a **sphere**.

Practice Name the shape of the objects listed in (a)–(d).

a. A brick

b. A soup can

c. An ice cream cone

d. A shoebox

Problem set 93

1. Alicia left for school at a quarter of eight in the morning and got home $7\frac{1}{2}$ hours later. What time was it when Alicia got home?

2. Mark has 5 coins in his pocket that total 47¢. How many dimes are in his pocket?

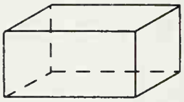
3. Use digits to write the number twenty-three million, two hundred eighty-seven thousand, four hundred twenty.

4. **a.** What number is $\frac{3}{4}$ of 24?
b. What number is $\frac{2}{3}$ of 24?

5. List all the prime numbers between 10 and 20.

6. What is the greatest common factor (GCF) of 4 and 8?

7. **a.** Name this shape.
b. How many faces does it have?



8. What is the shape of the earth?

9. Write a decimal number equal to the mixed number $1\frac{7}{10}$.

10. Which word names the distance across a circle?
a. center **b.** circumference **c.** radius **d.** diameter

11.
$$\begin{array}{r} 3.625 \\ 4.5 \\ +\ 7.38 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 3704 \\ -2918 \\ \hline \end{array}$$

13.
$$\begin{array}{r} 364 \\ \times\ 478 \\ \hline \end{array}$$

14. $\$6.25 \times 4 =$

15. $6\overline{)\$14.58}$

16. $3518 \div 7 =$

17. $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} =$

18. $\frac{3}{4} \times \square = \frac{6}{8}$

19. $\frac{3}{4} = \frac{\square}{12}$

20.
$$\begin{array}{r} 4\frac{2}{5} \\ +\ \ \frac{1}{5} \\ \hline \end{array}$$

21.
$$\begin{array}{r} 3\frac{3}{4} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$$

22.
$$\begin{array}{r} 5 \\ -\ 1\frac{1}{4} \\ \hline \end{array}$$

23. Compare: .1 ○ .01

Use the information given and the table to answer questions 24 and 25.

Mr. and Mrs. Minick took their children, Samantha and Douglas, to a movie. Ticket prices are shown in the table.

TICKET PRICES	
Adults	$5.00
Ages 9–12	$2.50
Under 9	$1.75

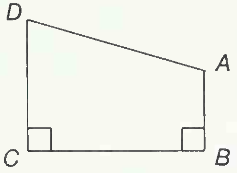
24. Samantha is 12 years old and Douglas is 8 years old. What is the total cost of all 4 tickets?

25. Before 5 p.m. adult tickets cost \$2.50. How much money would the Minicks save by going to the movie before 5 p.m. instead of after 5 p.m.?

LESSON 94 Using Letters to Name Points, Segments, and Angles

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

The quadrilateral below is formed by four segments which intersect at four points and form four angles. In this lesson we will learn to name points, segments, and angles using letters and symbols.



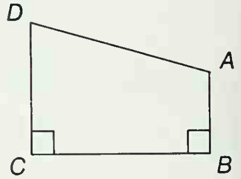
We name a point with a single letter. The letters A, B, C, and D are used in this drawing to name the points where the segments intersect. We may use all of these letters to name this polygon. This polygon is **quadrilateral *ABCD*.**

To name a line segment, we use two letters. We use the letters which name the end points of the segment. **Segment *AB*** is the name of the line segment which runs from point A to point B. We may abbreviate segment AB this way, $\overline{AB}$. The same segment could also be named $\overline{BA}$. Notice that we draw a segment over the letters that name the segment. If we write AB or BA without a line segment on top, we mean the distance from A to B.

To name an angle, we may use three letters. Angle DAB can be abbreviated $\angle DAB$ and is read "angle D-A-B." $\angle DAB$ names the angle that is formed by the segments which run from point A to point D and from point A to point B. This angle can also be named $\angle BAD$.

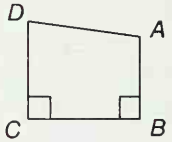
Notice the small squares in ∠ABC and ∠BCD. We remember that the small square is a symbol that means the angle is a right angle.

Example 1 Which segment in quadrilateral ABCD is perpendicular to segment AB?



Solution Perpendicular segments intersect and form right angles. There are two segments that intersect $\overline{AB}$. They are $\overline{AD}$ and $\overline{BC}$. The right angle mark in ∠ABC shows that $\overline{AB}$ is perpendicular to $\boldsymbol{\overline{BC}}$. This segment can also be named $\boldsymbol{\overline{CB}}$.

Example 2 Which angle in quadrilateral ABCD appears to be an acute angle?



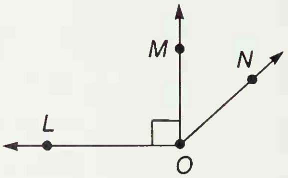
Solution An acute angle is smaller than a right angle. The angle that is smaller than a right angle is ***∠CDA***, which can also be named ***∠ADC***.

Practice Use the diagram to answer questions (a)–(c).

a. Name the acute angle.

b. Name the right angle.

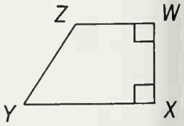
c. Name the obtuse angle.



Use the drawing of quadrilateral WXYZ to answer questions (d) and (e).

d. Which segment is parallel to $\overline{XY}$?

e. Which segment is perpendicular to $\overline{XY}$?



Problem set 94

1. Draw a circle and shade $\frac{1}{3}$ of it.

2. Tom and his two friends found $2418 of treasure buried in the cave. If they share the treasure equally, how much will each receive?

3. This math book weighs about 1 kilogram. A kilogram is how many grams?

4. Estimate the product of 732 and 480 by rounding the numbers to the nearest hundred before you multiply.

5. At which of these times do the hands of the clock form an acute angle?
a. 3:00 **b.** 6:15 **c.** 9:00 **d.** 12:10

6. Compare: 1 ○ .1

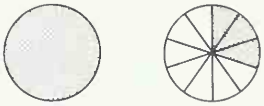
7. Find the greatest common factor (GCF) of 8 and 12.

8. **a.** What number is $\frac{1}{4}$ of 80?
b. What number is $\frac{3}{4}$ of 80?

9. $\frac{1}{2} \times \square = \frac{3}{6}$

10. $36 \times 1 = 36 + \square$

11. Name the total number of shaded circles as a mixed number and as a decimal number.



12. 99,439 + 6148 + 751 + 8362 =

13. $10 − 59¢ =

14. $8 \times 76 \times 54 =$

15. 5 × 68¢ = $

16. $3.40 ÷ 5 =

17. $30\overline{)672}$

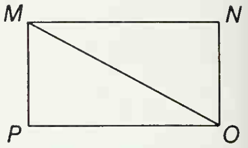
18. $3\frac{1}{3} + 3\frac{1}{3} + 3\frac{1}{3} =$

19. $10 - 3\frac{1}{3} =$

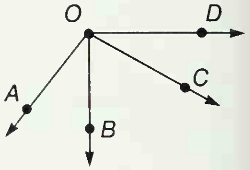
20. $\frac{3}{4} \times \frac{5}{4} =$

21. What is the name of this solid?

22. In rectangle $MNOP$, which segment is parallel to $\overline{MN}$?
a. $\overline{MP}$ b. $\overline{PO}$ c. $\overline{NO}$
d. $\overline{MO}$



23. Which angle in this figure appears to be a right angle?
a. $\angle AOB$ b. $\angle BOC$ c. $\angle BOD$
d. $\angle AOD$



Use the grocery receipt to answer questions 24 and 25.

24. How much money was spent on eggs, juice, and cereal?

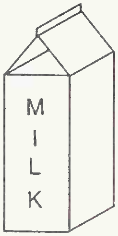
25. Each item labeled "Milk" is a half-gallon carton. What is the cost of 1 gallon of milk?

Milk	.97
Milk	.97
Milk	.97
Milk	.97
Apple juice	.69
Apple juice	.69
Eggs	1.51
Cereal	1.99
TOTAL	8.76

LESSON
95

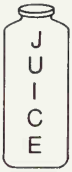
Converting Units of Liquid Measure

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)



$\frac{1}{2}$ gallon

2 liters



1 quart

When we buy milk or soda pop or fruit juice at the store, we are buying a quantity of liquid. Liquid quantities are often measured in ounces, pints, quarts, and gallons. They are also measured in liters and milliliters.

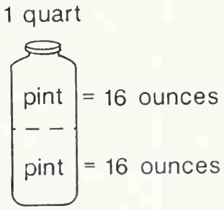
The chart below lists some common units of liquid measure used in the U.S. Customary System and in the metric system. The chart also gives the number of units needed to equal the next larger unit of liquid measure.

Equivalence Table for Units of Liquid Measure

U.S. CUSTOMARY UNITS	METRIC UNITS
16 ounces = 1 pint 2 pints = 1 quart 4 quarts = 1 gallon	1000 milliliters = 1 liter
A liter is slightly more than a quart.	

Example 1 One quart of juice is how many ounces of juice?

Solution The table tells us that a quart is 2 pints and that each pint is 16 ounces. Since 2 times 16 is 32, 1 quart is the same as **32 ounces**.



Note: The word "ounce" is used to describe a weight as well as an amount of liquid. An ounce of liquid is often called a **fluid ounce**. Although ounce has two meanings, a fluid ounce of water does weigh about 1 ounce.

Example 2 A half gallon of milk is the same as how many quarts?

Solution A whole gallon is equal to 4 quarts. A half gallon is equal to half as many quarts. A half gallon equals **2 quarts**.

Practice **a.** One fourth of a dollar is a quarter. What is the name for one fourth of a gallon?

b. How many pints equal 1 gallon?

c. How many milliliters equal 2 liters?

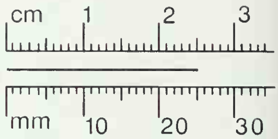
d. A cup is one half of a pint. A cup is the same as how many ounces?

Problem set 95

1. Draw a rectangle. Shade all but two fifths of it.

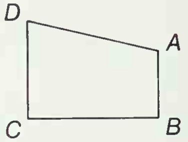
2. Write a three-digit prime number using the digits 4, 1, and 0 once each.

3. Write the length of this segment as a number of centimeters and as a number of millimeters.



4. Tena counted her heartbeats. Her heart beat 20 times in 15 seconds. At that rate, how many times would it beat in 1 minute?

5. In this quadrilateral, which segment appears to be perpendicular to $\overline{AB}$?
a. $\overline{BC}$ **b.** $\overline{CD}$ **c.** $\overline{DA}$



6. Find the greatest common factor (GCF) of 6 and 9.

7. **a.** What number is $\frac{1}{5}$ of 60?
b. What number is $\frac{2}{5}$ of 60?

8. AB is $1\frac{1}{4}$ inches. BC is $2\frac{1}{4}$ inches. Find AC.

9. Compare: .1 ○ 0

10. Four quarts of water is how many pints of water?

11. Three liters equals how many milliliters?

12. \$17.56 + \$12 + 95¢ =

13. $\begin{array}{r} 4.324 \\ -\ 1.91 \\ \hline \end{array}$

14. $\begin{array}{r} 396 \\ \times\ 405 \\ \hline \end{array}$

15. $1.25 × 20 =

16. $9\overline{)3605}$

17. $2.50 ÷ 10 =

18. $3\frac{2}{3} + 3\frac{2}{3} =$

19. $3 - \left(2\frac{2}{3} - 1\right) =$

20. $\frac{3}{5} = \frac{\square}{10}$

21. $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} =$

22. $\frac{3}{1} \times \frac{1}{4} =$

23. Since $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$, how many $\frac{1}{4}$s are in $\frac{3}{4}$?

Read this information. Then answer questions 24 and 25.

Stan is 6 inches taller than Roberta. Roberta is 4 inches shorter than Gilbert. Gilbert is 5 feet 3 inches tall.

24. How tall is Roberta?

25. How tall is Stan?

LESSON 96

Multiplying Fractions and Whole Numbers

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

Problems about fractional parts of a number are very important. One form of this kind of problem is this question:

$$\text{What number is } \frac{1}{3} \text{ of } 2?$$

We have found fractions of whole numbers that could be divided evenly by the denominator of the fraction. But in this problem we see that the whole number cannot be divided evenly by the denominator of the fraction. We can solve problems like this by multiplying. To find $\frac{1}{3}$ of 2, we will multiply

$$\frac{1}{3} \times 2 =$$

When we try to multiply, we find that the whole number is not written with a numerator and denominator. To multiply a fraction and a whole number, we first write the whole number as a fraction with a numerator and denominator. **To write a whole number as a fraction, we make the whole number the numerator of the fraction and we make 1 the denominator of the fraction.** Thus the number 2 may be written as the fraction $\frac{2}{1}$. Now we multiply.

$$\frac{1}{3} \times \frac{2}{1} = \frac{2}{3}$$

We find that $\frac{1}{3}$ of 2 is $\frac{2}{3}$.

Example What number is $\frac{2}{3}$ of 4?

Solution Since we cannot divide the whole number evenly by the denominator, we will solve this problem by multiplying $\frac{2}{3}$ and 4. We first write 4 as the fraction $\frac{4}{1}$. Then we multiply and simplify to get the answer $\mathbf{2\frac{2}{3}}$.

$$\frac{2}{3} \times \frac{4}{1} = \frac{8}{3} = \mathbf{2\frac{2}{3}}$$

Practice* Multiply. Simplify answers when possible.

a. $\frac{1}{3} \times 4 =$

b. $2 \times \frac{3}{5} =$

c. $\frac{2}{3} \times 2 =$

d. $3 \times \frac{1}{4} =$

e. What number is $\frac{1}{5}$ of 4?

f. What number is $\frac{1}{6}$ of 5?

g. What number is $\frac{2}{3}$ of 5?

h. What number is $\frac{3}{4}$ of 4?

Problem set 96

1. Draw a pair of horizontal parallel segments. Make the lower segment longer than the upper segment. Make a quadrilateral by connecting the endpoints.

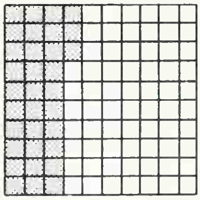
2. Estimate the difference when 3047 is subtracted from 6970 by rounding the numbers to the nearest thousand before you subtract.

3. Write the following sentence using digits and symbols.

"The sum of six and four is ten."

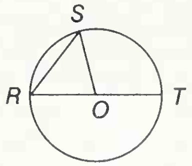
4. A 2-liter bottle of soft drink contains how many milliliters of liquid?

5. Name the shaded part of the square as a fraction and as a decimal number.



6. a. What number is $\frac{1}{3}$ of 120?
   b. What number is $\frac{2}{3}$ of 120?

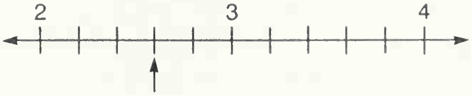
7. Which segment names a diameter of this circle?
   a. $\overline{RS}$ b. $\overline{RT}$ c. $\overline{OS}$ d. $\overline{OT}$



8. List these numbers in order of size from least to greatest.

$$1, 0, \frac{1}{2}$$

9. The arrow is pointing to what mixed number on this number line.



10. $2 \times \frac{2}{3} =$

11. $\frac{2}{3} + \frac{2}{3} =$

12. $3 - \left(2\frac{3}{5} - 1\frac{1}{5}\right) =$

13.
$$\begin{array}{r} 53.487 \\ 12.596 \\ +\ 18.427 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 3014 \\ -\ 1435 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 476 \\ \times\ 890 \\ \hline \end{array}$$

16. $4\overline{)348}$

17. $40\overline{)3480}$

18. $42.36 ÷ 6 =

19. $\frac{1}{2} \times \square = \frac{5}{10}$

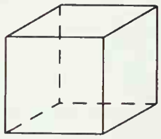
20. $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} =$

21. $3 \times \frac{3}{4} =$

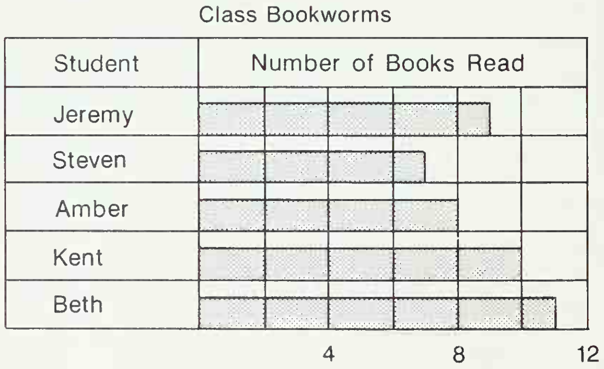
22. Since $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{9}{4}$, how many $\frac{3}{4}$s are in $\frac{9}{4}$?

23. **a.** What is the name of this solid?

b. How many faces does it have?



Use this graph to answer questions 24 and 25.



24. How many more books must Steven read to reach the goal of 12?

25. Each book must be 180 pages or more. Kent has read at least how many pages so far?

LESSON 97

Dividing Fractions, Part 1

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

In this lesson we will learn one way to divide fractions. We may remember that one meaning of division is, "How many of one number are in another number?" For example,

10 ÷ 2 means, How many 2s are in 10?

We will use this meaning of division to discuss the meaning of $\frac{3}{4} \div \frac{1}{4}$.

$\frac{3}{4} \div \frac{1}{4}$ means, How many $\frac{1}{4}$s are in $\frac{3}{4}$?

Here we will write the same question using pictures.

How many  are in  ?

We see that the number of $\frac{1}{4}$s in $\frac{3}{4}$ is 3. Below we show an algorithm we may use to find the answer.

$$\frac{3}{4} \div \frac{1}{4} = \frac{3}{1} \qquad \frac{3}{1} \text{ equals } 3.$$

We get the answer $\frac{3}{1}$ by dividing the numerator of the first fraction by the numerator of the second fraction, and the denominator of the first fraction by the denominator of the second fraction. Then we simplify the answer.

Example $\frac{2}{3} \div \frac{1}{3} =$

Solution This question means, how many $\frac{1}{3}$s are in $\frac{2}{3}$? We divide 2 ÷ 1 to find the numerator of the answer and 3 ÷ 3 to find the denominator. Then we simplify the answer.

$$\frac{2}{3} \div \frac{1}{3} = \frac{2}{1}$$

$$\frac{2}{1} = 2$$

Practice

a. $\frac{2}{3} \div \frac{2}{3} =$

b. $\frac{5}{6} \div \frac{1}{3} =$

c. $\frac{4}{9} \div \frac{2}{3} =$

d. $\frac{6}{8} \div \frac{2}{2} =$

e. $\frac{5}{6} \div \frac{1}{6} =$

f. $\frac{6}{6} \div \frac{3}{2} =$

Problem set 97

1. Mary's rectangular garden is twice as long as it is wide. Her garden is 10 feet wide. What is the perimeter of her garden?

2. In which of these numbers does the 1 mean $\frac{1}{10}$?
a. 12.34 **b.** 21.43 **c.** 34.12 **d.** 43.21

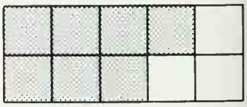
3. List these numbers in order of size from least to greatest.

$$1, \frac{1}{2}, .3$$

4. Two quarts of juice is how many ounces of juice?

5. **a.** A quarter is what fraction of a dollar?
b. How many quarters equal 1 dollar?
c. How many quarters equal 3 dollars?

6. Name the shaded part of the rectangle as a fraction and as a decimal number.



7. If $a = 3$, then $2a + 5 =$
a. 10 **b.** 11 **c.** 16 **d.** 28

8. AC is 84 millimeters, AB is one fourth of AC. Find BC.

9. One **big** step is about a meter in length. About how many meters long is a bicycle?

10. $\frac{9}{4} \div \frac{3}{4} =$

11. $\frac{6}{8} \div \frac{2}{2} =$

12. $3 - \left(1\frac{3}{4} - 1\right) =$

13. $\$20 - (\$6.25 + 49¢) =$

14.

$$\begin{array}{r} 706 \\ \times\ 468 \\ \hline \end{array}$$

15.

$$\begin{array}{r} \$12.75 \\ \times\quad\ \ 8 \\ \hline \end{array}$$

16.

$$\begin{array}{r} 5365 \\ 428 \\ 3997 \\ 659 \\ 7073 \\ +\ \ 342 \\ \hline \end{array}$$

17. $2250 \div 50 =$

18. $5\overline{)225}$

19. $4\overline{)\$8.20}$

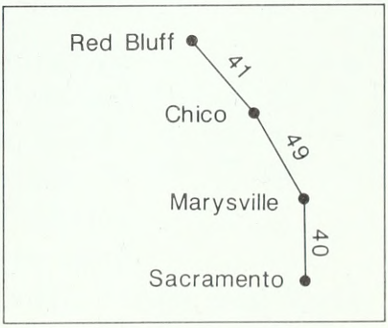
20. $\frac{2}{5}$ of 100 =

21. $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} =$

22. $3 \times \frac{2}{3} =$

23. Since $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} = 2$, how many $\frac{2}{3}$s are in 2?

This map shows the number of miles it is between towns. Use this map to answer questions 24 and 25.



24. The distance from Marysville to Red Bluff is how many miles more than the distance from Marysville to Sacramento?

25. Allen was travelling from Sacramento to Chico. When he was half way to Marysville, how far did he still have to go?

LESSON
98

Reducing Fractions

Facts Practice: Simplify 60 Improper Fractions (Test H in Test Booklet)

In an earlier lesson we saw that we can form equivalent fractions by multiplying a fraction by a fraction name for 1. By multiplying $\frac{1}{2}$ by $\frac{3}{3}$, we form the equivalent fraction $\frac{3}{6}$.

$$\frac{1}{2} \times \boxed{\frac{3}{3}} = \frac{3}{6}$$

The fraction $\frac{3}{6}$ is equal to $\frac{1}{2}$ because we multiplied $\frac{1}{2}$ by a form of 1. When we multiply by 1, the value of the number is not changed. It is also true that when we **divide by 1**, the value of a number is not changed.

$$5 \div 1 = 5 \qquad 10{,}000 \div 1 = 10{,}000 \qquad \frac{1}{2} \div 1 = \frac{1}{2}$$

Dividing by 1 does not change the value of a number. However, if we divide by a fraction name for 1, we will form a different name for the number. We can change the name of the fraction $\frac{3}{6}$ to $\frac{1}{2}$ by dividing. Here we divide $\frac{3}{6}$ by $\frac{3}{3}$.

$$\frac{3}{6} \div \boxed{\frac{3}{3}} = \frac{1}{2}$$

By dividing, we changed $\frac{3}{6}$ to $\frac{1}{2}$. When we divided, both the top and the bottom numbers of the fraction became smaller. This is called **reducing**. We reduce a fraction when we form an equivalent fraction with smaller numbers on the top and on the bottom. To reduce, we divide both the numerator and the denominator by a number which evenly divides both.

The ability to reduce fractions is an important skill that is used throughout mathematics. In mathematics it is expected that if a fraction can be reduced it will be reduced. From this lesson on, fraction answers which can be reduced should be reduced.

Example Reduce: $\frac{4}{6}$

Solution To reduce, we divide both parts of the fraction by a number which divides both parts evenly. Only two numbers divide both 4 and 6 evenly. The two numbers are 1 and 2. Dividing by $\frac{1}{1}$ does not change the size of the terms, so we divide by $\frac{2}{2}$.

$$\frac{4}{6} \div \boxed{\frac{2}{2}} = \frac{2}{3}$$

The fraction $\frac{4}{6}$ reduces to $\mathbf{\frac{2}{3}}$.

Practice Write the reduced form of each fraction.

a. $\frac{2}{4}$ **b.** $\frac{6}{8}$ **c.** $\frac{8}{10}$ **d.** $\frac{2}{12}$

e. $\frac{3}{6}$ **f.** $\frac{2}{6}$ **g.** $\frac{9}{12}$ **h.** $\frac{6}{10}$

Solve and reduce the answer.

i. $\frac{5}{9} + \frac{1}{9} =$ **j.** $\frac{5}{8} - \frac{1}{8} =$ **k.** $\frac{2}{3} \times \frac{5}{4} =$

Problem set 98

1. Pam lives $\frac{1}{4}$ mile from school. How far does she travel each day going to school and back?

2. According to this calendar, what is the date of the first Friday in April 2070?

MARCH 2070

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

3. Use digits to write the decimal number three and twelve hundredths.

4. a. How many dimes equal \$1?
b. How many dimes equal \$5?

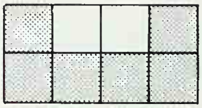
5. What number is $\frac{2}{3}$ of 150?

6. A half gallon of milk is how many quarts of milk?

7. Which part of a bicycle wheel is like a radius?
   a. the tire **b.** a spoke **c.** the hub

8. Reduce these fractions: **a.** $\frac{3}{6}$ **b.** $\frac{6}{9}$

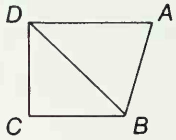
9. What fraction of the rectangle is shaded? (Reduce your answer.)



10. *RT* is 84 millimeters. *RS* is one third of *RT*. Find *ST*.

11. Compare: $\frac{3}{5}+\frac{3}{5}+\frac{3}{5} \bigcirc 3 \times \frac{3}{5}$

12. In this drawing, which angle appears to be obtuse?
   a. $\angle ABC$ **c.** $\angle BDC$
   b. $\angle ABD$ **d.** $\angle DAB$



13. $\frac{9}{5} \div \frac{3}{5} =$

14. $\frac{4}{6} \div \frac{2}{2} =$

15. $5 - 1\frac{3}{10} =$

16. $\frac{1}{4} + \frac{1}{4} =$

17. $\frac{7}{8} - \frac{1}{8} =$

18. $\frac{3}{4} = \frac{\square}{12}$

19. $6.57 + 38¢ + $16 =

20. 42,105 − 1,257 =

21. 7 × 35¢ = $

22. 340 × 607 =

23. $9\overline{)\$7.65}$

Use this school schedule to answer questions 24 and 25.

24. How many total minutes are spent each morning in reading and language?

25. If students come back for 2 hours and 10 minutes after lunch, then at what time does school end?

Reading	8:00– 8:50
Math	8:50– 9:40
Recess	9:40–10:10
Language	10:10–10:50
Science	10:50–11:30
Lunch	11:30–12:30

LESSON 99

Reducing Mixed Numbers

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)

In mathematics we usually write answers in the simplest form. A fraction is in its simplest form when it is reduced. We reduce fractions and we reduce mixed numbers.

We reduce a mixed number by reducing its fraction. The mixed number $4\frac{2}{4}$ is not in its simplest form because the fraction can be reduced. When we reduce the fraction, the whole number is not changed.

$$4\frac{2}{4} \text{ means } 4 + \frac{2}{4}$$

$$\frac{2}{4} \text{ reduces to } \frac{1}{2}$$

$$\text{So } 4\frac{2}{4} \text{ equals } 4\frac{1}{2}$$

Example 1 Reduce: $3\frac{4}{6}$

Solution We reduce a mixed number by reducing its fraction. Since the fraction $\frac{4}{6}$ reduces to $\frac{2}{3}$, the mixed number $3\frac{4}{6}$ reduces to $\mathbf{3\frac{2}{3}}$.

Fraction answers which can be reduced should be. We must be alert for fraction answers which can be reduced.

Example 2 $4\frac{5}{6} - 1\frac{1}{6} =$

Solution We subtract and get the answer $3\frac{4}{6}$. However, the fraction can be reduced. We reduce the fraction $\frac{4}{6}$ to $\frac{2}{3}$ and write the answer $\mathbf{3\frac{2}{3}}$.

$$4\frac{5}{6} - 1\frac{1}{6} = 3\frac{4}{6} = \mathbf{3\frac{2}{3}}$$

Practice* Reduce each mixed number in problems (a)–(f).

a. $1\frac{2}{8}$ **b.** $2\frac{6}{9}$ **c.** $2\frac{5}{10}$

d. $3\frac{2}{4}$ **e.** $3\frac{4}{6}$ **f.** $4\frac{3}{12}$

Add or subtract as indicated in problems (g)–(l). Reduce answers.

g. $1\frac{1}{4} + 1\frac{1}{4} =$ **h.** $4\frac{1}{10} + 2\frac{3}{10} =$ **i.** $6\frac{9}{10} - 1\frac{1}{10} =$

j. $3\frac{1}{8} + \frac{5}{8} =$ **k.** $5\frac{5}{8} - 1\frac{1}{8} =$ **l.** $5\frac{5}{12} - \frac{1}{12} =$

Problem set 99

1. Thomas Jefferson wrote the Declaration of Independence in 1776. He died exactly 50 years later. In what year did he die?

2. Shannon won $10,000. She will be paid $20 a day until the money runs out. How many days will the money last?

3. A number is divisible by 4 if it can be divided by 4 without leaving a remainder. Which of these numbers is divisible by both 4 and 5?
   a. 15 **b.** 16 **c.** 20 **d.** 25

4. List these numbers in order of size from least to greatest.

   .5, 1, 0

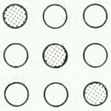
5. **a.** How many half-gallon cartons of milk equal 1 gallon?

   b. How many half-gallon cartons of milk equal 3 gallons?

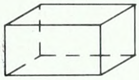
6. Use digits to write the number one million, three hundred fifty-four thousand, seven hundred sixty.

7. Reduce: **a.** $3\frac{6}{8}$ **b.** $2\frac{2}{4}$

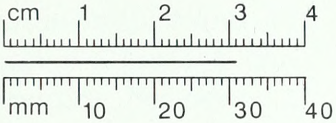
8. What fraction of the circles is shaded?



9. **a.** Name this shape.
   b. How many faces does it have?



10. Write the length of the segment as a number of centimeters and as a number of millimeters.



11. $3 \times \frac{2}{5} =$

12. $\frac{2}{5} + \frac{2}{5} + \frac{2}{5} =$

13. $1\frac{1}{4} + 1\frac{1}{4} =$

14. $3\frac{5}{6} - 1\frac{1}{6} =$

15. 68,423 + 4976 + 2875 + 5318 =

16. \$10 − (57¢ + \$2.48) =

17. 42 × 5 × 36 =

18. \$6.15 × 10 =

19. $40\overline{)2760}$

20. $4\overline{)276}$

21. $\frac{8}{9} \div \frac{2}{3} =$

22. $\frac{8}{12} \div \frac{4}{4} =$

23. Divide 371 by 10 and write the answer with a remainder.

Read this information. Then answer questions 24 and 25.

When Jenny was born, her dad was 29 years old. Her brothers are Tom and Monty. Tom is 2 years older than Jenny and 2 years younger than Monty. Monty is 10 years old.

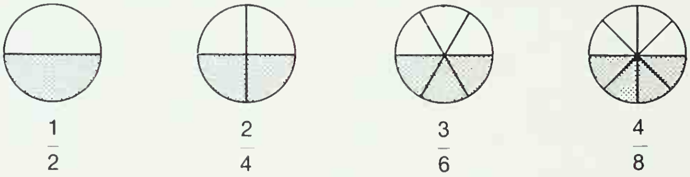
24. How old is Jenny?

25. How old is her Dad?

LESSON 100

Reducing Fractions as Far as Possible

Facts Practice: 64 Multiplication Facts (Test D in Test Booklet)



The equivalent fractions pictured above all name the same amount. The **simplest** way to name this amount is with the fraction $\frac{1}{2}$. To write fraction answers in their simplest form we reduce.

In this lesson we will begin to reduce fractions which may need to be reduced more than once. We show this here by reducing $\frac{4}{8}$.

$$\frac{4}{8} \div \boxed{\frac{2}{2}} = \frac{2}{4}$$

If we reduce $\frac{4}{8}$ by dividing both terms by 2, we find that $\frac{4}{8}$ is equal to $\frac{2}{4}$. However, $\frac{2}{4}$ also can be reduced.

$$\frac{2}{4} \div \boxed{\frac{2}{2}} = \frac{1}{2}$$

The fraction $\frac{4}{8}$ reduces to $\frac{2}{4}$, which reduces to $\frac{1}{2}$. We reduce twice to find that $\frac{4}{8}$ equals $\frac{1}{2}$.

We can avoid the need to reduce more than once if we divide by the largest number which divides both terms evenly. The largest number which divides two numbers evenly is the **greatest common factor (GCF)** of the two numbers. The greatest common factor of 4 and 8 is 4. If we reduce $\frac{4}{8}$ by dividing both terms by 4, we reduce only once.

$$\frac{4}{8} \div \boxed{\frac{4}{4}} = \frac{1}{2}$$

Example Reduce: $\frac{8}{12}$

Solution To reduce $\frac{8}{12}$, we divide both the top and bottom numbers of the fraction by a number which divides both of the numbers evenly. If we divide both 8 and 12 by 2, we get the fraction $\frac{4}{6}$, which can still be reduced by dividing by 2 over 2 again.

Reduce twice:

$$\frac{8}{12} \div \boxed{\frac{2}{2}} = \frac{4}{6}$$

$$\frac{4}{6} \div \boxed{\frac{2}{2}} = \frac{2}{3}$$

If we divide both the top and bottom numbers by 4, which is the GCF of 8 and 12, then we reduce only once.

To reduce just once:

$$\frac{8}{12} \div \boxed{\frac{4}{4}} = \frac{2}{3}$$

Practice* Reduce each fraction as far as possible.

a. $\frac{4}{12}$ **b.** $\frac{6}{18}$ **c.** $\frac{16}{24}$

d. $\frac{4}{16}$ **e.** $\frac{12}{16}$ **f.** $\frac{40}{100}$

Solve and reduce the answers.

g. $\frac{7}{16} + \frac{1}{16} =$ **h.** $\frac{3}{4} \times \frac{4}{5} =$ **i.** $\frac{19}{24} - \frac{1}{24} =$

Problem set 100

1. This little poem is about what number?

I am a number, not 1, 2, or 3.
Whenever I'm added, no difference you'll see.

2. Write the following sentence using digits and symbols.

The product of nine and ten is ninety.

3. Reduce: **a.** $\frac{6}{12}$ **b.** $1\frac{4}{8}$

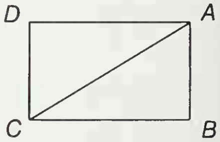
4. Write the greatest four-digit even number you can make using the four digits 1, 2, 3, and 4 one time each.

5. **a.** How many quarts of milk equal a gallon?
   b. How many quarts of milk equal 6 gallons?

6. Use digits to write the decimal number fourteen and seven tenths.

7. Name the shaded part of the rectangle as a decimal number and as a reduced fraction.

8. What is the shape of a basketball?



9. In this rectangle, which segment is parallel to $\overline{AB}$?
   a. $\overline{BC}$ **b.** $\overline{CD}$ **c.** $\overline{CA}$ **d.** $\overline{DA}$

10. $\frac{5}{6} + \frac{5}{6} =$

11. $\frac{5}{6} \times 2 =$

12. $\frac{10}{6} \div \frac{5}{6} =$

13. $\frac{1}{12} + \frac{7}{12} =$

14. $6\frac{2}{3} - \left(4 - \frac{1}{3}\right) =$

15. $\frac{2}{3} \times \frac{3}{4} =$

16.
$$\begin{array}{r} 8242.19 \\ 7657.36 \\ +\ 9414.87 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 3015 \\ -\ 2939 \\ \hline \end{array}$$

18.
$$\begin{array}{r} 487 \\ \times\ 396 \\ \hline \end{array}$$

19. $\$7.50 \times 6 =$

20. $480 \div 10 =$

21. $7\,\overline{)\,\$14.35}$

22. $240 \div 5 =$

23. $\frac{3}{5} \times \square = \frac{6}{10}$

This table lists ways Brian can earn extra credit points in social studies. Use this table to answer questions 24 and 25.

EXTRA CREDIT POINTS	
Magazine Report	35 points
TV Special	50 points
Book Report	75 points
Museum Report	100 points

24. Brian has done a book report, two magazine reports, and a TV special. How many points has he earned?

25. Brian needs to earn a total of 400 points. How many more points does he need?

LESSON 101

Converting and Reducing Improper Fractions

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

We have learned two ways to simplify fractions. We have converted improper fractions to whole numbers or mixed numbers, and we have reduced fractions. In some cases we should simplify a fraction answer **both** ways. To show this we will add $\frac{3}{4}$ and $\frac{3}{4}$.

$$\frac{3}{4} + \frac{3}{4} = \frac{6}{4}$$

We see that the answer is an improper fraction. To convert an improper fraction to a mixed number, we divide and write the remainder as a fraction.

$$\frac{6}{4} \rightarrow \begin{array}{r} 1\frac{2}{4} \\ 4\overline{)6} \\ \underline{4} \\ 2 \end{array} \qquad \text{so} \qquad \frac{6}{4} = 1\frac{2}{4}$$

The improper fraction $\frac{6}{4}$ is equal to the mixed number $1\frac{2}{4}$. However, $1\frac{2}{4}$ can be reduced.

$$1\frac{2}{4} = 1\frac{1}{2}$$

The simplified answer to $\frac{3}{4} + \frac{3}{4}$ is $1\frac{1}{2}$.

