

• Word Problems About Comparing

Power Up

facts

Power Up B

count aloud

Count by fours from 4 to 60 and then back down to 4.

mental math

In problems **a–c**, practice splitting the second number to add.

a. **Number Sense:** $57 + 8$

b. **Number Sense:** $78 + 6$

c. **Number Sense:** $49 + 4$

d. **Number Sense:** $63 + 19 + 200$

e. **Time:** The Johnsons are driving to Yosemite National Park. They expect that the drive will take 6 hours. If the Johnsons left their house at 6:50 a.m., at what time would they expect to arrive at the park?

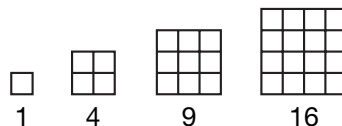
f. **Measurement:** Many adults are about 2 yards tall. Two yards is how many feet?

g. **Geometry:** True or False: Parallel lines intersect.

h. **Estimation:** Madison has \$18.47. Round this amount to the nearest 25 cents.

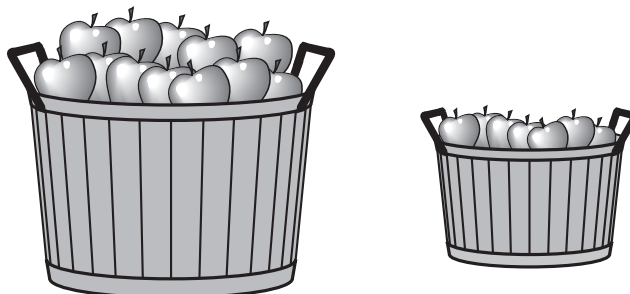
problem solving

Choose an appropriate problem-solving strategy to solve this problem. Here we show four squares. The first is made up of 1 small square. The second, third, and fourth squares are made up of 4, 9, and 16 small squares. Describe the pattern that you see. How many small squares would make up the sixth square of the pattern? Explain how you arrived at your answer.



New Concept

There are 43 apples in the large basket. There are 19 apples in the small basket.



The difference tells us “how many more” and “how many fewer.” There are 24 *more* apples in the large basket than in the small basket. There are 24 *fewer* apples in the small basket than in the large basket.

When we compare the number of apples in the two baskets, we see that 43 is **greater than** 19. To find **how much greater** 43 is than 19, we subtract.

$$\begin{array}{r} \text{Larger amount} \quad 43 \\ - \text{Smaller amount} \quad - 19 \\ \hline \text{Difference} \quad 24 \end{array}$$

As we think about this story, we realize that it is not a “some went away” story because nothing went away. This is a different kind of story. In this story we are comparing two numbers. One way to compare two numbers is to subtract to find their difference. We subtract the smaller number from the larger number. Here we show two ways to write the formula:

$$\begin{array}{r} \text{Larger} \\ - \text{Smaller} \\ \hline \text{Difference} \end{array}$$

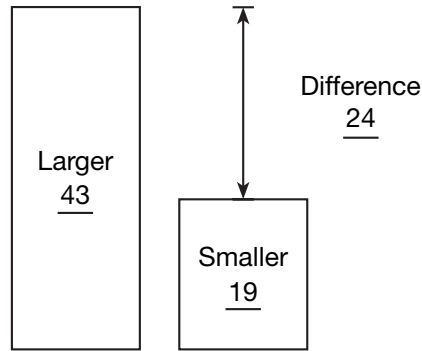
$$\text{Larger} - \text{Smaller} = \text{Difference}$$

A diagram can help us understand a larger-smaller-difference plot. In the following diagram, we have used the numbers from the apple problem. There are two towers, a “larger” tower and a “smaller” tower. The “difference” is the difference in the heights of the two towers.

Reading Math

We translate the problem using a *larger-smaller-difference* formula.

Larger: 43 apples
Smaller: 19 apples
Difference:
24 apples



Recall that we solve a word problem using the four-step problem-solving process:

Step 1: Read and translate the problem.

Step 2: Make a plan to solve the problem.

Step 3: Follow the plan and solve the problem.

Step 4: Check your answer for reasonableness.

A plan that can help us solve word problems is to *write an equation*.

We do this by using a formula and writing the numbers we know in an equation that we can solve to find the answer.

Example 1

Andrea picked 42 apples at the apple orchard. Her younger brother picked 13 apples. How many more apples did Andrea pick than her brother?

To find “how many more,” we use a subtraction formula. Here we are comparing the two numbers 42 and 13.

Formula	Problem
Larger	42 apples
– Smaller	– 13 apples
<hr/>	<hr/>
Difference	<i>d</i>

Andrea picked **29 more apples** than her brother picked.

To check the answer, we see if it correctly completes the problem.

Forty-two apples are 29 apples more than 13 apples.

Example 2

There were 17 apples in a basket and 63 apples in a barrel. How many fewer apples were in the basket than were in the barrel?

We are asked to find “how many fewer.” The formula is the same as the formula for finding “how many more.” We use a subtraction formula to compare the numbers.

Formula	Problem
$\begin{array}{r} \text{Larger} \\ - \text{Smaller} \\ \hline \text{Difference} \end{array}$	$\begin{array}{r} 63 \text{ apples} \\ - 17 \text{ apples} \\ \hline d \end{array}$

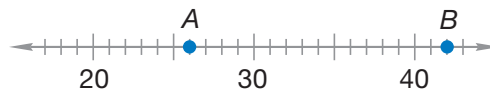
There were **46 fewer apples** in the basket than were in the barrel.

We check the answer.

Seventeen apples are 46 apples fewer than 63 apples.

Example 3

The number represented by point *B* is how much greater than the number represented by point *A*?



We see that point *A* represents 26 and point *B* represents 42. We use these numbers in the larger-smaller-difference formula.

$$\begin{array}{r} \text{Larger} - \text{Smaller} = \text{Difference} \\ 42 - 26 = d \end{array}$$

We find that 42 is **16 greater** than 26.

We can check our answer by counting the number of units from point *A* to point *B*.

Lesson Practice

Formulate Write and solve an equation for each problem.

- Forty-three is how much greater than twenty-seven?
- Maricela has 42 CDs. Frank has 22 CDs. How many fewer CDs does Frank have?
- Cesar had 53 shells. Juanita had 95 shells. How many more shells did Juanita have?

Written Practice

Distributed and Integrated

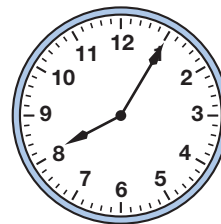
Formulate Write and solve equations for problems 1–3.

- * 1. There were 43 parrots in the flock. Some flew away. Then there were ⁽²⁵⁾ 27 parrots in the flock. How many parrots flew away?

*2. One hundred fifty is how much greater than twenty-three?
(31)

*3. Twenty-three apples is how many fewer than seventy-five apples?
(31)

*4. On Saturday morning, Brady awoke at the time shown on the clock. Three hours later, he left home to go to softball practice. What time did Brady leave home?
(27)

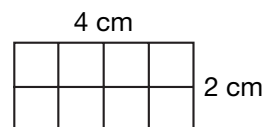


*5. **Represent** Write 412 in expanded form. Then use words to write the number.
(7, 16)

6. What fraction of this figure is shaded?
(22)



*7. The rectangle shown at right is 4 cm long and 2 cm wide.
(Inv. 2, Inv. 3)



a. What is the perimeter?

b. What is the area?

8. Multiply:
(28, 29)

a. 2×5

b. 5×7

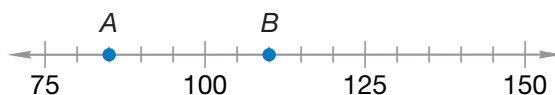
c. 2×7

d. 4×11

*9. **Connect** Write two addition facts and two subtraction facts using the numbers 20, 30, and 50.
(6)

*10. At 8 p.m. the temperature was 3°C . By 8 a.m. the next morning, the temperature had fallen 8 degrees. What was the temperature at 8 a.m.?
(18)

*11. The number represented by point A is how much less than the number represented by point B?
(31)



12. Multiply:
(28, 29)

a. 5×8

b. 2×8

c. 5×9

13. a. How many quarters equal one dollar?
(22)

b. A quarter is what fraction of a dollar?

c. Three quarters are what fraction of a dollar?

* 14. **Represent** Use digits and symbols to write this comparison:
(Inv. 1)

Three hundred nine is less than three hundred ninety.

* 15. Three hundred nine is how much less than 390?
(31)

* 16. $\begin{array}{r} \$4.22 \\ - \$2.95 \\ \hline \end{array}$
(30)

* 17. $\begin{array}{r} 909 \\ - 27 \\ \hline \end{array}$
(30)

* 18. $\begin{array}{r} \$422 \\ - \$144 \\ \hline \end{array}$
(30)

* 19. $\begin{array}{r} 703 \\ - 471 \\ \hline \end{array}$
(30)

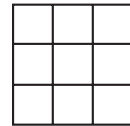
20. $\begin{array}{r} \$4.86 \\ + \$2.95 \\ \hline \end{array}$
(22)

21. $\begin{array}{r} 370 \\ - 209 \\ \hline \end{array}$
(30)

22. $\begin{array}{r} 22 \\ + n \\ \hline 37 \end{array}$
(24)

23. $\begin{array}{r} 76 \\ - c \\ \hline 28 \end{array}$
(24)

* 24. **Connect** What multiplication fact is illustrated by this square?
(Inv. 3)



* 25. Find each square root:
(Inv. 3)

a. $\sqrt{9}$

b. $\sqrt{25}$

* 26. **Multiple Choice** Which of these does *not* equal 9?
(Inv. 3)

A 3 squared

B $\sqrt{81}$

C $\sqrt{18}$

D $\sqrt{25} + \sqrt{16}$

27. Multiply:
(28, Inv. 3)

a. 1×1

b. 5×5

c. 8×8


d. 9×9

28. Compare. Write $>$, $<$, or $=$.
(Inv. 1)

a. $510 \bigcirc 501$

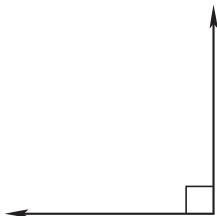
b. $722 \bigcirc 976$

c. $234 \bigcirc 238$

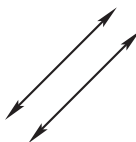
- * 29.**  **Estimate** The land area of Aztec Ruins National Monument in New Mexico is 318 acres. The land area of Casa Grande Ruins National Monument in Arizona is 473 acres. What is a reasonable estimate of the total acreage of these two national monuments? Explain why your estimate is reasonable.

- * 30.** **Classify** Name each figure:
(23)

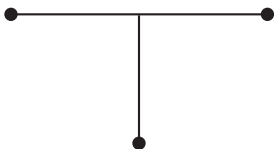
a.



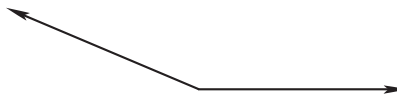
b.



c.



d.



Early Finishers

Real-World Connection

Tricia outlined two rectangles on her paper. Rectangle *A* measured 4 cm by 6 cm, and rectangle *B* measured 5 cm by 5 cm. Use 1-cm grid paper or a centimeter ruler to draw both rectangles. Then find the area of each rectangle. Which rectangle has the larger area? Use the *larger* – *smaller* = *difference* formula.

- **Multiplication Facts:**
9s, 10s, 11s, 12s

Power Up**facts**

Power Up B

count aloud

Count down by fours from 40 to 4.

mental mathIn problems **a–c**, practice splitting the second number to add.

- Number Sense:** $49 + 6$
- Number Sense:** $65 + 8$
- Number Sense:** $38 + 8$
- Number Sense:** $920 + 38 + 7$
- Time:** Simone goes to bed each night at 9:15 p.m. She wants to watch a movie that lasts 2 hours. At what time must Simone begin the movie to finish it by her bedtime?
- Measurement:** There are 8 squares along each edge of a checkerboard. If each square has 1-inch sides, what is the perimeter of the checkerboard?
- Money:** The bicycle was \$240, and the lock was \$35. What was the total cost for the two items?
- Estimation:** The length of the car is 176 inches. Round this length to the nearest ten inches.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. TJ has seven coins in his right pocket. He does not have any dollar or half-dollar coins. TJ has at least one penny, one nickel, one dime, and one quarter, but he has no more than two coins of any type. What are the possible values of all seven coins? (There are four possibilities.)

New Concept

Some 9s multiplication facts are listed below. Look for patterns in the facts. Notice that the first digit of each product is one less than the number that is multiplied by nine. Also notice that the two digits of each product add up to nine.

$$\begin{array}{ll} 9 \times 2 = 18 & (1 + 8 = 9) \\ 9 \times 3 = 27 & (2 + 7 = 9) \\ 9 \times 4 = 36 & (3 + 6 = 9) \\ 9 \times 5 = 45 & (4 + 5 = 9) \\ 9 \times 6 = 54 & (5 + 4 = 9) \\ 9 \times 7 = 63 & (6 + 3 = 9) \\ 9 \times 8 = 72 & (7 + 2 = 9) \\ 9 \times 9 = 81 & (8 + 1 = 9) \\ 9 \times 10 = 90 & (9 + 0 = 9) \end{array}$$

These two patterns can help us quickly multiply by nine.

Example 1

What is the first digit of each product?

$$\begin{array}{ccccc} \text{a.} & \text{b.} & \text{c.} & \text{d.} & \text{e.} \\ 9 & 3 & 9 & 4 & 9 \\ \times 6 & \times 9 & \times 7 & \times 9 & \times 8 \\ \hline ? _ & ? _ & ? _ & ? _ & ? _ \end{array}$$

The first digit is one less than the number multiplied by nine.

$$\begin{array}{ccccc} \text{a.} & \text{b.} & \text{c.} & \text{d.} & \text{e.} \\ 9 & 3 & 9 & 4 & 9 \\ \times 6 & \times 9 & \times 7 & \times 9 & \times 8 \\ \hline 5 _ & 2 _ & 6 _ & 3 _ & 7 _ \end{array}$$

Example 2

What is the second digit of each product?

$$\begin{array}{ccccc} \text{a.} & \text{b.} & \text{c.} & \text{d.} & \text{e.} \\ 9 & 3 & 9 & 4 & 9 \\ \times 6 & \times 9 & \times 7 & \times 9 & \times 8 \\ \hline 5 ? & 2 ? & 6 ? & 3 ? & 7 ? \end{array}$$

Complete each two-digit product so that the sum of the digits is nine.

$$\begin{array}{ccccc} \text{a.} & \text{b.} & \text{c.} & \text{d.} & \text{e.} \\ 9 & 3 & 9 & 4 & 9 \\ \times 6 & \times 9 & \times 7 & \times 9 & \times 8 \\ \hline 54 & 27 & 63 & 36 & 72 \end{array}$$

In Examples 3, 4, and 5, look for patterns that appear when whole numbers are multiplied by 10, 11, and 12.

Example 3

Thinking Skill

Generalize

What strategy could you use to remember the 10s multiplication facts?

Find the number of millimeters that equal the given length in centimeters.

Centimeters	1	2	3	4	5	6	7	8	9	10	11	12
Millimeters	10	20	30	40	?	?	?	?	?	?	?	?

Notice that one centimeter equals 10 millimeters. We will use our 10s multiplication facts to complete the table.

Centimeters	1	2	3	4	5	6	7	8	9	10	11	12
Millimeters	10	20	30	40	50	60	70	80	90	100	110	120

Example 4

A sheet of notebook paper is 11 inches long. Find the length in inches of 12 sheets laid end to end by completing this table.

Sheets	1	2	3	4	5	6	7	8	9	10	11	12
Inches	11	22	33	44	?	?	?	?	?	?	?	?

We are told that notebook paper is 11 inches long. We will use our 11s multiplication facts to complete the table.

Sheets	1	2	3	4	5	6	7	8	9	10	11	12
Inches	11	22	33	44	55	66	77	88	99	110	121	132

Example 5

Find the number of inches in 12 feet by completing this table:

Feet	1	2	3	4	5	6	7	8	9	10	11	12
Inches	12	24	36	48	?	?	?	?	?	?	?	?

Notice that one foot equals 12 inches. We will use our 12s multiplication facts to complete the table.

Feet	1	2	3	4	5	6	7	8	9	10	11	12
Inches	12	24	36	48	60	72	84	96	108	120	132	144

Lesson Practice

Find the product for each multiplication fact:

a. $\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$

b. $\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$

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

d. $\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$

e. $\begin{array}{r} 9 \\ \times 4 \\ \hline \end{array}$

f. $\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$

g. $\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$

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

i. $\begin{array}{r} 10 \\ \times 5 \\ \hline \end{array}$

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

k. $\begin{array}{r} 10 \\ \times 3 \\ \hline \end{array}$

l. $\begin{array}{r} 10 \\ \times 9 \\ \hline \end{array}$

m. $\begin{array}{r} 11 \\ \times 6 \\ \hline \end{array}$

n. $\begin{array}{r} 11 \\ \times 4 \\ \hline \end{array}$

o. $\begin{array}{r} 11 \\ \times 7 \\ \hline \end{array}$

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

q. $\begin{array}{r} 12 \\ \times 3 \\ \hline \end{array}$

r. $\begin{array}{r} 12 \\ \times 5 \\ \hline \end{array}$

s. $\begin{array}{r} 12 \\ \times 2 \\ \hline \end{array}$

t. $\begin{array}{r} 12 \\ \times 4 \\ \hline \end{array}$

Written Practice

Distributed and Integrated

- * 1. **Formulate** ⁽²⁵⁾ There are two hundred fifteen pages in the book. Kande has read eighty-six pages. How many more pages are left to read? Write and solve an equation.

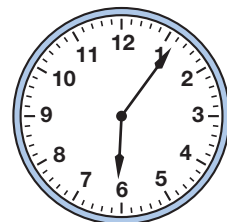
2. ⁽¹⁰⁾ Use the digits 7, 8, and 9 to make an even number greater than 800. Use each digit only once.

3. **Compare** ^(Inv. 1) Use digits and a comparison symbol to show that four hundred eighty-five is less than six hundred ninety.

- * 4. **Conclude** ^(3, Inv. 3) This is a sequence of square numbers. What are the next three numbers in the sequence? How do you know?

1, 4, 9, 16, _____, _____, _____, ...

5. ⁽¹⁹⁾ One evening Jermaine finished washing the dishes at the time shown on the clock. What time did Jermaine finish washing the dishes?



- * 6. **Represent** ^(7, 16) Write 729 in expanded form and use words to write the number.

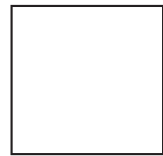
- *7. **Connect** Change this addition problem to a multiplication problem.
 (27, 28) Then find the product on the multiplication table.

$$6 + 6 + 6 + 6 + 6 + 6 + 6$$

8. (10) Is the value of three nickels and two dimes an even number of cents or an odd number of cents?

9. (20) a. Round 66 to the nearest ten.
 b. Round \$6.60 to the nearest dollar.
 c. Round \$6.60 to the nearest 25 cents.

10. (Inv. 2) a. Use a metric ruler to measure the length of each side of this square in centimeters.

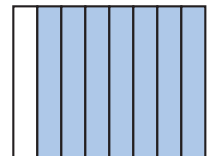


- b. What is the perimeter of the square?

- *11. (23) **Analyze** Which two uppercase letters are formed with only two perpendicular line segments?

12. (24) If $62 - w = 48$, then what is the value of w ?

13. (22) What fraction of this rectangle is shaded?



- *14. (Inv. 3) **Represent** Draw an array of Xs to show the multiplication 5×5 .

- *15. (31) **Represent** The number represented by point B is how much greater than the number represented by point A ?

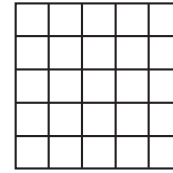


Multiply:

- *16. (32) a. 9×6 b. 9×8 c. 9×4 d. 9×10
- *17. (Inv. 3) a. 6×6 b. 4×4 c. 7×7 d. 10×10

- *18. a. 2×11 b. 8×11 c. 5×11 d. 3×11
(32)

- *19. **Represent** a. What multiplication fact is illustrated by this square?
(Inv. 3)



- b. Find $\sqrt{25}$.