Example 1 Write $\frac{8}{6}$ as a reduced mixed number.

Solution To convert $\frac{8}{6}$ to a mixed number, we divide 8 by 6 and get $1\frac{2}{6}$. Then we reduce $1\frac{2}{6}$ by dividing both terms of the fraction by 2 and get $\mathbf{1\frac{1}{3}}$.

Convert: $\frac{8}{6} = 1\frac{2}{6}$

Reduce: $1\frac{2}{6} = \mathbf{1\frac{1}{3}}$

Example 2 $1\frac{7}{8} + 1\frac{3}{8} =$

Solution We add to get $2\frac{10}{8}$. We convert the improper fraction $\frac{10}{8}$ to $1\frac{2}{8}$ and add it to the 2 to get $3\frac{2}{8}$. Finally we reduce the fraction to get $\mathbf{3\frac{1}{4}}$.

Add		Convert answer		Reduce answer
$1\frac{7}{8} + 1\frac{3}{8} = 2\frac{10}{8}$	$\longrightarrow$	$2\frac{10}{8} = 3\frac{2}{8}$	$\longrightarrow$	$3\frac{2}{8} = 3\frac{1}{4}$

Practice* Simplify each fraction and mixed number.

a. $\frac{6}{4}$ **b.** $\frac{10}{6}$ **c.** $2\frac{8}{6}$ **d.** $3\frac{10}{4}$

e. $\frac{10}{4}$ **f.** $\frac{12}{8}$ **g.** $4\frac{14}{8}$ **h.** $1\frac{10}{8}$

Perform the operations. Then simplify the answers.

i. $1\frac{5}{6} + 1\frac{5}{6} =$ **j.** $2\frac{3}{4} + 4\frac{3}{4} =$ **k.** $\frac{5}{3} \times \frac{3}{2} =$

Problem set 101

1. Two fathoms deep is 12 feet deep. How deep is 10 fathoms?

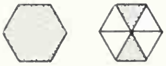
2. When Jessica babysits, she is paid $1.50 per hour. If she babysits Saturday from 10:30 a.m. to 3:30 p.m., how much pay will she get?

3. Use digits to write the number one hundred fifty-four million, three hundred forty-three thousand, five hundred fifteen.

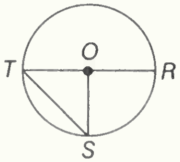
4. a. How many quarter-mile laps should Jim run to run 1 mile?
b. How many quarter-mile laps should Jim run to run 5 miles?

5. a. Write $\frac{10}{6}$ as a reduced mixed number.
b. Write $\frac{12}{8}$ as a reduced mixed number.

6. What mixed number names the number of shaded hexagons?



7. Which segment does **not** name a radius of this circle?
a. $\overline{OR}$ **b.** $\overline{OS}$ **c.** $\overline{RT}$ **d.** $\overline{OT}$



8. Compare: $\frac{1}{2}$ of 2 ○ $2 \times \frac{1}{2}$

9. What is the shape of a can of beans?

10. *AB* is 3.2 cm. *BC* is 1.8 cm. *CD* equals *BC*. Find *AD*.

11. $1\frac{3}{4} + 1\frac{3}{4} =$

12. $5\frac{7}{8} - 1\frac{3}{8} =$

13. $3 \times \frac{3}{8} =$

14. $\$10 - (\$1.25 + 35¢) =$

15. $\begin{array}{r} \$4.32 \\ \times \quad 5 \\ \hline \end{array}$

16. $\begin{array}{r} 416 \\ \times\ 740 \\ \hline \end{array}$

17. $\begin{array}{r} 9635 \\ 8247 \\ 7775 \\ 682 \\ 513 \\ +\quad 9 \\ \hline \end{array}$

18. $960 \div 8 =$

19. $80\,\overline{)\,9600}$

20. $5\,\overline{)\,\$12.00}$

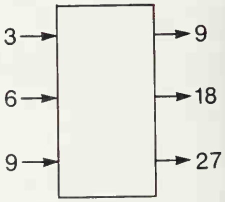
21. $\frac{5}{2} \times \frac{2}{3} =$

22. $\frac{5}{3} = \frac{\square}{6}$

23. $\frac{10}{6} \div \frac{5}{2} =$

Read this information. Then answer questions 24 and 25.

Matthew fixed his function machine so that when he puts in a 3, a 9 comes out. When he puts in a 6, an 18 comes out. When he puts in a 9, a 27 comes out.



24. Which of the following does Matthew's function machine do to the numbers he puts into it?

a. It adds 3. **b.** It multiplies by 3.
c. It adds 9. **d.** It multiplies by 2 and 3.

25. Matthew put in a number and a 12 came out. What number did he put in?

LESSON 102

Dividing by Two-Digit Numbers, Part 1

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

In this lesson we will begin dividing by two-digit numbers. When we can divide by two-digit numbers we will be able to solve problems like the following:

> One hundred forty-four players signed up for soccer. If the players are separated into 12 equal teams, how many players will be on each team?

$$12\overline{)144}$$

When we divide by a two-digit number, we continue to follow the four steps: divide, multiply, subtract, and bring down. When we divide by two-digit numbers, the divide step takes a little more thought, because we have not memorized the two-digit multiplication facts.

Example Divide: 150 ÷ 12 =

Solution We begin by breaking the division into a smaller division problem. Starting from the first digit in 150, we try to find a number that 12 will divide into at least once. Our first smaller division is $12\overline{)15}$. We see that there is **one** 12 in 15, so we write 1 above the 5 of 15. Then we multiply, subtract, and bring down.

$$\begin{array}{r} 1 \\ 12\overline{)150} \\ -12 \\ \hline 30 \end{array}$$

Now we begin a new division. This time we divide $12\overline{)30}$. If we are not sure of the division answer, we may need to try more than once to find the number of 12s in 30. We find that there are two 12s in 30. We write 2 in the answer, then we multiply and subtract.

$$\begin{array}{r} \mathbf{12\ r\ 6} \\ 12\,\overline{)\,150} \\ -12 \\ \hookrightarrow\overline{)\,30} \\ -24 \\ \hline 6 \end{array}$$

Since there is no digit to bring down, we are finished. The remainder is 6.

To check our answer, we multiply 12 × 12, then we add the remainder, 6.

$$12 \times 12 = 144 \qquad 144 + 6 = 150 \qquad \text{(check)}$$

Practice Divide. End uneven divisions with a remainder.

a. $11\,\overline{)\,253}$ **b.** $21\,\overline{)\,253}$ **c.** $31\,\overline{)\,403}$

d. $12\,\overline{)\,253}$ **e.** $12\,\overline{)\,300}$ **f.** $23\,\overline{)\,510}$

g. One hundred forty-four players signed up for soccer. If the players are separated into 12 equal teams, how many players will be on each team?

Problem set 102

1. Draw a pair of horizontal line segments. Make them the same length. Make a quadrilateral by connecting the endpoints.

2. Nathan worked on his homework from 3:30 p.m. to 6 p.m. For how many **minutes** did he work on his homework?

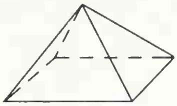
3. Write a decimal number equal to the mixed number $3\frac{9}{10}$.

4. If 24 of them exactly fill 2 cartons, how many will it take to fill 3 cartons?

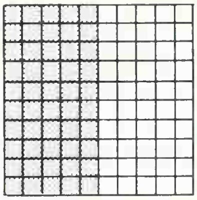
5. About $\frac{2}{3}$ of our body weight is water. Olivia weighs 105 pounds. Her body contains about how many pounds of water?

6. **a.** How many apples weighing $\frac{1}{3}$ of a pound each would it take to total 1 pound?
b. How many apples weighing $\frac{1}{3}$ of a pound each would it take to total 4 pounds?

7. Name this shape.



8. Name the shaded part of this square as a decimal number and as a reduced fraction.



9. Compare: $.5 \bigcirc \frac{1}{2}$

10. *AB* is 40 millimeters. *BC* is half of *AB*. *CD* equals *BC*. Find *AD*.

11. $$\begin{array}{r} 905.363 \\ 612.785 \\ +\ \ 66.547 \\ \hline \end{array}$$ **12.** $$\begin{array}{r} 10{,}000 \\ -\ \ 9{,}184 \\ \hline \end{array}$$ **13.** $$\begin{array}{r} 640 \\ \times\ 806 \\ \hline \end{array}$$ **14.** $$\begin{array}{r} \$125 \\ \times\ \ \ \ 8 \\ \hline \end{array}$$

15. $12\overline{)450}$ **16.** $293 \div 13 =$ **17.** $24\overline{)510}$

18. $3\frac{5}{8} + 1\frac{7}{8} =$ **19.** $5 - 1\frac{2}{5} =$ **20.** $\frac{1}{3}$ of $5 =$

21. $\frac{3}{4} \times \frac{2}{5} =$ **22.** $\frac{4}{5} = \frac{\square}{10}$ **23.** $\frac{6}{10} \div \frac{2}{5} =$

Read this information and study the table. Then answer questions 24 and 25.

Stephanie, Lupe, and Melanie bought treats for the party.

24. What was the total cost of the treats?

25. If the girls share the cost evenly, how much will each pay?

GROCERIES	
Nuts	$2.19
Mints	$1.19
Cake	$3.87
Ice cream	$1.39

LESSON 103

Dividing by Two-Digit Numbers, Part 2

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

We are practicing dividing by two-digit numbers. There are some "tricks" we can use to make dividing by two-digit numbers easier. One trick is to think of dividing by only the first digit. We call this the **first-digit trick**.

Example Divide: $32\overline{)987}$

Solution We begin by breaking the division into the smaller division problem, $32\overline{)98}$. Instead of thinking, "How many 32s are in 98?" we may use the first-digit trick and think, "How many 3s are in 9?" We see $32\overline{)98}$ but we think $3\overline{)9}$. We answer 3. Since we are really dividing $32\overline{)98}$, we write the 3 above the 8 of 98. Then we multiply 3 × 32, subtract, and bring down.

$$\begin{array}{rr} & \mathbf{30\ r\ 27} \\ 32 & \overline{)987} \\ & 96\downarrow \\ \hookrightarrow & \overline{)27} \\ & 0 \\ \hline & 27 \end{array}$$

Now we begin the new division, $32\overline{)27}$. Since there is not even one 32 in 27, we write 0 in the answer; then we multiply and subtract. There are no digits to bring down. We are finished. The answer is **30 r 27**. We may check our answer by multiplying 30 × 32 and then adding 27.

$$\begin{array}{rl} 32 & \\ \times\ \ 30 & \\ \hline 960 & \\ +\ \ 27 & \text{remainder} \\ \hline 987 & \text{(check)} \end{array}$$

Practice Divide. Use the first-digit trick to help with the divide step.

a. $30\overline{)682}$ **b.** $32\overline{)709}$ **c.** $43\overline{)880}$

d. $22\overline{)924}$ **e.** $22\overline{)750}$ **f.** $21\overline{)126}$

g. $21\overline{)654}$ **h.** $41\overline{)910}$ **i.** $21\overline{)1290}$

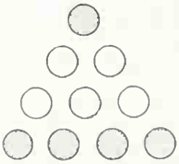
Problem set 103

1. The saying "A pint's a pound, the world around" means that a pint of water weighs about a pound. About how much does 2 quarts of water weigh?

2. If 3 of them cost $2.55, how much would 4 of them cost?

3. If 300 marbles will fill a carton, how many marbles will make the carton $\frac{1}{2}$ full?

4. Name the shaded part of this group as a decimal number and as a reduced fraction.



5. **a.** How many plums weighing $\frac{1}{5}$ of a pound each would it take to total 1 pound?
   b. How many plums weighing $\frac{1}{5}$ of a pound each would it take to total 3 pounds?

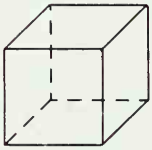
6. Write the following sentence using digits and symbols.

> "When nine is subtracted from twelve,
> the difference is three."

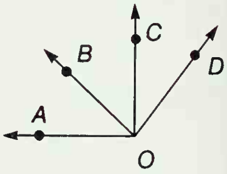
7. Compare: $\frac{2}{3}$ of 3 ○ $3 \times \frac{2}{3}$

8. If $3n = 18$, then $2n + 5$ equals what?
a. 23 **b.** 17 **c.** 31 **d.** 14

9. Every face of this block is a square. This is a special type of rectangular solid. What word names this shape?



10. Which angle appears to be a right angle?
a. $\angle AOB$ **b.** $\angle BOC$
c. $\angle COD$ **d.** $\angle AOC$



11. $$\begin{array}{r} 1\frac{3}{5} \\ +\ 2\frac{4}{5} \\ \hline \end{array}$$

12. $$\begin{array}{r} 4\frac{5}{8} \\ -\ \ \frac{1}{8} \\ \hline \end{array}$$

13. $$\begin{array}{r} 6\frac{5}{6} \\ -\ 1\frac{5}{6} \\ \hline \end{array}$$

14. $\frac{6}{6} \div \frac{3}{2} =$

15. $\frac{8}{10} \times \frac{5}{10} =$

16. $\frac{1}{5} = \frac{\square}{20}$

17. $2657 + 484 + 93 =$

18. (\$20 − \$6.55) ÷ 5 =

19. 10 × 56¢ =

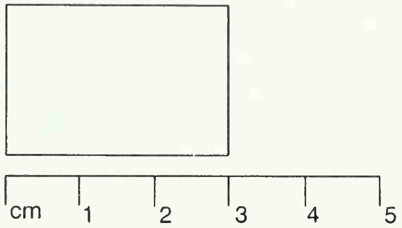
20. $6 \times 78 \times 900 =$

21. $31\overline{)970}$

22. $947 \div 22 =$

23. $32\overline{)777}$

Look at this picture. Then answer questions 24 and 25.



24. How long is the rectangle?

25. The rectangle is 1 centimeter longer than it is wide. What is the perimeter of the rectangle?

LESSON 104

Dividing by Two-Digit Numbers, Part 3

> **Facts Practice:** Reduce 40 Fractions (Test I in Test Booklet)

In the preceding lesson we learned a trick to help us divide by two-digit numbers. The problems in that lesson were chosen so that using the first digit to guess the division answer would work. However, often this method will not work.

We see.	We think.	We try the guess, but the guess is too large.
$\begin{array}{r} ? \\ 19\overline{)59} \end{array}$	$\begin{array}{r} \textcircled{5} \\ 1\overline{)5} \end{array} \longrightarrow$	$\begin{array}{r} 5 \\ 19\overline{)59} \\ \underline{\textcircled{95}} \end{array}$ Too large

If we use the first-digit trick here, we would guess 5. But this is not the right guess because there are not five 19s in 59. Our guess is too large. A better trick is to **estimate**. To estimate, we mentally round both numbers to the nearest 10. Then we use the first-digit trick with the rounded numbers.

We see.	We think.	We try the guess.
$19\overline{)59}$	$\textcircled{3} \longrightarrow$ $20\overline{)60} \rightarrow 2\overline{)6}$	$\begin{array}{r} 3 \text{ r } 2 \\ 19\overline{)59} \\ 57 \\ \hline 2 \end{array}$
		The guess is right.

Example Divide: $19\overline{)595}$

Solution We begin by breaking the division into the smaller division problem $19\overline{)59}$. Estimating, we think $20\overline{)60} \rightarrow 2\overline{)6}$ and guess 3. We write the 3 above the 9 of 59. Then we multiply 3 × 19, subtract, and bring down. The next division is $19\overline{)25}$. We may estimate to help us divide. We write 1 in the answer; then we multiply and subtract.

The answer is **31 r 6**. To check our answer, we multiply 31 × 19 and add 6.

$$\begin{array}{r} \mathbf{31 \text{ r } 6} \\ 19\overline{)\;595} \\ -57 \\ \hline 25 \\ -19 \\ \hline 6 \end{array}$$

Multiply:

$31 \times 19 = 589$

Then add:

$589 + 6 = 595$ check

Practice*

a. $19\overline{)792}$

b. $39\overline{)600}$

c. $29\overline{)121}$

d. $29\overline{)900}$

e. $48\overline{)829}$

f. $29\overline{)1210}$

g. $28\overline{)896}$

h. $18\overline{)782}$

i. $39\overline{)1200}$

Problem set 104

1. List all of the prime numbers less than 50 that end with the digit 1.

2. What number is missing in this division? $\square \div 8 = 24$

3. Cheryl ran 660 yards in 3 minutes. At this rate, how many yards would she run in 6 minutes?

4. Write a decimal number equal to the mixed number $4\frac{9}{10}$.

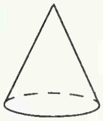
5. Seventy-six trombone players lead the parade. If they marched in 4 rows, how many were in each row?

6. **a.** A dime is what fraction of a dollar?
b. How many dimes are there in $1?
c. How many dimes are there in $4?

7. Which of these means, "How many 19s are there in 786?"

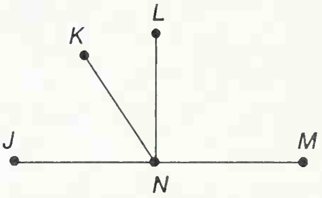
a. $19 \div 786$ **b.** $786 \div 19$ **c.** 19×786

8. **a.** How many $\frac{1}{4}$s are in 1?
b. How many $\frac{1}{3}$s are in 1?



9. What word names the shape?

10. If $\overline{LN}$ is perpendicular to $\overline{JM}$, then $\angle JNL$ is what type of angle?
a. acute **b.** right **c.** obtuse



11. $\$63.75 + \$1.48 + 59¢ + \$5 =$

12. $1010 - (101 - 10) =$

13. $\$3.48 \times 7 =$

14. $679 \times 408 =$

15. $19\overline{)786}$

16. $890 \div 29 =$

17. $38\overline{)1200}$

18. $\frac{5}{6} + \frac{5}{6} + \frac{5}{6} =$

19. $3 \times \frac{5}{6} =$

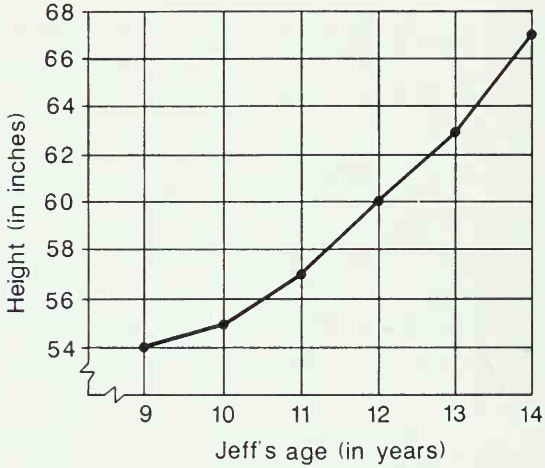
20. $\frac{15}{6} \div \frac{5}{6} =$

21. $3 - \left(2 - \frac{1}{4}\right) =$

22. $\frac{12}{12} \div \frac{4}{3} =$

23. $\frac{3}{5} = \frac{\square}{20}$

The graph shows Jeff's height on his birthday from ages 9 to 14. Use this graph to answer questions 24 and 25.



24. How many inches did Jeff grow between his twelfth and fourteenth birthdays?

25. On which birthday was Jeff 5 feet tall?

LESSON 105

Writing the Reciprocal of a Fraction

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

If we turn a fraction "upside down," the fraction we get is the **reciprocal** of the first fraction. The reciprocal has the same digits but the positions of the digits are reversed.

The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

The reciprocal of $\frac{3}{2}$ is $\frac{2}{3}$.

Whole numbers also have reciprocals. To write the reciprocal of a whole number, we first write the number as a fraction by writing a 1 under the whole number. To find the reciprocal of 2, we first write a 1 under the 2 to get $\frac{2}{1}$. Then we invert the fraction to get the reciprocal of $\frac{2}{1}$.

$$2 = \frac{2}{1} \qquad \text{The reciprocal of } \frac{2}{1} \text{ is } \frac{1}{2}.$$

When we divide 1 by any number (except 0), the answer is the reciprocal of the number.

$$\text{How many } \frac{2}{3}\text{s are in 1?}$$

The answer is the reciprocal of $\frac{2}{3}$, which is $\frac{3}{2}$. We show the process below. Since 6 over 6 equals 1,

$$1 \div \frac{2}{3} \qquad \text{can be written} \qquad \frac{6}{6} \div \frac{2}{3}$$

$$\frac{6}{6} \div \frac{2}{3} = \frac{3}{2}$$

We can use reciprocals to help us divide fractions, as we will see in the next lesson.

Example 1 What is the reciprocal of $\frac{5}{6}$?

Solution The reciprocal of $\frac{5}{6}$ is $\mathbf{\frac{6}{5}}$. We leave the answer as an improper fraction.

Example 2 What is the product of $\frac{1}{3}$ and its reciprocal?

Solution The reciprocal of $\frac{1}{3}$ is $\frac{3}{1}$. To find the product, we multiply.

$$\frac{1}{3} \times \frac{3}{1} = \mathbf{1}$$

The product of any fraction and its reciprocal is 1.

Example 3 What is the reciprocal of 4?

Solution To find the reciprocal of a whole number, we may first write the whole number as a fraction by writing a 1 under it. To write 4 as a fraction we write $\frac{4}{1}$. The reciprocal of $\frac{4}{1}$ is $\frac{1}{4}$.

Practice Write the reciprocal of each of these numbers.

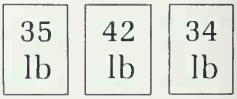
a. $\frac{4}{5}$ **b.** $\frac{6}{5}$ **c.** 3 **d.** $\frac{7}{8}$

e. $\frac{3}{8}$ **f.** 5 **g.** $\frac{3}{10}$ **h.** $\frac{5}{12}$

i. 2 **j.** $\frac{1}{5}$ **k.** 10 **l.** 1

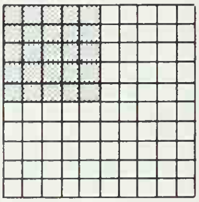
Problem set 105

1. The three boxes of nails weigh 34, 35, and 42 pounds. If some nails are moved from the heaviest box to the other two boxes so that the boxes weigh the same, how much will each box weigh?



2. Each finger of the human hand is formed by three bones except for the thumb, which is formed by two bones. The palm contains five bones—one leading to each finger. Not counting the wrist, the hand contains how many bones?

3. Name the shaded part of this square as a decimal number and as a reduced fraction.



4. What is the product of $\frac{2}{3}$ and its reciprocal?

5. **a.** A quarter is what fraction of a dollar?
   b. How many quarters equal $1?
   c. How many quarters equal $5?

6. What is the reciprocal of $\frac{3}{4}$?

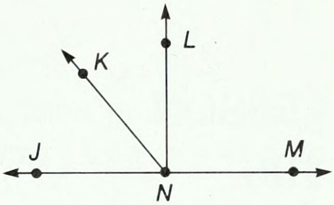
7. Which of these means, "How many 25s are there in 500?"

a. 25 ÷ 500 **b.** 500 ÷ 25 **c.** 25 × 500

8. **a.** What is the reciprocal of 6?
b. What is the reciprocal of $\frac{1}{4}$?

9. If $\overline{LN}$ is perpendicular to $\overline{JM}$, then which of these angles is an acute angle?

a. $\angle LNM$ **b.** $\angle JNL$
c. $\angle KNL$ **d.** $\angle KNM$



10. ($20 − $4.72) ÷ 8 =

11. 10 × $2.75 =

12.
$$\begin{array}{r} 742\\ 34{,}135\\ 6{,}947\\ 218\\ 7{,}865\\ +\quad 72\\ \hline \end{array}$$

13. 36 × 10 × 42 =

14. $31\overline{)410}$

15. $\frac{567}{27} =$

16. $\frac{3}{5} \times \square = \frac{15}{25}$

17. $1\frac{5}{6} + 1\frac{5}{6} =$

18. $4\frac{5}{6} - 1\frac{1}{6} =$

19. $\frac{3}{8}$ of 24 =

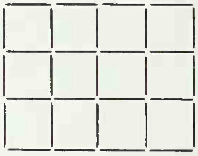
20. $3 \times \frac{4}{5} =$

21. $\frac{9}{10} \div \frac{3}{5} =$

22. $\frac{6}{6} \div \frac{3}{2} =$

23. Divide 123 by 10 and write the answer as a mixed number.

Diane used toothpicks to make this rectangle. Look at the rectangle. Then answer questions 24 and 25.



24. How many toothpicks form the perimeter of this rectangle?

25. The rectangle closes in an area covered with small squares. How many small squares cover the area of the rectangle?

LESSON 106

Dividing Fractions, Part 2

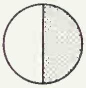
Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

In Lesson 97 we learned one way to divide fractions. We have used that method to reduce fractions and to solve some division problems. In this lesson we will learn another method for solving division problems. When we have learned this new method, we will be able to solve division problems like the following:

$$\frac{1}{2} \div \frac{2}{3} =$$

This problem means,

How much of $\frac{2}{3}$ is in $\frac{1}{2}$?

How much of  is in  ?

This problem is different from the problems we have been solving because the numerators and denominators do not divide evenly. To solve this problem, we will use another method. This method uses **reciprocals** to help us find the answer. We begin by changing the question. Instead of asking, How much of $\frac{2}{3}$ is in $\frac{1}{2}$?, we ask, How many $\frac{2}{3}$s are in 1? Once we know how many $\frac{2}{3}$s are in 1, then we can find the number of $\frac{2}{3}$s in $\frac{1}{2}$.

Step 1. How many $\frac{2}{3}$s are in 1? (Answer: $\frac{3}{2}$)

Step 2. Then the number of $\frac{2}{3}$s in $\frac{1}{2}$ is **half of that.**

$$\frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$$

We see that this method changes the division problem into a multiplication problem. Instead of dividing $\frac{1}{2}$ by $\frac{2}{3}$, we end up multiplying $\frac{1}{2}$ by the reciprocal of $\frac{2}{3}$.

$$\begin{array}{ccccc} \frac{1}{2} & \div & \frac{2}{3} & = & ? \\ & \downarrow & \circlearrowright & & \\ \frac{1}{2} & \times & \frac{3}{2} & = & \frac{3}{4} \end{array}$$

To solve a division problem that "won't divide," we multiply by the reciprocal of the number we are dividing by.

Example 1 $\frac{2}{3} \div \frac{1}{2} =$

Solution We are finding the number of $\frac{1}{2}$s in $\frac{2}{3}$. We cannot divide the denominators evenly, so we multiply by the reciprocal of the second fraction. (The first fraction stays the same.) We simplify the answer $\frac{4}{3}$ to get $\mathbf{1\frac{1}{3}}$.

$$\begin{array}{ccccccc} \frac{2}{3} & \div & \frac{1}{2} & = & & & \\ & \downarrow & \circlearrowright & & & & \\ \frac{2}{3} & \times & \frac{2}{1} & = & \frac{4}{3} & = & \mathbf{1\frac{1}{3}} \end{array}$$

Example 2 $2 \div \frac{2}{3} =$

Solution We begin by writing the whole number 2 as the fraction $\frac{2}{1}$. Then we multiply $\frac{2}{1}$ by the reciprocal of $\frac{2}{3}$. Finally, we simplify the answer and find that the number of $\frac{2}{3}$s in 2 is **3**.

$$\frac{2}{1} \div \frac{2}{3} =$$

$$\frac{2}{1} \times \frac{3}{2} = \frac{6}{2} = \mathbf{3}$$

Practice*

a. $\frac{1}{3} \div \frac{1}{2} =$ **b.** $\frac{2}{3} \div \frac{3}{4} =$ **c.** $\frac{2}{3} \div \frac{1}{4} =$

d. $\frac{1}{2} \div \frac{1}{3} =$ **e.** $\frac{3}{4} \div \frac{2}{3} =$ **f.** $3 \div \frac{3}{4} =$

g. $2 \div \frac{1}{3} =$ **h.** $3 \div \frac{2}{3} =$ **i.** $10 \div \frac{5}{6} =$

Problem set 106

1. Draw two circles. Shade $\frac{1}{2}$ of one circle and $\frac{2}{3}$ of the other circle.

2. James gave Robert half of a candybar. Robert gave his sister half of what he had. What fraction of the whole candybar did Robert's sister get?

3. How much is $\frac{2}{3}$ of one dozen?

4. Estimate the product of 712 and 490 by rounding the numbers to the nearest hundred before you multiply.

5. Use digits to write the number ninety-three million, eight hundred fourteen thousand, two hundred.

6. Which of these means, "How many one tenths are there in three?"

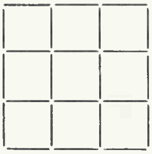
   a. $\frac{1}{10} \div 3$ **b.** $3 \div \frac{1}{10}$ **c.** $\frac{1}{10} \div \frac{3}{10}$

7. **a.** A dime is what fraction of a dollar?
   b. How many dimes are there in $1?
   c. How many dimes are there in $3?

8. **a.** $1 \div \frac{1}{10} =$ **b.** $3 \div \frac{1}{10} =$

9. The **multiples** of a number are the numbers we say when counting by that number. The first four multiples of 2 are 2, 4, 6, and 8. What are the first four multiples of 3?

10. Diane made this rectangle with toothpicks.

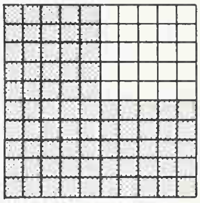


a. How many toothpicks form the perimeter?

b. How many small squares cover the area?

11. *AB* is 3 cm. *BC* is 4 cm. *AD* is 10 cm. Find *CD*.

12. Name the shaded part of the square as a decimal number and as a reduced fraction.



13. $\frac{1}{3} \div \frac{1}{4} =$

14. $\frac{1}{4} \div \frac{1}{3} =$

15. $3 \div \frac{1}{2} =$

16.
$$\begin{array}{r} 793.459 \\ 827.8 \\ +\ \ 63.475 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 30{,}103 \\ -\ \ 7{,}457 \\ \hline \end{array}$$

18.
$$\begin{array}{r} 704 \\ \times\ 960 \\ \hline \end{array}$$

19. $20 \times 47¢ = \$$____

20. $568 \div 15 =$

21. $30\overline{)427}$

22. $\$30.24 \div 6 =$

23. $\frac{1}{10} \times \square = \frac{10}{100}$

24. $5 - \left(1\frac{1}{4} + 2\right) =$

25. $5 \times \left(\frac{2}{3} \times \frac{1}{2}\right) =$

LESSON 107

Memorizing the Decimals Chart

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

When we add, subtract, multiply, and divide numbers, we are doing arithmetic. We have practiced whole-number arithmetic for many years. Decimal arithmetic is much like whole-number arithmetic. The main difference is that with decimal arithmetic we must keep track of the decimal point. There are six rules which will help us do that. The six rules are written in the chart below. Memorizing these rules will help us to do decimal arithmetic well. In the problem sets that follow you will be asked to draw this chart. Drawing the chart each time will make the task of learning these rules easier.

Decimals Chart

<table>
<tr><th>+ −</th><th>×</th><th>÷ BY WHOLE</th><th>÷ BY DECIMAL</th></tr>
<tr><td>Line up</td><td>× Then count</td><td>Up</td><td>Over, over, and up</td></tr>
<tr><td colspan="4">1. Pin the decimal point on the back of the whole number.
2. Fill empty places with zero.</td></tr>
</table>

Practice Draw the decimals chart.

Problem set 107

1. Draw the decimals chart.

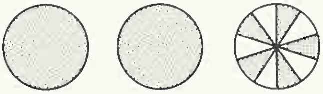
2. Write this sentence using digits and symbols.

   "The sum of one fourth and one fourth is one half."

3. Cynthia had 4 dollar bills, 3 quarters, 2 dimes, and 1 nickel. If she spent half of her money, how much money does she have left?

4. How many $\frac{1}{8}$s are there in $\frac{1}{2}$?

5. Name the number of shaded circles as a decimal number and as a reduced mixed number.



6. Use digits to write the decimal number eleven and twelve hundredths.

7. a. A quart is what fraction of a gallon?
b. How many quarts are there in 1 gallon?
c. How many quarts are there in 4 gallons?

8. a. $1 \div \frac{1}{4} =$ **b.** $4 \div \frac{1}{4} =$

9. Name the point marked by the arrow as a decimal number and as a fraction.

10. Compare: $\frac{1}{2} \div 2 \bigcirc 2 \div \frac{1}{2}$

11. *AB* is 30 millimeters. *CD* is 40 millimeters. *AD* is 90 millimeters. Find *BC*.

12. $3 \div \frac{2}{3} =$ **13.** $\frac{2}{3} \div 3 =$ **14.** $\frac{7}{10} + \frac{7}{10} =$

15. 4315 + 8694 + 7287 + 516 =

16. ($10 − 19¢) ÷ 9 = **17.** 6 × 72¢ = $___

18. 6 × 48 × 360 = **19.** $24\overline{)500}$

20. $1224 \div 12 =$

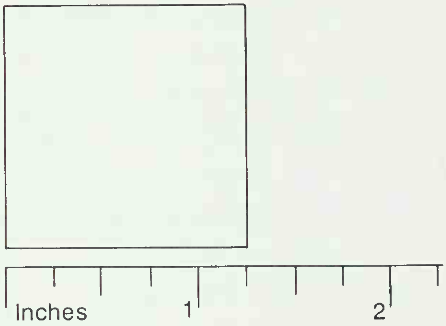
21. $5\frac{3}{4} - \left(3 - 1\frac{3}{4}\right) =$

22. $1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} =$

23. $\frac{3}{10} = \frac{\square}{100}$

24. Reduce: $\frac{50}{100} =$

25. What is the perimeter of this square?



LESSON 108

Adding and Subtracting Decimal Numbers, Part 2

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

In the preceding lesson we looked at a chart with six rules to follow when doing decimal arithmetic. In this lesson we will learn the rule for adding and subtracting decimal numbers.

Whenever we add and subtract, we must remember that we can only add and subtract **like things**. That means we must add and subtract digits with the same place value. When we add and subtract whole numbers, we line up the last digits so that digits with the same place value are in line. **In decimal arithmetic we line up the decimal points instead.** Lining up the decimal points automatically lines up digits with the same place value. The rule for adding and subtracting decimals is "Line up."

Example 1 3.42 + 12.3 =

Solution To add decimal numbers, we line up the decimal points. We find that 3.42 plus 12.3 is **15.72**.

$$\begin{array}{r} 3.42 \\ +\ 12.3 \\ \hline \mathbf{15.72} \end{array}$$

Some people find it easier to add and subtract decimal numbers by using zeros as necessary to write every number with the same number of decimal places. We show this in the next example.

Example 2 23.45 − 1.2 =

Solution This problem means to take 1.2 from 23.45, so we write 23.45 on top. We write 1.2 under 23.45 so that the decimal points are in line. This time fill the empty decimal place with zero. Subtracting, we find that when we take 1.2 from 23.45, the number left is **22.25**.

$$\begin{array}{r} 23.45 \\ -\ \ 1.20 \\ \hline \mathbf{22.25} \end{array}$$

Example 3 5.6 + 2.47 + .875 =

Solution We write the problem vertically and line up the decimal points. We may fill in with zeros so that each number is written with the same number of decimal places. We add and find the sum is **8.945**.

$$\begin{array}{r} 5.600 \\ 2.470 \\ +\ \ .875 \\ \hline \mathbf{8.945} \end{array}$$

Practice

a. 9.87 + 12.4 =

b. .35 − .2 =

c. .4 + .428 + .12 =

d. .456 − .12 =

e. 3.6 + .63 + 4.75 =

f. 4.25 − 1.7 =

g. 5.6 + 4. + 1.38 =

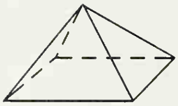
h. 26.48 − 9.5 =

i. 42.8 + 5.2 + .95 =

j. 1.000 − .375 =

Problem set 108

1. Draw the decimals chart.

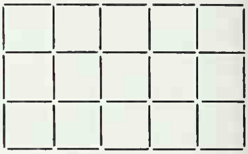


2. a. What is the name of this solid?

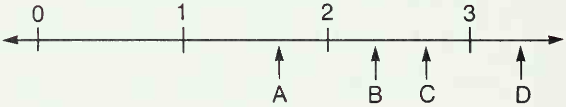
   b. How many faces does it have?

3. Juan lives 1.2 miles from school. How far does he travel going from home to school and back?

4. Diane made this rectangle with toothpicks.
   a. How many toothpicks form the perimeter?
   b. How many small squares cover the area?