*20. $\sqrt{81}$
(Inv. 3)

*21. $\$3.60 - \1.37
(30)

*22. $413 - 380$
(30)

*23. $875 - 218$
(30)

*24. Compare: $24 + 36$ \bigcirc $12 + 48$
(Inv. 1)

- *25. What number equals 8 squared?
(Inv. 3)

- *26. **Multiple Choice** Jacob saw an array of freshly baked rolls on a pan. There were four rows of rolls with four rolls in each row. How many rolls will be left on the pan if he eats one roll?
(25, Inv. 3)

A 3

B 7

C 12

D 15

- *27. Which property of multiplication does this story illustrate?
(28, Inv. 3)

Twenty-four desks were arranged in 4 rows with 6 desks in each row. Then they were moved into 6 rows with 4 desks in each row.

- *28. **Formulate** In 2000, a professional baseball pitcher struck out 347 batters and another professional pitcher struck out 284 batters. Write and solve an equation to find the total number of batters the two pitchers struck out.
(13)

- *29. **Estimate** The average depth of the East China Sea is 620 feet. The average depth of the Yellow Sea is 121 feet. Estimate the difference between the two average depths. Explain why your estimate is reasonable.
(30)

- *30. **Predict** Write the sixth term of each pattern:
(32)

a. 11, 22, 33, 44, 55, ...

b. 12, 24, 36, 48, 60, ...

• Writing Numbers Through Hundred Thousands

Power Up

facts

Power Up C

count aloud

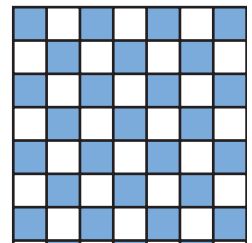
As a class, count by threes from 30 to 60 and then back down to 30.

mental math

- Number Sense:** $60 - 40$
- Number Sense:** $80 - 30$
- Number Sense:** $800 - 300$
- Number Sense:** $340 + 35 + 115$
- Geometry:** The square table was 3 feet along each edge. What was the perimeter of the table?
- Time:** Carole records her favorite television show. Each episode is 1 hour long. If Carole watches two episodes in a row starting at 6:20 p.m., what time will she finish?
- Measurement:** The high temperature on the hot day was 36° Celsius. The low temperature was 27° Celsius. The difference between the high and low temperatures for the day was how many degrees?
- Estimation:** Layne pen was 128 millimeters long. Round this length to the nearest ten millimeters.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. A checkerboard has 64 small squares. There are 8 squares along each side. If a square checkerboard had only 36 small squares, then how many squares would there be along each side?



New Concept

Recall that the places in a three-digit number are the ones place, the tens place, and the hundreds place. The three places to the left of the hundreds place are the thousands place, the ten-thousands place, and the hundred-thousands place.

hundred thousands
ten thousands
thousands
hundreds
tens
ones

— — — , — — —

Analyze How is the value of each place related to the value of the place to its right?

In order to make the numbers easier to read, we can use commas when writing numbers equal to or greater than one thousand. To read a whole number with four, five, or six digits, we read the number to the left of the comma, say “thousand” at the comma, and then read the number after the comma. When we write a number in words, we place a comma after the word *thousand*.

4,507 is read four **thousand**, five hundred seven
34,507 is read thirty-four **thousand**, five hundred seven
234,507 is read two hundred thirty-four **thousand**,
five hundred seven

Four-digit whole numbers are often written without a comma, like when we write the year. In this book we will typically not use a comma when writing a four-digit whole number. However, we will use commas to express any whole number with more than four digits.

Example 1

Reading Math

When we see a comma, we write the place-value name of the digit to the left of the comma. This comma represents the thousands place.

Use words to write 23456.

To make the number easier to read, we insert a comma three places from the right-hand end of the number.

23,456

Then we write the number that is to the left of the comma.

twenty-three

Next we write “thousand” followed by a comma.

twenty-three thousand,

Finally, we write the number that is to the right of the comma.

twenty-three thousand, four hundred fifty-six

Example 2

In the 2000 Census, Fort Worth had a population of 534,694. Use words to write the population.

First we name the part of the number to the left of the comma and then write “thousand.”

five hundred thirty-four thousand

Then we name the rest of the number, remembering to write a comma after the word thousand.

five hundred thirty-four thousand, six hundred ninety-four

Example 3

Write 75,634 in expanded form.

The 7 is in the ten-thousands place. It has a value of 70,000. So we write

$$70,000 + 5000 + 600 + 30 + 4$$

Example 4

Which digit in 345,678 is in the hundred-thousands place?

The digit **3** is in the hundred-thousands place.

Example 5

Compare: 510,000 ○ 501,000

We compare the numbers place by place, beginning with the greatest place value (hundred thousands).

$$510,000 > 501,000$$

Example 6

Write these numbers in order from least to greatest:

23,000 230,000 78,000 870,000 500,000

First we compare the numbers place by place, beginning with the greatest place value (hundred thousands). Then we order the numbers from least to greatest.

23,000 78,000 230,000 500,000 870,000

Example 7

Use digits to write eight hundred ninety-five thousand, two hundred seventy.

It is a good idea to read the entire number before we begin writing it. We see the word *thousand*, so we know to place a thousands comma after the digits that tell how many thousands.

_____ , _____

We read the part of the number before the word *thousand* and write this number in front of the comma. For “eight hundred ninety-five thousand” we write

8 9 5 , _____

Now, to the right of the comma, we write the last part of the number: “two hundred seventy.”

895,270

Lesson Practice

As a class, read the following numbers aloud:

- | | |
|------------|------------|
| a. 125,000 | b. 435,000 |
| c. 12,500 | d. 25,375 |
| e. 4875 | f. 250,625 |

Represent Use words to write the numbers in problems g–i.

- | | |
|------------|-----------|
| g. 2750 | h. 14,518 |
| i. 500,000 | |

Use digits to write the numbers in problems j–l.

- j. twenty thousand
- k. twelve thousand, three hundred fifty
- l. one hundred twenty thousand, five hundred
- m. Write 5280 in expanded form.
- n. Write 2040 in expanded form.
- o. Which digit in 284,359 is in the ten-thousands place?
- p. Compare: 760,000 ○ 670,000

- q. The dates in the table below are important to aerospace history. Arrange the dates in order from earliest to latest.

Event in Aerospace History	Date
First human lands on the moon	1969
Wright brothers invent the first successful airplane	1903
Russians launch Sputnik, the first artificial satellite	1957
Charles Lindbergh completes the first nonstop, solo flight across the Atlantic Ocean	1927

Written Practice

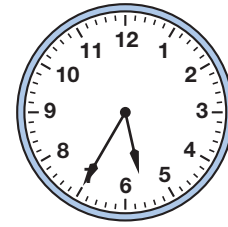
Distributed and Integrated

- * 1. Marcos is reading a book with 211 pages. K'Neesha is reading a book with 272 pages. How many more pages will K'Neesha read than Marcos? Write and solve an equation.
(31)
- * 2. **Represent** Write the number 3425 in expanded form. Then use words to write the number.
(16, 33)
- * 3. **Represent** Draw two parallel lines. Then draw a perpendicular line that makes right angles where it intersects the parallel lines.
(23)
- * 4. The square root of 49 is how much less than four squared?
(Inv. 3, 31)
- * 5. **Represent** On 1-cm grid paper, draw a 6 cm by 2 cm rectangle.
(Inv. 2, Inv. 3)
- a. What is the perimeter of the rectangle?
- b. What is the area of the rectangle?
- * 6. Place commas in 250000. Then use words to write the number.
(33)
- * 7. **Conclude** What are the next four numbers in this counting sequence?
(3)
- ..., 230, 240, 250, 260, _____, _____, _____, _____, ...
- * 8. Which digit in 123,456 is in the ten-thousands place?
(33)

9. Compare: $9 \times 4 \bigcirc \sqrt{36}$

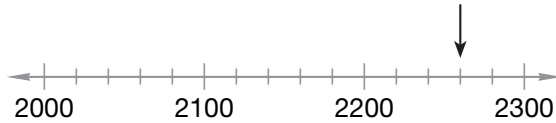
(Inv. 1,
Inv. 3)

- * 10. After school yesterday, Luis began playing outside at the time shown on the clock. He played for 2 hours 25 minutes. What time did Luis finish playing outside?



- * 11. **Represent** To what number is the arrow pointing?

(Inv. 1)



Multiply:

- * 12. a. 5×8 b. 4×4 c. 8×8 d. 12×12

(29,
Inv. 3)

- * 13. a. 9×3 b. 9×4 c. 9×5 d. 9×10

(29, 32)

- * 14. **Connect** Write two addition facts and two subtraction facts using the numbers 40, 60, and 100.

(6)

15. **Connect** Change this addition problem to a multiplication problem:

(27)

$$20 + 20 + 20 + 20 + 20$$

* 16.
$$\begin{array}{r} \$7.37 \\ - \$2.68 \\ \hline \end{array}$$

(30)

* 17.
$$\begin{array}{r} 921 \\ - 58 \\ \hline \end{array}$$

(30)

* 18.
$$\begin{array}{r} 464 \\ + 247 \\ \hline \end{array}$$

(13)

* 19.
$$\begin{array}{r} 329 \\ + \quad z \\ \hline 547 \end{array}$$

(24, 30)

* 20.
$$\begin{array}{r} \$4.88 \\ + \$2.69 \\ \hline \end{array}$$

(22)

* 21.
$$\begin{array}{r} 555 \\ - \quad c \\ \hline 222 \end{array}$$

(24)

22. Judy's birth date is 5/27/98. In which month was she born?

(5)

• Writing Numbers Through Hundred Millions

Power Up

facts

Power Up A

count aloud

Count by sevens from 7 to 63.

mental math

- Number Sense:** $65 - 30$
- Number Sense:** $650 - 300$
- Number Sense:** $58 + 4 + 100$
- Number Sense:** $36 + 29 + 200$
- Number Sense:** $520 + 36 + 126$
- Measurement:** Compare: 14 in. 1 ft
- Time:** If the time is 7:45, how many minutes is it until 8:00?
- Estimation:** The tabletop was 73 centimeters above the floor. Round that height to the nearest ten centimeters.

problem solving

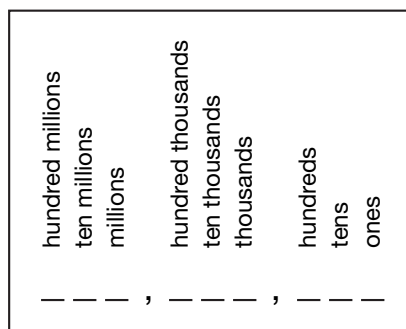
Choose an appropriate problem-solving strategy to solve this problem. Ramone has seven coins in his right pocket. He does not have any dollar or half-dollar coins. Ramone has at least one penny, one nickel, one dime, and one quarter, but he has no more than two coins of any type. Although Ramone has an odd number of coins, their total value is an even number of cents. What is the total value of the coins?