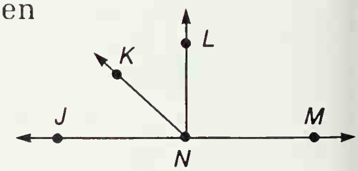


5. Which arrow could be pointing to $2\frac{1}{3}$ on the number line?



6. The first four multiples of 2 are 2, 4, 6, and 8. What are the first four multiples of 4?

7. If $\overline{LN}$ is perpendicular to $\overline{JM}$, then which of these angles is obtuse?
   a. $\angle JNK$ b. $\angle KNL$
   c. $\angle KNM$ d. $\angle LNM$



8. $6.5 + 2.47 + .875 =$

9. $4.26 + 8. + 15.9 =$

10. $23.45 - 1.2 =$

11. $.367 - .1 =$

12. $\$1.25 \times 7 =$

13. $75 \times 608 =$

14. $364 \div 16 =$

15. $\$7.20 \div 20 =$

16. $\begin{array}{r} 3\frac{1}{2} \\ +\ 1\frac{1}{2} \\ \hline \end{array}$

17. $\begin{array}{r} 5\frac{8}{15} \\ -\ 4\frac{7}{15} \\ \hline \end{array}$

18. $\begin{array}{r} 6 \\ -\ 1\frac{1}{3} \\ \hline \end{array}$

19. $1 \times \frac{5}{7} =$

20. $\frac{4}{5}$ of 25 =

21. $\frac{3}{4} \div \frac{2}{3} =$

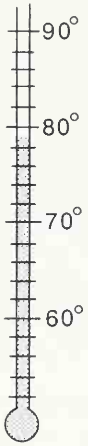
22. $\frac{7}{10} = \frac{\square}{100}$

23. Reduce: $\frac{30}{100} =$

Look at the thermometer. Then answer questions 24 and 25.

24. What temperature is shown on the thermometer?

25. What temperature would be shown if the temperature increased 10°?



LESSON 109

Adding Whole Numbers and Decimal Numbers

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

When decimal numbers are in an addition problem, we must line up the decimal points. Sometimes there are whole numbers in a decimal addition problem. The whole number might not be written with a decimal point. A decimal point marks the end of a whole number. We may write a decimal point on the back, on the right, of a whole number. We can write a whole number like 5 with a decimal point, 5., so that we can line up the decimal points and add.

It may help to remember the party game "Pin the Tail on the Donkey." The tail belongs on the back of the donkey, and the decimal point belongs on the back of the whole number. This is one of the six rules of decimal arithmetic to memorize:

"Pin the decimal point on the back of the whole number."

Example $6.2 + 3 + 4.25 =$

Solution We use two rules: "Line up the decimal points" and "Pin the decimal point on the back of the whole number." We may also attach zeros. We add and find that the sum is **13.45**.

$$\begin{array}{r} 6.20 \\ 3.00 \\ +\ 4.25 \\ \hline \mathbf{13.45} \end{array}$$

Practice*

a. $4.3 + 2 =$

b. $12 + 1.2 =$

c. $6.4 + 24 =$

d. $4 + 1.3 + .6 =$

e. $5.2 + .75 + 2 =$

f. $56 + 75.4 =$

g. $8 + 4.7 + 12.1 =$

h. $9 + 4.8 + 12 =$

Problem set 109

1. Draw the decimals chart.

2. The pizza was sliced into 6 equal pieces. Martin ate 2 pieces. What fraction of the pizza did he eat?

3. Artichokes were on sale. Five of them cost $1. At this rate, what would be the price for a dozen artichokes?

4. Maria ran 100 yards in 13.8 seconds. Mike ran 1 second slower than Maria. How long did it take Mike to run 100 yards?

5. Name the point on the number line marked with an x as a decimal number and as a reduced mixed number.

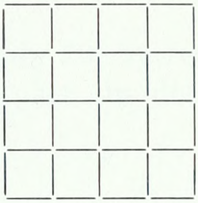
6. If $50n = 100$, then n equals what number?

7. Write the number one thousand, six hundred twenty with a decimal point.

8. Diana made this rectangle with toothpicks.

a. How many toothpicks form the perimeter?

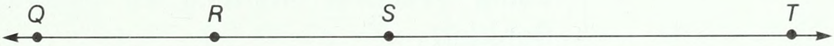
b. How many small squares cover the area?



9. Compare: 3 ○ 3.00

10. Attach a zero to the number 8 without changing the value of the number.

11. QT is 100 mm. QR is 23 mm. RS equals QR. Find ST.



12. $3.4 + 5 =$

13. $7.25 - 7 =$

14. 8 × 47¢ = $

15. $596 \times 340 =$

16. $28\overline{)952}$

17. $\$18.27 \div 9 =$

18. $4\frac{5}{8} + 1\frac{7}{8} =$

19. $5 - \left(2\frac{3}{5} - 1\right) =$

20. $\frac{3}{4} \times \frac{1}{3} =$

21. $\frac{3}{4} \div 3 =$

22. $\frac{9}{10} = \frac{\square}{100}$

23. Reduce: $\frac{20}{100} =$

Read this information. Then answer questions 24 and 25.

Matthew fixed his function machine so that when he puts in a 12, a 6 comes out. When he puts in a 10, a 4 comes out. When he puts in an 8, a 2 comes out.

IN	OUT
12 →	6
10 →	4
8 →	2

24. What rule does the machine use?
  a. It subtracts 2.
  b. It divides by 2.
  c. It subtracts 6.
  d. It adds 6.

25. If Matthew puts in a 6, what number will come out?

LESSON 110

Simplifying Decimal Numbers

Facts Practice: Reduce 40 Fractions (Test I in Test Booklet)

Removing unneeded zeros

When we write numbers, we should write them in simplest form. When we simplify a number, we change the form of the number, but we do not change the value of the number. We have learned how to simplify fractions by reducing. We can often simplify decimal numbers as well. We simplify decimal numbers by removing unnecessary zeros. We will explain this by simplifying .20.

The decimal number .20 has a 2 in the tenths' place and a 0 in the hundredths' place. The zero in the hundredths' place means "no hundredths." If we remove the zero from .20, we get .2. The number .2 also has a 2 in the tenths' place and "no hundredths." Thus, .20 equals .2. We say that .20 simplifies to .2.

We can remove zeros from the front of whole numbers and from the back of decimal numbers. We remove zeros until we come to a digit that is not a zero or until we come to a decimal point. Below we have simplified 02.0100, 20.0, and 0.200 by removing the unnecessary zeros.

$$\longrightarrow 02.0100 \longleftarrow \qquad \longrightarrow 20.0 \longleftarrow \qquad \longrightarrow 0.200 \longleftarrow$$

$$2.01 \qquad\qquad 20. \quad = 20 \qquad\qquad .2 \quad \text{or} \quad 0.2$$

In the center example, we continue to simplify 20. by removing the decimal point. If there is no fraction part, the decimal point can be removed.

Writing a zero in the ones' place

Notice the example on the right. Two simplified forms are shown, .2 and 0.2. We know that the decimal point separates the whole-number part of a decimal number from the fraction part. If there is no whole-number part, a zero may be written in the ones' place. The numbers .2 and 0.2 are equal to each other. Either form is correct. Calculators display a zero in the ones' place, and many standardized tests also show a zero in the ones' place. Beginning with this lesson, we will also show a zero in the ones' place in some of the problems so that you can become familiar with this form.

Practice

Simplify each decimal number in problems (a)–(d).

a. 03.20

b. 0.320

c. 32.00

d. 3.020

Simplify each answer in problems (e)–(g).

e. $\begin{array}{r} 3.65 \\ +\ 6.35 \\ \hline \end{array}$

f. $\begin{array}{r} 23.16 \\ -\ 19.46 \\ \hline \end{array}$

g. $\begin{array}{r} 4.23 \\ -\ 3.18 \\ \hline \end{array}$

Problem set 110

1. Draw the decimals chart.

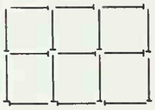
2. A pack of 10 hot dogs cost $1.25. What would be the cost of 100 hot dogs?

3. Three fourths of the 28 students finished their test early. How many students finished the test early?

4. This rectangle was formed with pins 1 inch long.

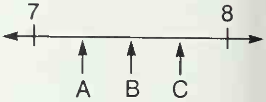
a. How many pins form the perimeter?

b. How many small squares cover this rectangle?



5. Is \$7.13 closer to \$7 or \$8?

6. Which arrow could be pointing to $7\frac{3}{4}$ on this number line?



7. Rewrite .125 so that there is a zero in the ones' place.

8. The giraffe stood 5 meters tall. Five meters is how many centimeters?

9. AB is 40 mm. BC is half of AB. CD equals BC. Find AD.

10. $6.299 + 3 + 4.2598 =$

11. $0.6298 + 4.276 + 412 =$

12. $6.37 - 6 =$

13. $234 \times 506 =$

14. $10 \times \$1.75 =$

15. $\$17.50 \div 10 =$

16. $32\overline{)832}$

17. $832 \div 16 =$

18. $\frac{5}{9} + \frac{5}{9} + \frac{5}{9} =$

19. $\frac{9}{10} \times \frac{9}{10} =$

20. $\frac{2}{3} \div \frac{3}{4} =$

21. $3 \div \frac{3}{4} =$

22. $\frac{1}{50} = \frac{\square}{100}$

23. Reduce: $\frac{40}{100} =$

24. The flagpole is 10 yards tall. The flagpole is how many feet tall?

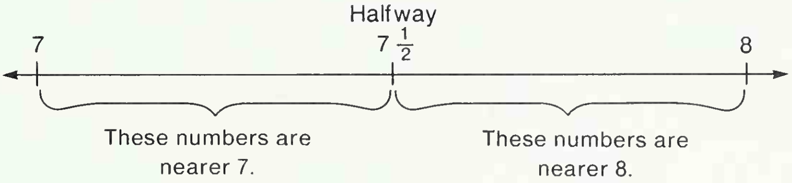
25. How many months is it from May 1 of one year to January 1 of the next year?

LESSON 111

Rounding Mixed Numbers to the Nearest Whole Number

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

Mixed numbers are between whole numbers on the number line. Sometimes we must round mixed numbers to the nearest whole number. The mixed number $7\frac{3}{4}$ is between 7 and 8. To round $7\frac{3}{4}$ to the nearest whole number, we must decide whether $7\frac{3}{4}$ is nearer 7 or nearer 8. To help us answer this question, we have drawn this number line.



We see that $7\frac{1}{2}$ is halfway between 7 and 8. If $7\frac{3}{4}$ is more than $7\frac{1}{2}$, then it is nearer 8. If $7\frac{3}{4}$ is less than $7\frac{1}{2}$, then it is nearer 7. In order to round $7\frac{3}{4}$, we must decide whether it is greater than or less than $7\frac{1}{2}$.

$$\text{Compare: } 7\frac{3}{4} \bigcirc 7\frac{1}{2}$$

Since the whole-number part of these mixed numbers is the same, we only need to compare the fraction part.

$$\text{Compare: } \frac{3}{4} \bigcirc \frac{1}{2}$$

One way to decide whether a fraction is more or less than $\frac{1}{2}$ is to look at the top and the bottom of the fraction. A fraction equal to $\frac{1}{2}$ has a top that is half of its bottom. The following fractions are equal to $\frac{1}{2}$. Notice that each top is exactly half of the bottom.

$$\frac{1}{2} \quad \frac{2}{4} \quad \frac{3}{6} \quad \frac{4}{8} \quad \frac{5}{10} \quad \frac{6}{12} \quad \frac{50}{100}$$

Fractions that are less than $\frac{1}{2}$ have tops that are less than half of the bottoms. Fractions that are more than one half have tops that are more than half of the bottoms. Since the top of $\frac{3}{4}$ is more than half of the bottom, we know that $\frac{3}{4}$ is greater than $\frac{1}{2}$. Thus, $7\frac{3}{4}$ is greater than $7\frac{1}{2}$, and $7\frac{3}{4}$ rounds up to the whole number 8.

Example Round $6\frac{2}{5}$ to the nearest whole number.

Solution The mixed number $6\frac{2}{5}$ is between 6 and 7. We need to decide whether it is nearer 6 or nearer 7. The number $6\frac{1}{2}$ is halfway between 6 and 7. The number $6\frac{2}{5}$ is less than $6\frac{1}{2}$, so we round $6\frac{2}{5}$ down to **6**.

Practice Round each mixed number to the nearest whole number.

a. $3\frac{2}{3}$

b. $7\frac{1}{8}$

c. $6\frac{3}{5}$

d. $6\frac{1}{4}$

e. $12\frac{5}{6}$

f. $25\frac{3}{10}$

g. $9\frac{4}{5}$

h. $15\frac{1}{3}$

i. $36\frac{5}{8}$

Problem set 111

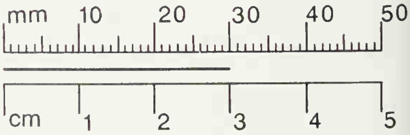
1. Draw the decimals chart.

2. If each of the 8 sides of an octagon is 25 centimeters long, then the perimeter of the octagon is how many **meters**?

3. What year was five decades before 1826?

4. What number is $\frac{3}{4}$ of 100?

5. Write the length of this line segment as a number of millimeters and as a number of centimeters.



6. If the segment in problem 5 were cut in half, then each small segment would be how many centimeters long?

7. Is \$8.80 closer to \$8 or \$9?

8. Round $7\frac{3}{4}$ to the nearest whole number.

9. The kite was 240 feet away. How many yards of string had been let out?

10. *AB* is 60 mm. *BC* is half of *AB*. *CD* is one third of *AB*. Find *AD*.

11. $43 + 8.579 + 12.375 + .09768 =$

12. $16.37 - 12 =$

13. $\begin{array}{r} \$3.58 \\ \times \quad 10 \\ \hline \end{array}$

14. $\begin{array}{r} 437 \\ \times\ 648 \\ \hline \end{array}$

15. $\frac{4300}{25} =$

16. $14\overline{)\$20.16}$

17. $\$20.16 \div 7 =$

18. $\begin{array}{r} 5\frac{3}{12} \\ +\ 1\frac{2}{12} \\ \hline \end{array}$

19. $\begin{array}{r} 6\frac{3}{5} \\ +\ 1\frac{3}{5} \\ \hline \end{array}$

20. $\begin{array}{r} 8\frac{5}{6} \\ -\ 1\frac{1}{6} \\ \hline \end{array}$

21. $\frac{2}{10} \times \frac{5}{10} =$

22. $2 \div \frac{4}{5} =$

23. $\frac{9}{50} = \frac{\square}{100}$

Read this information; then answer questions 24 and 25.

Becky ran two races at the track meet. She won the 100-meter race with a time of 13.8 seconds. In the 200-meter race, she came in second with a time of 29.2 seconds.

24. In the 200-meter race, the girl who won ran 1 second faster than Becky. What was the winning time?

25. Becky earned points for her team. First place earns 5 points. Second place earns 3 points, and third place earns 1 point. How many points did Becky earn?

LESSON 112

Subtracting: Fill Empty Places with Zero

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

The main rule for decimal subtraction is, "Line up the decimal points." For some subtraction problems we must also use rules from the bottom of the chart. In this lesson we will practice subtraction problems in which we must follow the rule,

"Fill empty places with zero."

In this problem we are unable to subtract because there is an "empty place" in the problem. By filling the empty place with zero, we are able to subtract.

$$\begin{array}{r} .4\underline{\ \ } \\ -\ .23 \\ \hline \end{array}$$

$$\begin{array}{rcc} . & \overset{3}{\cancel{4}} & {}^{1}0 \\ -\ . & 2 & 3 \\ \hline . & 1 & 7 \end{array}$$

Example .4 − .231 =

Solution We set up the problem by lining up the decimal points, remembering to write the first number on top. We fill empty places with zero. Then we subtract and get **.169**.

$$\begin{array}{r} .400 \\ -\ .231 \\ \hline \end{array}$$

$$\begin{array}{rccc} . & \overset{3}{\cancel{4}} & \overset{9}{{}^{1}\cancel{0}} & {}^{1}0 \\ -\ . & 2 & 3 & 1 \\ \hline . & \mathbf{1} & \mathbf{6} & \mathbf{9} \end{array}$$

Practice*

a. .3 − .15 =

b. .3 − .25 =

c. 4.2 − .42 =

d. 3.5 − .35 =

e. .4 − .123 =

f. .4 − .321 =

g. 5. − .5 =

h. 5. − 4.1 =

i. 1. − .25 =

j. 1.2 − .123 =

Problem set 112

1. Draw two parallel segments that are horizontal. Make the upper segment longer than the lower segment. Connect the endpoints of the segments to form a quadrilateral.

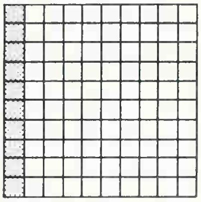
2. "A pint's a pound the world around" means that a pint of water weighs about a pound. About how much does a gallon of water weigh?

3. Estimate the sum of $7\frac{1}{5}$ and $3\frac{7}{8}$ by rounding both numbers to the nearest whole number before you add.

4. Use digits to write the decimal number twenty-three thousand, two hundred seventeen and five tenths.

5. If $25m = 100$, then m equals what number?

6. Name the shaded part of the square as a decimal number and as a reduced fraction.

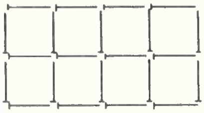


7. Round $12\frac{1}{6}$ to the nearest whole number.

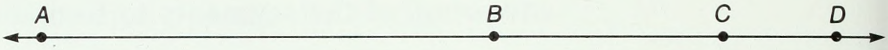
8. Compare: one tenth ○ ten hundredths

9. The first four multiples of 2 are 2, 4, 6, and 8. What are the first four multiples of 6?

10. This rectangle was made with pins 1 inch long.
    a. The length of the rectangle is how many inches?
    b. The perimeter of the rectangle is how many inches?



11. AB is 60 mm. BC is half of AB. CD is half of BC. Find AD.



12. $0.4 - 0.123 =$

13. $6.2 - 0.715 =$

14.

$$\begin{array}{r} 315 \\ 278 \\ 4197 \\ 586 \\ 92 \\ +\ 3634 \\ \hline \end{array}$$

15. $9 \times \$4.36 =$

16. $540 \times 780 =$

17. $\frac{432}{6} =$

18. $\frac{864}{12} =$

19. $5 - \left(1\frac{2}{3} + 1\frac{2}{3}\right) =$

20. $\frac{5}{6} \times \left(3 \times \frac{2}{5}\right) =$

21. $2 \div \frac{1}{3} =$

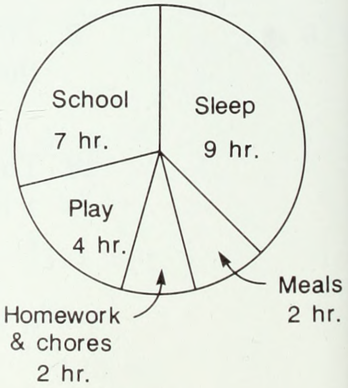
22. $\frac{1}{3} \div 2 =$

23. $\frac{12}{50} = \frac{\square}{100}$

This graph shows how Darren spends his time each school day. Use the information in this graph to answer questions 24 and 25.

24. What is the total of all the hours listed in the graph?

25. What fraction of the day does Darren spend sleeping?



LESSON 113

Subtracting: Pin Decimal Point on Whole Number

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

For some decimal subtraction problems we use both rules from the bottom of the decimals chart. If there is a whole number in the problem, we **"pin a decimal point on the back of the whole number."** If there are empty places in the problem, we **"fill empty places with zero."**

To subtract 3 − 1.2, we pin a decimal point on the 3 so that we can line up the decimal points. Then we fill empty places with zero so we can subtract.

$$\begin{array}{r} {}^{2}\cancel{3}\,.\,{}^{1}0 \\ -\,1\,.\,2 \\ \hline 1\,.\,8 \end{array}$$

Example 3 − 1.23 =

Solution We pin a decimal point on the back of the whole number. We line up the decimal points, remembering to write the first number on top. Then we fill all empty places with zeros and subtract.

$$\begin{array}{r} 3.00 \\ -\,1.23 \\ \hline \end{array} \qquad \begin{array}{r} \overset{2}{\cancel{3}}\,.\,{}^{1}\overset{9}{\cancel{0}}\;{}^{1}0 \\ -\,1\,.\,2\;\;3 \\ \hline \mathbf{1\,.\,7\;\;7} \end{array}$$

Practice*

a. 3 − .12 =

b. 3 − .3 =

c. 4.2 − 2 =

d. 4 − 2.2 =

e. 10 − 6.5 =

f. 6.5 − 4 =

g. 1 − .9 =

h. 1 − .1 =

i. 1 − .25 =

j. 2.5 − 1 =

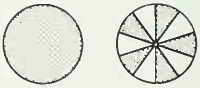
Problem set 113

1. Draw the decimals chart.

2. About $\frac{1}{3}$ of the weight of a banana is the weight of the peel. If a banana weighs 180 grams, then the weight of the peel would be about how many grams?

3. As the "forty-niners" headed west, what direction was to their left?

4. Name the total number of shaded circles as a decimal number and as a reduced mixed number.



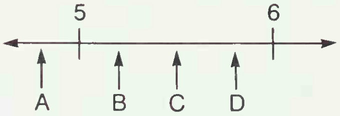
5. Which digit in 1.234 is in the same place as the 6 in 56.78?

6. If the radius of a wheel is 30 centimeters, then how many centimeters is its diameter?

7. Round $9\frac{2}{3}$ to the nearest whole number.

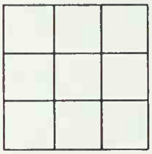
8. Is $12.65 closer to $12 or to $13?

9. Which arrow could be pointing to 5.8 on this number line?



10. **a.** The perimeter of this rectangle is how many units?

b. How many small squares cover the area of this rectangle?



11. QT is 10 cm. QR is 4 cm. RS is half of QR. Find ST.

12. $3 - 2.35 =$

13. $10 - 4.06 =$

14. $4.35 + 12.6 + 15 =$

15. $7 \times 47 \times 360 =$

16. 5 × 68¢ =

17. $47.00 ÷ 20 =

18. $21\overline{)5292}$

19. $2112 \div 16 =$

20. $3\frac{2}{3} + \left(2 - \frac{2}{3}\right) =$

21. $\frac{1}{2} \times \left(4 \times \frac{1}{4}\right) =$

22. $1 \div \frac{7}{5} =$

23. $\frac{3}{2} \div \frac{2}{3} =$

24. $\frac{4}{10} \times \frac{5}{10} =$

25. $\frac{1}{25} = \frac{\square}{100}$

LESSON 114

Rounding Dollars and Cents to the Nearest Dollar

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

In previous problem sets we have answered questions like the following question:

Is $7.56 closer to $7 or $8?

When we answer this question, we are rounding $7.56 to the nearest dollar. We know that $7.56 is more than $7 but less than $8. Counting from $7 to $8, we are halfway at $7.50. An amount of money less than $7.50 is closer to $7. An amount of money more than $7.50 is closer to $8. Since $7.56 is more than halfway to $8, it is closer to $8 than it is to $7.

Example 1 Round $12.46 to the nearest dollar.

Solution The problem tells us to write the whole number of dollars to which $12.46 is closest. We know that $12.46 is more than $12 and less than $13. Halfway between $12 and $13 is $12.50. Since $12.46 is slightly less than halfway, we round $12.46 to **$12.**

Example 2 Round $99.95 to the nearest dollar.

Solution When we round money to the nearest dollar, we write dollars and no cents. We must find the whole number of dollars to which \$99.95 is closest. Since \$99.95 is between \$99 and \$100, our choice will be one of these two. Halfway between \$99 and \$100 is \$99.50. Since \$99.95 is much closer to \$100, we round up to **\$100**.

Practice Round each amount of money to the nearest dollar.

a. \$6.24 **b.** \$15.06 **c.** \$118.59

d. \$9.75 **e.** \$30.89 **f.** \$198.47

Problem set 114

1. Draw a quadrilateral that has four right angles.

2. In Joshua's class there are twice as many boys as there are girls. If there are 18 boys in the class, how many students are in the class?

3. Which of these does not equal .5?

a. $\frac{1}{2}$ **b.** $\frac{1}{5}$ **c.** $\frac{5}{10}$ **d.** .50

4. Write the following sentence using digits and symbols.

"The product of one half and one third is one sixth."

5. Which digit is in the tenths' place in 142.75?

6. Compare: $\frac{1}{2} \div \frac{1}{3} \bigcirc \frac{1}{3} \div \frac{1}{2}$

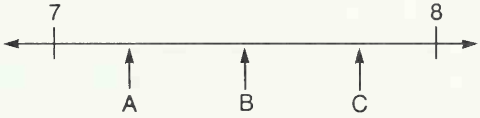
7. Reduce: **a.** $\frac{2}{10} =$ **b.** $\frac{20}{100} =$

8. Round $4\frac{3}{10}$ to the nearest whole number.

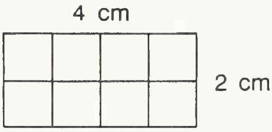
9. **a.** Round \$10.49 to the nearest dollar.
b. Round \$9.51 to the nearest dollar.

10. The first five multiples of 2 are 2, 4, 6, 8, and 10. What are the first five multiples of 7?

11. Which arrow could be pointing to 7.2 on this number line?



12. **a.** What is the perimeter of this rectangle?
b. How many squares cover the area of this rectangle



13. $6.453 + 2.87 + 4 =$

14. $(\$16 - \$5.74) \div 6 =$

15. $\$5.64 \times 10 =$

16. $976 \times 267 =$

17. $\frac{444}{12} =$

18. $\frac{888}{24} =$

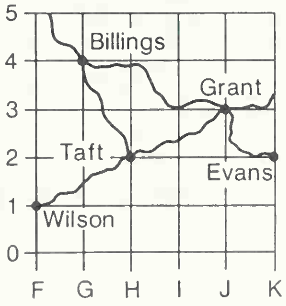
19. $5\frac{2}{3} + \left(3 - \frac{1}{3}\right) =$

20. $2 \times \left(\frac{1}{2} \times \frac{1}{3}\right) =$

21. $\frac{3}{10}$ of 30 =

22. $\frac{4}{25} = \frac{\square}{100}$

This map has been divided into a grid to make towns easier to find. Use this map to answer questions 23–25.



23. We find Taft at H2. Where do we find Billings?
a. G4 **b.** F4 **c.** H2 **d.** F5

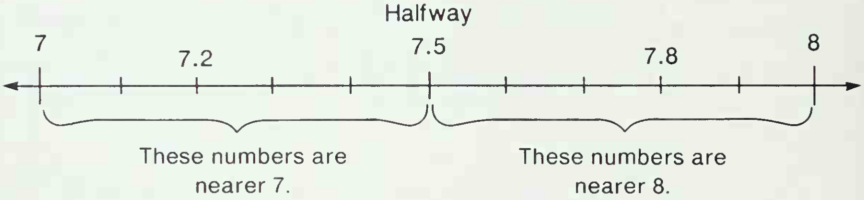
24. What town do we find at J3?

25. What letter and number show where to find Evans?

LESSON 115 Rounding Decimal Numbers to the Nearest Whole Number, Part 1

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

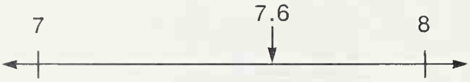
When a number is written with digits after the decimal point, the number is not a whole number but is between two whole numbers. Sometimes we must round a decimal number to the nearest whole number. Since a decimal number is between two whole numbers, we must be able to decide which of the two whole numbers it is nearer. The number line can help us understand this idea.



The decimal number which is halfway between 7 and 8 is 7.5. It is the same distance from 7 as it is from 8. The number 7.2 is less than halfway, so it is nearer 7. The number 7.8 is more than halfway, so it is nearer 8.

Example Round 7.6 to the nearest whole number.

Solution We must find the whole number closest to 7.6. Halfway between 7 and 8 is 7.5. Since 7.6 is more than halfway, we round up to the whole number **8**. We can see this if we use a number line.



We see that 7.6 is closer to 8 than it is to 7.

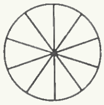
Practice Round each of these decimal numbers to the nearest whole number.

a. 4.7	b. 12.3	c. 96.4
d. 7.4	e. 45.7	f. 89.8

Problem set 115

1. Draw the decimals chart.

2. This circle is divided into tenths. How many tenths does it take to equal one half?



3. Tony had six coins in his pockets totaling 43¢. How many of the coins were nickels?

4. Carl finished the race in ten and twenty-three hundredths seconds. Write that number using digits.

5. If 20 of them cost \$50, how many of them could you buy with \$100?

6. Reduce: **a.** $\frac{4}{10} =$ **b.** $\frac{40}{100} =$

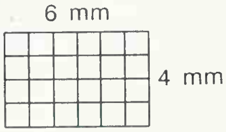
7. List these numbers in order of size from least to greatest.

2, .02, .2, 20

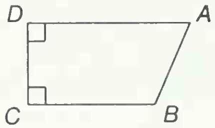
8. Round \$18.68 to the nearest dollar.

9. Round 6.7 to the nearest whole number.

10. **a.** What is the perimeter of this rectangle?
    b. How many squares cover its area?



11. A right angle is sometimes marked with a square in the corner. Both $\angle CDA$ and $\angle DCB$ are right angles. Which angle is acute?



12. $\frac{1}{100} + \frac{9}{100} =$

13. $\frac{63}{100} - \frac{13}{100} =$

14. $\frac{5}{10} \times \frac{5}{10} =$

15. $\frac{3}{5} \div \frac{3}{4} =$

16. $3.765 + 12 + 6.8 + 14.683 + 907.618 + 413.5 + .005 =$

17. $1.2 - 0.125 =$

18. 8 × 63¢ = $___

19. $804 \times 740 =$

20. $28\overline{)5964}$

21. $5964 \div 14 =$

22. $\frac{3}{20} \times \square = \frac{15}{100}$

23. $\frac{7}{25} = \frac{\square}{100}$

Read this information. Then answer questions 24 and 25.

Matthew fixed his function machine so that when he puts in a 24, an 8 comes out. When he puts in a 12, a 4 comes out. When he puts in a 6, a 2 comes out.

IN	OUT
24 ⟶	8
12 ⟶	4
6 ⟶	2

24. What rule does the machine use?
  a. It divides by 3.
  b. It multiplies by 3.
  c. It divides by 2.
  d. It multiplies by 2.

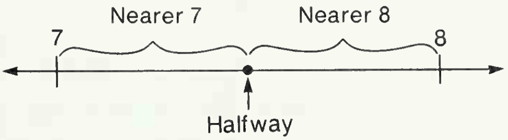
25. If Matthew puts in a 30, what number will come out?

LESSON 116

Rounding Decimal Numbers to the Nearest Whole Number, Part 2

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

In Lesson 115 we practiced rounding decimal numbers to the nearest whole number. We will continue that idea in this lesson by rounding decimal numbers which have more than one digit after the decimal point. We will use the number line again to help us with this idea.

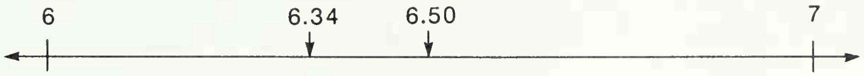


7.5
7.50
7.500

Notice that the halfway point may be named by using any number of decimal places. Halfway between 7 and 8 is 7.5, which is seven and **five tenths**. We may also name the halfway point seven and **fifty hundredths**, just as we do when we write $7.50. We may even name the halfway point 7.500. Remember, zeros at the end of a decimal number do not change the value of the number. We will keep this idea in mind when rounding decimal numbers which have more than one digit after the decimal point.

Example Round 6.34 to the nearest whole number.

Solution The part of the number in front of the decimal point is the whole-number part. The part of the number after the decimal point is the fraction part. The number 6.34 names a number which is **6 plus a fraction**. If the fraction part is less than .5 or .50 or .500, etc., we round down. If the fraction part is greater than .5 or .50 or .500, we round up. Since .34 is less than .50, we round 6.34 down to **6**.



Practice* Round each of these decimal numbers to the nearest whole number.

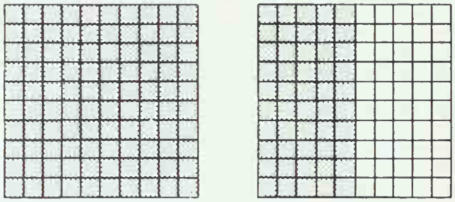
a. 7.57
b. 12.36
c. 4.375
d. 4.08
e. 19.63
f. 2.625
g. 9.81
h. 26.70
i. 1.333

Problem set 116

1. Milton was given a $100 gift certificate for toys. If he could buy 6 games with $25, how many games could he buy with his $100 gift certificate?

2. Detective Brown found one thousand, three hundred sixty-eight clues. Only one ninth of the clues were helpful. How many helpful clues did he find?

3. Name the shaded part of the squares as a decimal number and as a reduced mixed number.



4. Round 8.33 to the nearest whole number.

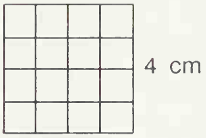
5. What are the first five multiples of 8?

6. Reduce: **a.** $\frac{60}{100} =$ **b.** $\frac{16}{24} =$

7. Estimate the sum of $8.96, $12.14, and $4.88 by rounding each amount to the nearest dollar before you add.

8. Round 5.7 to the nearest whole number.

9. **a.** What is the perimeter of this rectangle?
   b. How many small squares cover its area?



10. What is the next number in this sequence?

. . . , 3465, 3475, 3485, ____

11. $\begin{array}{r} 4\frac{3}{8} \\ +\ 1\frac{3}{8} \\ \hline \end{array}$

12. $\begin{array}{r} 3\frac{7}{10} \\ +\ \frac{3}{10} \\ \hline \end{array}$

13. $\begin{array}{r} 4 \\ -\ 1\frac{3}{10} \\ \hline \end{array}$

14. 46.3 + 28.49 + .125 + 6 + 759.6 + 808.73 + .15 =

15. 4 − 1.3 =

16. 8 × 57 × 250 =

17. 5 × $7.25 =

18. $8\overline{)\$26.00}$

19. 436 ÷ 21 =

20. $16\overline{)5040}$

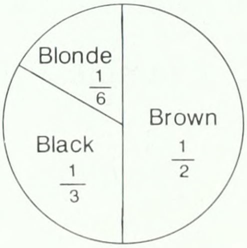
21. $5 \times \frac{3}{10} =$

22. $5 \div \frac{2}{3} =$

23. $\frac{1}{20} = \frac{\square}{100}$

The graph below shows the fraction of students in a class who have hair of a certain color. Use this graph to answer questions 24 and 25.

24. There are 30 students in this class. How many students have blonde hair?



Hair Color of Students

25. Which two groups **taken together** total one half of the class?

a. Black and brown

b. Brown and blonde

c. Blonde and black

LESSON 117

Using Percent to Name Part of a Group

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

Percent is a word that means out of 100. If we read that 50 percent of all Americans drive cars, we understand that 50 out of every 100 Americans drive cars. The statement, "Ten percent of the population is left-handed" means that 10 out of every 100 people are left-handed.

When we say "percent," we speak **as though there were 100** in the group. However, we may say percent when there are more or less than 100 in the group. If there are more or less than 100 in the group, we evenly decrease or increase the group until it has exactly 100. We will illustrate this with two examples.

Example 1 If 8 of the 20 students are boys, then what percent of the students are boys?

Solution If we write the number of boys over the total number of students in the group, we get 8 boys over 20 total. If we multiply this fraction by a name for 1 so that the bottom number becomes 100, the top number will be the percent. So we will multiply by 5 over 5.

$$\frac{8 \text{ boys}}{20 \text{ total}} \times \frac{5}{5} = \frac{40 \text{ boys}}{100 \text{ total}}$$

This means that if there were 100 students there would be 40 boys. Thus **40 percent** of the students are boys.

Example 2 There were 400 pieces of candy in all. If 60 pieces were chocolate, what percent of the candy was chocolate?

Solution We have the fraction 60 chocolate over 400 total. We must make the total equal 100. Thus we divide by 4 over 4.

$$\frac{60 \text{ chocolate}}{400 \text{ total}} \div \frac{4}{4} = \frac{15 \text{ chocolate}}{100 \text{ total}}$$

When we make the bottom number 100, the top number is the percent. Thus **15 percent** of the candy was chocolate.

Instead of using the word "percent," we may use the percent sign, %. Using the percent sign, we write 15 percent this way, **15%**.

Practice

a. If 120 of the 200 students are girls, then what percent of the students are girls?

b. If 10 of the 50 pieces of candy are green, then what percent of the pieces of candy are green?

c. Sixty out of 300 is like how many out of 100?

d. Forty-eight out of 200 is what percent?

e. Thirty out of 50 is what percent?

f. If half of the people came, then what percent of the people came?

Problem set 117

1. Draw the decimals chart.

2. Gilbert ran 100 yards in 13.8 seconds. Julie ran 100 yards 1 second faster than Gilbert. How long did it take Julie to run 100 yards?

3. The camel could carry 245 kilograms. How many bundles of straw weighing 15 kilograms each could the camel carry?

4. Estimate the total cost of 8 records priced at $6.98 each by rounding the cost per record to the nearest dollar before you multiply.

5. If 60 of the 200 students are girls, then what percent of the students are girls?

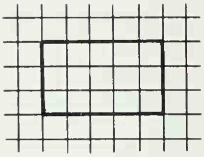
6. Compare: $\frac{1}{10} + \frac{1}{10} \bigcirc .1 + .1$

7. Round 3.8 to the nearest whole number.

8. If a bag of M&M's contains 50 pieces of candy and 10 of the pieces are green, then what percent of the M&M's are green?

9. Round 8.47 to the nearest whole number.

10. **a.** The perimeter of the darker rectangle is how many units?
b. How many small squares cover the area of the rectangle?



11. QT equals 9 centimeters. QR equals RS equals ST. Find QR.

12. $\frac{31}{100} + \frac{29}{100} =$

13. $5 - 3\frac{7}{10} =$

14. $10 + 7.45 + 8 + 32.5 + 946.8 + 78.64 + 423 =$

15. $5 - 3.7 =$

16. $10 \times \$3.65 =$

17. $468 \times 579 =$

18. $\$36.50 \div 10 =$

19. $5\overline{)8765}$

20. $800 \div 32 =$

21. $\frac{3}{5} \times 4 =$

22. $4 \div \frac{3}{5} =$

23. $\frac{7}{20} = \frac{\square}{100}$

The table below shows the number of votes students received in a class election. Look at this table. Then answer questions 24 and 25.

Election Results

STUDENT	VOTES
Miguel	𝍸 𝍸 ||
Debbie	𝍸 ||
Patrick	𝍸
Tina	𝍸 |||

24. How many votes did Miguel receive?

25. What fraction of the votes did Tina get?

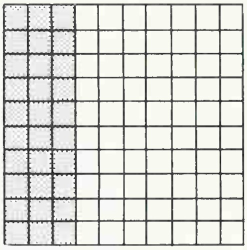
LESSON 118

Writing a Percent as a Fraction

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

We have used fractions and decimal numbers to name parts of a whole. We may also use percent to name part of a whole.

Example 1 What percent of this square is shaded?



Solution The square has been divided into 100 equal parts. Thirty of the parts are shaded. Thirty out of 100 is **30%**.

Since "percent" means out of 100, we may write a percent as a fraction by removing the percent sign and writing the number as the numerator of a fraction that has a denominator of 100. Look at these examples.

$$3\% = \frac{3}{100} \qquad 49\% = \frac{49}{100} \qquad 70\% = \frac{70}{100} = \frac{7}{10}$$

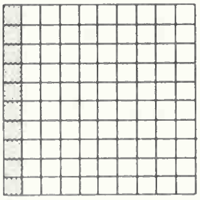
When we write a percent as a fraction, we should reduce the fraction if possible. In the examples above, 70% was written as the fraction $\frac{70}{100}$. We reduced $\frac{70}{100}$ to $\frac{7}{10}$.

Example 2 Write 40% as a reduced fraction.

Solution Forty percent may be written as the fraction $\frac{40}{100}$. Then we reduce to get $\frac{2}{5}$.

$$40\% = \frac{40}{100} = \frac{2}{5}$$

Practice **a.** What percent of this square is shaded?



b. What percent of this square is not shaded?

In problems (c)–(f), write each percent as a reduced fraction.

c. 60% **d.** 90% **e.** 25% **f.** 4%

Problem set 118

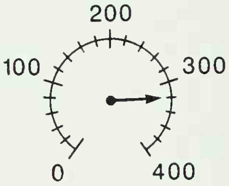
1. Bobby weighs forty-five million, four hundred fifty-four thousand, five hundred forty-five milligrams. Write that number.

2. What is the total cost of 2 items at $1.26 each and 3 items at 49¢ each plus a total tax of 24¢?

3. Flora rode her bike 2.5 miles to the library. How far did she ride going to the library and back?
a. 4.10 miles **b.** 4.5 miles **c.** 5 miles **d.** 25 miles

4. If $4y = 20$, then $2y - 1$ equals what number?

5. The arrow is pointing to what number on this scale?



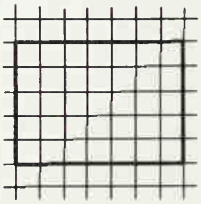
6. Fifteen of the 25 students are boys. What percent of the students are boys?

7. Estimate the sum of 12.7 and 8.16 by rounding to the nearest whole number before you add.

8. Write the reduced fraction that equals 40%.

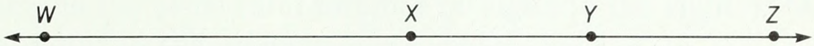
9. Compare: 50% ○ $\frac{1}{2}$

10. Which digit in 76.345 is in the tenths' place?



11. a. The perimeter of the rectangle is how many units?
b. How many small squares cover the area of the rectangle?

12. WX is 48 mm. XY is half of WX. YZ equals XY. Find WZ.



13. $2.386 + 1.2 + 16.25 + 10 + 0.987 + 486.914 + 83 =$

14. $4.2 - (3 - 0.45) =$

15. $\begin{array}{r} \$0.42 \\ \times \quad 6 \\ \hline \end{array}$

16. $\begin{array}{r} 780 \\ \times\ 906 \\ \hline \end{array}$

17. $\dfrac{\$40.60}{7} =$

18. $3427 \div 17 =$

19. $3705 \div 15 =$

20. $\dfrac{4}{11} + \dfrac{5}{11} =$

21. $4\dfrac{5}{7} - \dfrac{1}{7} =$

22. $\dfrac{5}{6}$ of $24 =$

23. $\dfrac{1}{2} \div \dfrac{2}{3} =$

The table shows the number of students who made certain scores on the test. Look at this table. Then answer questions 24 and 25.

Test Results

SCORE (NUMBER CORRECT)	NUMBER OF STUDENTS
20	4
19	4
18	5
17	6
16	3
15	2

24. Which score was made by the largest number of students?

25. If 28 students took the test, how many students got fewer than 15 correct?

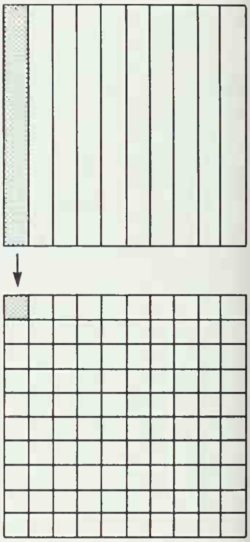
LESSON 119

Multiplying Decimal Numbers

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

What is one tenth of one tenth? We will use pictures to answer this question.

The square at right represents one whole, and each column is one tenth of the whole. To find one tenth of one tenth, we divide each tenth into 10 parts.



The second picture shows the columns divided into 10 parts with one part shaded. We shaded one tenth of one tenth of the square. The shaded part is **one hundredth** of the square. We see that one tenth of one tenth is one hundredth.

When we find one tenth of one tenth, we are multiplying. If we use arithmetic and multiply fractions, the work looks like this.

$$\frac{1}{10} \times \frac{1}{10} = \frac{1}{100}$$

If we use decimal numbers instead, the work looks like this.

$$\begin{array}{r} .1 \\ \times\ .1 \\ \hline .01 \end{array}$$

When we set up a decimal multiplication problem, we do not try to line up the decimal points. That rule is only for adding and subtracting. When we multiply, we just set up the problem as though it were a whole-number problem and multiply. To place the decimal point in the answer, we first count the total number of digits to the right of the decimal point in both factors. Then we place the decimal point in the answer so that there is the same total number of digits to the right of the decimal point in the answer.

Copy and **study** the following examples and solutions.

Examples, ***Solutions***

$$\begin{array}{r l} .12 & \rightarrow 2 \text{ digits to right of decimal point} \\ \times \quad 6 & \rightarrow 0 \text{ digits to right of decimal point} \\ \hline \underleftarrow{.72} & \rightarrow 2 \text{ digits to right of decimal point} \end{array}$$

$$\begin{array}{r l} 25 & \rightarrow 0 \text{ digits to right of decimal point} \\ \times \;\; .3 & \rightarrow 1 \text{ digit to right of decimal point} \\ \hline 7\underleftarrow{.5} & \rightarrow 1 \text{ digit to right of decimal point} \end{array}$$

$$\begin{array}{r l} .15 & \rightarrow 2 \text{ digits to right of decimal point} \\ \times \quad .9 & \rightarrow 1 \text{ digit to right of decimal point} \\ \hline \underleftarrow{.135} & \rightarrow 3 \text{ digits to right of decimal point} \end{array}$$

The decimal chart we have been memorizing gives the rule to remember when we multiply decimal numbers. The rule is, **Multiply**, **then count**. We **multiply** the digits; then we **count** the total number of digits behind the decimal point in the factors. Then, starting from the right side of the answer, we count over that many digits to the left and mark the decimal point.

Practice*

a. $\begin{array}{r} .3 \\ \times\ 4 \\ \hline \end{array}$

b. $\begin{array}{r} 3 \\ \times\ .6 \\ \hline \end{array}$

c. $\begin{array}{r} 0.12 \\ \times \quad\; 4 \\ \hline \end{array}$

d. $\begin{array}{r} 1.4 \\ \times\ 0.7 \\ \hline \end{array}$

e. $\begin{array}{r} 37 \\ \times\ .6 \\ \hline \end{array}$

f. .3 × .5 =

g. 1.2 × 3 =

h. 1.5 × 0.5 =

i. .25 × .9 =

Problem set 119

1. Draw the decimals chart.

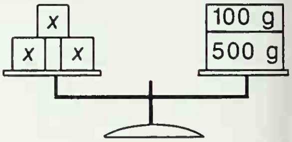
2. Forty of Dan's 50 answers were correct. What percent of Dan's answers were correct?

3. Compare: $\frac{1}{10} \times \frac{1}{10} \bigcirc .1 \times .1$

4. What time is 35 minutes before midnight?

5. Use digits to write the decimal number one hundred ten and five tenths.

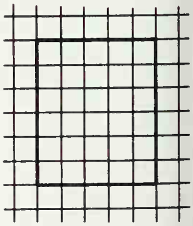
6. Three small blocks of wood are balanced on one side of a scale with a 100-gram weight and a 500-gram weight on the other side. If each block weighs the same, what is the weight of each block?



7. What are the first five multiples of 10?

8. Estimate the difference when \$6.94 is subtracted from \$23.07 by rounding to the nearest dollar before you subtract.

9. **a.** How many units is the perimeter of the rectangle?
   b. How many small squares cover the area of the rectangle?



10. **a.** Write the reduced fraction equal to 10%.
    b. Write the reduced fraction equal to 20%.

11. 32.3 + 4.96 + 7.5 + 11 + 478.6 + 94.372 + 462 =

12. 1 − (1.36 − .8) =

13. $\begin{array}{r} 12 \\ \times\ .6 \\ \hline \end{array}$

14. $\begin{array}{r} .15 \\ \times\ .9 \\ \hline \end{array}$

15. $\begin{array}{r} .16 \\ \times\ 10 \\ \hline \end{array}$

16. $\frac{3705}{13} =$

17. $6\overline{)\$8.76}$

18. $980 \div 28 =$

19. $\begin{array}{r} 1\frac{3}{5} \\ +\ 1\frac{1}{5} \\ \hline \end{array}$

20. $\begin{array}{r} 4\frac{3}{10} \\ +\ 1\frac{2}{10} \\ \hline \end{array}$

21. $\begin{array}{r} 4\frac{3}{10} \\ -\ 1\frac{2}{10} \\ \hline \end{array}$

22. a. $\frac{2}{3} = \frac{\square}{6}$ **b.** $\frac{1}{2} = \frac{\square}{6}$

23. $\frac{3}{10} \times \frac{1}{3} =$

24. $\frac{3}{4} \div \frac{3}{5} =$

25. $\frac{3}{10} \div 3 =$

LESSON
120

Multiplying Decimal Numbers: Fill Empty Places with Zero

Facts Practice: Simplify 50 Fractions (Test J in Test Booklet)

When we multiply decimal numbers, we follow the rule, "Multiply, then count." We count the total number of digits to the right of the decimal points in the factors. Then, starting from the right, we count over the same number of digits in the product to write the decimal point. Sometimes there are more digits to the right of the decimal point in the factors than there are digits in the product. Look at the problem below.

$$\left.\begin{array}{r} .3 \\ \times\ .3 \end{array}\right\} \atop \begin{array}{r} \hline \underset{\smile\smile}{.\ \ 9} \end{array}$$

There are two digits to the right of the decimal points in the factors. So we count over two places in the product, but there is only one digit.

To complete the multiplication, we use a rule from the bottom of the decimals chart. We "fill empty places with zero."

$$\begin{array}{r} .3 \\ \times\ .3 \\ \hline .\underline{0}\,\underline{9} \end{array}$$

Fill empty place with zero.

Changing the problem .3 × .3 to a fraction problem may help us understand why we use this rule. Since .3 equals $\frac{3}{10}$, we may write the problem the following way.

$$\frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$$

The product $\frac{9}{100}$ may be written as the decimal number, .09.

Example .12 × .3 =

Solution We set up the problem as though it were a whole-number problem. We follow the rule, "Multiply, then count." We "fill empty places with zero" and get the product **.036**.

$$\begin{array}{r} .12 \\ \times\ \ .3 \\ \hline 36 \\ \\ .\underbrace{0\,3\,6} \end{array}$$

3 digits to the right of the decimal points

Count over 3 places; fill empty place with zero

Practice* Multiply.

a. $\begin{array}{r} .25 \\ \times\ \ .3 \\ \hline \end{array}$ **b.** $\begin{array}{r} .12 \\ \times\ \ .4 \\ \hline \end{array}$ **c.** $\begin{array}{r} .125 \\ \times\ \ \ .3 \\ \hline \end{array}$ **d.** $\begin{array}{r} .05 \\ \times\ .03 \\ \hline \end{array}$

Set up and multiply.

e. .03 × .3 = **f.** 3.2 × .03 = **g.** .6 × .16 =

h. .12 × .2 = **i.** .01 × .1 = **j.** .07 × .12 =

Problem set 120

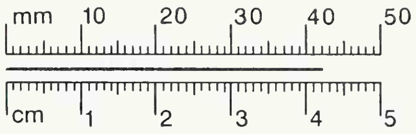
1. Estimate the product of 5.3 and 3.8 by rounding both numbers to the nearest whole number before you multiply.

2. The Jets played 10 games and won 5. What percent of their games did the Jets win?

3. **a.** Write the reduced fraction that equals 30%.
   b. Write the reduced fraction that equals 40%.

4. What number is $\frac{3}{5}$ of 100?

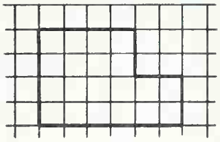
5. Name the length of this segment as a number of centimeters and as a number of millimeters.



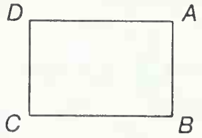
6. If the segment in problem 5 were cut in thirds, each third would be how many centimeters long?

7. The first three multiples of 6 are 6, 12, and 18. What are the next three multiples of 6?

8. **a.** How many units is the perimeter of this hexagon?
   b. How many squares cover its area?



9. In rectangle $ABCD$, which segment is parallel to $\overline{AB}$?



10. In rectangle $ABCD$, which two segments are perpendicular to $\overline{AB}$?

11. $16.75 + $10 + 49¢ + $141.68 + 63¢ =

12. 6 − 4.32 =

13. .12 × .4 =

14. .04 × .28 =

15. 10 × .25 =

16. $19\overline{)3705}$ **17.** $9\overline{)\$16.38}$ **18.** $40\overline{)1440}$

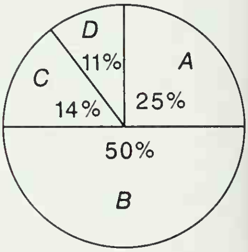
19. $\frac{5}{13} + \frac{10}{13} =$ **20.** $\frac{11}{12} - \frac{7}{12} =$ **21.** $1 \times \frac{5}{6} =$

22. $2 \div \frac{5}{6} =$ **23. a.** $\frac{5}{6} = \frac{\square}{12}$ **b.** $\frac{3}{4} = \frac{\square}{12}$

The pie graph below shows the percent of students in the class who made certain grades in math. Use this graph to answer questions 24 and 25.

24. Add the percents shown on the graph. What is the total?

25. What grade was made by $\frac{1}{4}$ of the students?



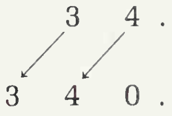
Math Grades

LESSON 121

Multiplying Decimal Numbers by 10, 100, 1000

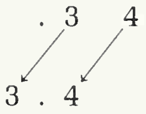
Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

In our number system the places have value. The value of each place is 10 times greater each time we move one place to the left. When we multiply a number by 10, the digits all shift one place to the left. When we multiply 34 by 10, the 3 shifts from the tens' place to the hundreds' place, and the 4 shifts from the ones' place to the tens' place.



(10 × 34 = 340)

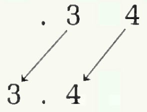
This fact can help us multiply decimal numbers quickly when we multiply by 10 or 100 or 1000. When we multiply by 10, each digit shifts one place to the left.



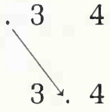
(10 × .34 = 3.4)

We see that the digit 3 moved to the other side of the decimal point when it shifted one place. The decimal point holds steady while the digits move. Although it is the digits which change places when the number is multiplied by 10, we can produce the same result by moving the decimal point in the opposite direction.

Shift the digits to the left	or	Shift the decimal point to the right



(10 × .34 = 3.4)



When we multiply by 10, we may simply shift the decimal point one place to the right.

Since 100 is 10 × 10, multiplying by 100 is like multiplying by 10 **twice**. When we multiply by 100, we may shift the decimal point **two** places to the right.

Since 1000 is 10 × 10 × 10, we may shift the decimal point **three** places to the right when we multiply by 1000.

The number of places we shift the decimal point is the same as the number of zeros we see in 10 or 100 or 1000.

Example 1.234 × 100 =

Solution We may multiply by 100 mentally by shifting the decimal point two places to the right.

$$1.234 \times 100 = 1\underset{\smile}{2}\,\underset{\smile}{3}.4 = \mathbf{123.4}$$

Practice

a. 1.234 × 10 =

b. 1.234 × 1000 =

c. .1234 × 100 =

d. .345 × 10 =

e. .345 × 100 =

f. .345 × 1000 =

g. 5.67 × 10 =

h. 5.67 × 1000 =

i. 5.67 × 100 =

Problem set 121

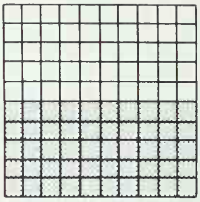
1. Draw the decimals chart.

2. Genghis Khan was born in 1167. In 1211 he invaded China. How old was he then?

3. a. Write the reduced fraction equal to 25%.
b. Write the reduced fraction equal to 50%.

4. What are the first three multiples of 9?

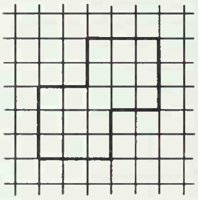
5. What percent of this square is shaded?



6. Name the shape of a basketball.

7. How many months are in $1\frac{1}{2}$ years?

8. a. How many units long is the perimeter of this shape?
b. How many squares cover the area of this shape?



9. *QR* is 45 mm. *RS* is one third of *QR*. *QT* is 90 mm. Find *ST*.

Perform the multiplications in problems 10 and 11 by shifting the decimal point.

10. 1.23 × 10 =

11. 3.42 × 1000 =

12. $15 + 9.67 + 3.292 + 5.5 =$

13. $4.3 - 1.21 =$

14. $$\begin{array}{r} .14 \\ \times\ \ .6 \\ \hline \end{array}$$

15. $$\begin{array}{r} 48 \\ \times\ \ .7 \\ \hline \end{array}$$

16. $$\begin{array}{r} 0.735 \\ \times\ \ 100 \\ \hline \end{array}$$

17. $4\overline{)5824}$

18. $16\overline{)4000}$

19. $\$18.00 \div 10 =$

20. $$\begin{array}{r} \frac{7}{11} \\ +\ \frac{8}{11} \\ \hline \end{array}$$

21. $$\begin{array}{r} 3\frac{7}{12} \\ +\ \ \frac{1}{12} \\ \hline \end{array}$$

22. $$\begin{array}{r} 5\frac{9}{10} \\ -\ 5\frac{3}{10} \\ \hline \end{array}$$

23. $\frac{7}{2} \times \frac{1}{2} =$

24. $\frac{2}{3} \div \frac{1}{4} =$

25. $3 \div \frac{3}{4} =$

LESSON 122

Finding the Least Common Multiple of Two Numbers

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

In Lesson 1 we practiced counting by numbers other than 1. For example, when we count by 4 we get the sequence 4, 8, 12, 16, and so on. We get the same sequence if we multiply 4 first by 1, then by 2, 3, 4, and so on. The numbers in this sequence are called the **multiples** of 4. Here we list some of the multiples of 4 and of 6.

Multiples of 4	4, 8, ⑫, 16, 20, ㉔, 28, 32, ㊱, . . .
Multiples of 6	6, ⑫, 18, ㉔, 30, ㊱, . . .

We have circled some of the multiples that 4 and 6 have in common—that are multiples of both numbers. The smallest number that is a multiple of both 4 and 6 is 12.

The smallest number that is a multiple of two or more numbers is called the **least common multiple** of the numbers. The letters **LCM** are sometimes used to stand for **least common multiple.**

When we look for the least common multiple of two numbers, it may help to think of the words in reverse order: multiple, common, least. We will take the words in this order to solve the example problem.

Example Find the least common multiple (LCM) of 6 and 8.

Solution We begin by listing some of the **multiples** of 6 and 8.

Multiples of 6	6, 12, 18, ㉔, 30, 36, 42, ㊽, . . .
Multiples of 8	8, 16, ㉔, 32, 40, ㊽, . . .

We now circle the multiples which 6 and 8 have in **common.** Finally we find the **least** of the common multiples. Our answer is **24.**

Practice* Find the least common multiple (LCM) of each pair of numbers.

a. 2 and 3
b. 3 and 5
c. 5 and 10
d. 2 and 4
e. 3 and 6
f. 6 and 10
g. 3 and 4
h. 4 and 10
i. 8 and 10

Problem set 122

1. A VW Bug weighs about one ton. Most large elephants weigh 4 times that much. About how many pounds would a large elephant weigh?

2. The Arctic Ocean is almost completely covered with the polar ice cap, which averages about 10 feet thick. About how many inches thick is the polar ice cap?

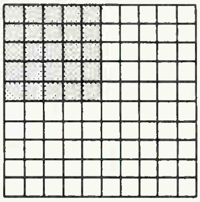
3. What is the total cost of 10 movie tickets priced at $2.25 each?

4. Which digit in 375.246 is in the hundredths' place?

5. Draw a pentagon.

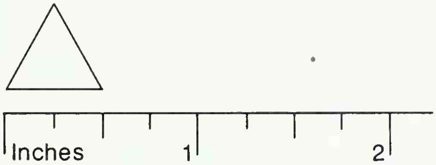
6. Write 12.5 as a mixed number.

7. What percent of this square is shaded?



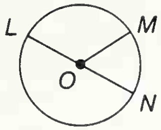
8. Name the shape of a can of pop.

9. All three sides of this triangle are equal in length. What is the perimeter of this triangle



10. Find the least common multiple (LCM) of 6 and 9.

11. If $\overline{OM}$ measures 15 mm, then what is the measure of $\overline{LN}$?



12. WX is 4.2 cm. XY is 3 cm. WZ is 9.2 cm. Find YZ.

13. $4.38 + 7.525 + 23.7 + 9 + 788.4 + 936.5 + 14 =$

14. $5 - (4.3 - 0.21) =$

15. $3.6 \times 4 =$

16. $.15 \times .5 =$

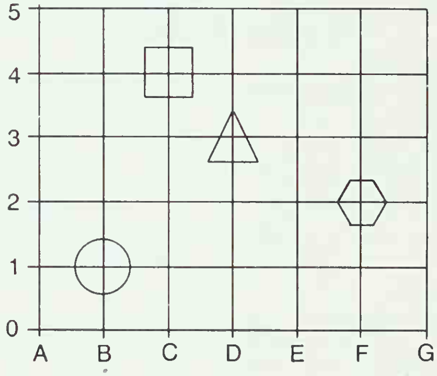
17. $10 \times .125 =$

18. $4\overline{)300}$ **19.** $40\overline{)3000}$ **20.** $25\overline{)3300}$

21. $3\frac{3}{7} + \left(5 - 1\frac{2}{7}\right) =$ **22.** $1\frac{1}{2} - \left(3 \times \frac{1}{2}\right) =$

23. **a.** $\frac{1}{4} = \frac{\square}{12}$ **b.** $\frac{2}{3} = \frac{\square}{12}$

On this grid there are shapes at different points. For example, there is a circle at the point B1. Use this grid to answer questions 24 and 25.



24. Name the shape at point D3.

25. What letter and number names the point where there is a hexagon?

LESSON 123

Writing Mixed Numbers as Improper Fractions

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

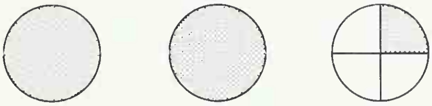
The picture below shows $1\frac{1}{2}$ shaded circles. How many half circles are shaded?

Three halves are shaded. We may name the number of shaded circles as the mixed number $1\frac{1}{2}$ or as the improper fraction $\frac{3}{2}$.

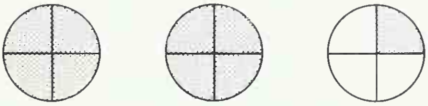
$$1\frac{1}{2} = \frac{3}{2}$$

We have converted improper fractions to mixed numbers by dividing. In this lesson we will practice writing mixed numbers as improper fractions. We will use this skill later when we learn to multiply and divide mixed numbers.

To help us understand changing mixed numbers into fractions, we will draw pictures. Here we show the number $2\frac{1}{4}$, using shaded circles.

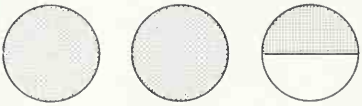


To show $2\frac{1}{4}$ as an improper fraction, we will divide the whole circles into the same size pieces as the divided circle. In this example we divide the whole circles into fourths.

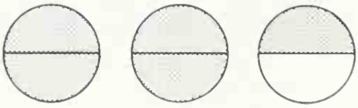


Now we count the total number of fourths that are shaded. We see that $2\frac{1}{4}$ equals the improper fraction $\frac{9}{4}$.

Example Name the number of shaded circles as an improper fraction and as a mixed number.

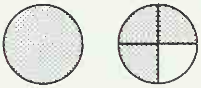


Solution To show the improper fraction, we divide the whole circles into the same size pieces as the part circle, in this case, halves. The improper fraction is $\frac{5}{2}$. The mixed number is $2\frac{1}{2}$.

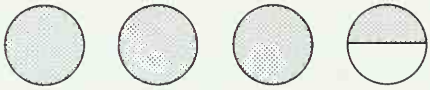


Practice* Name the number of shaded circles in problems (a)–(c) as improper fractions and as mixed numbers.

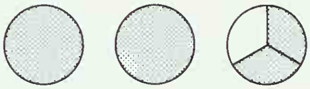
a.



b.



c.



In problems (d)–(g) change each mixed number to an improper fraction.

d. $4\frac{1}{2}$ e. $1\frac{2}{3}$ f. $2\frac{3}{4}$ g. $3\frac{1}{8}$

Problem set 123

1. Draw the decimals chart.

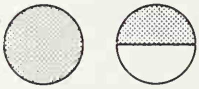
2. Estimate the product of 634 and 186 by rounding both numbers to the nearest hundred before you multiply.

3. a. $\frac{1}{10} = \frac{\square}{100}$

   b. What percent equals the fraction $\frac{1}{10}$?

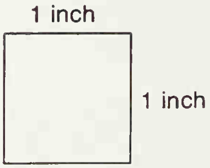
4. The weight of an object on the moon is $\frac{1}{6}$ of the weight of the same object on earth. A person on earth who weighs 108 pounds would weigh how many pounds on the moon?

5. Name the number of shaded circles as an improper fraction and as a mixed number.



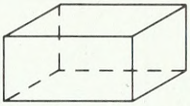
6. a. What is the perimeter of this square?

   b. How many squares cover its area?



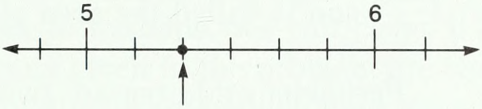
7. What fraction of a year is 3 months?

8. **a.** Name this shape.
b. How many faces does it have?



9. Find the least common multiple (LCM) of 4 and 6.

10. The arrow is pointing to what mixed number on this number line?



11. $4.239 + 25 + 6.79 + 12.5 + 986.47 + 83.925 + 43.0 =$

12. $6.875 - (4 - 3.75) =$

13. $\begin{array}{r} 3.7 \\ \times\ 0.8 \\ \hline \end{array}$

14. $\begin{array}{r} .125 \\ \times\ 100 \\ \hline \end{array}$

15. $\begin{array}{r} .32 \\ \times\ .04 \\ \hline \end{array}$

16. $\frac{408}{17} =$

17. $27\overline{)705}$

18. $5\overline{)\$17.70}$

19. $\begin{array}{r} 3\frac{7}{10} \\ +\ 4 \\ \hline \end{array}$

20. $\begin{array}{r} 5\frac{5}{8} \\ +\ \frac{1}{8} \\ \hline \end{array}$

21. $\begin{array}{r} 7 \\ -\ 4\frac{3}{10} \\ \hline \end{array}$

22. $\frac{5}{6}$ of $4 =$

23. $\frac{3}{8} \times \frac{1}{2} =$

24. $\frac{3}{8} \div \frac{1}{2} =$

25. **a.** $\frac{1}{6} = \frac{\square}{12}$ **b.** $\frac{1}{4} = \frac{\square}{12}$

LESSON 124

Contrasting Perimeter and Area

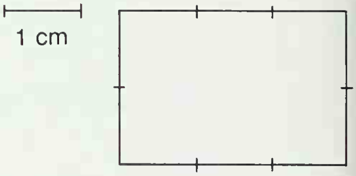
Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

Sometimes we want to know the distance around a polygon. Sometimes we want to know the size of the inside of a polygon. The distance around and the size of the inside have special names.

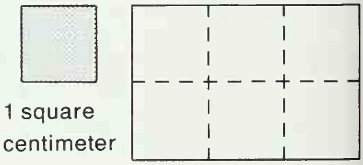
1. The distance around a polygon is called the **perimeter** of the polygon.

2. The amount of surface inside the polygon is called the **area** of the polygon.

Perimeter and area are two different things and are measured with different kinds of units.



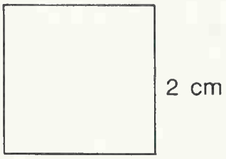
Perimeter is the **distance** around a polygon. To measure perimeter, we use units of **length** like inches or centimeters. Next to this rectangle we show a 1-centimeter unit of length. To find the perimeter, we count the number of centimeters around the rectangle. Moving around the rectangle, we see that the perimeter is 3 cm plus 2 cm plus 3 cm plus 2 cm. The perimeter is **10 cm**.



Area is an amount of surface. To measure area, we use units of area like square inches or square centimeters. Next to the rectangle we show 1 square centimeter. This is a square with sides 1 centimeter long. To find the area, we count the number of square centimeters needed to cover the inside of the rectangle. We see that the area is **6 square centimeters**.

When stating the perimeter or area of a shape, we should name the units used to measure the shape. The perimeter of a shape is measured in **length** units like **centimeters** or **inches**. The area of a shape is measured in **square** units like **square centimeters** or **square inches**.

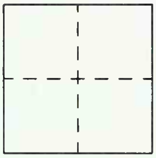
Example **a.** What is the perimeter of this square?
b. What is the area of this square?



Solution **a.** To find the perimeter, we measure the distance around it. The square has 4 sides that are 2 cm long, so the perimeter is 2 cm + 2 cm + 2 cm + 2 cm, which equals **8 cm**.

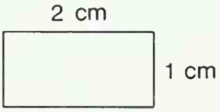
b. To find the area of a shape, we can cover it with square stickers. The units given in the problem are centimeters, so we could use square stickers which have sides 1 centimeter long.

We can fit four square stickers inside the square. The area is **4 square centimeters**.

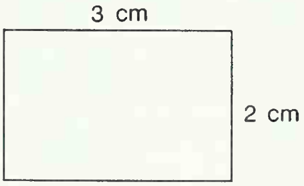


Practice Copy these rectangles on your paper. Draw lines to divide the inside of the rectangle into square centimeters. Then state the perimeter and area of each rectangle.

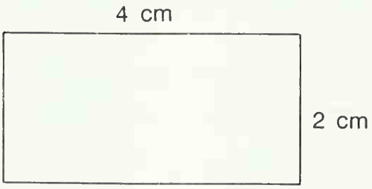
a.



b.



c.

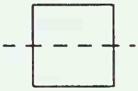


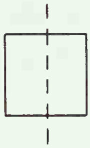
Problem set 124

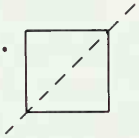
1. Draw a circle and shade all but $\frac{1}{3}$ of it.

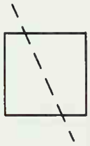
2. Which of these units of length would probably be used to measure the length of a room?
a. inches **b.** feet **c.** miles **d.** light-years

3. A **line of symmetry** divides a shape into mirror images. Which of these does **not** show a line of symmetry?

a.


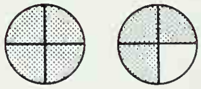
b.


c.


d.


4. Michael's car gets 28 miles per gallon of gas. How far can he travel on 16 gallons of gas?

5. Name the number of shaded circles as an improper fraction and as a mixed number.



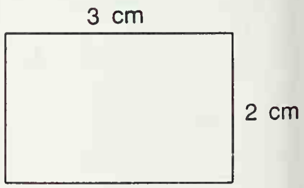
6. Which of these fractions has the same denominator as $\frac{5}{6}$?

a. $\frac{1}{5}$ **b.** $\frac{1}{6}$ **c.** $\frac{6}{5}$ **d.** $\frac{5}{8}$

7. Find the least common multiple (LCM) of 4 and 6.

8. What is the perimeter of this rectangle?

9. How many square centimeters cover the area of this rectangle?



10. QS is 6 cm. RS is 2 cm. RT is 6 cm. Find QT.

11. $45 + 16.7 + 8.29 + 4.325 =$

12. $4.2 - (3.2 - 1) =$

13. $.75 \times .05 =$

14. $0.6 \times 38 =$

15. $100 \times 7.5 =$

16. $\$24.36 \div 12 =$

17. $4600 \div 25 =$

18. $50\overline{)4600}$

19. $5\frac{4}{9} + 3\frac{5}{9} =$

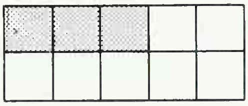
20. $6\frac{9}{10} - \frac{1}{10} =$

21. $4 \times \frac{1}{8} =$

22. $4 \div \frac{1}{8} =$

23. **a.** $\frac{4}{5} = \frac{\square}{10}$ **b.** $\frac{1}{2} = \frac{\square}{10}$

24. **a.** What percent of the rectangle is shaded?
b. What percent of the rectangle is not shaded?



25. **a.** Write the reduced fraction equal to 60%.
b. Write the reduced fraction equal to 70%.

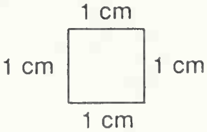
LESSON
125

Calculating Areas of Rectangles

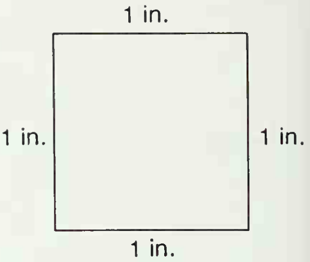
Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

We measure the area enclosed by a polygon by counting the number of squares needed to cover the area. We agree to use squares of specific sizes to measure area.

A square that has sides 1 centimeter long is called a **square centimeter**. This is the actual size of a square centimeter.



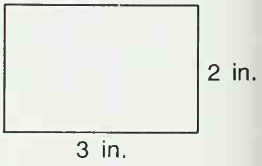
A square that has sides 1 inch long is called a **square inch**. This is the actual size of a square inch.



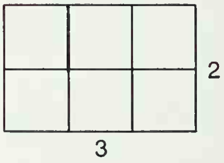
A square with sides 1 meter long is a **square meter**. A square with sides 1 foot long is a **square foot**. These squares are bigger than this book and are used to measure large areas such as the area of the floor of a room. Even larger areas may be measured with square kilometers or square miles.

We have noted that it is necessary to draw figures in reduced size so they will fit on a page. In the following example we have drawn the figure smaller than 2 inches by 3 inches. We do this so that the figure will fit in the space we have.

Example How many square inches are needed to cover the area of this rectangle? (Be sure to label your answer.)

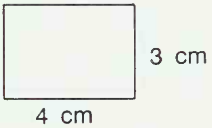


Solution The length of the rectangle is 3 inches, so we can fit 3 square-inch stickers along the length. The width is 2 inches, so we can fit 2 square-inch stickers along the width. Two rows of three means that we could cover the area with **6 square inches**.