New Concept

In Lesson 33 we wrote numbers through hundred thousands. In this lesson we will write numbers through hundred millions.

To write a whole number with seven, eight, or nine digits, we use another comma to indicate millions.

Whole-Number Place Values



To read a whole number with seven, eight, or nine digits, we first read the digits to the left of the millions comma and say “million” at the comma. Then we read the next three digits and say “thousand” at the next comma. We finish by reading the remaining digits.

15,000,000 is read fifteen **million**

2,500,000 is read two **million**, five hundred thousand

1,258,300 is read one **million**, two hundred fifty-eight thousand, three hundred

Generalize How many hundred thousands equal one million? Explain why.

Example 1

Use words to write 12345678.

Counting from the right, we place a comma every three digits.

12,345,678

Next we write the part of the number to the left of the millions comma.

twelve million

Since there are more digits to read, we place a comma after the word *million*. Then we write the part of the number up to the thousands comma.

twelve million, three hundred forty-five thousand

Since there are still more digits to read, we place a comma after the word *thousand* and write the rest of the number.

twelve million, three hundred forty-five thousand, six hundred seventy-eight

When writing numbers, every comma is followed by at least three digits. Sometimes it is necessary to use one or more zeros in order to get the correct number of digits after a comma.

Example 2

Use digits to write two million, three hundred thousand.

We see the word *million*, so we use this form:

_____ , _____ , _____

In front of the word *million*, we read “two,” so we write

 2 , _____ , _____

Next we read “three hundred thousand,” so we write

 2 , 3 0 0 , _____

Now we fill the three places after the thousands comma with zeros.

2,300,000

In newspapers we often see large numbers written in short word form.

2 million people gathered for the Rose Parade.

95 thousand fans filled the stadium.

Connect Use digits to write the numbers 2 million and 95 thousand.

Example 3

Compare: 113 million ○ 311 million

We compare the digits place by place, beginning with the greatest place value (millions).

113 million < 311 million

Example 4

Write these numbers in order from least to greatest:

7 million 250 thousand 12 million

First we compare the digits place by place, beginning with the greatest place value (millions). Then we order the numbers from least to greatest.

250 thousand, 7 million, 12 million

Lesson Practice

Represent Use words to write each number:

- a. 121,340,000
- b. 12,507,000
- c. 5,075,000

Use digits to write each number:

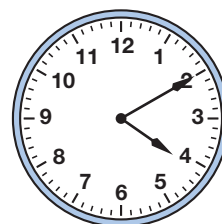
- d. twenty-five million
- e. twelve million, five hundred thousand
- f. two hundred eighty million
- g. Compare: 34 million ○ 43 million
- h. Arrange these numbers in order from least to greatest:
5 million 25 thousand 750 thousand
- i. Arrange these numbers in order from least to greatest:
12,375 1,000,000 987,000


Written Practice

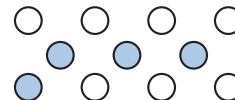
Distributed and Integrated

Formulate Write and solve equations for problems 1 and 2.

- *1. Four hundred sixty-five is how much greater than twenty-four?
(31)
- *2. Marcie had four hundred twenty marbles. Kareem had one hundred twenty-three marbles. How many fewer marbles did Kareem have?
(31)
- *3. **Represent** On 1-cm grid paper, draw a square that is 4 cm on each side.
(Inv. 2, Inv. 3)
 - a. What is the perimeter of the square?
 - b. What is the area of the square?
- *4. **Represent** Write the number 25,463 in expanded form.
(16, 33)
- *5. **Represent** Draw a circle that has a diameter of 4 centimeters. What is the radius of the circle?
(21)
- *6. Jharma arrived home from school at the time shown on the clock and finished her homework 1 hour 35 minutes later. What time did Jharma finish her homework?
(27)



7.  **Explain** What fraction of the circles is shaded? Describe how you found your answer.



8. **Connect** Change this addition problem to a multiplication problem. Then find the product.

$$12 + 12 + 12 + 12 + 12$$

- *9. **Estimate** Round 76 to the nearest ten. Round 59 to the nearest ten. Then add the rounded numbers.

10. Compare:

(Inv. 1,
34)

a. $3 \bigcirc -4$

b. two million \bigcirc 200,000

- *11. The number represented by point A is how much less than the number represented by point B?

(31)



Multiply:

12. a. 5×7
(29,
Inv. 3)

b. 6×6

c. 9×9

d. 10×10

13. a. 3×9
(29, 32)

b. 9×7

c. 8×9

d. 9×1

14. a. 11×11
(32)

b. 6×12

c. 8×11

d. 10×12

- *15. a. **Represent** Use words to write 3,500,000.
(34, 33)

- b. **Represent** Use digits to write seven hundred fifty thousand.

*16.
$$\begin{array}{r} 535 \\ - 268 \\ \hline \end{array}$$

(30)

*17.
$$\begin{array}{r} 908 \\ - 43 \\ \hline \end{array}$$

(30)

*18.
$$\begin{array}{r} \$471 \\ - \$346 \\ \hline \end{array}$$

(30)

*19. $c + 329 = 715$
(24, 30)

20. $c - 127 = 398$
(24)

21. If the radius of a circle is 12 inches, then the diameter of the circle is how many feet?
(Inv. 2,
21)

- *22. Five squared is how much more than $5 + 5$?
(Inv. 3, 31)

- *23. **Connect** Select two odd numbers and one even number that form an addition/subtraction fact family. Then use the numbers to write two addition facts and two subtraction facts.
(6, 10)

*24. $\sqrt{9} + \sqrt{16}$
(Inv. 3)

25. **Represent** Draw a triangle that has one obtuse angle.
(23)

- *26. **Multiple Choice** Which digit in 3,756,289 is in the thousands place?
(34)

A 3 B 7 C 5 D 6

- *27. In the year 2000, the four most populous U.S. states and their populations were:
(34)

California	33,871,648
Florida	15,982,378
New York	18,976,457
Texas	20,851,820


These states are listed in alphabetical order. List the names of the states in order of population, beginning with the greatest population.

- *28. **Predict** What is the twelfth term in this counting sequence?
(3, 32)

11, 22, 33, 44, ...

- *29. **Predict** What is the eighth term in this counting sequence?
(3, 32)

12, 24, 36, 48, ...

- *30.  **Estimate** M'Lisa would like to purchase about 100 balloons for her birthday party. One bag of 25 balloons costs \$2.49. What is a reasonable estimate of M'Lisa's cost to purchase about 100 balloons? Explain why your estimate is reasonable.
(20, 22)

• Naming Mixed Numbers and Money

Power Up

facts

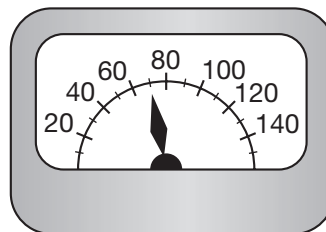
Power Up C

count aloud

Count by fours from 40 to 80.

mental math

- Number Sense:** $750 - 200$
- Number Sense:** $86 - 50$
- Number Sense:** $43 + 9 + 110$
- Measurement:** The needle is pointing to what number on this scale?



- Measurement:** It took Paul only two minutes to finish the quiz. How many seconds is that?
- Money:** Kalea had \$45. She bought a pair of slacks for \$25. How much money does she have left?
- Estimation:** Each paperback at the used bookstore costs \$1.93. About how much would 5 paperbacks cost?
- Calculation:** $4 \times 5, - 10, + 2, + 3$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. The pattern of the sequence below is $1 \times 1, 2 \times 2, 3 \times 3$, and so on. Use a multiplication table to help you continue this sequence of square numbers up to 100.

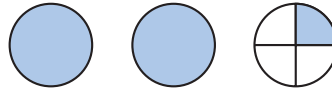
1, 4, 9, 16, _____, _____, _____, _____, _____, 100

New Concept

A **mixed number** is a whole number combined with a fraction.
The mixed number $3\frac{1}{2}$ is read “three and one half.”

Example 1

How many circles are shaded?



Two whole circles are shaded, and one fourth of another circle is shaded. The total number of shaded circles is two and one fourth, which we write as

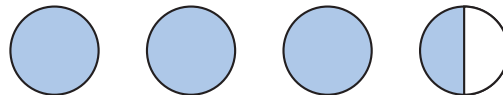
Thinking Skill

Analyze

How many fourths are equal to 2 ?
Explain why.

Example 2

Use words to write $3\frac{1}{2}$.

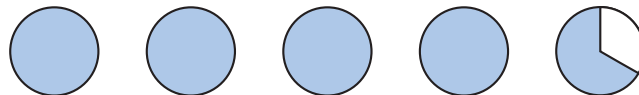


We use the word *and* when naming mixed numbers.

three and one half

Example 3

Use words to write $4\frac{2}{3}$.



four and two thirds

Math Symbols

We do not use a decimal point with a cent sign. The notation 0.50¢ is incorrect because it does not represent fifty cents. Instead, it represents 50 hundredths (or $\frac{50}{100}$) of one cent.

We can show amounts of money by using a number and a cent sign (¢). We put a cent sign after a number to tell how many cents there are.

324¢ 20¢ 4¢

We can also use a dollar sign (\$) to show amounts of money. We put the dollar sign in front of the money amount, and we use a decimal point and two places to the right of the decimal point to show the number of cents. The money amounts below are the same as the previous amounts, but they are expressed with a dollar sign and decimal point rather than a cent sign.

\$3.24 \$0.20 \$0.04

Sometimes we use mixed numbers to name an amount of money. For example, we might say “seven and one-half dollars” to name \$7.50 because 50 cents is one half-dollar. When writing a check, we can write the number of dollars in words and the cents as a fraction on the “dollars” line.