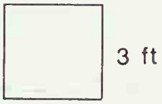


Practice What is the area of each rectangle in problems a, b, c, and d? Draw the squares and count them.

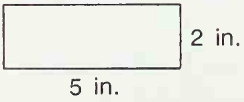
a.



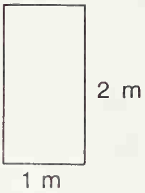
b.



c.



d.

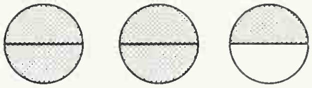


Problem set 125

1. Draw the decimals chart.

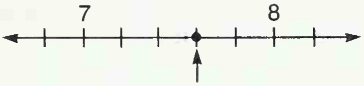
2. Jack was 48 inches tall. The giant was 24 feet tall. How many feet taller than Jack was the giant?

3. Name the number of shaded circles as an improper fraction and as a mixed number.



4. Compare: $\frac{5}{2} \bigcirc 2\frac{1}{2}$

5. The arrow is pointing to what mixed number on this number line?



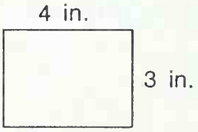
6. What time is $1\frac{1}{2}$ hours after 11:40 a.m.?

7. Which pair of fractions has the same denominators?

a. $\frac{1}{3}, \frac{1}{4}$ **b.** $\frac{4}{3}, \frac{4}{2}$ **c.** $\frac{1}{4}, \frac{3}{4}$

8. Find the least common multiple (LCM) of 4 and 8.

9. What is the perimeter of this rectangle?



10. How many square inches cover the area of this rectangle?

11. $42.98 + 50 + 23.5 + 0.025 =$

12. $6 - 5.18 =$

13. $\begin{array}{r} .375 \\ \times \quad 10 \\ \hline \end{array}$

14. $\begin{array}{r} .14 \\ \times .06 \\ \hline \end{array}$

15. $\begin{array}{r} 7.8 \\ \times \quad 9 \\ \hline \end{array}$

16. $2340 \div 30 =$

17. $18 \overline{)2340}$

18. $7 \overline{)8765}$

19. $\frac{5}{6} + 1\frac{5}{6} =$

20. $7\frac{5}{8} - 7\frac{1}{8} =$

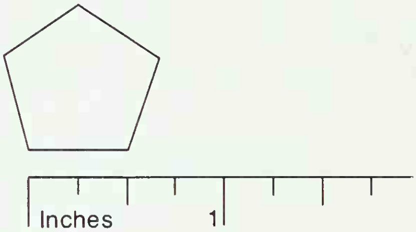
21. $\frac{4}{5} \times \frac{2}{3} =$

22. $\frac{4}{5} \div \frac{2}{3} =$

23. **a.** $\frac{2}{5} = \frac{\square}{15}$ **b.** $\frac{2}{3} = \frac{\square}{15}$

24. **a.** Write the reduced fraction equal to 70%.
b. Write the reduced fraction equal to 75%.

25. All five sides of this pentagon are equal in length. What is the perimeter of this pentagon?



LESSON 126

Using Abbreviations for Units of Measure

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

We may shorten the length of some words by abbreviating them. In this lesson we will learn the abbreviations of some common units of measure.

The abbreviations for commonly used units of measure are listed in the chart on the next page. Notice that we use a period only for the abbreviation for inch. We write the rest of the abbreviations without a period at the end.

METRIC		U.S. CUSTOMARY (ENGLISH)	
UNIT	ABBREVIATION	UNIT	ABBREVIATION
meter	m	inch	in.
centimeter	cm	foot	ft
millimeter	mm	yard	yd
kilometer	km	mile	mi
gram	g	ounce	oz
kilogram	kg	pound	lb
degree Celsius	°C	degree Fahrenheit	°F
liter	L	pint	pt
milliliter	mL	quart, gallon	qt, gal
OTHER ABBREVIATIONS			
square	sq.		
square mile	sq. mi		
square centimeter	sq. cm		

Practice Write the abbreviated form of each of these measures.

a. 5 inches

b. 60 millimeters

c. 40 kilograms

d. 26 miles

e. 98 pounds

f. 100 degrees Celsius

g. 48 square centimeters

h. 16 ounces

i. 98.6 degrees Fahrenheit

j. 9 square feet

Problem set 126

1. Draw a circle. Shade $\frac{5}{8}$ of it.

2. If 20% of the students earned A's, then what fraction of the students earned A's?

3. Tapes were on sale, 4 tapes for \$14. At that price, what would be the cost of 10 tapes?

4. Two cups equal a pint. Two pints equal a quart. Four quarts equal a gallon. How many cups equal a gallon?

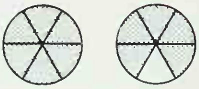
5. Use digits to write the decimal number twenty and five tenths.

6. How many decades is half a century?

7. Round $7\frac{3}{5}$ to the nearest whole number.

8. A centimeter is what fraction of a meter?

9. Name the number of shaded circles as an improper fraction and as a mixed number.



10. **a.** Write $1\frac{1}{10}$ as a decimal number.
b. Write $1\frac{1}{100}$ as a decimal number.

11. $6 + 7.4 + 8.56 + 0.3 + 12.1 =$

12. $3.625 - (3 - 1.2) =$

13. $$\begin{array}{r} 3.6 \\ \times\ \ .7 \\ \hline \end{array}$$

14. $$\begin{array}{r} .13 \\ \times\ \ .7 \\ \hline \end{array}$$

15. $$\begin{array}{r} 4.75 \\ \times\ \ 10 \\ \hline \end{array}$$

16. $6\overline{)\$8.76}$

17. $3751 \div 15 =$

18. $30\overline{)5970}$

19. $6\frac{11}{12} + 1\frac{5}{12} =$

20. $6 - 3\frac{1}{9} =$

21. $6 \times \frac{3}{8} =$

22. $\frac{3}{4} \div \frac{1}{2} =$

23. **a.** $\frac{3}{5} = \frac{\square}{20}$

b. $\frac{3}{4} = \frac{\square}{20}$

Below is a magic square. In this magic square the numbers in each row and each column should add up to the same total. In this magic square there are three missing numbers.

24. What should be the sum of each row and column?

25. What number should be written in place of the *y*?

Magic Square

2	9	4
x	y	3
6	z	8

LESSON 127

Adding and Subtracting Fractions, Part 2

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

In Lesson 43 we learned to add and subtract fractions that have the same denominators. In this lesson we will begin to add and subtract fractions that have different denominators.

Same denominators	Different denominators
$\frac{1}{4} \longleftrightarrow \frac{3}{4}$	$\frac{1}{2} \longleftrightarrow \frac{1}{4}$

To add or subtract fractions that have different denominators, we must first change the name of the fractions so that they will have the same denominators. In Lesson 89 we learned that we may change the name of a fraction by multiplying the fraction by a fraction name for 1. This is how we change the name of a fraction so that we can add or subtract fractions that have different denominators. We will show this by adding $\frac{1}{2}$ and $\frac{1}{4}$.

Example Add: $\frac{1}{2} + \frac{1}{4}$

Solution We will use a vertical format to add these fractions. Since $\frac{1}{2}$ and $\frac{1}{4}$ have different denominators, we must change the name of one of the fractions so that both fractions will have the same denominators. We will change the name of the fraction with the smaller denominator so that this fraction will have the same denominator as the fraction with the larger denominator. We change $\frac{1}{2}$ to fourths by multiplying by $\frac{2}{2}$ to give us $\frac{2}{4}$. Then we add the fractions to get $\mathbf{\frac{3}{4}}$.

First change the name of $\frac{1}{2}$

$$\frac{1}{2} \times \boxed{\frac{2}{2}} = \frac{2}{4}$$

Now we can add

$$\begin{array}{r} \frac{2}{4} \\ + \frac{1}{4} \\ \hline \mathbf{\frac{3}{4}} \end{array}$$

As you do the practice problems, follow these steps.

1. Figure out what the new denominator should be.
2. Change the name of one or both fractions.
3. Add or subtract the fractions that have the same denominators.

Practice*

a. $\frac{1}{2} + \frac{1}{8} =$

b. $\frac{1}{2} - \frac{1}{4} =$

c. $\frac{3}{4} + \frac{1}{8} =$

d. $\frac{2}{3} - \frac{1}{9} =$

e. $\frac{1}{6} + \frac{1}{2} =$

f. $\frac{5}{8} - \frac{1}{2} =$

g. $\frac{1}{6} + \frac{2}{3} =$

h. $\frac{5}{6} - \frac{2}{3} =$

Problem set 127

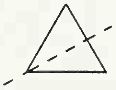
1. Draw a circle. Shade all but $\frac{1}{6}$ of it.

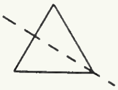
2. In 1875 Bret Harte wrote a story about the California Gold Rush of 1849. How many years after the Gold Rush did he write the story?

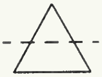
3. **a.** Write the reduced fraction equal to 25%.
b. Write the reduced fraction equal to 75%.

4. A **line of symmetry** divides a shape into mirror images. Which of these does not show a line of symmetry?

a.

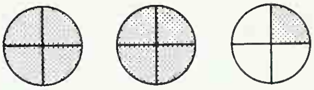

b.


c.


d.


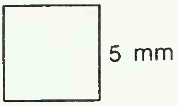
5. What time is 25 hours after 6 a.m.?

6. Name the number of shaded circles as an improper fraction and as a mixed number.



7. Find the least common multiple (LCM) of 6 and 3.

8. What is the perimeter of this square?



9. How many square millimeters cover the area of this square?

10. AC is 70 mm. BC is 40 mm. BD is 60 mm. Find AD.

11. $\frac{1}{4} + \frac{1}{8} =$ **12.** $\frac{3}{4} - \frac{1}{2} =$ **13.** $\frac{7}{8} - \frac{3}{4} =$

14. $\frac{3}{5} \times 3 =$ **15.** $\frac{3}{5} \div 3 =$ **16.** $3 \div \frac{3}{5} =$

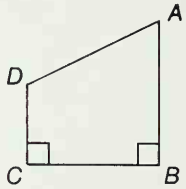
17. 45.275 + 16.18 + 125 =

18. 42 − 3.64 =

19. 6.5 × 100 = **20.** 4.6 × 8 = **21.** .18 × .4 =

22. $10\overline{)\$13.20}$ **23.** $12\overline{)\$13.20}$ **24.** $1470 \div 42 =$

25. Which angle in quadrilateral ABCD is an obtuse angle?



LESSON 128 Adding and Subtracting Mixed Numbers, Part 2

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

When we add and subtract mixed numbers, we must be sure that the fractions are written with the same denominators—that is, with the same bottom numbers. When the fractions do not have the same denominators, we change the name of the fractions so that they do have the same denominators. We use the same method we learned in the preceding lesson.

Example

$$\begin{array}{r} 3\frac{1}{2} \\ +\ 1\frac{1}{6} \\ \hline \end{array}$$

Solution We separate the mixed number into its whole-number part and its fraction part and work with the fraction part first. We change $\frac{1}{2}$ to $\frac{3}{6}$ by multiplying by $\frac{3}{3}$. Then we add the whole numbers to whole numbers and fractions to fractions and reduce the answer when possible.

First change the name of $\frac{1}{2}$

$$\frac{1}{2} \times \boxed{\frac{3}{3}} = \frac{3}{6}$$

Now we can add

$$\begin{array}{r} 3\frac{3}{6} \\ +\ 1\frac{1}{6} \\ \hline 4\frac{4}{6} \end{array} = \mathbf{4\frac{2}{3}}$$

Practice* a. $\begin{array}{r} 3\frac{1}{4} \\ +\ 2\frac{1}{2} \\ \hline \end{array}$ b. $\begin{array}{r} 2\frac{1}{8} \\ +\ 5\frac{1}{2} \\ \hline \end{array}$ c. $\begin{array}{r} 3\frac{1}{2} \\ -\ 1\frac{1}{6} \\ \hline \end{array}$ d. $\begin{array}{r} 2\frac{3}{4} \\ -\ 2\frac{1}{2} \\ \hline \end{array}$

e. $\begin{array}{r} 5\frac{5}{8} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$ f. $\begin{array}{r} 3\frac{3}{10} \\ +\ 1\frac{1}{5} \\ \hline \end{array}$ g. $\begin{array}{r} 4\frac{7}{8} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$ h. $\begin{array}{r} 4\frac{1}{2} \\ -\ 1\frac{1}{10} \\ \hline \end{array}$

Problem set 128

1. Draw the decimals chart.

2. Estimate the sum of 37.3 and 46.91 by rounding to the nearest whole number before you add.

3. If high tide is at 9:15 a.m., at what time is low tide if it is 6 hours and 12 minutes later?

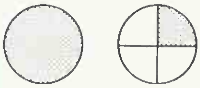
4. A loop of string 1 yard long is formed into a square. How many inches long is each side of the square?

5. Ten of the 50 prospectors found gold. What percent of the prospectors found gold?

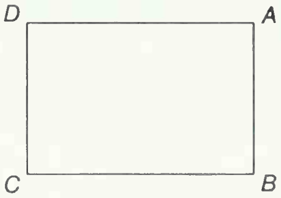
6. a. Write the reduced fraction equal to 80%.
   b. Write the reduced fraction equal to 90%.

7. Four years in a row is how many days?

8. Name the number of shaded circles as an improper fraction and as a mixed number.



9. In rectangle *ABCD*, *AB* is 2 cm and *BC* is 3 cm.
   a. How many segments one centimeter long would it take to reach around the rectangle?



   b. How many square stickers which are one centimeter on each side would it take to cover the area of the rectangle?

10. *AC* is 48 mm. *BC* is 20 mm. *BD* is 64 mm. Find *AD*.

11. $$\begin{array}{r} 2\frac{1}{2} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$$

12. $$\begin{array}{r} 3\frac{7}{10} \\ +\ 1\frac{1}{5} \\ \hline \end{array}$$

13. $$\begin{array}{r} 4\frac{5}{8} \\ -\ 1\frac{1}{4} \\ \hline \end{array}$$

14. $$\begin{array}{r} 6\frac{1}{2} \\ -\ 1\frac{1}{6} \\ \hline \end{array}$$

15. $29.32 + 9.3 + 16.7 + 8 =$

16. $25.3 - (4.2 - 1) =$

17. $$\begin{array}{r} 3.65 \\ \times\ \ 10 \\ \hline \end{array}$$

18. $$\begin{array}{r} .27 \\ \times\ .30 \\ \hline \end{array}$$

19. $$\begin{array}{r} .43 \\ \times\ .27 \\ \hline \end{array}$$

20. $4250 \div 25 =$

21. $12\overline{)912}$

22. $6 \times \frac{3}{4} =$

23. $6 \div \frac{3}{4} =$

Read this information. Then answer questions 24 and 25.

Dan's car holds 12.6 gallons of gas. He went to the gas station and filled the tank with 10.0 gallons, costing 97¢ per gallon.

24. How many gallons of gas were still in the tank when Dan went to the gas station?

25. If Dan paid for the gas with a $10 bill, how much money did he get back?

LESSON 129

Dividing a Decimal Number by a Whole Number

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

On the decimals chart there are two types of decimal division problems. Each type of problem follows its own rule. In this lesson we will learn the rule for dividing a decimal number by a whole number. The rule in the chart for this kind of problem is "up." The word "up" reminds us that the decimal point in the answer will be straight up from the decimal point in the number inside the division box. (*Note*: It is important in decimal division to line up the numbers properly.)

Example 1 $2\overline{)4.8}$

Solution We are dividing by 2, which is a whole number. We follow the rule "up" and place a decimal point in the answer straight up from the decimal point inside the division box. Then we divide and get **2.4**.

$$\begin{array}{r} 2\,.\,4 \\ 2\,\overline{)4\uparrow 8} \\ \underline{4} \\ 8 \\ \underline{8} \\ 0 \end{array}$$

Decimal point "up"

Example 2 $.42 \div 3 =$

Solution We rewrite the problem using a division box. The decimal point in the answer is straight up. Then we divide and get **.14**.

$$\begin{array}{r} .\,14 \\ 3\,\overline{)\uparrow 42} \\ \underline{3} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

Decimal point "up"

Practice*

a. $4\overline{).52}$ **b.** $6\overline{)3.6}$ **c.** $.85 \div 5 =$

d. $5\overline{)7.5}$ **e.** $5\overline{).65}$ **f.** $2.1 \div 3 =$

g. $3\overline{).51}$ **h.** $4\overline{).64}$ **i.** $0.58 \div 2 =$

j. $7\overline{)8.4}$ **k.** $4\overline{)14.4}$ **l.** $1.44 \div 6 =$

Problem set 129

1. Write the following sentence using digits and symbols.

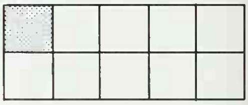
   "The sum of one sixth and one third is one half."

2. Gilbert scored half of his team's points. Juan scored 8 fewer points than Gilbert. The team scored 36 points. How many points did Juan score?

3. The first day of winter is December 21. The first day of summer is 6 months later. What is the date of the first day of summer?

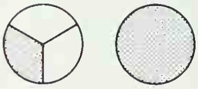
4. $\frac{1}{10} = \frac{\square}{100}$

5. **a.** What percent of the rectangle is shaded?
   b. What percent of the rectangle is not shaded?



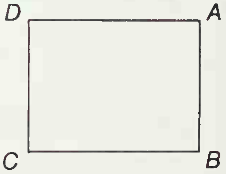
6. If each side of an octagon is 6 inches, then the perimeter of the octagon is how many feet?

7. Name the total number of shaded circles as an improper fraction and as a mixed number.



8. What is the largest four-digit odd number that has the digits 7, 8, 9, and 0 used once each?

9. In rectangle $ABCD$, which segment is parallel to $\overline{AB}$?



10. In rectangle $ABCD$, AB is 3 cm and BC is 4 cm.
    a. What is the perimeter of the rectangle?
    b. What is the area of the rectangle?

11. KL is 56 mm. LM is half of KL. MN is half of LM. Find KN.

12. $16 + 3.17 + 49 + 1.125 =$

13. $3.42 - 1.242 =$

14. $4.3 \times 100 =$

15. $6.4 \times 3.7 =$

16. $.36 \times .04 =$

17. $2\overline{)3.6}$

18. $3\overline{).51}$

19. $13.5 \div 9 =$

20. $\begin{array}{r} 2\frac{1}{8} \\ + 1\frac{3}{4} \\ \hline \end{array}$

21. $\begin{array}{r} \frac{1}{3} \\ + \frac{1}{6} \\ \hline \end{array}$

22. $\begin{array}{r} \frac{7}{10} \\ - \frac{1}{2} \\ \hline \end{array}$

23. $\begin{array}{r} 3\frac{9}{10} \\ - \frac{1}{5} \\ \hline \end{array}$

24. $4 \times \frac{3}{2} =$

25. $\frac{3}{4} \div \frac{1}{4} =$

LESSON 130 Dividing Decimal Numbers: Fill Empty Places with Zero

Facts Practice: Write 30 Percents as Fractions (Test K in Test Booklet)

The rule for dividing a decimal number by a whole number is "up." Sometimes we must also use a rule from the bottom of the chart, "Fill empty places with zero."

If \$.12 is shared equally by 3 people, then each will receive \$.04. The division looks like this. The decimal point is up. Then we divide and fill the empty places with zero.

$$\begin{array}{r} \$.04 \\ 3\overline{)\$.12} \\ 12 \\ \hline 0 \end{array}$$

Example 1 $.15 \div 3 =$

Solution The first number goes inside the division box. The decimal point in the answer is straight up. Divide and fill empty places with zero.

$$\begin{array}{r} \mathbf{.05} \\ 3\overline{)\,.15} \\ 15 \\ \hline 0 \end{array}$$

Example 2 $.024 \div 3 =$

Solution The first number is inside the box. The decimal point is straight up. Divide and fill empty places with zero.

$$\begin{array}{r} \mathbf{.008} \\ 3\overline{)\,.024} \end{array}$$

Practice*

a. $4\overline{)\,.16}$

b. $.35 \div 7 =$

c. $5\overline{)\,.025}$

d. $.08 \div 4 =$

e. $6\overline{)\,.24}$

f. $.012 \div 3 =$

g. $3\overline{)\,.06}$

h. $.009 \div 3 =$

Problem set 130

1. Draw the decimals chart.

2. It takes 6 months to grow a watermelon from seed. Jill planted seeds in March. In what month will the watermelon be ripe?

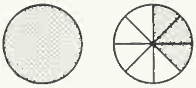
3. The parrot weighed $\frac{3}{4}$ pound. How many ounces did it weigh?

4. If 10% of the students were absent, what percent were present?

5. **a.** Write the fraction equal to 1%.
b. Write the fraction equal to 2%.

6. A string 1 meter long is made into a square. How many centimeters long is each side of the square?

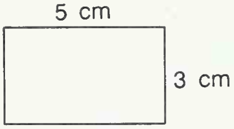
7. Name the number of shaded circles as an improper fraction and as a mixed number.



8. Write the mixed number $1\frac{1}{3}$ as an improper fraction.

9. **a.** Write $1\frac{3}{10}$ as a decimal number.
b. Write $1\frac{3}{100}$ as a decimal number.

10. **a.** What is the perimeter of this rectangle?
b. What is the area of this rectangle?



11. QR is $1\frac{1}{4}$ inches. RS is 2 inches. ST is $1\frac{1}{2}$ inches. Find QT.

12. \$47 + \$16.49 + 87¢ =

13. 6.5 − (3.42 − 1) =

14. $\begin{array}{r} .45 \\ \times\ 10 \\ \hline \end{array}$

15. $\begin{array}{r} 62 \\ \times\ 4.8 \\ \hline \end{array}$

16. $\begin{array}{r} .16 \\ \times\ .3 \\ \hline \end{array}$

17. $4\overline{).024}$

18. $10\overline{).180}$

19. $18\overline{)640}$

20. $\begin{array}{r} \frac{5}{6} \\ +\ \frac{1}{2} \\ \hline \end{array}$

21. $\begin{array}{r} 2\frac{1}{4} \\ +\ \frac{1}{8} \\ \hline \end{array}$

22. $\begin{array}{r} \frac{2}{3} \\ -\ \frac{1}{6} \\ \hline \end{array}$

23. $\begin{array}{r} 4\frac{7}{8} \\ -\ 1\frac{3}{4} \\ \hline \end{array}$

24. $\frac{3}{5} \times \frac{1}{2} =$

25. $\frac{3}{5} \div \frac{1}{2} =$

LESSON 131

Dividing Decimal Numbers: Keep Dividing

When whole-number division problems have not worked out evenly, we have written our answers with remainders. We may **not** write remainders with decimal division problems. The procedure we will follow for now is to continue the division until the problem does work out evenly. In order to continue the division we may need to attach extra zeros to the decimal number that is being divided. **Remember, attaching extra zeros to the back of a decimal number does not change the value of the number.**

Example 1 $.6 \div 5 =$

Solution The first number goes inside. The decimal point is straight up. As we divide, we attach a zero and keep dividing.

$$\begin{array}{r} \mathbf{.12} \\ 5\,\overline{)\,.60} \\ \underline{5} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

Example 2 $.3 \div 4 =$

Solution Put the first number inside! The decimal point is straight up. As we divide, we attach zeros and keep dividing. We fill empty places in the answer with zero.

$$\begin{array}{r} \mathbf{.075} \\ 4\,\overline{)\,.300} \\ \underline{28} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Practice*

a. $.6 \div 4 =$

b. $.12 \div 5 =$

c. $.1 \div 4 =$

d. $.1 \div 2 =$

e. $.4 \div 5 =$

f. $1.4 \div 8 =$

g. $.5 \div 4 =$

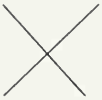
h. $.6 \div 8 =$

i. $.3 \div 4 =$

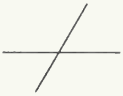
Problem set 131

1. Which of these shows two parallel line segments that are not horizontal?

a. 

b. 

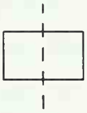
c. 

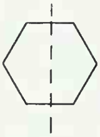
d. 

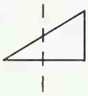
2. Estimate the product of $6\frac{1}{10}$ and $4\frac{7}{8}$ by rounding both numbers to the nearest whole number before you multiply.

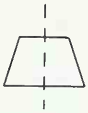
3. How many 12¢ pencils can be bought with one dollar?

4. A line of symmetry divides a shape into mirror images. Which of these dotted lines is not a line of symmetry?

a. 

b. 

c. 

d. 

5. The first roll knocked down 3 of the 10 bowling pins. What percent of the pins were still standing?

6. **a.** Write the fraction equal to 4%.
   b. Write the fraction equal to 5%.

7. Name the total number of shaded circles as an improper fraction and as a mixed number.

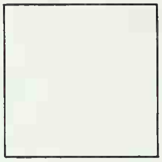
8. Write the mixed number $1\frac{3}{8}$ as an improper fraction.

9. A stop sign has the shape of an 8-sided polygon. What is the name for a polygon that has 8 sides?

10. List these numbers in order of size from least to greatest.

$$\frac{5}{3}, \frac{5}{6}, \frac{5}{5}$$

11. The perimeter of this square is 8 centimeters.
    a. How long is each side of this square?
    b. What is the area of this square?



12. $49.35 + 25 + 3.725 + 0.08 =$

13. $2 - 1.234 =$

14. $3.6 \times 87 =$

15. $4.2 \times 100 =$

16. $.5 \times .17 =$

17. $.6 \div 4 =$

18. $.6 \div 10 =$

19. $24 \overline{)850}$

20. $\begin{array}{r} 3\frac{1}{9} \\ + \ \frac{1}{3} \\ \hline \end{array}$

21. $\begin{array}{r} \frac{1}{3} \\ + \frac{5}{6} \\ \hline \end{array}$

22. $\begin{array}{r} \frac{7}{8} \\ - \frac{1}{4} \\ \hline \end{array}$

23. $\begin{array}{r} 4\frac{1}{2} \\ - 1\frac{3}{10} \\ \hline \end{array}$

24. $6 \times \dfrac{2}{3} =$

25. $6 \div \dfrac{2}{3} =$

LESSON 132

Dividing Decimal Numbers by 10, 100, 1000

When we divide a number by 10, we find that the answer has the same digits, but the digits have shifted one place to the right.

We may use this fact to find the answer to a decimal division problem when the divisor is 10. The shortcut is very similar to the method we use when multiplying a decimal number by 10. In both cases it is the digits which are shifting places, but we can make it appear that the digits are shifting places by shifting the decimal point instead. To divide by 10, we shift the decimal point one place to the left.

Example 1 Divide: $3.4 \div 10 =$

Solution To divide a number by 10, we may shift the decimal point to the left one place. We see that the answer is **.34**.

$$3.4 \div 10 = \underset{\curvearrowleft}{.3\,.}\,4 = .34 \qquad \begin{array}{r} .34 \\ 10\overline{)3.40} \end{array}$$

Dividing by 100 is like dividing by 10 twice. When we divide by 100, we move the decimal point two places to the left. When we divide by 1000, we move the decimal point three places to the left. We move the decimal point the same number of places as there are zeros in the numbers 10 or 100 or 1000. We will remember which way to move the decimal point if we keep in mind that dividing a number into 10 or 100 or 1000 parts produces **smaller** numbers. As a decimal moves to the left, the value of the number is less and less.

Example 2 Divide: $3.5 \div 100 =$

Solution When we divide by 10 or 100 or 1000, we may find the answer mentally without performing the division algorithm. To divide by 100, we shift the decimal point two places. We know that the answer will be less than 3.5, so we remember to shift the decimal point to the left. We fill the empty place with a zero.

$$3.5 \div 100 = \underset{\curvearrowleft}{.\,0\,3\,.}\,5 = \mathbf{.035}$$

Practice

a. $2.5 \div 10 =$

b. $32.4 \div 10 =$

c. $2.5 \div 100 =$

d. $32.4 \div 100 =$

e. $2.5 \div 1000 =$

f. $32.4 \div 1000 =$

g. $64. \div 10 =$

h. $1.25 \div 100 =$

i. $64. \div 100 =$

j. $630. \div 10 =$

k. $64. \div 1000 =$

l. $5. \div 1000 =$

Problem set 132

1. Draw the decimals chart.

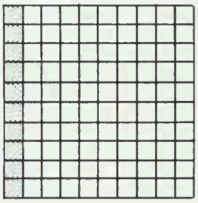
2. Write the following sentence using digits and symbols.

   "The sum of one half and one fourth is less than one."

3. A mile is 1760 yards. How many yards is $\frac{3}{4}$ of a mile?

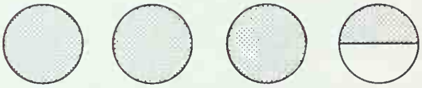
4. If the sun rises at 6 a.m. and sets at 5 p.m., at what time is it halfway across the sky?

5. **a.** Name the shaded part of the square as a fraction.
   b. Name the shaded part of the square as a decimal number.



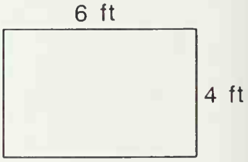
6. **a.** Name the shaded part of the square as a percent.
   b. What percent of the square is not shaded?

7. Name the total number of shaded circles as an improper fraction and as a mixed number.



8. Write the mixed number $2\frac{3}{4}$ as an improper fraction.

9. **a.** What is the perimeter of this rectangle?
   b. What is the area of this rectangle?



10. *AB* is 36 mm. *CD* is half of *AB*. *AD* is 68 mm. Find *BC*.

Solve problems 11 and 12 by mentally shifting the decimal point.

11. $3.5 \div 10 =$ **12.** $4.3 \div 100 =$

13. $4.5 + 3.25 + 16 + 5 =$ **14.** $(4.6 - 3) - 1.59 =$

15. $4.3 \times 100 =$ **16.** $.37 \times .06 =$ **17.** $6.8 \times 9.4 =$

18. $4\overline{)\$11.00}$ **19.** $7\overline{)8.33}$ **20.** $8\overline{)0.12}$

21. $1\frac{3}{5} + 2\frac{1}{10} =$ **22.** $3\frac{1}{3} - 1\frac{1}{6} =$

23. $\frac{5}{8} \times \frac{1}{2} =$ **24.** $\frac{1}{2} \div \frac{5}{8} =$

25. If $3a = 12$, then what number is equal to $10 - a$?

LESSON 133

Finding the Average of Two or More Numbers

We have found the average of numbers by making groups even. We have moved students from one line to another to make lines even. We have moved books from one pile to another to make piles even. We have moved water from one glass to another to make water levels even.

Sometimes it is not possible to move things around to make them even, but we can still find the average. Look at this example.

Example 1 The three boys weigh 108 pounds, 98 pounds, and 112 pounds. What is the average weight of the three boys?

Solution We cannot actually move weight from one boy to another, but we act **as though** we could. We first find the total weight. Then we evenly divide the total 3 ways because there are 3 boys.

Total weight: $108 + 98 + 112 = 318$ pounds

Average weight: $318 \div 3 =$ **106 pounds**

Example 2 What is the average of 5, 7, 8, and 12?

Solution We can find the average of two or more numbers by following the same "add and divide" method. We add to find the total. Then we divide by the number of numbers, which, in this case, is 4.

Add: $5 + 7 + 8 + 12 = 32$

Divide: $32 \div 4 = 8$

The average of 5, 7, 8, and 12 is **8**.

Practice* Find the average of each group of numbers.

a. 9, 7, 12, 12

b. 3, 3, 3, 5, 6

c. 78, 84, 87

d. 300, 310

Problem set 133

1. Draw a quadrilateral that has two parallel horizontal sides and two parallel oblique sides.

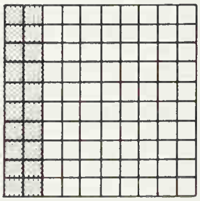
2. Write the following sentence using digits and symbols.

"The sum of one half and one sixth is two thirds."

3. The "stars and stripes" became the official flag of the United States in 1777. The pledge of allegiance to the flag was first used in 1892. The pledge came how many years after the flag?

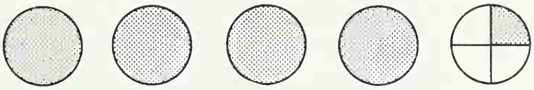
4. **a.** What fraction of this square is shaded?

b. Name the shaded part of this square as a decimal number.



5. **a.** Name the shaded part of the square in Problem 4 as a percent.
b. What percent of the square is not shaded?

6. Name the total number of shaded circles as an improper fraction and as a mixed number.

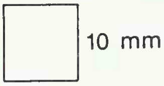


7. Write the mixed number $3\frac{1}{2}$ as an improper fraction.

8. What is the average of 6, 7, 9, and 10?

9. What is the name for a polygon with five sides?

10. **a.** What is the perimeter of the square?
b. What is the area of the square?



11. $29.325 + 7.5 + 123.7 + 4 =$

12. $6.15 - (4 - 1.8) =$

13. $\begin{array}{r} .48 \\ \times\ 10 \\ \hline \end{array}$

14. $\begin{array}{r} 46.3 \\ \times\ 47 \\ \hline \end{array}$

15. $\begin{array}{r} .015 \\ \times\ 5 \\ \hline \end{array}$

16. $3.6 \div 100 =$

17. $3.6 \div 5 =$

18. $.36 \div 9 =$

19. $6\frac{5}{6} + 3\frac{1}{12} =$

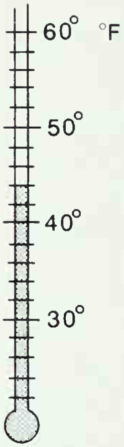
20. $5\frac{11}{12} - 2\frac{1}{2} =$

21. $4 \times \frac{5}{6} =$

22. $4 \div \frac{5}{6} =$

23. a. $\frac{3}{7} = \frac{\square}{14}$ b. $\frac{1}{2} = \frac{\square}{14}$

Look at the thermometer. Then answer questions 24 and 25.



24. What temperature is shown on the thermometer?

25. Water freezes at 32°F. The temperature shown on this thermometer is how many degrees above freezing?

LESSON 134

Adding and Subtracting Fractions, Part 3

When we add or subtract fractions with different denominators, we sometimes need to change the name of both fractions.

We cannot add $\frac{1}{2}$ and $\frac{1}{3}$ as they are written because they have different denominators. We must rename the fractions so that the denominators are the same.

$$\begin{array}{r} \frac{1}{2} \\ + \frac{1}{3} \\ \hline \end{array}$$

We must choose a denominator to which both $\frac{1}{2}$ and $\frac{1}{3}$ may be changed. One way to choose a new denominator is to multiply the denominators of the two fractions. The denominators of $\frac{1}{2}$ and $\frac{1}{3}$ are 2 and 3. Multiplying 2 and 3, we get 6, which we can use for the new denominator.

Choose a new denominator.

$$\begin{array}{r} \frac{1}{2} = \frac{}{6} \\ + \frac{1}{3} = \frac{}{6} \\ \hline \end{array}$$

After we choose a new denominator, we multiply each fraction by a name for 1 which will make a fraction with the new denominator. Here we multiply $\frac{1}{2}$ by $\frac{3}{3}$ and $\frac{1}{3}$ by $\frac{2}{2}$. This gives us the fractions $\frac{3}{6}$ and $\frac{2}{6}$, which we can add to get $\mathbf{\frac{5}{6}}$.

Change the name of $\frac{1}{2}$

$$\frac{1}{2} \times \boxed{\frac{3}{3}} = \frac{3}{6}$$

Change the name of $\frac{1}{3}$

$$\frac{1}{3} \times \boxed{\frac{2}{2}} = \frac{2}{6}$$

Then add

$$\frac{3}{6} + \frac{2}{6} = \mathbf{\frac{5}{6}}$$

Example Subtract: $\frac{2}{3} - \frac{1}{2} =$

Solution First we choose a new denominator for both fractions. One way to do this is to multiply the two denominators. We multiply 3 and 2 to get the new denominator 6. Then we multiply each fraction by a name for 1 which will make a new fraction with a denominator of 6. This gives us $\frac{4}{6}$ and $\frac{3}{6}$. Now we subtract these fractions to get $\mathbf{\frac{1}{6}}$.

First change the names

$$\frac{2}{3} \times \boxed{\frac{2}{2}} = \frac{4}{6}$$

$$\frac{1}{2} \times \boxed{\frac{3}{3}} = \frac{3}{6}$$

Then subtract

$$\frac{4}{6} - \frac{3}{6} = \mathbf{\frac{1}{6}}$$

Practice* Change the fractions as necessary to add or subtract.

a. $\frac{1}{3} + \frac{1}{4} =$

b. $\frac{1}{5} + \frac{1}{3} =$

c. $\frac{1}{2} - \frac{1}{3} =$

d. $\frac{2}{3} + \frac{1}{4} =$

e. $\frac{2}{3} + \frac{1}{5} =$

f. $\frac{3}{4} - \frac{2}{3} =$

g. $\frac{1}{2} + \frac{2}{5} =$

h. $\frac{3}{5} + \frac{1}{4} =$

i. $\frac{2}{3} - \frac{1}{4} =$

Problem set 134

1. An elephant eats about 250 pounds of food every day. How many days would it take an elephant to eat 1 ton of food?

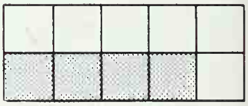
2. Write the following sentence using digits and symbols.