JOHN SMITH 123 4th Street	1021
	DATE <u>April 1, 2007</u>
PAY TO THE ORDER OF <u>Electric Company</u>	\$ 41.32
<u>Forty-one and $\frac{32}{100}$</u>	DOLLARS
*MYBANK	
Memo <u>March Electric Bill</u>	<u>John Smith</u>

Example 4

Anita is writing a check for her water bill. Show how she would write fifteen dollars and twenty-five cents using a dollar sign.

When we use a dollar sign and need to show cents, we put a decimal point between dollars and cents.

\$15.25

Example 5

Anita needs to pay her cable bill. Show how to write \$30.76 using words.

We write the number of dollars in words, write “and,” and then write the number of cents.

thirty dollars and seventy-six cents

Example 6

Show how to write the “dollars” line on this check.

Jan Jones 567 8th Street	2032
	DATE <u>July 3, 2007</u>
PAY TO THE ORDER OF <u>Water Company</u>	\$ <u>\$37.80</u>
_____ DOLLARS	
*MYBANK	
Memo <u>Water Bill</u>	<u>Jan Jones</u>

We write the number of dollars in words, write “and,” and then the cents as a fraction. Since 100 cents equals a dollar, the denominator is 100.

thirty-seven and $\frac{83}{100}$

Example 7

Kasim has one quarter, one dime, and one nickel. Write how much money she has using a cent sign. Then write the same amount using a dollar sign and decimal point.

First we find how many cents Kasim has. A quarter is twenty-five cents, a dime is ten cents, and a nickel is five cents.

$$25\text{¢} + 10\text{¢} + 5\text{¢} = 40\text{¢}$$

Now we write forty cents using a dollar sign and decimal point.

\$0.40

Example 8

Which of the following does not represent the value of a quarter?

25¢

\$0.25

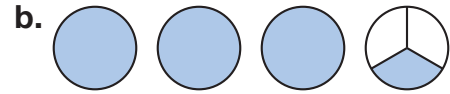
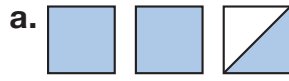
0.25¢

25 cents

The third choice, **0.25¢**, does not represent the value of a quarter. Instead, it represents a quarter (or $\frac{1}{4}$) of one cent.

Lesson Practice

What mixed numbers are illustrated by the shaded pictures?



Represent Draw and shade circles to illustrate these mixed numbers:

c. 1

d. 2

Represent Use words to write each mixed number.

e.

f.

g.

Connect Write each amount with a cent sign instead of a dollar sign.

h. \$0.17

i. \$0.05

Connect Write each amount with a dollar sign instead of a cent sign.

j. 8¢

k. 30¢

l. **Analyze** Write the value of two quarters, two dimes, and one nickel with a dollar sign. Then use a cent sign to write this amount again.

m. Use words to write \$20.05.


n. **Represent** Show how to write the dollars line on a check for \$12.25.

Written Practice

Distributed and Integrated

Write and solve equations for problems 1–3.

*1. ⁽³¹⁾ Thirty-seven nations sent athletes to the 1968 Winter Olympics in Grenoble, France. Thirty years later, seventy-two nations sent athletes to the 1998 Winter Olympics in Nagano, Japan. How many more nations sent athletes in 1998 than in 1968?

*2. ^(Inv. 2)  **Explain** Every morning Mario runs around the block. The block is 300 yards long and 100 yards wide. How many yards does Mario run when he runs around the block? Did you find the perimeter or area of the block? Explain your answer.

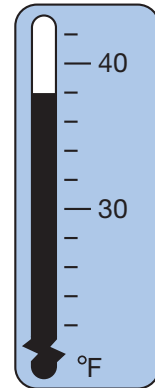
3. ^(1, 17) Ninety-seven oranges were in the first bunch, fifty-seven oranges were in the second bunch, and forty-eight oranges were in the third bunch. How many oranges were in all three bunches?

- *4. ⁽³⁵⁾ What mixed number is pictured in this figure?



5. ⁽³⁵⁾ Armena had four dollars and sixty-five cents. Use a dollar sign and a decimal point to write this amount.

6. ⁽¹⁸⁾ The thermometer shows the high temperature for one winter day in Fairlawn, Ohio. What was the high temperature that day?



7. **Multiple Choice** ⁽²³⁾ Which of these angles does *not* look like a right angle?



- *8. ^(Inv. 3, 31) The square root of 81 is how much less than seven squared?

- *9. ⁽²⁷⁾ On Saturday night, ShayZee fell asleep at the time shown on the clock. Two hours twenty minutes later, ShayZee woke up. What time did ShayZee wake up?



- *10. **Represent** ⁽³⁵⁾ Use words to write $2\frac{3}{10}$.

- *11. ⁽³¹⁾ Find the numbers represented by point A and point B. Then find the difference.



- * 12. **Represent** Use words to write \$1.43.
(35)

Multiply:

13. a. 6×9
(32)

b. 4×9

c. 3×9

d. 10×9

14. a. 6×6
(Inv. 3)

b. 7×7

c. 8×8

d. 11×11

15.
(Inv. 3)

- * 16. **Represent** Draw a rectangle that is 3 cm long and 3 cm wide. Divide the rectangle into thirds and shade $\frac{2}{3}$ of it.
(21, 26)

* 17. $\begin{array}{r} \$6.05 \\ - \$2.53 \\ \hline \end{array}$
(30)

* 18. $\begin{array}{r} 489 \\ + \quad z \\ \hline 766 \end{array}$
(24, 30)

19. $\begin{array}{r} \$5.32 \\ + \$3.44 \\ \hline \end{array}$
(22)

* 20. $\begin{array}{r} c \\ + 294 \\ \hline 870 \end{array}$
(24, 30)

* 21. $\begin{array}{r} 423 \\ - 245 \\ \hline \end{array}$
(30)

22. $\begin{array}{r} 670 \\ - \quad z \\ \hline 352 \end{array}$
(24, 30)

- * 23. **Represent** Use digits to write two hundred fifty million.
(34)

- * 24. **Conclude** What are the next three numbers in this counting sequence?
(3)

..., 3400, 3500, 3600, 3700, _____, _____, _____, ...

25. a. Round 77 to the nearest ten.
(20)

- b. Round \$6.82 to the nearest dollar.

- * 26. **Multiple Choice** If $7 + \square = 10$, then which of the following numbers equals $7 - \square$?
(1, 6)

A 3

B 4

C 7

D 10

- * 27. Compare:
(33, 35)

a. thirty thousand 13,000

b. 74¢ \$0.74

- *28. Write these numbers in order from greatest to least:
(33, 34)

125 thousand 125 million 12,500,000

- *29. **Predict** Write the twelfth term of each pattern below:
(32)

a. 11, 22, 33, 44, ...

b. 12, 24, 36, 48, ...

- *30. Name a real-world example of
(23)

a. parallel lines.

b. perpendicular lines.

Early Finishers

Real-World Connection

The school choir is having a car wash to raise money to buy new songbooks. Each car wash will cost 350¢.

- Write this money amount using a dollar sign and a decimal point.
- Draw and shade circles to represent $3\frac{1}{2}$ as a mixed number.
- Use words to write $3\frac{50}{100}$.

• Fractions of a Dollar

Power Up

facts

Power Up C

count aloud

Count by fours from 40 to 80.

mental math

- Number Sense:** $630 + 45 + 210$
- Number Sense:** $78 + 7 + 10$
- Number Sense:** $67 + 19 + 100$
- Money:** Jason has three bank accounts. His account balances are \$120, \$85, and \$37. Altogether, how much money does Jason have in his bank accounts?
- Measurement:** Isaac ran 5 kilometers. How many meters did Isaac run?
- Time:** Chase went to bed at 9:00 p.m. He woke up 9 hours later. At what time did Chase wake up?
- Estimation:** Carina has \$1.87 in her left pocket and \$2.35 in her right pocket. Round each amount to the nearest 25 cents.
- Calculation:** $6 \times 3, + 8, + 8, - 4$

problem solving

Tom has a penny, a nickel, a dime, and a quarter. Two of the coins are in his left pocket and two are in his right pocket. What combinations of coins could be in his left pocket?

Focus Strategies: Make an Organized List; Draw a Picture

Understand We are told that two of Tom's four coins are in his left pocket and that two are in his right pocket. We are asked to find the combinations of coins that could be in his left pocket.

Plan We can make an organized list or draw a picture of each pair of coins that Tom could have in his left pocket. To be sure we do not skip any possible pairs, we will consider each coin separately and list the other coins that could be paired with it.

Solve We can start with the least valuable coin, the penny. If one of the coins in Tom's left pocket is a penny, then these are the possible pairs:



If Tom does not have a penny in his left pocket, but he does have a nickel, then these are the possible pairs:







If Tom does not have a penny or a nickel in his left pocket, then only one possible pair remains:



We found that there are 6 different pairs of coins Tom could have put into his left pocket:

1. penny and nickel
2. penny and dime
3. penny and quarter
4. nickel and dime
5. nickel and quarter
6. dime and quarter

Check We know that our answer is reasonable because we organized our work to consider every possible pair of coins Tom could have in his left pocket, and we made sure not to repeat pairs of coins.

Each of the 6 coin pairs is called a **combination**. In this problem, we found all the combinations of 2 coins that can be made from the set that includes one penny, one nickel, one dime, and one quarter. When describing a combination, the order in which we list the parts of the combination does not matter. Thus,  and  is the same combination as  and .

New Concept

Thinking Skill

Verify

Explain why a dime is $\frac{1}{10}$ of a dollar.

Since Lesson 22 we have used coins as fractions of a dollar. Because 100 pennies equals one dollar, each penny is $\frac{1}{100}$ of a dollar. Likewise, since 20 nickels equals a dollar, each nickel is $\frac{1}{20}$ of a dollar. We may describe part of a dollar by using a fraction or by using a dollar sign and decimal point.

Example 1

a. Three pennies are what fraction of a dollar?



b. Write the value of three pennies using a dollar sign and a decimal point.

a. One penny is $\frac{1}{100}$ of a dollar, so three pennies are $\frac{3}{100}$ of a dollar.

b. The value of three pennies can also be written as **\$0.03**.

Example 2

a. Which coin equals one fourth of a dollar?

b. Write $\frac{1}{4}$ of a dollar using a dollar sign and a decimal point.



a. Since four quarters equals a dollar, a **quarter** is one fourth of a dollar. (The term *one quarter* means "one fourth.")

b. A quarter of a dollar is **\$0.25**.

Example 3

a. Three dimes are what fraction of a dollar?



b. Write the value of three dimes using a dollar sign and a decimal point.

a. Each dime is $\frac{1}{10}$ of a dollar, so three dimes are $\frac{3}{10}$ of a dollar.

b. The value of three dimes is 30 cents, which we can write as **\$0.30**. So $\frac{3}{10}$ of a dollar is \$0.30.

Example 4

Compare: $\frac{1}{20}$ of a dollar \bigcirc $\frac{1}{2}$ of a dollar

A nickel is $\frac{1}{20}$ of a dollar and is less than $\frac{1}{2}$ of a dollar.

$$\frac{1}{20} \text{ of a dollar} < \frac{1}{2} \text{ of a dollar}$$

Example 5

Look at these coins. How many different ways can we group three coins?



Use money manipulatives to find how many different ways we can group three coins. If the three coins include a penny, then the possible combinations are

penny, nickel, dime

penny, nickel, quarter

penny, dime, quarter

If a penny is not included, then the only combination is

nickel, dime, quarter

We have found **four combinations**.

Verify Describe another way to find that there are four possible combinations.

Lesson Practice

- Analyze** Write the value of three quarters using a dollar sign and a decimal point. Then write three quarters as a fraction of a dollar.
- What fraction of a dollar is three nickels? Write the value of three nickels using a dollar sign and a decimal point.
- Fifty pennies are what fraction of a dollar? Write the value of 50 pennies using a dollar sign and a decimal point.
- Compare: $\frac{1}{10}$ of a dollar \bigcirc $\frac{1}{4}$ of a dollar
- Compare: $\frac{1}{2}$ of a dollar \bigcirc \$0.25

f. Look at these coins:



List all of the different ways to pair two coins. You may use money manipulatives to solve.

Written Practice

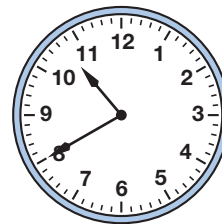
Distributed and Integrated

Formulate Write and solve equations for problems 1–3.

- *1. ⁽³¹⁾ Quinh is 49 inches tall. His dad is 70 inches tall. Quinh is how many inches shorter than his dad?
- *2. ⁽²⁵⁾ Smith went into the store with \$36.49. He bought a book and left the store with \$11.80. How much money did Smith spend in the store?
- *3. ⁽²⁴⁾ Beth answered eleven of the twenty-five questions at school. She answered the rest of the questions as homework. How many questions did Beth answer as homework?
- *4. ⁽³⁵⁾ Write the number of shaded rectangles shown as a mixed number.
- | |
|--|
| |
| |

- *5. ⁽²³⁾ **Verify** Which letter below appears to have no right angles?
- T H E N
- *6. ⁽³⁴⁾ **Represent** Use words to write 2,700,000.
- *7. ⁽³³⁾ **Represent** Use digits to write eighty-two thousand, five hundred.

8. Each day, classes at Kennedy Elementary School end 4 hours 20 minutes later than the time shown on the clock.
(27) What time do classes end each day?

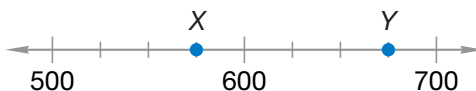


9. **Connect** Change this addition problem to a multiplication problem:
(27)

$$4 + 4 + 4 + 4 + 4 + 4 + 4 + 4$$

10. a. Round 176 to the nearest ten.
(20)
b. Round \$17.60 to the nearest dollar.

- * 11. **Represent** The number represented by point X is how much less than the number represented by point Y?
(31)



Multiply:

12. a. 2×8
(29)

b. 5×6

c. 4×5

d. 5×8

13. a. 3×3
(Inv. 3)

b. 5×5

c. 9×9

d. 10×10

14. a. 9×7
(32)

b. 9×4

c. 9×8

d. 9×12

15. $\sqrt{36} + \sqrt{49}$
(Inv. 3)

* 16. $\begin{array}{r} \$7.32 \\ - \$3.45 \\ \hline \end{array}$
(30)

17. $\begin{array}{r} \$4.89 \\ + \$2.57 \\ \hline \end{array}$
(22)

* 18. $\begin{array}{r} 464 \\ - 238 \\ \hline \end{array}$
(30)

19. $\begin{array}{r} 548 \\ + 999 \\ \hline \end{array}$
(13)

* 20. $\begin{array}{r} 487 \\ + \quad z \\ \hline 721 \end{array}$
(24, 30)

* 21. $\begin{array}{r} 250 \\ - \quad c \\ \hline 122 \end{array}$
(24, 30)

22. $c - 338 = 238$
(24)

23. $87 - b = 54$
(24)

- * 24. Which digit in 8,367,254 is in the ten-thousands place?
(34)

- *25. Multiple Choice** Which of the money amounts below does *not* equal one half of a dollar?
(36)

A 2 quarters B 0.50¢ C \$0.50 D 50¢

- *26. Multiple Choice** If a rectangle is 5 in. long and 4 in. wide, then its area is _____.
(Inv. 3)

A 9 in. B 18 in. C 20 sq. in. D 18 sq. in.

- 27. Compare:**

(Inv. 1,
36)

a. $-12 \bigcirc -21$

b. $\frac{1}{4}$ of a dollar \bigcirc \$0.25

- 28. Predict** Write the tenth term of each pattern below:
(32)

a. 12, 24, 36, 48, 60, ...

b. 11, 22, 33, 44, 55, ...

- *29. Look at these bills:**

(36)



List all of the different ways to pair two bills.

- 30. Estimate** The state of Louisiana has 397 miles of coastline. The state of Oregon has 296 miles of coastline. What is a reasonable estimate of the combined length of those coastlines? Explain why your estimate is reasonable.
(20)

Early Finishers

Real-World
Connection

Maria had a quarter, a dime, and a nickel in her pocket. How much money did Maria have in her pocket?

- Write the amount as a fraction of a dollar.
- Write the value of the coins using a dollar sign and a decimal point.
- Compare the amount to $\frac{1}{2}$ of a dollar.

• Reading Fractions and Mixed Numbers from a Number Line

Power Up

facts

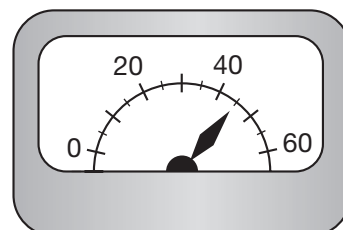
Power Up D

count aloud

Count down by fives from 150 to 50.

mental math

- Number Sense:** $780 - 200$
- Number Sense:** $870 - 230$
- Number Sense:** $157 + 19$
- Number Sense:** $58 + 6$
- Measurement:** The needle is pointing to what number on this scale?



- Geometry:** Altogether, how many sides do four triangles have?
- Estimation:** Choose the more reasonable estimate for the diameter of a music CD: 12 cm or 12 m.
- Calculation:** $3 \times 3 \times 3 + 3$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. The rectangle shown represents how a plot of land will be divided among four different owners. Area C is the same size as area D . Areas C and D together are the same size as area B . Areas B , C , and D together are the same size as area A . What fraction of the whole rectangle is each area?



New Concept

To name mixed numbers on a number line, we first count the number of segments between consecutive whole numbers. If there are four segments between the whole numbers, each segment equals $\frac{1}{4}$. If there are six segments between the whole numbers, each segment equals $\frac{1}{6}$.

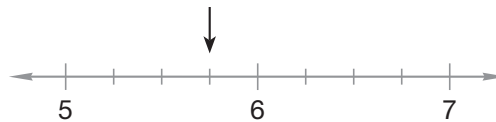
Example 1

Thinking Skill

Verify

How many fourths are between 5 and 6? Between 6 and 7? On this number line?

To what number is the arrow pointing?

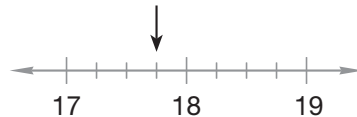


There are four segments between 5 and 6. Each segment equals $\frac{1}{4}$. The arrow points to $5\frac{3}{4}$.

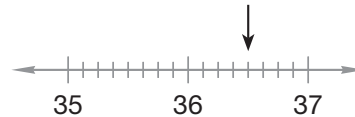
Example 2

To what number is each arrow pointing?

a.



b.



c. Copy and show $23\frac{1}{2}$ on the number line.



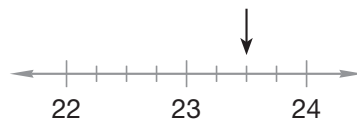
d. Copy and show $9\frac{1}{4}$ on the number line.



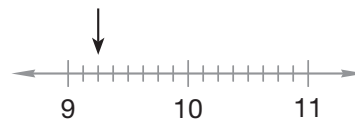
a. There are four segments between 17 and 18. Each segment equals $\frac{1}{4}$. The arrow points to $17\frac{3}{4}$.

b. There are eight segments between 36 and 37. Each segment equals $\frac{1}{8}$. The arrow points to $36\frac{4}{8}$, or $36\frac{1}{2}$.

c.

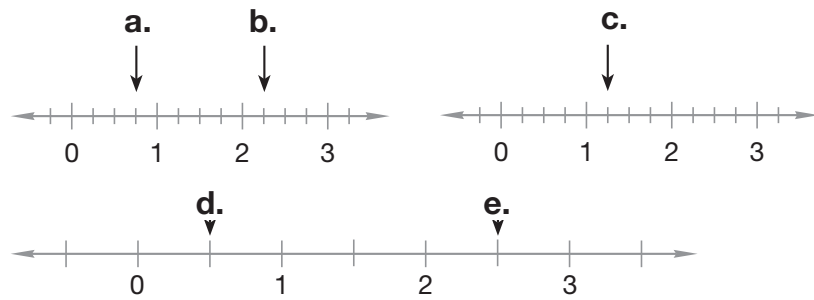


d.