> "When one third is subtracted from one half, the difference is one sixth."

3. The football field is 300 feet long and 160 feet wide. What is the perimeter of the football field?

4. $\frac{4}{10} = \frac{\square}{100}$

5. a. What fraction of the rectangle is shaded?
   b. What decimal number names the shaded part of this rectangle?



6. a. What percent of the rectangle above is shaded?
   b. What percent of the rectangle is not shaded?

7. Write the mixed number $4\frac{1}{4}$ as an improper fraction.

8. What is the average of 7, 4, 8, 6, and 10?

9. AD is 80 mm. AB is 50 mm. BC equals CD. Find AC.

10. $235 + 17.5 + 6.29 + 10.1 =$

11. $0.2 - 0.015 =$

12. $4.6 \times 100 =$

13. $.46 \times .04 =$

14. $37 \times 4.9 =$

15. $4.6 \div 100 =$

16. $0.46 \div 4 =$

17. $0.46 \div 5 =$

18. $\frac{1}{2} + \frac{1}{3} =$ **19.** $\frac{2}{3} - \frac{1}{4} =$ **20.** $\frac{5}{12} - \frac{1}{3} =$

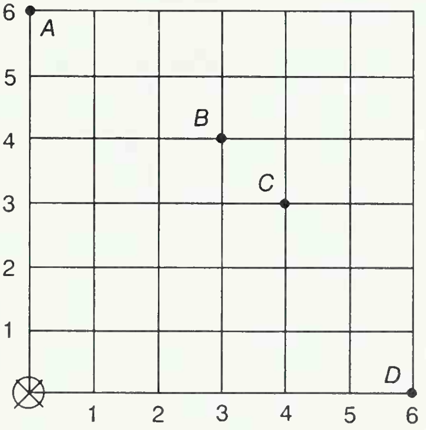
21. $4 \times \frac{3}{5} =$ **22.** $4 \div \frac{3}{5} =$ **23.** $\frac{3}{5} \div \frac{1}{5} =$

24. If $4a = 12$, then what number is equal to $3a + 1$?

Read this information. Then answer question 25.

Nancy found a treasure map with this clue:

> "Face north from where the tree be dead.
> Step sideways right, then step ahead.
> Count your paces (4 and 3).
> There you find the treasure be."



25. Nancy figured that the dead tree was marked with an X. At which point should she find the treasure?
a. *A* **b.** *B* **c.** *C* **d.** *D*

LESSON 135 Adding and Subtracting Mixed Numbers, Part 3

We may add or subtract mixed numbers just as we add or subtract fractions. Before we add or subtract mixed numbers, we must be sure that the fraction parts of the mixed numbers have the same denominators. If the fractions are not written with the same denominators, we must change the name of the fractions so that the denominators are the same. Then we add or subtract.

Example

$$\begin{array}{r} 3\frac{1}{2} \\ +\ 1\frac{1}{3} \\ \hline \end{array}$$

Solution We add fraction to fraction and whole number to whole number. Before we add the fractions, we change their names so that the denominators are the same. So our answer is $\mathbf{4\frac{5}{6}}$.

$$\begin{array}{r} 3\frac{1}{2} \times \frac{3}{3} = 3\frac{3}{6} \\ +\ 1\frac{1}{3} \times \frac{2}{2} = 1\frac{2}{6} \\ \hline \mathbf{4\frac{5}{6}} \end{array}$$

Practice* Add. Subtract.

a. $\begin{array}{r} 2\frac{1}{2} \\ +\ 1\frac{1}{5} \\ \hline \end{array}$ **b.** $\begin{array}{r} 3\frac{1}{4} \\ +\ 1\frac{1}{5} \\ \hline \end{array}$ **c.** $\begin{array}{r} 5\frac{3}{4} \\ -\ 4\frac{1}{2} \\ \hline \end{array}$ **d.** $\begin{array}{r} 4\frac{2}{3} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$

e. $\begin{array}{r} 4\frac{2}{3} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$ **f.** $\begin{array}{r} 3\frac{3}{4} \\ +\ 1\frac{1}{2} \\ \hline \end{array}$ **g.** $\begin{array}{r} 2\frac{2}{3} \\ -\ 1\frac{1}{4} \\ \hline \end{array}$ **h.** $\begin{array}{r} 6\frac{1}{3} \\ -\ 2\frac{1}{4} \\ \hline \end{array}$

i. $\begin{array}{r} 5\frac{1}{3} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$ **j.** $\begin{array}{r} 4\frac{1}{2} \\ +\ 1\frac{2}{3} \\ \hline \end{array}$ **k.** $\begin{array}{r} 3\frac{1}{2} \\ -\ 2\frac{1}{3} \\ \hline \end{array}$ **l.** $\begin{array}{r} 5\frac{3}{4} \\ -\ 1\frac{2}{3} \\ \hline \end{array}$

Problem set 135

1. If popsicles cost $1.92 per dozen, what would be the cost of 60 popsicles?

2. Write the following sentence using digits and symbols.

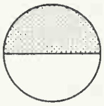
   "The product of one half and one third is one sixth."

3. What is the name for a polygon that has six sides?

4. A crocodile may lay 84 eggs at a time. How many dozen eggs is that?

5. a. $\frac{1}{2} = \frac{\square}{10}$ b. $\frac{1}{2} = \frac{\square}{100}$

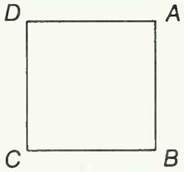
6. a. Name the shaded part of the circle as a fraction.
   b. Name the shaded part of the circle as a decimal number.



7. a. What percent of the circle above is shaded?
   b. What percent of the circle is not shaded?

8. Write the mixed number $2\frac{1}{2}$ as an improper fraction.

9. In rectangle *ABCD*, all sides are the same length. The perimeter is 12 inches.
   a. How many inches long is each side?
   b. How many square stickers that are 1 inch on a side would cover the area?



10. $\frac{5}{6} \times \frac{2}{3} =$

11. $\frac{5}{6} \div \frac{2}{3} =$

12. $\begin{array}{r} 3\frac{1}{3} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$

13. $\begin{array}{r} \frac{3}{5} \\ +\ \frac{1}{2} \\ \hline \end{array}$

14. $\begin{array}{r} 8\frac{1}{2} \\ -\ 1\frac{1}{5} \\ \hline \end{array}$

15. $\begin{array}{r} \frac{2}{3} \\ -\ \frac{1}{2} \\ \hline \end{array}$

16. 30 + 4.1 + 0.43 + 0.037 =

17. .02 − .019 =

18. 5.7 × 84 =

19. 5.7 × 10 =

20. 0.3 × 0.15 =

21. 5.7 ÷ 3 =

22. 5.7 ÷ 10 =

23. 0.15 ÷ 3 =

Read the following information. Then answer questions 24 and 25.

There are 7 children in the club. Their ages are 9, 12, 10, 10, 13, 12, and 11.

24. What is the average age of the children in the club?

25. In order of age, how old is the middle child?

LESSON 136

Dividing by a Decimal Number

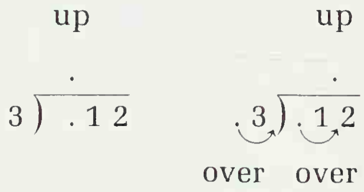
We have practiced dividing decimal numbers by whole numbers. In this lesson we will practice dividing decimal numbers **by decimal numbers**.

Look at these two problems. They are different in an important way.

$$3\overline{)\,.12} \qquad .3\overline{)\,.12}$$

The problem on the left is division **by a whole number**. The problem on the right is division **by a decimal number**.

These are different kinds of problems. We use different rules from the decimals chart to solve these problems. When we divide by a whole number, the rule is, "up." When we divide by a decimal number, the rule is, "over, over, and up."



The rule "over, over, and up" changes division by a decimal number to division by a whole number. To follow this rule, we move the decimal point on .3 over so that it is to the right of the 3, making it a whole number. Then we move the decimal point on .12 over the same number of places. Since we moved the decimal point on .3 one place, we move the decimal point of .12 one place to get 1.2. Now we write the decimal point in the answer straight up from the decimal point in 1.2.

Although this may look mysterious, we are simply doing with the numbers in the division problem what we have done when renaming fractions. We will show this by rewriting $.3\overline{)\,.12}$ with a division bar,

$$\frac{.12}{.3}$$

Then we will multiply by $\frac{10}{10}$ to make an equivalent division problem.

$$\frac{.12}{.3} \times \frac{10}{10} = \frac{1.2}{3} = 3\overline{)\,1.2}$$

In this problem when we follow the "over, over" part of the rule, we are really multiplying both numbers by 10. This makes a new problem with the same answer.

Example $0.6\overline{)\,2.34}$

Solution We are dividing by the decimal number 0.6. To make 0.6 into a whole number, we follow the rule **over**, **over**, **and up**. Following this rule makes a new problem with the same answer.

$$\begin{array}{r} 3.9 \\ 0.6\overline{)\,2.34} \\ 1\,8 \\ \hline 5\,4 \\ 5\,4 \\ \hline 0 \end{array}$$

Practice*

a. $0.3\overline{)\,1.2}$

b. $.3\overline{)\,.42}$

c. $1.2\overline{)\,.24}$

d. $0.4\overline{)\,0.24}$

e. $0.4\overline{)\,5.6}$

f. $1.2\overline{)\,3.6}$

g. $0.6\overline{)\,2.4}$

h. $0.5\overline{)\,0.125}$

i. $1.5\overline{)\,2.25}$

Problem set 136

1. What is the average of 5, 6, 7, 8, and 9?

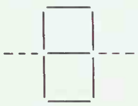
2. Write the following sentence using digits and symbols.

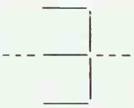
   "When one hundred is divided by four, the quotient is twenty-five."

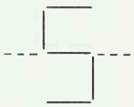
3. In the forest there were lions and tigers and bears. If there were twice as many lions as tigers and twice as many tigers as bears, then how many lions were there if there were 24 bears?

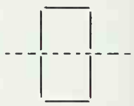
4. Joey has $18.35. John has $22.65. They want to put their money together to buy a car costing $16,040. How much more money do they need?

5. A line of symmetry divides a shape into mirror images. Which of these dotted lines is not a line of symmetry?

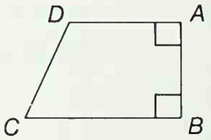
a. 

b. 

c. 

d. 

6. Write the mixed number $3\frac{1}{3}$ as an improper fraction.



7. In quadrilateral *ABCD*, which angle appears to be an obtuse angle?

8. In quadrilateral *ABCD*, which two segments are parallel?

9. $\begin{array}{r} 3\frac{1}{2} \\ +\ 1\frac{1}{3} \\ \hline \end{array}$

10. $\begin{array}{r} 2\frac{1}{6} \\ +\ 1\frac{1}{2} \\ \hline \end{array}$

11. $\begin{array}{r} 5\frac{5}{6} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$

12. $\begin{array}{r} 4\frac{2}{3} \\ -\ 1\frac{1}{4} \\ \hline \end{array}$

13. $3\,\overline{)\,.24}$

14. $5\,\overline{)\,1.2}$

15. $12\,\overline{)\,.180}$

16. $.3\,\overline{)\,.24}$

17. $.5\,\overline{)\,1.2}$

18. $1.2\,\overline{)\,.180}$

19. \$9.75 + 78¢ + \$16 + \$0.25 =

20. $(3 - 1.6) - 0.16 =$

21. $\begin{array}{r} .12 \\ \times\ .12 \\ \hline \end{array}$ **22.** $\begin{array}{r} .12 \\ \times\ 10 \\ \hline \end{array}$ **23.** $\begin{array}{r} 7.6 \\ \times\ 3.9 \\ \hline \end{array}$

24. $4 \times \frac{3}{8} =$ **25.** $4 \div \frac{3}{8} =$

LESSON 137

Multiplying by a Mixed Number

When we multiply fractions, we multiply numerator times numerator and denominator times denominator.

$$\frac{4}{5} \times \frac{2}{3} = \frac{8}{15} \qquad \frac{(4 \times 2)}{(5 \times 3)}$$

When we try to multiply mixed numbers, we see that there are whole numbers in the problem.

$$2\frac{1}{2} \times 1\frac{2}{3} = ?$$

To multiply mixed numbers, we will change the mixed numbers to improper fractions before we multiply.

Change to improper fraction first

$$\begin{array}{c} 2\frac{1}{2} \times 1\frac{2}{3} = \\ \downarrow \qquad\quad \downarrow \\ \underbrace{\frac{5}{2} \times \frac{5}{3} = }_{\text{Then multiply}} \underbrace{\frac{25}{6} = 4\frac{1}{6}}_{\text{Then simplify}} \end{array}$$

Example 1 $\frac{1}{5} \times 4\frac{1}{2} =$

Solution First we write the mixed number as an improper fraction. When both numbers are written as fractions, we multiply. We find that $\frac{1}{5}$ of $4\frac{1}{2}$ is $\frac{9}{10}$.

$$\begin{array}{ccccc} \frac{1}{5} & \times & 4\frac{1}{2} & = & \\ & & \downarrow & & \\ \frac{1}{5} & \times & \frac{9}{2} & = & \frac{9}{10} \end{array}$$

Example 2 $3 \times 2\frac{1}{3} =$

Solution We write both numbers as improper fractions. Then we multiply. We simplify the answer when possible. When we multiply $3 \times 2\frac{1}{3}$ the product is 7. We got our answer by multiplying. We could get the same answer if we added, as we show here.

$$\begin{array}{ccccc} 3 & \times & 2\frac{1}{3} & = & \\ \downarrow & & \downarrow & & \\ \frac{3}{1} & \times & \frac{7}{3} & = & \frac{21}{3} = 7 \end{array}$$

$$2\frac{1}{3} + 2\frac{1}{3} + 2\frac{1}{3} = 6\frac{3}{3} = 7$$

Practice*

a. $1\frac{1}{2} \times 1\frac{3}{4} =$

b. $3\frac{1}{2} \times 1\frac{2}{3} =$

c. $3 \times 2\frac{1}{2} =$

d. $4 \times 3\frac{2}{3} =$

e. $\frac{1}{3} \times 2\frac{1}{3} =$

f. $\frac{1}{6} \times 2\frac{5}{6} =$

Problem set 137

1. Draw the decimals chart.

2. Name this shape.

3. Write the following sentence using digits and symbols.

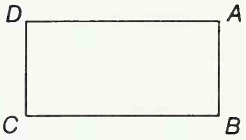
"The sum of two and two equals the product of two and two."

4. Which of these is not equal to $\frac{1}{2}$?
   a. 0.5 **b.** 50% **c.** .50 **d.** .05

5. Estimate the sum of $3\frac{1}{3}$ and $7\frac{3}{4}$ by rounding the numbers to the nearest whole number before you add.

6. If Lillian can type 2 pages in 1 hour, how long will it take her to type 100 pages?

7. In rectangle *ABCD*, segment *BC* is twice the length of segment *AB*. Segment *AB* is 3 inches long.
   a. What is the perimeter of the rectangle?
   b. What is the area of the rectangle?



8. Write the mixed number $2\frac{2}{3}$ as an improper fraction.

9. An octagon has how many more sides than a pentagon?

10. What is the average of 2, 4, 6, and 8?

11. *QR* equals *RS*. *ST* is 5 cm. *RT* is 7 cm. Find *QT*.

12. $38.248 + 7.5 + 37.23 + 15 =$

13. $\$6 - (\$1.49 - 75¢) =$

14. $2.4 \times 100 =$

15. $.24 \times .12 =$

16. $2.4 \times 5.7 =$

17. $3\,\overline{)\,.123}$

18. $.5\,\overline{)\,4.35}$

19. $1.2\,\overline{)\,1.44}$

20. $\begin{array}{r} 3\frac{1}{3} \\ +\ 7\frac{3}{4} \\ \hline \end{array}$

21. $\begin{array}{r} \frac{3}{7} \\ +\ \frac{1}{2} \\ \hline \end{array}$

22. $\begin{array}{r} 6\frac{14}{15} \\ -\ 1\frac{1}{5} \\ \hline \end{array}$

23. $\begin{array}{r} \frac{4}{5} \\ -\ \frac{1}{3} \\ \hline \end{array}$

24. $\frac{1}{2} \times 3\frac{1}{3} =$

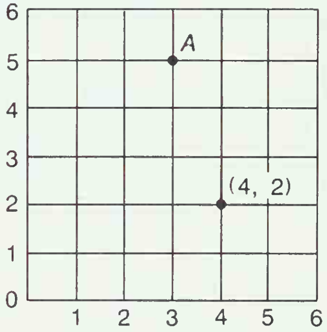
25. $4 \times 2\frac{1}{2} =$

LESSON 138 Locating Points on a Coordinate Graph

We have solved problems that asked us to locate points on a grid. For example, we located points on a map using a grid.

In mathematics we call a grid a **coordinate graph**. The coordinate graph is formed by two perpendicular number lines with marks extended to form a grid. We locate points on the coordinate graph with two numbers. The first number tells us how far to move horizontally from the starting point. The second number tells us how far to move vertically from there.

Look at the coordinate graph below. **The starting point is the point marked with the zero**. To find the point (4, 2), we move along the horizontal number line to the point marked 4. Then we move up **from there** to the level of the 2 on the vertical number line.



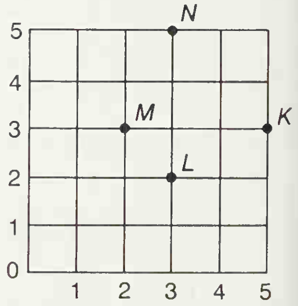
To name the location of point *A*, we find the number on the horizontal number line that is directly under point *A*. That number is 3 and is the first number of the location. Then we find the number on the vertical number line that is on level with point *A*. That number is 5 and is the second number of the location. We name the location of point *A* this way: **(3, 5)**.

Practice What letter names the point at these locations?

a. (3, 2) **b.** (5, 3)

Write the location of these points.

c. Point *M* **d.** Point *N*



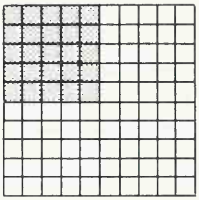
Problem set 138

1. List the first six prime numbers.

2. The diameter of the tree stump was 18 inches. What was the distance from the center of the stump to the outside of the tree?

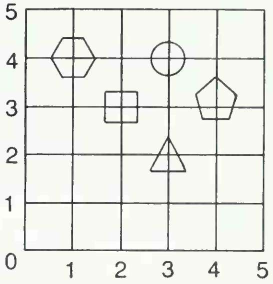
3. What is the average of 63, 84, and 102?

4. $365 + 0 = 365 \times \square$



5. Which of these does not name the part of the square that is shaded?
   a. 25 b. .25 c. $\frac{1}{4}$ d. 25%

Use the coordinate graph to do problems 6–8.

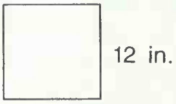


6. Name the shape located at (3, 2).

7. Name the shape located at (4, 3).

8. Which pair of numbers gives the location of the hexagon?
   a. (4, 2) b. (1, 4) c. (4, 1)

9. Fifty percent of the students were girls. If there were 30 students, how many girls were there?



10. a. What is the perimeter of this square?
    b. What is the area of this square?

11. $6.45 + 2.1 + 12 + 0.075 =$

12. $4.567 - (3 - 1.5) =$

13. $\begin{array}{r} .37 \\ \times\ .12 \\ \hline \end{array}$

14. $\begin{array}{r} .48 \\ \times\ 10 \\ \hline \end{array}$

15. $\begin{array}{r} .136 \\ \times\ 307 \\ \hline \end{array}$

16. $1.2\overline{)1.32}$

17. $1.5\overline{)0.6}$

18. $4\overline{)1.624}$

19. $\begin{array}{r} 3\frac{7}{20} \\ +\ 1\frac{1}{10} \\ \hline \end{array}$ **20.** $\begin{array}{r} \frac{1}{4} \\ +\ \frac{2}{5} \\ \hline \end{array}$ **21.** $\begin{array}{r} 5\frac{4}{5} \\ -\ 3\frac{1}{10} \\ \hline \end{array}$ **22.** $\begin{array}{r} \frac{1}{2} \\ -\ \frac{2}{5} \\ \hline \end{array}$

23. $\frac{1}{3} \times 2\frac{2}{3} =$ **24.** $3 \times 1\frac{2}{3} =$ **25.** $3 \div \frac{5}{6} =$

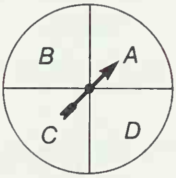
LESSON 139

Naming a Simple Probability

Probability is a measure of **how likely** it is for an event to happen. We name a probability with a number from 0 to 1. If an event is **certain to happen**, then the probability of the event is 1. If an event is **certain not to happen**, then the probability of the event is 0. If it is uncertain whether or not an event will happen, then its probability is some fraction between 0 and 1.

Probability is a part of many games—card games, dice games, and spinner games. We will use a spinner to give us a better idea of probability.

The drawing below shows a circle divided into four equal parts labeled *A*, *B*, *C*, and *D* with an arrow (spinner) in the center. If this were an actual spinner, the arrow could be spun and then it would stop with its point in one of the parts of the circle (or exactly on a line, which we will ignore for now).

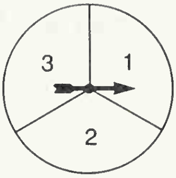


The probability that the spinner will stop in a certain part of the circle is equal to that part's fraction of the circle. Since part *A* is one fourth of the circle, the probability that the spinner will stop in part *A* is $\frac{1}{4}$.

Example What is the probability that the spinner will stop on each of the following?

a. an even number?

b. an odd number?

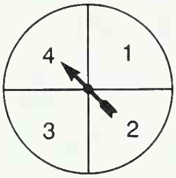


Solution **a.** Only 1 of the 3 parts has an even number in it. The even-numbered part is $\frac{1}{3}$ of the circle. The probability that the arrow will stop on an even number is $\frac{1}{3}$.

b. There are two parts with odd numbers in them. The odd-numbered parts take up $\frac{2}{3}$ of the circle. The probability that the spinner will stop on an odd number is $\frac{2}{3}$.

Practice What is the probability that the spinner will stop on each of the following?

a. the number 2



b. the number 4

c. an odd number

d. the number 5

e. a number less than 5

f. a number less than 4

Problem set 139

1. There are two prime numbers between 20 and 30. What is the product of those two prime numbers?

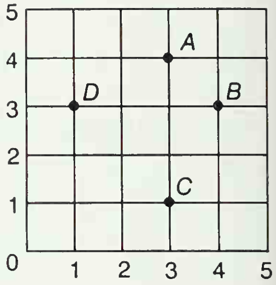
2. Jack is 11 and Jill is 18. If Jill was 12 when Jack fell down, then how old was Jack?

3. Compare: $\frac{1}{2} \times \frac{1}{2} \bigcirc \frac{1}{2} \div \frac{1}{2}$

4. Ralph's 4 scores were 78, 81, 81, and 80. What was the average of his 4 scores?

5. Estimate the sum of 6.15, 9.96, and 7.9 by rounding the numbers to the nearest whole number before you add.

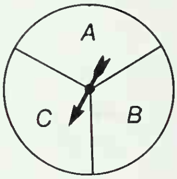
Look at the graph. Then answer questions 6 and 7.



6. Which letter names the point at (3, 4)?

7. Which pair of numbers gives the location of point C?
a. (3, 1) **b.** (1, 3) **c.** (3, 2)

Look at the drawing. Then answer questions 8 and 9.



8. What fraction names the probability that the spinner will stop in the area marked *A*?

9. What is the probability that the spinner will stop in area *B*?

10. The ceiling of Albert's classroom is covered with ceiling tiles that are 1 foot square. Albert counted 32 tiles along the length of the ceiling and 30 tiles along the width. What is the area of the ceiling?

11. $5.84 + 16.7 + 125 + 1.625 =$

12. $6.2 - 4.375 =$

13. $6.3 \times 100 =$

14. $0.18 \times 0.12 =$

15. $3.8 \times 0.7 =$

16. $4\overline{)1.3}$

17. $0.5\overline{)0.42}$

18. $1.6\overline{)3.248}$

19. $\begin{array}{r} 6\frac{5}{6} \\ +\ 1\frac{1}{3} \\ \hline \end{array}$

20. $\begin{array}{r} \frac{3}{5} \\ +\ \frac{1}{4} \\ \hline \end{array}$

21. $\begin{array}{r} 4\frac{3}{4} \\ -\ 1\frac{1}{12} \\ \hline \end{array}$

22. $\begin{array}{r} \frac{4}{5} \\ -\ \frac{3}{4} \\ \hline \end{array}$

23. $\frac{1}{5} \times 2\frac{1}{5} =$

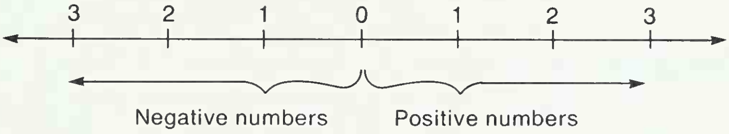
24. $3 \times 3\frac{1}{2} =$

25. $\frac{5}{6} \div \frac{1}{2} =$

LESSON
140

Recognizing Negative Numbers

There **are** numbers that are less than zero. These numbers are called **negative numbers**. On the number line below, negative numbers are to the left of zero. Numbers to the right of zero are positive numbers.



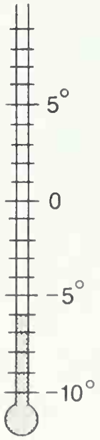
We identify negative numbers by a negative sign (like a minus sign) written in front of the digit. We may write a positive sign (a plus sign) in front of a digit to mark a positive number, although a digit without a sign in front stands for a positive number.

-4	negative four
$+4$ or 4	positive four

If we subtract a larger number from a smaller number, the answer will be a negative number. Here we show the answer when we subtract 4 from 3.

$$3 - 4 = -1$$

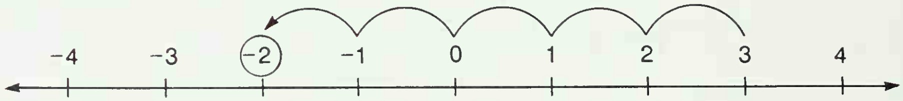
One use of negative numbers is to identify temperatures "below zero." This thermometer shows a temperature below zero. The temperature shown is $-6°$.



Example 3 − 5 =

Solution We are subtracting a larger number from a smaller number. One way to do this is to start at 3 on the number line and count back 5 numbers. We end up at −2.

3 − 5 = **−2**



Practice

a. 2 − 3 =
b. 1 − 4 =
c. 1 − 3 =
d. 0 − 1 =
e. 0 − 3 =
f. 2 − 5 =

Problem set 140

1. Draw the decimals chart.

2. What is the average of 1.2, 1.3, and 1.37?

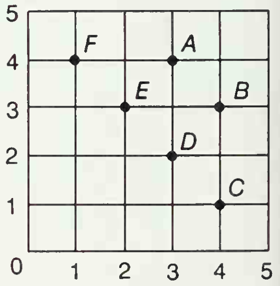
3. In three games Janet had 10 hits. Four of the hits were home runs. What percent of Janet's hits were home runs?

Look at the graph. Then answer questions 4–6.

4. Which letter names the point (1, 4)?

5. Which letter names the point (4, 3)?

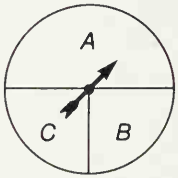
6. Which pair of numbers gives the location of point *D*?
a. (2, 3) **b.** (3, 3) **c.** (3, 2)



Look at the drawing. Then answer questions 7 and 8.

7. What fraction names the probability that the spinner will stop in the area marked *A*?

8. What is the probability that the spinner will stop in area *B*?



9. $49.37 + 0.23 + 125.4 =$

10. $8 - (0.8 - 0.08) =$

11. $\begin{array}{r} 2.5 \\ \times\ 2.5 \\ \hline \end{array}$

12. $\begin{array}{r} .64 \\ \times\ .07 \\ \hline \end{array}$

13. $\begin{array}{r} 1.43 \\ \times\quad 10 \\ \hline \end{array}$

14. $8\overline{)4.4}$

15. $0.5\overline{)0.42}$

16. $1.4\overline{)0.308}$

17. $\begin{array}{r} 5\frac{1}{6} \\ +\ 3\frac{1}{2} \\ \hline \end{array}$

18. $\begin{array}{r} \frac{3}{5} \\ +\ \frac{3}{4} \\ \hline \end{array}$

19. $\begin{array}{r} 3\frac{9}{10} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$

20. $\begin{array}{r} \frac{1}{2} \\ -\ \frac{1}{7} \\ \hline \end{array}$

21. $\frac{1}{4} \times 2\frac{2}{3} =$

22. $4 \times 5\frac{1}{2} =$

23. $3 \div \frac{3}{8} =$

Look at this table of whole numbers greater than 1. The table shows which prime numbers can be multiplied to equal numbers which are not prime numbers.

24. The number 12 is not a prime number. Write the prime numbers which can be multiplied to equal 12.

25. The first five prime numbers are listed in the table. What are the next four prime numbers?

2	PRIME
3	PRIME
4	2 × 2
5	PRIME
6	2 × 3
7	PRIME
8	2 × 2 × 2
9	3 × 3
10	2 × 5
11	PRIME
12	
⋮	

Appendix

Supplemental Practice Problems for Selected Lessons

This appendix contains additional practice problems for concepts presented in selected lessons. It is most important that no problems in the regular problem sets be omitted to make room for these problems. This book is designed to produce long-term retention of concepts, and long-term practice of all the concepts is most necessary. The practice problems in the problem sets provide enough initial exposure to concepts for most students. If a student continues to have difficulty with certain concepts, some of these problems can be assigned as remedial exercises.

Drill for Lesson 5

For problems 1–12, use words to name each number.

1. 44
2. 55
3. 110
4. 312
5. 426
6. 537
7. 211
8. 608
9. 762
10. 901
11. 893
12. 105

For problems 13–25, use digits to write each number.

13. one hundred fourteen
14. two hundred forty
15. seven hundred thirty-two
16. six hundred seven
17. eight hundred sixteen
18. three hundred eighty-four
19. four hundred nine
20. one hundred eighty
21. five hundred eight
22. six hundred fifty
23. nine hundred forty-five
24. two hundred eighteen
25. seven hundred eleven

Drill for Lesson 6

1. $3 + 6 + 7 + 8 + 4 + 1 =$
2. $5 + 4 + 3 + 7 + 8 + 6 =$
3. $12 + 4 + 23 + 17 + 8 =$
4. $16 + 24 + 58 + 7 + 9 =$
5. $56 + 9 + 31 + 18 + 7 =$
6. $324 + 472 =$
7. $589 + 723 =$
8. $487 + 706 =$
9. $312 + 58 =$
10. $936 + 87 =$
11. $43 + 246 + 97 =$
12. $517 + 49 + 327 =$
13. $625 + 506 + 84 =$
14. $315 + 287 + 589 =$
15. $643 + 420 + 708 =$
16. $36 + 24 + 275 + 9 =$
17. $513 + 68 + 8 + 45 =$
18. $178 + 215 + 24 + 9 =$
19. $47 + 6 + 428 + 14 =$
20. $351 + 157 + 68 + 5 =$
21. $231 + 154 + 316 + 15 =$
22. $63 + 459 + 527 + 71 =$

23. 842 + 6 + 537 + 64 =
24. 103 + 70 + 8 + 242 =
25. 517 + 638 + 96 + 970 =

Drill for Lesson 7

Use digits to write each number named in problems 1–15.

1. seven thousand, two hundred fifty-four
2. twelve thousand, six hundred twenty-five
3. eleven thousand, five hundred eighty
4. twenty-one thousand, three hundred
5. fifty-six thousand, two hundred eight
6. eighteen thousand, seven hundred
7. one hundred seventy-five thousand
8. two hundred ten thousand, five hundred
9. three hundred fifty-six thousand, two hundred
10. nine hundred eighty thousand
11. six hundred five thousand, seven hundred fifteen
12. ninety-six thousand, one hundred nine
13. five hundred forty thousand, four hundred sixty
14. one hundred five thousand, eight hundred twenty
15. nine hundred eighty-seven thousand, six hundred fifty-four

Use words to name each number in problems 16–25.

16. 6500
17. 4210
18. 1760
19. 8112
20. 21,000
21. 12,500
22. 40,800
23. 118,000
24. 210,600
25. 125,200

Drill for Lesson 9

1. $\begin{array}{r} 67 \\ -\ 48 \\ \hline \end{array}$

2. $\begin{array}{r} 50 \\ -\ 36 \\ \hline \end{array}$

3. $\begin{array}{r} 71 \\ -\ 63 \\ \hline \end{array}$

4. $\begin{array}{r} 413 \\ -\ 242 \\ \hline \end{array}$

5. $\begin{array}{r} 531 \\ -\ \ 50 \\ \hline \end{array}$

6. $\begin{array}{r} 736 \\ -\ 643 \\ \hline \end{array}$

7. $\begin{array}{r} 345 \\ -\ 137 \\ \hline \end{array}$

8. $\begin{array}{r} 512 \\ -\ 34 \\ \hline \end{array}$

9. $\begin{array}{r} 650 \\ -\ 552 \\ \hline \end{array}$

10. $\begin{array}{r} 300 \\ -\ 256 \\ \hline \end{array}$

11. $\begin{array}{r} 580 \\ -\ 74 \\ \hline \end{array}$

12. $\begin{array}{r} 400 \\ -\ 23 \\ \hline \end{array}$

13. $\begin{array}{r} 504 \\ -\ 132 \\ \hline \end{array}$

14. $\begin{array}{r} 710 \\ -\ 68 \\ \hline \end{array}$

15. $\begin{array}{r} 800 \\ -\ 743 \\ \hline \end{array}$

16. $530 - 321 =$
17. $400 - 291 =$
18. $437 - 340 =$
19. $156 - 86 =$
20. $403 - 396 =$
21. $800 - 57 =$
22. $429 - 109 =$
23. $304 - 67 =$
24. $600 - 214 =$
25. $310 - 46 =$

Drill for Lesson 17

1. $23 \times 7 =$
2. $6 \times 43 =$
3. $57 \times 4 =$
4. $8 \times 36 =$
5. $70 \times 6 =$
6. $4 \times 78 =$
7. $96 \times 8 =$
8. $7 \times 90 =$
9. $89 \times 6 =$
10. $8 \times 79 =$

11. $\begin{array}{r} 357 \\ \times\ 4 \\ \hline \end{array}$

12. $\begin{array}{r} 304 \\ \times\ 5 \\ \hline \end{array}$

13. $\begin{array}{r} 278 \\ \times\ 6 \\ \hline \end{array}$

14. $\begin{array}{r} 870 \\ \times\ 3 \\ \hline \end{array}$

15. $\begin{array}{r} 345 \\ \times\ 9 \\ \hline \end{array}$

16. $\begin{array}{r} 708 \\ \times\ 8 \\ \hline \end{array}$

17. $\begin{array}{r} 847 \\ \times\ 7 \\ \hline \end{array}$

18. $\begin{array}{r} 960 \\ \times\ 6 \\ \hline \end{array}$

19. $\begin{array}{r} 687 \\ \times\ 3 \\ \hline \end{array}$

20. $\begin{array}{r} 907 \\ \times\ 4 \\ \hline \end{array}$

21. $\begin{array}{r} 768 \\ \times\ 9 \\ \hline \end{array}$

22. $\begin{array}{r} 780 \\ \times\ 5 \\ \hline \end{array}$

23. $\begin{array}{r} 476 \\ \times\ 8 \\ \hline \end{array}$

24. $\begin{array}{r} 709 \\ \times\ 6 \\ \hline \end{array}$

25. $\begin{array}{r} 368 \\ \times\ 7 \\ \hline \end{array}$

Drill for Lesson 18

1. $5 \times 9 \times 4 =$
2. $5 \times 8 \times 3 =$
3. $7 \times 6 \times 5 =$
4. $9 \times 4 \times 6 =$
5. $7 \times 5 \times 8 =$
6. $5 \times 4 \times 3 \times 2 =$
7. $3 \times 3 \times 3 \times 3 =$
8. $2 \times 5 \times 2 \times 5 =$
9. $6 \times 4 \times 2 \times 0 =$
10. $3 \times 5 \times 4 \times 6 =$
11. $20 \times 7 \times 5 =$
12. $4 \times 9 \times 25 =$
13. $6 \times 30 \times 5 =$
14. $50 \times 5 \times 8 =$
15. $5 \times 7 \times 12 =$
16. $8 \times 10 \times 6 =$
17. $54 \times 9 \times 0 =$
18. $5 \times 5 \times 24 =$
19. $2 \times 5 \times 10 =$
20. $7 \times 75 \times 4 =$
21. $32 \times 6 \times 8 =$
22. $9 \times 4 \times 25 =$
23. $40 \times 7 \times 5 =$
24. $6 \times 35 \times 4 =$
25. $47 \times 8 \times 0 =$

Drill for Lesson 22

Divide and write the answer with a remainder.

1. $3\overline{)10}$
2. $4\overline{)33}$
3. $7\overline{)30}$
4. $8\overline{)51}$
5. $6\overline{)53}$
6. $5\overline{)32}$
7. $6\overline{)35}$
8. $7\overline{)32}$
9. $9\overline{)32}$
10. $\frac{17}{2}$
11. $\frac{26}{3}$
12. $\frac{35}{4}$
13. $\frac{28}{5}$
14. $\frac{55}{8}$
15. $\frac{70}{9}$
16. $23 \div 4 =$
17. $17 \div 6 =$
18. $35 \div 8 =$
19. $22 \div 3 =$
20. $9 \div 2 =$
21. $47 \div 7 =$
22. $25 \div 9 =$
23. $17 \div 5 =$
24. $66 \div 7 =$
25. $63 \div 8 =$

Drill for Lesson 23

1. $3 + $2.45 =
2. $6.58 + $4 =
3. $5.29 + $4.71 =
4. $9.15 + $10 =
5. $15.75 + $8.28 =
6. $27.80 + $6 =
7. $.48 + $.76 =
8. $7 + $12.99 =

9. \$12 + \$8.20 =
10. \$.45 + \$.55 =
11. \$1.25 + \$5 + \$4.18 =
12. \$5.36 + \$.75 + \$6 =
13. \$.75 + \$.80 + \$.38 =
14. \$6.54 + \$12 + \$.95 =
15. \$18.47 + \$.53 + \$21 =
16. \$6.54 − \$1.49 =
17. \$8.29 − \$1.29 =
18. \$3.18 − \$2.57 =
19. \$5.06 − \$.27 =
20. \$3 − \$1.25 =
21. \$5 − \$4.36 =
22. \$12.57 − \$5 =
23. \$10 − \$8.54 =
24. \$1 − \$.92 =
25. \$5 − \$4.95 =

Drill for Lesson 24

1. 8 − (6 − 2) =
2. 8 − (6 + 2) =
3. 8 − (6 ÷ 2) =
4. 8 ÷ (6 − 2) =
5. 8 ÷ (6 + 2) =
6. (24 ÷ 6) ÷ 2 =
7. 24 ÷ (6 ÷ 2) =
8. (24 ÷ 6) − 2 =
9. 24 ÷ (6 − 2) =
10. (24 ÷ 6) + 2 =
11. 24 ÷ (6 + 2) =
12. (24 ÷ 6) × 2 =
13. 24 ÷ (6 × 2) =
14. (36 ÷ 6) ÷ 3 =
15. 36 ÷ (6 ÷ 3) =
16. (36 − 6) × 3 =
17. 36 − (6 × 3) =
18. (36 ÷ 6) − 3 =
19. 36 + (12 − 6) + 3 =
20. (36 + 12) − (6 + 3) =
21. Compare: 6 × (3 × 2) ○ (6 × 3) × 2
22. Compare: 6 − (3 − 2) ○ (6 − 3) − 2
23. Compare: 6 + (3 + 2) ○ (6 + 3) + 2
24. Compare: 6 ÷ (3 − 2) ○ (6 ÷ 3) − 2
25. Compare: 6 − (3 × 2) ○ (6 − 3) × 2

Drill for Lesson 26

1. $2\overline{)136}$
2. $2\overline{)356}$
3. $3\overline{)234}$
4. $3\overline{)456}$
5. $3\overline{)567}$
6. $4\overline{)124}$
7. $4\overline{)248}$
8. $4\overline{)356}$
9. $5\overline{)120}$
10. $5\overline{)230}$
11. $6\overline{)432}$
12. $6\overline{)876}$
13. $7\overline{)511}$
14. $7\overline{)847}$
15. $7\overline{)903}$
16. $8\overline{)440}$
17. $8\overline{)944}$
18. $9\overline{)567}$
19. $9\overline{)568}$
20. $8\overline{)690}$
21. $7\overline{)611}$

22. $6\overline{)789}$ **23.** $5\overline{)876}$ **24.** $4\overline{)789}$

25. $3\overline{)890}$

Drill for Lesson 29

1. What time is shown on the clock?

2. What time was it 2 hours ago?

3. What time will it be in 2 hours?

4. What time was it half an hour ago?

5. What time will it be in a half hour?

Morning

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6. What time is shown on the clock?

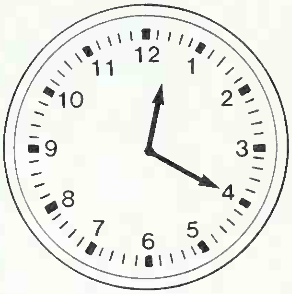
7. What time will it be in 12 hours?

8. What time was it 2 hours ago?

9. What time was it half an hour ago?

10. How many minutes is it until 1:00 p.m.?

Afternoon



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11. What time is shown on the clock?

12. What time will it be in 24 hours?

13. What time was it half an hour ago?

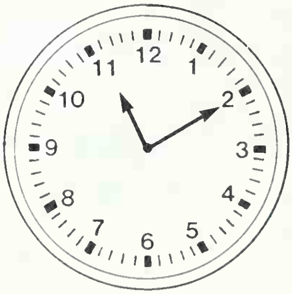
14. What time will it be in $1\frac{1}{2}$ hours?

15. How many minutes is it until noon?

16. What time is 10 minutes before noon?

17. What time is $1\frac{1}{2}$ hours after midnight?

Morning



18. What time is 5 minutes after two in the afternoon?

19. What time is 5 minutes before six in the morning?

20. What time is a quarter after three in the afternoon?

21. What time is a quarter to eight in the morning?

22. What time is 40 minutes before noon?

23. What time is 3 minutes after midnight?

24. What time is 8 minutes before 1 p.m.?

25. Jim leaves for school at 7:45 a.m. and gets home $7\frac{1}{2}$ hours later. What time is it when Jim gets home from school?

Drill for Lesson 30

1. 10 × 36 =
2. 47 × 30 =
3. 50 × 78 =
4. 34 × 70 =
5. 90 × 37 =
6. 45 × 10 =
7. 20 × 35 =
8. 73 × 40 =
9. 60 × 38 =
10. 74 × 80 =
11. 10 × 271 =
12. 932 × 30 =
13. 70 × 674 =
14. 465 × 20 =
15. 60 × 793 =
16. 81 × 100 =
17. 500 × 36 =
18. 64 × 900 =
19. 400 × 84 =
20. 96 × 800 =
21. 100 × 634 =
22. 490 × 500 =
23. 300 × 841 =
24. 350 × 400 =
25. 700 × 800 =

Drill for Lesson 34

Round the numbers in problems 1–8 to the nearest ten.

1. 46
2. 37
3. 61
4. 58
5. 43
6. 79
7. 84
8. 96

Round the numbers in 9–18 to the nearest hundred.

9. 375
10. 216
11. 843
12. 781
13. 460
14. 329
15. 198
16. 748
17. 638
18. 136

Round the numbers in problems 19–25 to the nearest ten.

19. 121 **20.** 127 **21.** 358 **22.** 341
23. 769 **24.** 532 **25.** 477

Drill for Lesson 35

1. $3\overline{)31}$ **2.** $4\overline{)83}$ **3.** $2\overline{)61}$

4. $3\overline{)122}$ **5.** $4\overline{)243}$ **6.** $5\overline{)404}$

7. $6\overline{)365}$ **8.** $6\overline{)305}$ **9.** $8\overline{)407}$

10. $3\overline{)315}$ **11.** $4\overline{)824}$ **12.** $5\overline{)540}$

13. $2\overline{)415}$ **14.** $3\overline{)920}$ **15.** $4\overline{)433}$

16. $7\overline{)742}$ **17.** $3\overline{)602}$ **18.** $4\overline{)963}$

19. $4\overline{)803}$ **20.** $3\overline{)925}$ **21.** $7\overline{)845}$

22. $8\overline{)1284}$ **23.** $9\overline{)3627}$ **24.** $7\overline{)4205}$

25. $8\overline{)5921}$

Drill for Lesson 40

1. Draw a square and shade $\frac{1}{2}$ of it.

2. Draw a square and shade $\frac{1}{2}$ of it another way.

3. Draw a square and shade $\frac{1}{2}$ of it another way.

4. Draw a square and shade $\frac{1}{4}$ of it.

5. Draw a circle and shade $\frac{1}{2}$ of it.

6. Draw a circle and shade $\frac{3}{4}$ of it.

7. Draw a circle and shade $\frac{1}{3}$ of it.

8. Draw a rectangle and shade $\frac{1}{2}$ of it.

9. Draw a rectangle and shade $\frac{1}{4}$ of it.

10. Draw a rectangle and shade $\frac{1}{3}$ of it.

11. Draw a rectangle and shade $\frac{1}{5}$ of it.

12. Draw a square and shade $\frac{3}{4}$ of it.

13. Draw a circle and shade $\frac{2}{3}$ of it.

14. Draw a rectangle and shade $\frac{2}{3}$ of it.

15. Draw a rectangle and shade $\frac{2}{5}$ of it.

16. Draw a circle and shade $\frac{1}{6}$ of it.

17. Draw a rectangle and shade $\frac{1}{6}$ of it.

18. Draw a rectangle and shade $\frac{3}{5}$ of it.

19. Draw a circle and shade $\frac{5}{6}$ of it.

20. Draw a rectangle and shade $\frac{5}{6}$ of it.

21. Draw a rectangle and shade $\frac{4}{5}$ of it.

22. Draw a rectangle and shade $\frac{1}{8}$ of it.

23. Draw a circle and shade $\frac{1}{8}$ of it.

24. Draw a rectangle and shade $\frac{7}{8}$ of it.

25. Draw a square and shade $\frac{1}{3}$ of it.

Drill for Lesson 43

1. $\frac{1}{3} + \frac{1}{3} =$ **2.** $\frac{1}{5} + \frac{1}{5} =$ **3.** $\frac{1}{6} + \frac{4}{6} =$

4. $\frac{1}{7} + \frac{2}{7} =$ **5.** $\frac{2}{5} + \frac{2}{5} =$ **6.** $\frac{2}{7} + \frac{3}{7} =$

7. $\frac{1}{8} + \frac{2}{8} =$

8. $\frac{3}{10} + \frac{4}{10} =$

9. $\frac{5}{12} + \frac{6}{12} =$

10. $\frac{12}{50} + \frac{11}{50} =$

11. $\frac{8}{100} + \frac{91}{100} =$

12. $\frac{243}{499} + \frac{243}{499} =$

13. $\frac{1}{2} - \frac{1}{2} =$

14. $\frac{2}{3} - \frac{1}{3} =$

15. $\frac{3}{4} - \frac{2}{4} =$

16. $\frac{4}{5} - \frac{1}{5} =$

17. $\frac{5}{6} - \frac{5}{6} =$

18. $\frac{5}{6} - \frac{4}{6} =$

19. $\frac{4}{5} - \frac{2}{5} =$

20. $\frac{6}{7} - \frac{2}{7} =$

21. $\frac{7}{8} - \frac{4}{8} =$

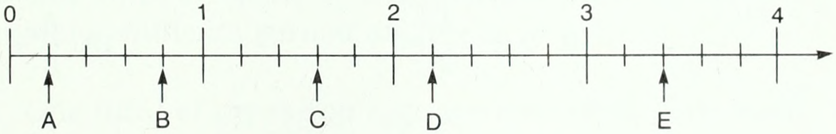
22. $\frac{9}{10} - \frac{9}{10} =$

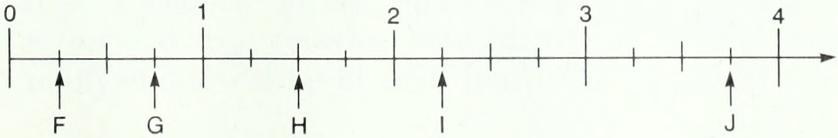
23. $\frac{33}{50} - \frac{12}{50} =$

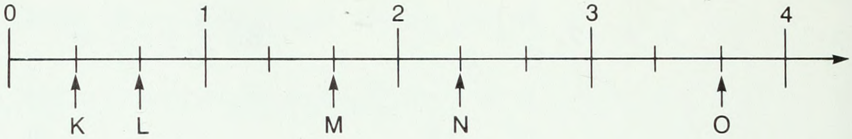
24. $\frac{51}{100} - \frac{42}{100} =$

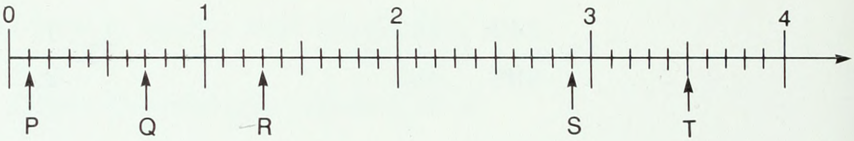
25. $\frac{999}{1000} - \frac{998}{1000} =$

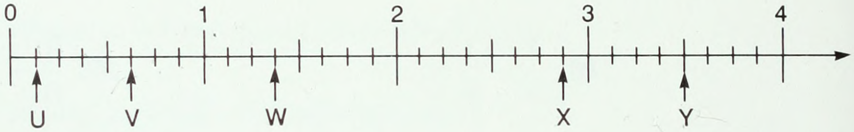
Drill for Lesson 46 Use a fraction or mixed number to name every point marked with an arrow on these number lines.











Drill for Lesson 47

1. $3\frac{1}{3} + 1 =$

2. $2\frac{1}{3} + 3\frac{1}{3} =$

3. $5 + 1\frac{2}{5} =$

4. $1 + \frac{3}{4} =$

5. $6\frac{4}{8} + 1\frac{3}{8} =$

6. $7\frac{2}{3} + 5 =$

7. $4 + \frac{3}{10} =$

8. $3\frac{5}{12} + 1\frac{6}{12} =$

9. $9 + 7\frac{1}{2} =$

10. $\frac{5}{6} + 1 =$

11. $3\frac{3}{10} + 4\frac{4}{10} =$

12. $5\frac{2}{8} + \frac{3}{8} =$

13. $6\frac{2}{3} - 4 =$

14. $3\frac{3}{4} - 1\frac{2}{4} =$

15. $7\frac{1}{2} - \frac{1}{2} =$

16. $1\frac{5}{8} - 1 =$

17. $8\frac{3}{4} - 2\frac{3}{4} =$

18. $3\frac{1}{2} - 3\frac{1}{2} =$

19. $10\frac{7}{10} - 1\frac{4}{10} =$

20. $4\frac{3}{5} - \frac{1}{5} =$

21. $9\frac{4}{9} - 4 =$

22. $1\frac{7}{8} - \frac{7}{8} =$

23. $5\frac{1}{2} - 2\frac{1}{2} =$

24. $2\frac{3}{4} - 2 =$

25. $3\frac{6}{7} - 1\frac{3}{7} =$

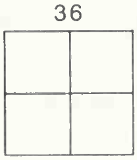
Drill for Lesson 50

1. What is $\frac{1}{2}$ of 24?
2. What is $\frac{1}{3}$ of 24?
3. What is $\frac{1}{4}$ of 24?
4. What is $\frac{1}{6}$ of 24?
5. What is $\frac{1}{8}$ of 24?
6. What is $\frac{1}{24}$ of 24?
7. What is $\frac{1}{2}$ of 100?
8. What is $\frac{1}{4}$ of 100?
9. What is $\frac{1}{5}$ of 100?
10. What is $\frac{1}{2}$ of 200?
11. What is $\frac{1}{2}$ of 60?
12. What is $\frac{1}{4}$ of 60?
13. What is $\frac{1}{3}$ of 60?
14. What is $\frac{1}{5}$ of 60?
15. What is $\frac{1}{6}$ of 60?
16. What is $\frac{1}{8}$ of 48?
17. What is $\frac{1}{6}$ of 48?
18. What is $\frac{1}{4}$ of 48?
19. What is $\frac{1}{3}$ of 48?
20. What is $\frac{1}{10}$ of 10?

21. One sixth of the 30 students earned an A on the test. How many students earned an A?

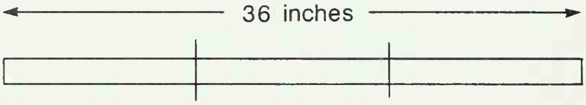
22. One third of the dozen eggs were cracked. How many eggs were cracked?

23. If a collection of 36 tiddlywinks is divided into fourths, how many tiddlywinks will be in each fourth?



24. If a 50-pound block of clay is cut in half, what will be the weight of each half?

25. If a 36-inch-long stick is cut into thirds, what will be the length of each third?



Drill for Lesson 53

Write the standard form of the numbers named in problems 1–15.

1. 5000 + 200 + 80
2. 600 + 40 + 2
3. 40,000 + 5000 + 60 + 7
4. 5,000 + 400 + 90 + 2
5. 70,000 + 1000 + 400
6. (5 × 1000) + (2 × 100) + (8 × 10)
7. (6 × 100) + (4 × 10) + (2 × 1)
8. (4 × 10,000) + (5 × 1000) + (6 × 10) + (7 × 1)
9. (5 × 1000) + (4 × 100) + (9 × 10) + (2 × 1)
10. (7 × 10,000) + (1 × 1000) + (4 × 100)
11. (6 × 1000) + (4 × 100) + (3 × 1)
12. (7 × 1000) + (8 × 10) + (9 × 1)
13. (1 × 10,000) + (4 × 100) + (7 × 1)
14. (6 × 1000) + (1 × 10)
15. (1 × 10,000) + (6 × 1000) + (5 × 1)

Write the numbers in problems 16–25 in expanded notation.

16. 65
17. 742
18. 320
19. 506
20. 7500
21. 2001
22. 1040
23. 1760
24. 1492
25. 25,000

Drill for Lesson 57

1. $\begin{array}{r} 38 \\ \times\ 49 \\ \hline \end{array}$ **2.** $\begin{array}{r} 96 \\ \times\ 97 \\ \hline \end{array}$ **3.** $\begin{array}{r} 78 \\ \times\ 76 \\ \hline \end{array}$ **4.** $\begin{array}{r} 52 \\ \times\ 47 \\ \hline \end{array}$

5. $\begin{array}{r} 63 \\ \times\ 85 \\ \hline \end{array}$ **6.** $\begin{array}{r} 69 \\ \times\ 81 \\ \hline \end{array}$ **7.** $\begin{array}{r} 58 \\ \times\ 59 \\ \hline \end{array}$ **8.** $\begin{array}{r} 16 \\ \times\ 74 \\ \hline \end{array}$

9. $\begin{array}{r} 96 \\ \times\ 36 \\ \hline \end{array}$ **10.** $\begin{array}{r} 27 \\ \times\ 73 \\ \hline \end{array}$ **11.** $\begin{array}{r} 85 \\ \times\ 96 \\ \hline \end{array}$ **12.** $\begin{array}{r} 47 \\ \times\ 72 \\ \hline \end{array}$

13. $\begin{array}{r} 74 \\ \times\ 18 \\ \hline \end{array}$ **14.** $\begin{array}{r} 36 \\ \times\ 83 \\ \hline \end{array}$ **15.** $\begin{array}{r} 74 \\ \times\ 58 \\ \hline \end{array}$ **16.** $\begin{array}{r} 67 \\ \times\ 64 \\ \hline \end{array}$

17. $\begin{array}{r} 92 \\ \times\ 47 \\ \hline \end{array}$ **18.** $\begin{array}{r} 63 \\ \times\ 49 \\ \hline \end{array}$ **19.** $\begin{array}{r} 18 \\ \times\ 85 \\ \hline \end{array}$ **20.** $\begin{array}{r} 46 \\ \times\ 89 \\ \hline \end{array}$

21. $\begin{array}{r} 75 \\ \times\ 86 \\ \hline \end{array}$ **22.** $\begin{array}{r} 39 \\ \times\ 47 \\ \hline \end{array}$ **23.** $\begin{array}{r} 58 \\ \times\ 92 \\ \hline \end{array}$ **24.** $\begin{array}{r} 89 \\ \times\ 83 \\ \hline \end{array}$

25. $\begin{array}{r} 58 \\ \times\ 39 \\ \hline \end{array}$

Drill for Lesson 58

Write the value of the 1 in each number in problems 1–8.

1. 315,275,486
2. 21,987,564
3. 128,675
4. 7,351,487
5. 125,386,794
6. 97,315,248
7. 2,468,105
8. 62,975,318

Name the value of the place held by the zero in each number in problems 9–16.

9. 20,675,482
10. 123,450,683
11. 5,046,912
12. 17,954,068
13. 805,423,796
14. 8,907,485
15. 32,145,670
16. 125,364,809

Which digit is in the millions' place in each number in problems 17 and 18?

17. 654,297,801
18. 37,591,846

Which digit is in the ten-millions' place in each number in 19 and 20?

19. 752,931,468 **20.** 246,801,357

Write the value of the 5 in each number in problems 21–24.

21. 375,286,420 **22.** 17,576,284

23. 56,234,196 **24.** 123,456,786

25. Which digit is in the millions' place in 12,345,678?

Drill for Lesson 59

Use digits to write each number named in problems 1–15.

1. one million, two hundred fifty thousand

2. five million, three hundred twelve thousand

3. ten million, one hundred twenty-five thousand, two hundred

4. thirteen million, two hundred ten thousand, five hundred

5. twenty-five million, one hundred ninety-six thousand, one hundred

6. three hundred twenty-seven million

7. six hundred forty-five million, six hundred thousand, two hundred

8. seven hundred sixteen million, nine hundred eleven thousand

9. one hundred twenty million, six hundred fifteen thousand

10. nine hundred eighty-four million, two hundred thousand

11. seventeen million, five hundred forty thousand, two hundred

12. two million, one hundred fifty thousand, six hundred forty-one

13. one hundred five million, two hundred eighty thousand

14. nineteen million, three hundred six thousand, four hundred

15. two hundred four million, one hundred eighteen thousand

Use words to name each number in problems 16–25.

16. 1,500,000

17. 10,200,000

18. 15,352,000
19. 25,740,000
20. 42,164,000
21. 78,345,200
22. 120,000,000
23. 253,000,000
24. 412,520,000
25. 635,154,000

Drill for Lesson 61

1. $20\overline{)420}$
2. $30\overline{)450}$
3. $40\overline{)480}$
4. $50\overline{)700}$
5. $60\overline{)800}$
6. $70\overline{)700}$
7. $80\overline{)900}$
8. $20\overline{)560}$
9. $30\overline{)570}$
10. $40\overline{)650}$
11. $50\overline{)850}$
12. $60\overline{)900}$
13. $70\overline{)800}$
14. $20\overline{)614}$
15. $30\overline{)765}$
16. $40\overline{)876}$
17. $50\overline{)987}$
18. $60\overline{)960}$
19. $20\overline{)1240}$
20. $30\overline{)1650}$
21. $40\overline{)2720}$
22. $50\overline{)4200}$
23. $20\overline{)1780}$
24. $30\overline{)2370}$
25. $40\overline{)3480}$

Drill for Lesson 63

1. $\begin{array}{r}135\\ \times\ 246\\ \hline\end{array}$
2. $\begin{array}{r}650\\ \times\ 473\\ \hline\end{array}$
3. $\begin{array}{r}408\\ \times\ 592\\ \hline\end{array}$
4. $\begin{array}{r}354\\ \times\ 260\\ \hline\end{array}$
5. $\begin{array}{r}625\\ \times\ 403\\ \hline\end{array}$
6. $\begin{array}{r}754\\ \times\ 365\\ \hline\end{array}$
7. $\begin{array}{r}347\\ \times\ 198\\ \hline\end{array}$
8. $\begin{array}{r}680\\ \times\ 743\\ \hline\end{array}$
9. $\begin{array}{r}503\\ \times\ 936\\ \hline\end{array}$
10. $\begin{array}{r}418\\ \times\ 650\\ \hline\end{array}$
11. $\begin{array}{r}973\\ \times\ 409\\ \hline\end{array}$
12. $\begin{array}{r}349\\ \times\ 156\\ \hline\end{array}$
13. $\begin{array}{r}760\\ \times\ 394\\ \hline\end{array}$
14. $\begin{array}{r}507\\ \times\ 938\\ \hline\end{array}$
15. $\begin{array}{r}243\\ \times\ 671\\ \hline\end{array}$
16. $\begin{array}{r}953\\ \times\ 870\\ \hline\end{array}$

17. $\begin{array}{r} 740 \\ \times\ 698 \\ \hline \end{array}$

18. $\begin{array}{r} 486 \\ \times\ 203 \\ \hline \end{array}$

19. $\begin{array}{r} 705 \\ \times\ 258 \\ \hline \end{array}$

20. $\begin{array}{r} 578 \\ \times\ 369 \\ \hline \end{array}$

21. $\begin{array}{r} 375 \\ \times\ 408 \\ \hline \end{array}$

22. $\begin{array}{r} 370 \\ \times\ 493 \\ \hline \end{array}$

23. $\begin{array}{r} 186 \\ \times\ 590 \\ \hline \end{array}$

24. $\begin{array}{r} 709 \\ \times\ 638 \\ \hline \end{array}$

25. $\begin{array}{r} 279 \\ \times\ 403 \\ \hline \end{array}$

Drill for Lesson 65

Divide and write each answer with a fraction.

1. $6\overline{)19}$
2. $5\overline{)36}$
3. $4\overline{)27}$
4. $16 \div 7 =$
5. $25 \div 8 =$
6. $56 \div 9 =$
7. $\frac{10}{3} =$
8. $\frac{50}{7} =$
9. $\frac{81}{10} =$
10. $2\overline{)45}$
11. $3\overline{)46}$
12. $4\overline{)47}$
13. $56 \div 5 =$
14. $79 \div 6 =$
15. $61 \div 10 =$
16. $\frac{33}{8} =$
17. $\frac{125}{3} =$
18. $\frac{95}{6} =$
19. $3\overline{)257}$
20. $10\overline{)257}$
21. $5\overline{)257}$
22. $100 \div 7 =$
23. $100 \div 9 =$
24. $100 \div 3 =$
25. $\frac{99}{10} =$

Drill for Lesson 69

Estimate each answer by rounding before doing the arithmetic. Round numbers less than 100 to the nearest ten. Round numbers more than 100 to the nearest hundred.

1. $36 + 43$
2. $38 + 49$
3. $73 - 31$
4. $59 - 31$

5. 51×39
6. 78×42
7. $88 \div 29$
8. $81 \div 19$
9. $397 + 214$
10. $688 + 291$
11. $687 - 304$
12. $915 - 588$
13. 503×491
14. 687×298
15. $395 \div 21$
16. $589 \div 29$
17. $87 + 93$
18. $786 + 495$
19. $893 - 514$
20. $980 - 217$
21. 419×39
22. 81×589
23. $419 \div 39$
24. $788 \div 41$
25. $53 \times 49 \times 21$

Drill for Lesson 70

1. $1 - \frac{1}{3} =$
2. $2 - \frac{2}{3} =$
3. $3 - \frac{1}{4} =$
4. $4 - \frac{3}{4} =$
5. $2 - 1\frac{1}{5} =$
6. $3 - 1\frac{1}{6} =$
7. $4 - 2\frac{5}{6} =$
8. $5 - 3\frac{1}{8} =$
9. $6 - 1\frac{3}{8} =$
10. $8 - 5\frac{5}{8} =$
11. $7 - 6\frac{7}{8} =$
12. $10 - \frac{1}{2} =$
13. $4 - 2\frac{1}{10} =$
14. $6 - 3\frac{3}{10} =$
15. $3 - 2\frac{1}{2} =$
16. $5 - 1\frac{1}{12} =$
17. $10 - \frac{1}{10} =$
18. $8 - 4\frac{2}{5} =$
19. $1 - \frac{11}{12} =$
20. $3 - 2\frac{3}{5} =$
21. $7 - \frac{1}{7} =$
22. $3 - 1\frac{5}{12} =$

23. $8 - 4\frac{7}{10} =$

24. $4 - 1\frac{9}{10} =$

25. $2 - 1\frac{7}{12} =$

Drill for Lesson 78

Use words to name each decimal number in problems 1–12.

1. 3.4
2. .23
3. 12.9
4. 7.14
5. 20.5
6. 15.15
7. 10.1
8. 1.10
9. 120.8
10. 21.04
11. 8.9
12. 100.01

Use digits to write the decimal numbers named in problems 13–25.

13. twenty-three and four tenths
14. thirty-two hundredths
15. ten and five tenths
16. two and twenty-five hundredths
17. fifty-two and one tenth
18. five hundredths
19. one hundred thirty-five and nine tenths
20. seventy-six and twelve hundredths
21. one and six hundredths
22. ninety-six and five tenths
23. ten and one hundredth
24. three hundred twenty and one tenth
25. forty and fourteen hundredths

Drill for Lesson 81

1. 35¢ + 48¢ = $

2. $.63 − 15¢ = __¢

3. $1.25 × 7 =

4. $2.25 ÷ 3 =

5. 35¢ + $1 =

6. $1 − 5¢ = $

7. $.48 × 5 =
8. $6.30 ÷ 5 =
9. $.18 + $.37 = __¢
10. $1.25 − $.70 = __¢
11. $.25 × 10 =
12. $341.00 ÷ 4 =
13. $6.48 + 5¢ =
14. $10 − 10¢ =
15. $7.35 × 3 =
16. $92.80 ÷ 8 =
17. 65¢ + 56¢ =
18. $5 − 5¢ =
19. 43¢ × 4 = $
20. $1.44 ÷ 6 = __¢
21. $.08 × 9 = __¢
22. 72¢ ÷ 8 = $
23. $6.25 + 38¢ + $12 =
24. 5¢ + $.25 + $3 + $9.48 =
25. $1.03 + $.09 + 98¢ + $1 =

Drill for Lesson 85

Convert each improper fraction or mixed number into a whole number or mixed number.

1. $\frac{8}{3} =$
2. $\frac{7}{2} =$
3. $\frac{12}{4} =$
4. $\frac{7}{4} =$
5. $\frac{10}{5} =$
6. $\frac{100}{100} =$
7. $5\frac{3}{2} =$
8. $6\frac{6}{3} =$
9. $4\frac{8}{5} =$
10. $9\frac{4}{4} =$
11. $3\frac{11}{8} =$
12. $4\frac{9}{4} =$
13. $5\frac{8}{3} =$
14. $7\frac{9}{5} =$
15. $8\frac{7}{3} =$
16. $\frac{2}{3} + \frac{2}{3} =$
17. $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} =$
18. $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} =$
19. $1\frac{1}{2} + 1\frac{1}{2} =$
20. $3\frac{2}{3} + 1\frac{2}{3} =$
21. $\frac{5}{3} + \frac{4}{3} =$

22. $6\frac{5}{6} + 1\frac{2}{6} =$

23. $3\frac{5}{8} + \frac{7}{8} + 1\frac{3}{8} =$

24. $\frac{9}{10} + 1\frac{1}{10} =$

25. $\frac{4}{5} + \frac{3}{5} + \frac{2}{5} =$

Drill for Lesson 86

1. $\frac{1}{2} \times \frac{1}{2} =$

2. $\frac{1}{2} \times \frac{3}{4} =$

3. $\frac{2}{3} \times \frac{2}{3} =$

4. $\frac{1}{3} \times \frac{1}{3} =$

5. $\frac{5}{6} \times \frac{1}{2} =$

6. $\frac{3}{4} \times \frac{1}{2} =$

7. $\frac{1}{2} \times \frac{1}{3} =$

8. $\frac{1}{5} \times \frac{2}{3} =$

9. $\frac{3}{7} \times \frac{2}{5} =$

10. $\frac{1}{4} \times \frac{1}{4} =$

11. $\frac{2}{3} \times \frac{1}{3} =$

12. $\frac{1}{2} \times \frac{1}{5} =$

13. $\frac{1}{2} \times \frac{1}{4} =$

14. $\frac{3}{4} \times \frac{3}{4} =$

15. $\frac{5}{8} \times \frac{1}{2} =$

16. $\frac{1}{3} \times \frac{1}{4} =$

17. $\frac{3}{4} \times \frac{1}{4} =$

18. $\frac{3}{4} \times \frac{3}{5} =$

19. $\frac{1}{10} \times \frac{1}{10} =$

20. $\frac{5}{8} \times \frac{3}{4} =$

21. $\frac{9}{10} \times \frac{1}{2} =$

22. $\frac{3}{10} \times \frac{3}{10} =$

23. $\frac{5}{12} \times \frac{1}{2} =$

24. $\frac{1}{2} \times \frac{1}{10} =$

25. $\frac{9}{10} \times \frac{9}{10} =$

Drill for Lesson 89 In problems 1–12, find the fraction name for 1 used to make the equivalent fraction.

1. $\frac{1}{2} \times \square = \frac{2}{4}$

2. $\frac{1}{2} \times \square = \frac{6}{12}$

3. $\frac{2}{3} \times \square = \frac{4}{6}$

4. $\frac{2}{3} \times \square = \frac{8}{12}$

5. $\frac{3}{4} \times \square = \frac{6}{8}$

6. $\frac{3}{4} \times \square = \frac{9}{12}$

7. $\frac{1}{2} \times \square = \frac{5}{10}$

8. $\frac{5}{6} \times \square = \frac{10}{12}$

9. $\frac{2}{3} \times \square = \frac{6}{9}$

10. $\frac{3}{5} \times \square = \frac{6}{10}$

11. $\frac{5}{8} \times \square = \frac{15}{24}$

12. $\frac{5}{6} \times \square = \frac{20}{24}$

In problems 13–25, find the numerator to complete the equivalent fraction.

13. $\frac{2}{5} = \frac{?}{10}$

14. $\frac{1}{4} = \frac{?}{12}$

15. $\frac{4}{5} = \frac{?}{15}$

16. $\frac{3}{8} = \frac{?}{16}$

17. $\frac{2}{3} = \frac{?}{15}$

18. $\frac{1}{6} = \frac{?}{12}$

19. $\frac{1}{3} = \frac{?}{18}$

20. $\frac{1}{2} = \frac{?}{20}$

21. $\frac{3}{10} = \frac{?}{20}$

22. $\frac{3}{4} = \frac{?}{20}$
23. $\frac{4}{5} = \frac{?}{20}$
24. $\frac{1}{10} = \frac{?}{100}$
25. $\frac{1}{2} = \frac{?}{100}$

Drill for Lesson 91

Find the greatest common factor of each pair of numbers.

1. 4 and 6
2. 4 and 8
3. 6 and 8
4. 6 and 9
5. 6 and 10
6. 6 and 12
7. 8 and 12
8. 9 and 12
9. 10 and 12
10. 5 and 10
11. 3 and 5
12. 8 and 16
13. 12 and 16
14. 12 and 15
15. 9 and 15
16. 10 and 15
17. 5 and 15
18. 10 and 20
19. 12 and 20
20. 15 and 20
21. 14 and 21
22. 12 and 21
23. 12 and 24
24. 15 and 24
25. 16 and 24

Drill for Lesson 92

1. What is $\frac{1}{3}$ of 9?
2. What is $\frac{2}{3}$ of 9?
3. What is $\frac{1}{4}$ of 8?
4. What is $\frac{3}{4}$ of 8?
5. What is $\frac{1}{5}$ of 10?
6. What is $\frac{3}{5}$ of 10?
7. What is $\frac{1}{6}$ of 12?
8. What is $\frac{5}{6}$ of 12?
9. What is $\frac{1}{7}$ of 21?
10. What is $\frac{4}{7}$ of 21?
11. What is $\frac{1}{8}$ of 16?
12. What is $\frac{5}{8}$ of 16?
13. What is $\frac{1}{9}$ of 36?
14. What is $\frac{7}{9}$ of 36?
15. What is $\frac{1}{10}$ of 40?
16. What is $\frac{9}{10}$ of 40?
17. What is $\frac{1}{3}$ of 48?
18. What is $\frac{2}{3}$ of 48?
19. What is $\frac{1}{4}$ of 60?
20. What is $\frac{3}{4}$ of 60?
21. What is $\frac{1}{10}$ of 100?
22. What is $\frac{3}{10}$ of 100?
23. What is $\frac{1}{4}$ of 100?
24. What is $\frac{3}{4}$ of 100?
25. What is $\frac{3}{5}$ of 100?