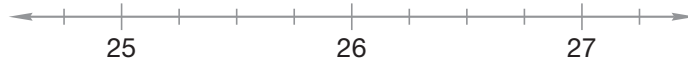


Lesson Practice

Represent Name each fraction or mixed number marked by the arrows below:



f. Copy and locate $25\frac{3}{4}$, $26\frac{1}{2}$, and $27\frac{1}{4}$ on the number line.

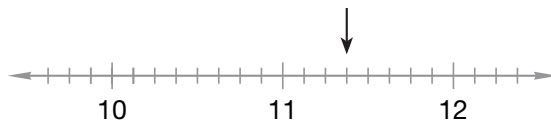


Written Practice

Distributed and Integrated

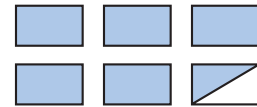
Formulate Write and solve equations for problems 1 and 2.

- *1. ⁽³¹⁾ The Pearl River in Mississippi is 411 miles long. The San Juan River in Colorado is 360 miles long. How many miles longer is the Pearl River?
- *2. ^(11, 24) If the length of the Sabine River in Texas were 50 miles longer, it would be the same length as the Wisconsin River. The Wisconsin River is 430 miles long. How long is the Sabine River?
- *3. ⁽³³⁾ **Represent** Use digits to write four hundred seventy-five thousand, three hundred forty-two. Then circle the digit in the ten-thousands place.
- *4. ^(Inv. 3) **Explain** Leah wants to put square floor tiles that measure one foot on each side in a room that is 9 feet long and 9 feet wide. How many floor tiles will Leah need? Is your answer reasonable? Explain why.
- *5. ⁽³⁷⁾ **Represent** To what mixed number is the arrow pointing?



- *6. Represent** Draw a rectangle whose length is 5 cm and whose width is 3 cm. What is the perimeter of the rectangle?
(Inv. 2, 21)

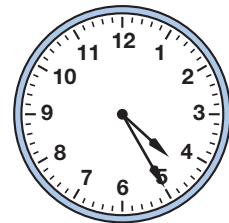
- *7.** What mixed number is shown by the shaded rectangles?
(35)



- *8. Represent** Use words to write $12\frac{3}{10}$.
(35)

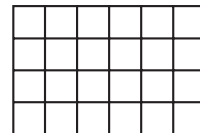
- *9. Represent** Write 7026 in expanded form. Then use words to write the number.
(16, 33)

- 10.** On the morning of an important game, Gail woke up at the time shown on the clock. She wanted to wake up 2 hours 35 minutes later. What time did Gail want to wake up?
(27)



- *11. a.** Three quarters are what fraction of a dollar?
(36)
- b.** Write the value of three quarters using a dollar sign and a decimal point.

- 12. Connect** What multiplication fact is illustrated by this rectangle?
(Inv. 3)



Multiply for problems 13–15.

13. a. 9×6
(29, 32)

b. 9×5

c. 9×0

14. a. 10×10
(Inv. 3)

b. 7×7

c. 8×8

15. a. 5×7
(29)

b. 6×5

c. 2×8

16. $\sqrt{81} + \sqrt{49}$
(Inv. 3)

***17.** $\$6.63 - \3.55
(30)

18. $\$4.99 + \2.88
(22)

19. $a - 247 = 321$
(24)

***20.** $z + 296 = 531$
(24, 30)

***21.** $523 - z = 145$
(24, 30)

22. $28 + 46 + 48 + 64 + 32 + 344$
(17)

- *23. a. **Conclude** What are the next three numbers in this counting sequence?
(3)

..., 450, 460, 470, 480, _____, _____, _____, ...

- b. **Generalize** What is one rule for this sequence?

24. If the diameter of a circle is one foot, then the radius of the circle is how many inches?
(Inv. 2, 21)

- *25. Compare:
(33, 36)

a. $\frac{1}{4}$ of a dollar \bigcirc $\frac{1}{2}$ of a dollar

b. 101,010 \bigcirc 110,000

- *26. **Multiple Choice** One yard does *not* equal which of the following?
(Inv. 2)

A 36 in.

B 3 ft


C 1 m

D 2 ft + 12 in.

- *27. In the year 2000, the four least populous U.S. states and their populations were as follows:
(33)

Alaska	626,932
North Dakota	642,200
Vermont	608,827
Wyoming	493,782

List these states in order of population size, beginning with the smallest population.

- *28.  **Justify** An adult cheetah weighs about 130 pounds. An adult mountain lion weighs about 170 pounds. A student estimates that a mountain lion weighs about twice as much as a cheetah. Is the estimate reasonable? Explain why or why not.
(13)

29. For a very short distance, a world-class sprinter can run at a speed of about 23 miles per hour. Round that speed to the nearest ten miles per hour.
(20)

- *30. In Barrow, Alaska, the average maximum temperature in July is 47°F. The average minimum temperature is 34°F. How many degrees cooler is a temperature of 34°F compared to a temperature of 47°F?
(18)

• Multiplication Facts (Memory Group)

Power Up

facts

Power Up D

count aloud

Count by sevens from 7 to 63.

mental math

- a. **Number Sense:** $365 - 120$
- b. **Number Sense:** $45 + 8 + 120$
- c. **Number Sense:** $56 + 19 + 200$
- d. **Money:** $\$3.45 + \1.00
- e. **Money:** $\$5.75 + \2.00
- f. **Money:** $\$0.85 + \2.00
- g. **Estimation:** Choose the more reasonable estimate for the high temperature on a cold, winter day: 30°F or 30°C .
- h. **Calculation:** $5 \times 2 + 3 + 42 - 5$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Hamid has a penny, a nickel, a dime, and a quarter. Two of the coins are in his left pocket and two are in his right pocket. What could be the total value of the two coins in his right pocket?

New Concept

There are only ten multiplication facts from 0×0 through 9×9 that we have not practiced. We call these facts the **memory group**.

$$3 \times 4 = 12 \quad 4 \times 7 = 28$$

$$3 \times 6 = 18 \quad 4 \times 8 = 32$$

$$3 \times 7 = 21 \quad 6 \times 7 = 42$$

$$3 \times 8 = 24 \quad 6 \times 8 = 48$$

$$4 \times 6 = 24 \quad 7 \times 8 = 56$$

Multiplication facts can be practiced by doing timed, written tests on a daily basis. You should continue to practice often in order to memorize the facts.

Besides the facts from 0×0 to 9×9 , it is helpful to memorize the 10s, 11s, and 12s. Recall that the multiples of 10 and 11 follow patterns that help us remember them.

Tens 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120

Elevens 11, 22, 33, 44, 55, 66, 77, 88, 99, 110, **121, 132**

The multiples of 12 also have patterns that help us to remember them.

Twelves 12, 24, 36, 48, **60, 72, 84, 96, 108, 120, 132, 144**

Example

The school orders pencils in boxes of 12 pencils. Complete this table showing the number of pencils in the given number of boxes.

Boxes	1	2	3	4	5	6	7	8	9	10	11	12
Pencils	12	24	36	48								

To find the number of pencils, we multiply the number of boxes by 12.

Boxes	1	2	3	4	5	6	7	8	9	10	11	12
Pencils	12	24	36	48	60	72	84	96	108	120	132	144

Lesson Practice

- a. Brainstorm ways to recall the ten memory-group facts. Then complete Power Up F.

Find each product:

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

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

d.
$$\begin{array}{r} 12 \\ \times 9 \\ \hline \end{array}$$

e.
$$\begin{array}{r} 12 \\ \times 6 \\ \hline \end{array}$$

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

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

h.
$$\begin{array}{r} 12 \\ \times 5 \\ \hline \end{array}$$

i.
$$\begin{array}{r} 12 \\ \times 11 \\ \hline \end{array}$$

Written Practice

Distributed and Integrated

1. **Formulate** ⁽³¹⁾ There were two hundred twenty boats on the river. There were four hundred five boats in the harbor. How many more boats were in the harbor? Write and solve an equation.

***2. Represent** (33) Five hundred seventy-five thousand, five hundred forty-two people lived in the city. Use digits to write that number of people.

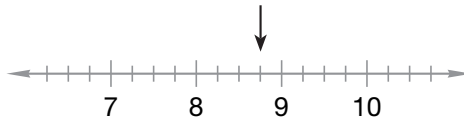
***3. Represent** (16, 33) Write 2503 in expanded form. Then use words to write the number.

***4. Model** (Inv. 2, Inv. 3) On 1-cm grid paper, draw a rectangle 6 cm long and 4 cm wide.

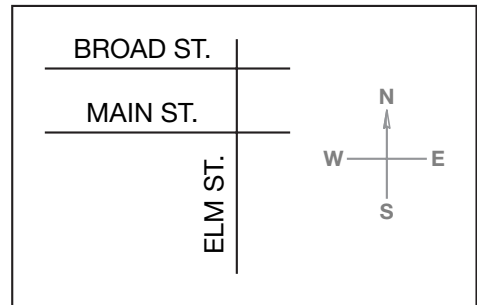
a. What is the perimeter of the rectangle?

b. What is the area of the rectangle?

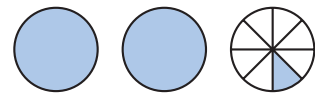
***5. Represent** (37) To what mixed number is the arrow pointing?



6. Conclude (23) Which street is parallel to Broad Street?



***7.** What mixed number is shown by the shaded circles? (35)

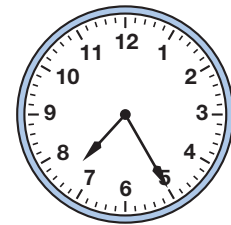


8. a. Round 624 to the nearest ten. (20)

b. Round \$6.24 to the nearest dollar.

c. Round \$6.24 to the nearest 25 cents.

9. On a school day, Alberto finishes eating breakfast every morning at the time shown on the clock. He starts eating lunch at 12:30 p.m. How long after Alberto finishes eating breakfast does he start eating lunch? (19)

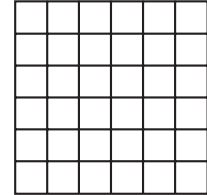


* 10. a. **Connect** Fifty cents is what fraction of a dollar?
(36)

b. Write the value of fifty cents using a dollar sign and a decimal point.