Drill for Lesson 96

1. $\frac{1}{3} \times 2 =$
2. $\frac{1}{2} \times 3 =$
3. $\frac{2}{3} \times 2 =$
4. $\frac{2}{3} \times 3 =$
5. $\frac{1}{4} \times 5 =$
6. $\frac{3}{4} \times 3 =$
7. $2 \times \frac{4}{5} =$
8. $3 \times \frac{3}{5} =$
9. $4 \times \frac{2}{3} =$

10. $5 \times \frac{2}{5} =$

11. $\frac{5}{6} \times 5 =$

12. $4 \times \frac{3}{4} =$

13. $\frac{3}{8} \times 3 =$

14. $\frac{1}{2} \times 7 =$

15. $6 \times \frac{1}{3} =$

16. $\frac{2}{3} \times 5 =$

17. $\frac{3}{8} \times 5 =$

18. $8 \times \frac{3}{4} =$

19. $7 \times \frac{3}{10} =$

20. $\frac{3}{5} \times 10 =$

21. What number is $\frac{2}{3}$ of 10?
22. What number is $\frac{1}{4}$ of 7?
23. What number is $\frac{1}{3}$ of 16?
24. What number is $\frac{3}{4}$ of 7?
25. What number is $\frac{3}{5}$ of 4?

Drill for Lesson 99

Reduce each fraction and mixed number in problems 1–15.

1. $\frac{2}{8} =$

2. $\frac{3}{9} =$

3. $\frac{4}{6} =$

4. $\frac{4}{10} =$

5. $\frac{5}{10} =$

6. $\frac{3}{12} =$

7. $1\frac{2}{4} =$

8. $3\frac{6}{8} =$

9. $2\frac{3}{6} =$

10. $4\frac{8}{10} =$

11. $1\frac{2}{6} =$

12. $5\frac{6}{9} =$

13. $3\frac{2}{12} =$

14. $2\frac{8}{10} =$

15. $4\frac{9}{12} =$

Reduce each answer in problems 16–25.

16. $\frac{3}{8} + \frac{3}{8} =$

17. $\frac{9}{10} - \frac{3}{10} =$

18. $\frac{2}{3} \times \frac{1}{4} =$

19. $\frac{1}{6} \times 3 =$

20. $1\frac{1}{4} + 2\frac{1}{4} =$

21. $3\frac{5}{6} - 1\frac{1}{6} =$

22. $5\frac{5}{9} + 1\frac{1}{9} =$

23. $\frac{5}{12} + \frac{5}{12} =$

24. $3\frac{2}{10} + \frac{3}{10} =$

25. $7\frac{7}{8} - 1\frac{5}{8} =$

Drill for Lesson 100

Reduce each fraction as far as possible.

1. $\frac{4}{8} =$

2. $\frac{6}{12} =$

3. $\frac{8}{12} =$

4. $\frac{10}{20} =$

5. $\frac{4}{20} =$

6. $\frac{8}{16} =$

7. $\frac{12}{18} =$

8. $\frac{10}{100} =$

9. $\frac{18}{24} =$

10. $\frac{50}{100} =$

11. $\frac{16}{20} =$

12. $\frac{60}{100} =$

13. $\frac{16}{48} =$

14. $\frac{24}{100} =$

15. $\frac{12}{20} =$

16. $\frac{7}{12} + \frac{1}{12} =$

17. $\frac{15}{16} - \frac{3}{16} =$

18. $\frac{3}{10} \times \frac{2}{3} =$

19. $\frac{2}{3} \times \frac{3}{8} =$

20. $\frac{9}{24} + \frac{7}{24} =$

21. $\frac{17}{18} - \frac{11}{18} =$

22. $\frac{6}{10} \times \frac{5}{10} =$

23. $\frac{1}{12} \times 6 =$

24. $\frac{7}{20} + \frac{1}{20} =$

25. $\frac{13}{24} - \frac{5}{24} =$

Drill for Lesson 101

Simplify each fraction and mixed number.

1. $\frac{8}{6}$
2. $\frac{9}{6}$
3. $\frac{10}{6}$
4. $\frac{10}{8}$
5. $\frac{12}{8}$
6. $\frac{12}{10}$
7. $\frac{14}{4}$
8. $\frac{27}{6}$
9. $\frac{20}{8}$
10. $\frac{15}{6}$
11. $\frac{15}{10}$
12. $\frac{14}{8}$
13. $3\frac{6}{4}$
14. $4\frac{16}{10}$
15. $5\frac{10}{4}$
16. $9\frac{15}{9}$
17. $25\frac{8}{6}$
18. $11\frac{16}{6}$
19. $\frac{36}{8}$
20. $\frac{40}{6}$
21. $\frac{50}{4}$
22. $\frac{8}{9} + \frac{8}{9} + \frac{8}{9} =$
23. $3\frac{7}{8} + 4\frac{7}{8} =$
24. $\frac{3}{4} \times 10 =$
25. $\frac{6}{5} \times \frac{9}{2} =$

Drill for Lesson 104

1. $12\overline{)432}$
2. $24\overline{)432}$
3. $18\overline{)432}$
4. $27\overline{)432}$
5. $13\overline{)235}$
6. $29\overline{)401}$
7. $32\overline{)516}$
8. $19\overline{)399}$
9. $23\overline{)490}$

10. $14\overline{)500}$ **11.** $25\overline{)700}$ **12.** $33\overline{)1000}$

13. $41\overline{)464}$ **14.** $39\overline{)800}$ **15.** $17\overline{)422}$

16. $22\overline{)657}$ **17.** $15\overline{)218}$ **18.** $31\overline{)943}$

19. $35\overline{)457}$ **20.** $28\overline{)628}$ **21.** $26\overline{)795}$

22. $16\overline{)400}$ **23.** $21\overline{)861}$

24. $37\overline{)925}$ **25.** $48\overline{)770}$

Drill for Lesson 106

1. $\frac{2}{3} \div \frac{1}{2} =$ **2.** $\frac{1}{2} \div \frac{2}{3} =$ **3.** $\frac{1}{3} \div \frac{3}{4} =$

4. $\frac{3}{4} \div \frac{1}{3} =$ **5.** $\frac{3}{4} \div \frac{1}{4} =$ **6.** $\frac{1}{4} \div \frac{3}{4} =$

7. $2 \div \frac{1}{2} =$ **8.** $\frac{1}{2} \div 2 =$ **9.** $2 \div \frac{1}{3} =$

10. $\frac{1}{3} \div 2 =$ **11.** $\frac{1}{6} \div \frac{1}{3} =$ **12.** $\frac{1}{3} \div \frac{1}{6} =$

13. $\frac{3}{4} \div \frac{1}{2} =$ **14.** $\frac{1}{2} \div \frac{3}{4} =$ **15.** $3 \div \frac{2}{3} =$

16. $\frac{2}{3} \div 3 =$ **17.** $3 \div \frac{3}{4} =$ **18.** $\frac{3}{4} \div 3 =$

19. $\frac{5}{6} \div \frac{1}{2} =$ **20.** $\frac{1}{2} \div \frac{5}{6} =$ **21.** $\frac{3}{4} \div \frac{1}{5} =$

22. $\frac{1}{5} \div \frac{3}{4} =$ **23.** $4 \div \frac{2}{3} =$ **24.** $\frac{2}{3} \div 4 =$

25. $5 \div \frac{3}{7} =$

Drill for Lesson 109

1. 3.47 + 6.4 =
2. 23.51 − 1.7 =
3. 25.3 + .421 =
4. 6.57 − .8 =
5. 3.842 + 1.6 =
6. 20.45 − 12.1 =
7. 4.2 + .34 + .1 =
8. 5.423 − 1.4 =
9. 4.28 + .6 + 3.2 =
10. 1.00 − .84 =
11. 7.45 + 12.383 =
12. 1.000 − .625 =
13. 3 + 4.6 + .27 =
14. 36.27 − 12 =
15. 14.2 + 6.4 + 5 =
16. 3.427 − 1 =
17. 5.2 + 3 + .47 =
18. 32.47 − 5.8 =
19. 5.36 + 12 =
20. 16.25 − 15 =
21. 4.23 + 4.7 + 12 =
22. 36 + 4.5 + 7 =
23. 3.59 + .428 + 7 =
24. 6.4 + 12 + 1.52 =
25. 8.4 + 12.65 + 8 + 15 =

Drill for Lesson 112

1. .4 − .15 =
2. .3 − .23 =
3. 3.5 − 0.35 =
4. 4.2 − 1.25 =
5. 0.2 − 0.12 =
6. 8.6 − 4.31 =
7. 5. − 1.4 =
8. 0.75 − 0.375 =
9. .8 − .75 =
10. 4.3 − .125 =
11. .6 − .599 =
12. 1.25 − .625 =
13. 4. − 1.25 =
14. 4.1 − 0.14 =
15. .25 − .125 =
16. 7. − 1.6 =
17. .5 − .425 =
18. 4.8 − 3.29 =
19. 6. − .6 =
20. 0.34 − 0.291 =
21. 12. − 10.75 =
22. 8.6 − .315 =
23. 0.1 − 0.018 =
24. 3.65 − .365 =
25. 0.5 − 0.125 =

Drill for Lesson 113

1. 3 − 2.1 =
2. 4 − 3.21 =
3. 1 − .2 =
4. 3.45 − 1 =
5. 6 − 4.7 =
6. 1 − 0.01 =
7. 3.4 − 2 =
8. 1 − 0.23 =
9. 12 − 6.4 =
10. 15 − 1.5 =
11. 4.3 − 1 =
12. 8 − 7.9 =
13. 1 − .9 =
14. 4 − 3.99 =
15. 25 − 12.5 =
16. 16.7 − 8 =
17. 14 − 5.6 =
18. 8 − 1.35 =
19. 4 − 2.77 =
20. 1 − 0.211 =
21. 46 − 23.7 =
22. 5 − 4.91 =
23. 10 − 0.01 =
24. 12 − 4.65 =
25. 3 − 1.25 =

Drill for Lesson 116

Round each number to the nearest whole number.

1. $7\frac{1}{8}$
2. 3.8
3. 4.18
4. $5\frac{5}{6}$
5. 5.2
6. 4.93
7. $12\frac{1}{3}$
8. 16.9
9. 14.23
10. $3\frac{2}{3}$
11. 6.7
12. 5.41
13. $16\frac{1}{5}$
14. 24.4
15. 12.75
16. $9\frac{9}{10}$
17. 9.6
18. 9.87
19. $6\frac{3}{8}$
20. 12.1
21. 18.38
22. $25\frac{3}{4}$
23. 15.3
24. 21.64
25. $11\frac{51}{100}$

Drill for Lesson 119

1. $\begin{array}{r} 0.3 \\ \times\ \ 5 \\ \hline \end{array}$
2. $\begin{array}{r} 4 \\ \times\ 0.6 \\ \hline \end{array}$
3. $\begin{array}{r} 0.7 \\ \times\ 0.8 \\ \hline \end{array}$
4. $\begin{array}{r} 0.6 \\ \times\ \ 6 \\ \hline \end{array}$
5. $\begin{array}{r} 0.4 \\ \times\ 0.4 \\ \hline \end{array}$
6. $\begin{array}{r} 0.8 \\ \times\ \ 9 \\ \hline \end{array}$
7. $\begin{array}{r} 0.25 \\ \times\ \ \ 3 \\ \hline \end{array}$
8. $\begin{array}{r} 2.5 \\ \times\ \ 5 \\ \hline \end{array}$
9. $\begin{array}{r} 2.5 \\ \times\ 0.7 \\ \hline \end{array}$

10. $\begin{array}{r} 0.12 \\ \times \quad 6 \\ \hline \end{array}$ **11.** $\begin{array}{r} 1.2 \\ \times\ 0.8 \\ \hline \end{array}$ **12.** $\begin{array}{r} 0.15 \\ \times \quad 5 \\ \hline \end{array}$

13. $\begin{array}{r} 4.8 \\ \times\ 12 \\ \hline \end{array}$ **14.** $\begin{array}{r} 1.2 \\ \times\ 1.2 \\ \hline \end{array}$ **15.** $\begin{array}{r} 2.5 \\ \times\ 1.2 \\ \hline \end{array}$

16. $0.18 \times 3 =$ **17.** $4.7 \times 0.5 =$
18. $0.3 \times 0.8 =$ **19.** $1.23 \times 0.7 =$
20. $6.25 \times 8 =$ **21.** $0.15 \times 1.5 =$
22. $0.45 \times 0.3 =$ **23.** $0.06 \times 8 =$
24. $0.13 \times 1.5 =$ **25.** $0.35 \times 15 =$

Drill for Lesson 120

1. $\begin{array}{r} .3 \\ \times\ .3 \\ \hline \end{array}$ **2.** $\begin{array}{r} .2 \\ \times\ .4 \\ \hline \end{array}$ **3.** $\begin{array}{r} .12 \\ \times \quad .3 \\ \hline \end{array}$

4. $\begin{array}{r} .05 \\ \times\ .07 \\ \hline \end{array}$ **5.** $\begin{array}{r} .08 \\ \times \quad .7 \\ \hline \end{array}$ **6.** $\begin{array}{r} .12 \\ \times\ .12 \\ \hline \end{array}$

7. $\begin{array}{r} .12 \\ \times\ .08 \\ \hline \end{array}$ **8.** $\begin{array}{r} .42 \\ \times \quad .2 \\ \hline \end{array}$ **9.** $\begin{array}{r} .25 \\ \times \quad .3 \\ \hline \end{array}$

10. $\begin{array}{r} .23 \\ \times \quad .4 \\ \hline \end{array}$ **11.** $\begin{array}{r} .03 \\ \times\ .07 \\ \hline \end{array}$ **12.** $\begin{array}{r} 1.23 \\ \times \quad .04 \\ \hline \end{array}$

13. $\begin{array}{r} .12 \\ \times\ .11 \\ \hline \end{array}$ **14.** $\begin{array}{r} .15 \\ \times\ .15 \\ \hline \end{array}$ **15.** $\begin{array}{r} .45 \\ \times\ .03 \\ \hline \end{array}$

16. $.4 \times .2 =$ **17.** $.25 \times 0.1 =$
18. $.025 \times .7 =$ **19.** $6.5 \times .01 =$
20. $.03 \times .03 =$ **21.** $.01 \times .1 =$
22. $.24 \times .3 =$ **23.** $.12 \times .06 =$
24. $3 \times .017 =$ **25.** $.015 \times .05 =$

Drill for Lesson 122

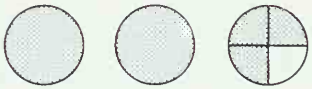
Find the least common multiple of each pair of numbers.

1. 3 and 4 **2.** 4 and 5
3. 4 and 6 **4.** 3 and 6
5. 4 and 8 **6.** 6 and 8

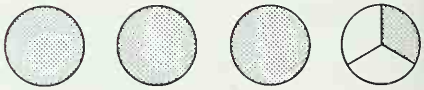
7. 6 and 9
8. 6 and 10
9. 6 and 12
10. 8 and 10
11. 8 and 12
12. 8 and 16
13. 10 and 15
14. 5 and 15
15. 5 and 10
16. 5 and 6
17. 10 and 20
18. 10 and 25
19. 20 and 30
20. 20 and 40
21. 8 and 40
22. 9 and 12
23. 7 and 8
24. 10 and 12
25. 12 and 15

Drill for Lesson 123 Name the number of shaded circles in each problem, 1–4, as a mixed number and as an improper fraction.

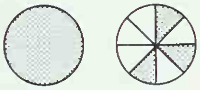
1.



2.



3.



4.

In problems 5–25, write each mixed number as an improper fraction.

5. $3\frac{1}{2}$
6. $2\frac{1}{3}$
7. $3\frac{2}{3}$
8. $4\frac{1}{2}$
9. $1\frac{1}{8}$
10. $2\frac{1}{5}$
11. $5\frac{1}{2}$
12. $4\frac{1}{3}$
13. $3\frac{1}{4}$
14. $7\frac{1}{2}$
15. $3\frac{1}{3}$
16. $4\frac{1}{5}$
17. $2\frac{1}{6}$
18. $3\frac{1}{8}$
19. $2\frac{7}{8}$

20. $1\frac{3}{10}$ **21.** $2\frac{1}{10}$ **22.** $3\frac{9}{10}$

23. $4\frac{3}{4}$ **24.** $5\frac{2}{5}$ **25.** $10\frac{1}{2}$

Drill for Lesson 127

1. $\frac{1}{2} + \frac{1}{4} =$ **2.** $\frac{3}{4} - \frac{1}{2} =$ **3.** $\frac{1}{2} + \frac{3}{8} =$

4. $\frac{5}{8} - \frac{1}{2} =$ **5.** $\frac{1}{4} + \frac{1}{8} =$ **6.** $\frac{7}{8} - \frac{1}{4} =$

7. $\frac{3}{4} + \frac{1}{8} =$ **8.** $\frac{1}{3} - \frac{1}{9} =$ **9.** $\frac{1}{2} + \frac{1}{10} =$

10. $\frac{8}{9} - \frac{2}{3} =$ **11.** $\frac{1}{5} + \frac{1}{10} =$ **12.** $\frac{9}{10} - \frac{1}{2} =$

13. $\frac{2}{5} + \frac{3}{10} =$ **14.** $\frac{3}{10} - \frac{1}{5} =$ **15.** $\frac{1}{6} + \frac{7}{12} =$

16. $\frac{7}{10} - \frac{2}{5} =$ **17.** $\frac{1}{2} + \frac{5}{12} =$ **18.** $\frac{7}{12} - \frac{1}{3} =$

19. $\frac{3}{4} + \frac{1}{12} =$ **20.** $\frac{3}{4} - \frac{1}{12} =$ **21.** $\frac{2}{3} + \frac{1}{12} =$

22. $\frac{4}{5} - \frac{1}{10} =$ **23.** $\frac{2}{5} + \frac{3}{10} =$ **24.** $\frac{11}{12} - \frac{2}{3} =$

25. $\frac{3}{5} + \frac{1}{15} =$

Drill for Lesson 128

1. $\begin{array}{r} 3\frac{1}{2} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$ **2.** $\begin{array}{r} 3\frac{3}{4} \\ +\ 1\frac{1}{8} \\ \hline \end{array}$ **3.** $\begin{array}{r} 5\frac{3}{8} \\ +\ 1\frac{1}{2} \\ \hline \end{array}$ **4.** $\begin{array}{r} 5\frac{1}{6} \\ +\ 1\frac{1}{3} \\ \hline \end{array}$

5. $\begin{array}{r} 4\frac{1}{2} \\ +\ 1\frac{1}{6} \\ \hline \end{array}$ **6.** $\begin{array}{r} 3\frac{2}{3} \\ +\ 1\frac{1}{6} \\ \hline \end{array}$ **7.** $\begin{array}{r} 4\frac{3}{8} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$ **8.** $\begin{array}{r} 6\frac{3}{10} \\ +\ 1\frac{1}{2} \\ \hline \end{array}$

9. $\begin{array}{r} 3\frac{3}{10} \\ +\ 2\frac{3}{5} \\ \hline \end{array}$ **10.** $\begin{array}{r} 5\frac{1}{2} \\ +\ 1\frac{5}{12} \\ \hline \end{array}$ **11.** $\begin{array}{r} 4\frac{5}{12} \\ +\ 1\frac{1}{3} \\ \hline \end{array}$ **12.** $\begin{array}{r} 6\frac{3}{4} \\ +\ 1\frac{1}{12} \\ \hline \end{array}$

13. $\begin{array}{r} 4\frac{7}{8} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$ **14.** $\begin{array}{r} 4\frac{3}{4} \\ -\ 2\frac{3}{8} \\ \hline \end{array}$ **15.** $\begin{array}{r} 6\frac{1}{5} \\ -\ 3\frac{1}{10} \\ \hline \end{array}$ **16.** $\begin{array}{r} 5\frac{7}{10} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$

17. $\begin{array}{r} 8\frac{2}{3} \\ -\ 1\frac{1}{6} \\ \hline \end{array}$ **18.** $\begin{array}{r} 4\frac{5}{6} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$ **19.** $\begin{array}{r} 6\frac{7}{8} \\ -\ 1\frac{3}{4} \\ \hline \end{array}$ **20.** $\begin{array}{r} 7\frac{7}{12} \\ -\ 3\frac{1}{2} \\ \hline \end{array}$

21. $6\frac{2}{3} + 1\frac{1}{6} =$ **22.** $4\frac{5}{8} - 1\frac{1}{4} =$ **23.** $8\frac{5}{12} + 1\frac{1}{6} =$

24. $8\frac{5}{6} - 1\frac{1}{3} =$ **25.** $7\frac{3}{10} + 1\frac{2}{5} =$

Drill for Lesson 129

1. $3\overline{)\,.42}$ **2.** $4\overline{)\,5.2}$ **3.** $5\overline{)\,0.85}$

4. $6\overline{)\,4.2}$ **5.** $7\overline{)\,.84}$ **6.** $8\overline{)\,9.6}$

7. $2\overline{)\,0.36}$ **8.** $4\overline{)\,7.2}$ **9.** $5\overline{)\,7.5}$

10. $6\overline{)\,1.32}$ **11.** $7\overline{)\,12.6}$ **12.** $8\overline{)\,3.44}$

13. $6\overline{)\,23.4}$ **14.** $3\overline{)\,2.34}$ **15.** $2\overline{)\,1.36}$

16. 6.4 ÷ 4 = **17.** .64 ÷ 2 =
18. 6.5 ÷ 5 = **19.** .63 ÷ 3 =
20. 3.24 ÷ 6 = **21.** 12.8 ÷ 8 =
22. 1.44 ÷ 9 = **23.** 23.8 ÷ 7 =
24. .81 ÷ 3 = **25.** 5.31 ÷ 9 =

Drill for Lesson 130

1. $3\overline{)\,.15}$ **2.** $4\overline{)\,.28}$ **3.** $5\overline{)\,1.35}$

4. $6\overline{)\,.144}$ **5.** $7\overline{)\,.63}$ **6.** $8\overline{)\,.144}$

7. $9\overline{)\,.45}$ **8.** $3\overline{)\,.012}$ **9.** $2\overline{)\,.054}$

10. $4\overline{).36}$
11. $5\overline{).30}$
12. $6\overline{).138}$
13. $7\overline{).105}$
14. $8\overline{)1.92}$
15. $9\overline{).765}$
16. $.18 \div 3 =$
17. $1.54 \div 7 =$
18. $.36 \div 9 =$
19. $.144 \div 6 =$
20. $.08 \div 2 =$
21. $.095 \div 5 =$
22. $.64 \div 8 =$
23. $.036 \div 4 =$
24. $1.28 \div 8 =$
25. $.065 \div 5 =$

Drill for Lesson 131

1. $4\overline{)3.4}$
2. $5\overline{).12}$
3. $6\overline{)2.7}$
4. $8\overline{).52}$
5. $2\overline{)3.1}$
6. $4\overline{).54}$
7. $5\overline{).7}$
8. $6\overline{)1.5}$
9. $8\overline{)3.6}$
10. $2\overline{).5}$
11. $4\overline{)1.5}$
12. $5\overline{)0.12}$
13. $6\overline{).45}$
14. $8\overline{)2.6}$
15. $4\overline{).3}$
16. $.5 \div 4 =$
17. $.6 \div 5 =$
18. $1.2 \div 8 =$
19. $3.3 \div 6 =$
20. $.9 \div 2 =$
21. $.9 \div 5 =$
22. $.18 \div 4 =$
23. $.18 \div 8 =$
24. $.3 \div 5 =$
25. $.6 \div 8 =$

Drill for Lesson 133

Find the average of each group of numbers.

1. 3, 3, 6
2. 4, 5, 7, 8
3. 5, 6, 8, 9
4. 15, 17, 19
5. 21, 19, 26
6. 1, 2, 3, 4, 5
7. 3, 5, 7, 9,
8. 36, 44
9. 65, 47, 32
10. 6, 7, 8, 9, 10
11. 112, 124
12. 47, 52, 54
13. 6, 6, 6, 10
14. 11, 12, 13, 14, 15
15. 33, 34, 35
16. 30, 40, 50, 60
17. 22, 24, 26, 28
18. 163, 197
19. 97, 101, 111
20. 43, 62, 56, 63
21. 11, 12, 13, 14, 15, 16, 17
22. 10, 20, 30, 40, 50, 60

23. 1436, 1634
24. 80, 80, 85, 80, 75, 80
25. 95, 90, 95, 85, 80

Drill for Lesson 134

1. $\frac{1}{2} + \frac{1}{3} =$
2. $\frac{1}{2} - \frac{1}{3} =$
3. $\frac{1}{3} + \frac{1}{4} =$
4. $\frac{1}{3} - \frac{1}{4} =$
5. $\frac{1}{2} + \frac{1}{5} =$
6. $\frac{1}{2} - \frac{1}{5} =$
7. $\frac{1}{4} + \frac{1}{5} =$
8. $\frac{1}{4} - \frac{1}{5} =$
9. $\frac{2}{3} + \frac{1}{4} =$
10. $\frac{2}{3} - \frac{1}{4} =$
11. $\frac{3}{4} + \frac{1}{3} =$
12. $\frac{3}{4} - \frac{1}{3} =$
13. $\frac{1}{4} + \frac{1}{6} =$
14. $\frac{1}{4} - \frac{1}{6} =$
15. $\frac{5}{6} + \frac{3}{4} =$
16. $\frac{5}{6} - \frac{3}{4} =$
17. $\frac{3}{4} + \frac{2}{3} =$
18. $\frac{3}{4} - \frac{2}{3} =$
19. $\frac{1}{2} + \frac{2}{7} =$
20. $\frac{1}{2} - \frac{2}{7} =$
21. $\frac{2}{3} + \frac{2}{5} =$
22. $\frac{2}{3} - \frac{2}{5} =$
23. $\frac{4}{5} + \frac{3}{4} =$
24. $\frac{4}{5} - \frac{3}{4} =$
25. $\frac{4}{5} + \frac{1}{2} =$

Drill for Lesson 135

1. $\begin{array}{r} 3\frac{1}{3} \\ + 1\frac{1}{4} \\ \hline \end{array}$
2. $\begin{array}{r} 5\frac{2}{5} \\ + 2\frac{1}{2} \\ \hline \end{array}$
3. $\begin{array}{r} 4\frac{1}{6} \\ + 3\frac{3}{4} \\ \hline \end{array}$
4. $\begin{array}{r} 4\frac{3}{4} \\ - 1\frac{1}{2} \\ \hline \end{array}$
5. $\begin{array}{r} 5\frac{5}{6} \\ - 1\frac{1}{4} \\ \hline \end{array}$
6. $\begin{array}{r} 4\frac{7}{8} \\ - 1\frac{3}{4} \\ \hline \end{array}$

7. $\begin{array}{r} 9\frac{1}{3} \\ +\ 3\frac{2}{5} \\ \hline \end{array}$

8. $\begin{array}{r} 4\frac{3}{5} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$

9. $\begin{array}{r} 6\frac{1}{2} \\ +\ 1\frac{1}{3} \\ \hline \end{array}$

10. $\begin{array}{r} 4\frac{5}{6} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$

11. $\begin{array}{r} 8\frac{3}{4} \\ -\ 1\frac{2}{3} \\ \hline \end{array}$

12. $\begin{array}{r} 7\frac{5}{8} \\ -\ 4\frac{1}{3} \\ \hline \end{array}$

13. $\begin{array}{r} 9\frac{2}{3} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$

14. $\begin{array}{r} 8\frac{3}{4} \\ +\ 1\frac{1}{5} \\ \hline \end{array}$

15. $\begin{array}{r} 7\frac{1}{6} \\ +\ 1\frac{1}{4} \\ \hline \end{array}$

16. $3\frac{3}{5} + 1\frac{3}{10} =$

17. $5\frac{1}{2} - 1\frac{1}{3} =$

18. $7\frac{2}{3} + 1\frac{1}{6} =$

19. $7\frac{2}{3} - 1\frac{3}{5} =$

20. $4\frac{3}{5} + 3\frac{1}{4} =$

21. $6\frac{1}{4} - 6\frac{1}{6} =$

22. $3\frac{1}{8} + 2\frac{3}{4} =$

23. $9\frac{3}{4} - 7\frac{3}{5} =$

24. $6\frac{1}{3} + 4\frac{3}{5} =$

25. $11\frac{9}{10} - 3\frac{3}{4} =$

Drill for Lesson 136

1. $.3\,\overline{)\,.15}$

2. $.4\,\overline{)\,2.4}$

3. $.5\,\overline{)\,.15}$

4. $.2\,\overline{)\,.32}$

5. $.3\,\overline{)\,1.23}$

6. $.4\,\overline{)\,0.56}$

7. $.6\,\overline{)\,.72}$

8. $.7\,\overline{)\,.98}$

9. $.8\,\overline{)\,1.52}$

10. $.5\,\overline{)\,6.5}$

11. $.4\,\overline{)\,.132}$

12. $.6\,\overline{)\,1.26}$

13. $1.2\,\overline{)\,4.8}$

14. $1.2\,\overline{)\,1.44}$

15. $2.5\,\overline{)\,2.75}$

16. $4.6 \div .2 =$

17. $.64 \div .4 =$

18. $4.5 \div .3 =$

19. $.45 \div .5 =$

20. $3.21 \div .3 =$

21. $1.23 \div .3 =$

22. $.95 \div .5 =$

23. $1.74 \div .6 =$

24. $3.00 \div 1.2 =$

25. $3.45 \div 1.5 =$

Drill for Lesson 137

1. $1\frac{1}{2} \times \frac{2}{3} =$

2. $\frac{3}{4} \times 1\frac{1}{4} =$

3. $2\frac{1}{2} \times 3 =$

4. $4 \times 2\frac{1}{2} =$

5. $1\frac{1}{3} \times 1\frac{1}{3} =$

6. $1\frac{1}{2} \times 1\frac{1}{4} =$

7. $\frac{1}{2} \times 1\frac{2}{3} =$

8. $2\frac{1}{3} \times \frac{1}{2} =$

9. $2 \times 3\frac{1}{2} =$

10. $3\frac{1}{3} \times 3 =$

11. $1\frac{2}{3} \times 2\frac{1}{2} =$

12. $3\frac{1}{2} \times 1\frac{3}{4} =$

13. $\frac{1}{3} \times 2\frac{2}{3} =$

14. $2\frac{3}{4} \times \frac{1}{2} =$

15. $4\frac{1}{2} \times 4 =$

16. $3 \times 1\frac{2}{3} =$

17. $2\frac{1}{4} \times 1\frac{1}{2} =$

18. $1\frac{3}{4} \times 1\frac{2}{3} =$

19. $\frac{3}{4} \times 1\frac{3}{4} =$

20. $2\frac{3}{4} \times \frac{1}{3} =$

21. $5 \times 1\frac{2}{5} =$

22. $2\frac{2}{3} \times 3 =$

23. $1\frac{3}{5} \times \frac{5}{8} =$

24. $3\frac{1}{3} \times 1\frac{1}{5} =$

25. $\frac{1}{2} \times 4\frac{1}{2} =$

Glossary

Acute angle An angle that is less than a right angle.

Algorithmn A method of calculation.

a.m. Before noon (*ante meridiem*).

Angle An opening between two intersecting lines.

Average A middle amount; found by dividing the sum of the numbers by the number of numbers.

Calendar Table showing days of week and dates of month.

Century One hundred years.

Circumference The distance around a circle; the curved line that bounds a circle.

Common In reference to numbers, the same number, as in common factor, common multiple, and common denominator.

Compare Determine whether one number is greater than another number or whether two numbers are equal.

Decade Ten years.

Decimal places Places to the right of a decimal point.

Decimal point A period used to make the separation of the ones' place and the tenths' place.

Denominator The bottom number of a fraction.

Diameter The distance across a circle.

Difference The result of subtraction.

Digit Any one of the ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Dividend In division, the number being divided.

Divisible Able to be divided without a remainder; for example, 6 is divisible by 1, 2, 3, and 6.

Divisor In division, the number by which another number is divided.

Equivalent Of the same value; for example, $\frac{2}{4}$ is equivalent to $\frac{1}{2}$, or $\frac{2}{4} = \frac{1}{2}$.

Estimate To roughly determine a size or value; to calculate approximately using rounded numbers.

Factor A number being multiplied.

Fraction Part of a whole.

Horizontal Level; parallel with the horizon.

Improper fraction A fraction with the numerator equal to or greater than the denominator; a fraction that is equal to or greater than 1.

Intersecting lines Lines that cross; lines with a common point.

Invert Exchange the numerator and denominator of a fraction.

Minus sign Symbol for subtraction, also used for negative value.

Mixed number A number made up of a whole number and a fraction.

Negative Opposite of positive; a number less than zero.

Noon Midday.

Numeral A written symbol for a number.

Numerator The top number of a fraction.

Oblique Slanted.

Obtuse angle An angle greater than a right angle but less than a straight angle.

Parallel lines Lines that stay the same distance apart.

Perimeter The distance around a closed plane figure.

Perpendicular lines Lines that intersect and form right angles.

Place value That value of a digit determined by the position of the digit within the numeral.

Plane figure A shape, drawn on a flat surface, that has length and width but no thickness.

Plus sign Symbol for addition.

p.m. After noon (*post meridiem*).

Polygon Straight-sided closed plane figure.

Prime A number divisible by only 1 and itself.

Product The result of multiplying.

Proper fraction A fraction with a numerator that is less than the denominator.

Quadrilateral Any four-sided polygon.

Quotient The result of division.

Radius The distance from the center of a circle to the outside edge of the circle.

Reciprocal A fraction resulting from inverting a fraction.

Rectangle A four-sided polygon having four right angles.

Reduce To form an equivalent fraction with a smaller numerator and denominator.

Remainder What is left after subtraction; also, since division serves to repeat subtraction, what is left after division.

Right angle A square angle, often marked with a square.

Segment Part of a line.

Sequence A list of numbers following a rule or plan.

Solve Find a missing value in an equation; find a solution to a problem.

Sphere A smooth geometric solid shaped like a ball.

Square A rectangle all of whose sides are the same length.

Straight angle An angle which forms a straight line.

Sum The result of addition.

Tally mark A mark to keep track of counting.

Times sign Symbol for multiplication.

Triangle A polygon with three angles and three sides.

Vertical Straight up and down; perpendicular to horizontal.

Whole numbers All the numbers in the sequence 0, 1, 2, 3, ...

Index

Abbreviations

U.S. CUSTOMARY		METRIC	
UNIT	ABBREVIATION	UNIT	ABBREVIATION
inch	in.	meter	m
foot	ft	centimeter	cm
yard	yd	millimeter	mm
mile	mi	kilometer	km
ounce	oz	gram	g
pound	lb	kilogram	kg
degree Fahrenheit	°F	degree Celsius	°C
pint	pt	liter	L
quart, gallon	qt, gal	milliliter	mL

OTHER ABBREVIATIONS	
square	sq.
square mile	sq. mi
square centimeter	sq. cm

Equivalence Table for Units

LENGTH	
U.S. CUSTOMARY	METRIC
12 in. = 1 ft	10 mm = 1 cm
3 ft = 1 yd	1000 mm = 1 m
5280 ft = 1 mi	100 cm = 1 m
1760 yd = 1 mi	1000 m = 1 km

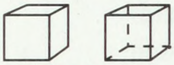
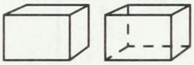
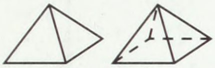
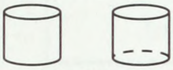
WEIGHT	MASS
U.S. CUSTOMARY	METRIC
16 oz = 1 lb	1000 g = 1 kg
2000 lb = 1 ton	

LIQUID MEASURE	
U.S. CUSTOMARY	METRIC
16 oz = 1 pt	1000 mL = 1 L
2 pt = 1 qt	
4 qt = 1 gal	

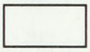
Place Value Chart

hundred billions	ten billions	billions	,	hundred millions	ten millions	millions	,	hundred thousands	ten thousands	thousands	,	hundreds	tens	ones	.	tenths	hundredths	thousandths	ten thousandths	hundred thousandths		
—	—	—		—	—	—		—	—	—		—	—	—		—	—	—	—	—		

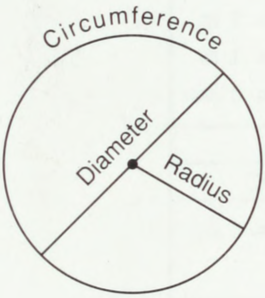
Geometric Solids

SHAPE	NAME
	Cube
	Rectangular solid
	Pyramid
	Cylinder
	Sphere
	Cone

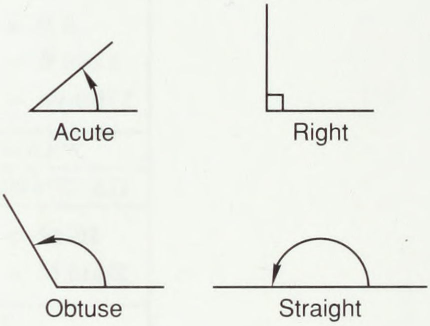
Common Polygons

SHAPE	NUMBER OF SIDES	NAME
	3	Triangle
	4	Quadrilateral
	5	Pentagon
	6	Hexagon
	8	Octagon

Measures of a Circle



Types of Angles



Roman Numerals

NUMERAL	VALUE
I	1
V	5
X	10
L	50
C	100
D	500
M	1000