11. **Represent** Use words to write $2\frac{11}{100}$.
(35)

* 12. **Connect** This square illustrates six squared. What multiplication fact is illustrated by the square?
(Inv. 3)



Multiply:

* 13. a. 3×4
(38)

b. 3×6

c. 3×8

* 14. a. 4×6
(38)

b. 4×7

c. 4×8

* 15. a. 6×7
(38)

b. 6×8

c. 7×8

* 16. Compare: $\frac{1}{10}$ of a dollar \bigcirc $\frac{1}{2}$ of a dollar
(36)

17. $\begin{array}{r} \$7.23 \\ - \$2.54 \\ \hline \end{array}$
(30)

18. $\begin{array}{r} \$5.42 \\ + \$2.69 \\ \hline \end{array}$
(22)

19. $\begin{array}{r} 943 \\ - 276 \\ \hline \end{array}$
(30)

20. $z - 581 = 222$
(24)

21. $c + 843 = 960$
(24)


22. If the radius of a circle is 100 cm, then the diameter of the circle is how many meters?
(Inv. 2, 21)

23. $28 + 36 + 78 + \sqrt{49}$
(17, Inv. 3)

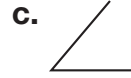
* 24. $\sqrt{144} - \sqrt{121}$
(Inv. 3, 32)

* 25. **Multiple Choice** Which of the following is *not* $\frac{1}{10}$ of a dollar?
(36) A dime B 0.10¢ C \$0.10 D 10¢

* 26. **Multiple Choice** Which digit in 457,326,180 is in the hundred-thousands place?
(34) A 1 B 6 C 4 D 3


27.  **Conclude** Name and describe each angle below.

(23)



*28. Consider the sequence 12, 24, 36, 48,

(3)

a.  **Generalize** Write a rule that describes how to find the next term of the sequence.

b. **Predict** What is the eleventh term of the sequence?

29. **Estimate** Mrs. Rojas would like to purchase a CD that costs \$14.99 and a DVD that costs \$18.95 for the school library. What is a reasonable estimate of the amount of money she will spend? Explain why your estimate is reasonable.

(20)

*30. The table below shows the cost of tickets to a game. Use the table to help find the cost of tickets for a family of six.

(38)

Number of Tickets	1	2	3	4
Cost	\$11	\$22	\$33	\$44

Early Finishers

Real-World Connection

Yolanda planted eleven flowers in each of 12 rows. How many flowers did she plant? Draw a table and complete it to show the number of flowers in 12 rows.

• Reading an Inch Scale to the Nearest Fourth

Power Up

facts

Power Up E

count aloud

Count by threes from 30 to 60 and back down to 30.

mental math

To add 99¢, 98¢, or 95¢ to another amount of money, add one dollar and then subtract 1¢, 2¢, or 5¢.

- a. **Money:** $\$3.45 + \0.99
- b. **Money:** $\$5.75 + \0.98
- c. **Money:** $\$0.85 + \0.95
- d. **Measurement:** Brian threw the baseball 30 yards. How many feet did he throw the ball?
- e. **Geometry:** If a square is 2 inches on each side, what is the square's perimeter?
- f. **Time:** It is 10:20 a.m. Carmelita must leave for her appointment at 11:00 a.m. How many minutes is it until Carmelita must leave?
- g. **Estimation:** Ramesh wants to buy a board game for \$9.55 and a deck of cards for \$1.43. What are two dollar amounts he could use to estimate the total cost of both items?
- h. **Calculation:** $4 \times 8 + 68 + 92 + 9$

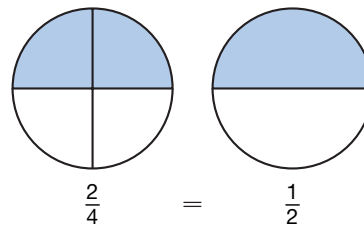
problem solving

Choose an appropriate problem-solving strategy to solve this problem. Cantara's mom cut an orange in half. Then she cut each half in half. Cantara ate three of the orange pieces. What fraction of the orange did Cantara eat?

New Concept

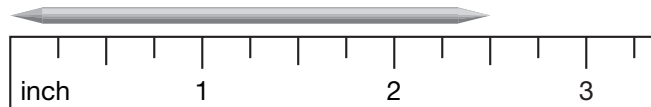
To measure lengths in inches, we use an inch scale. Inch scales are found on rulers and on tape measures. An inch scale often has tick marks between the inch marks. These tick marks let us read the inch scale to the nearest half inch, quarter inch, or eighth inch. In this lesson we will practice reading to the nearest quarter inch. Remember that one quarter inch is the same as one fourth inch.

When reading inch scales, keep in mind that $\frac{2}{4}$ equals $\frac{1}{2}$. The two circles below show these equivalent fractions. You can recall this relationship by remembering that two quarters equal half of a dollar.



Example 1

How long is the toothpick to the nearest quarter inch?



The toothpick is 2 inches plus a fraction. It is closest to $2\frac{2}{4}$ inches. Instead of writing $\frac{2}{4}$, we write $\frac{1}{2}$. So the toothpick is $2\frac{1}{2}$ inches long. We abbreviate this length as **$2\frac{1}{2}$ in.**

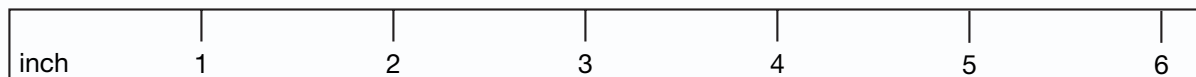
Activity

Make a Ruler and Measure

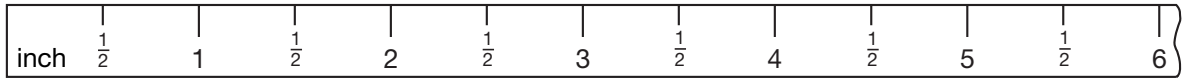
Materials needed:

- inch ruler
- strip of tagboard (6 inches long by 1 inch wide)

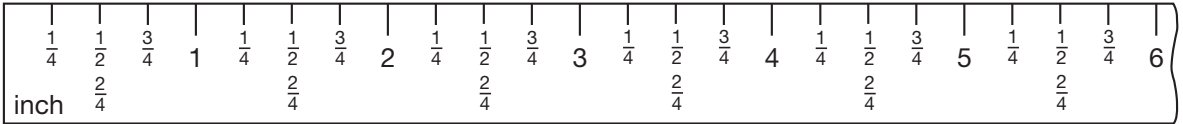
Model With a ruler, mark and label the inch marks on the tagboard strip.



Set the ruler aside and visually find the midpoint between the inch marks. Draw the half-inch marks and label them.



Then visually find the midpoint between the inch and the half-inch marks. Draw and label the quarter-inch tick marks as $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ as shown below.



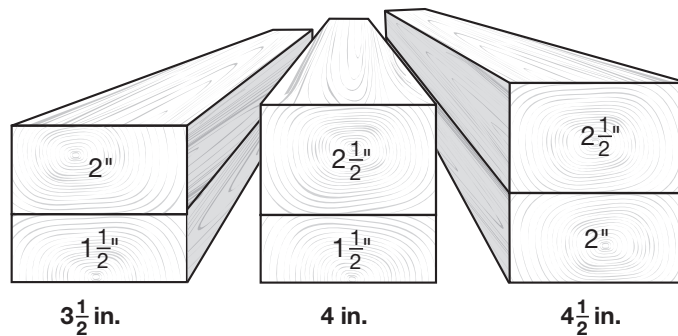
Use your tagboard ruler to measure the segments below. Then keep the tagboard ruler to use for the measurement problems in this book.

- a. _____
- b. _____
- c. _____

Example 2

Hajari has three boards. One board is $1\frac{1}{2}$ inches thick, the second board is 2 inches thick, and the third board is $2\frac{1}{2}$ inches thick. If Hajari selects two of the boards and stacks one on top of the other, then the two boards could have a combined thickness of how many inches?

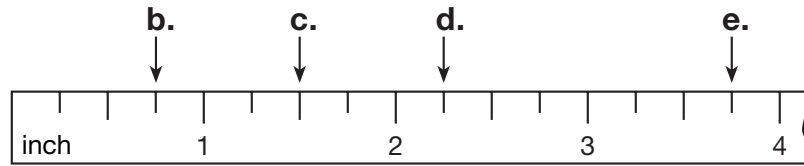
We can sketch a picture of the possible combinations and calculate the combined thickness.



Lesson Practice

- a. **Represent** Draw a picture that shows that $\frac{2}{4}$ equals $\frac{1}{2}$.


Name each point marked by an arrow on this inch scale:



- f. **Estimate** Measure the length and width of your notebook paper to the nearest half inch.
- g. Use your pencil and ruler to draw points A , B , and C in order on a straight line so that the distance from A to B is $1\frac{1}{2}$ inches, and the distance from B to C is $\frac{3}{4}$ inch. Then find the distance from A to C .
- h. Pam selected three different sizes of blocks from a set. She has a 1-inch block, a $1\frac{1}{2}$ -inch block, and a 2-inch block. If she stacks two blocks together, what are all the possible combined heights she could make? You may use strips of paper to solve.

Written Practice

Distributed and Integrated

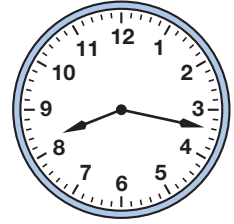
1.  **Explain** Trinity is twelve years old. Trinity's mother is thirty-five years old. Trinity's mother is how many years older than Trinity? Describe this type of word problem.
- *2. (33) Four hundred sixty-eight thousand, five hundred two boxes were in the warehouse. Use digits to write that number of boxes.
- *3. (16, 33) **Represent** Write the number 3905 in expanded form. Then use words to write the number.
4. (10, 13) **Verify** J'Maresh collected two hundred forty-three aluminum cans while volunteering at the recycling center. Leilani collected three hundred sixty-four aluminum cans. Was the total number of cans collected an even number or an odd number?
- *5. (35) **Represent** Use words to write $100\frac{1}{100}$.
6. (Inv. 1) **Represent** Use digits and symbols to show that negative nineteen is greater than negative ninety.

***7.** **Connect** Use a dollar sign and a decimal point to write the value of two dollars, one quarter, two dimes, and three nickels.

(35)

8. The clock shows the time that Brayden arrived at school. School begins at 8:15 a.m. Was Brayden early or late for school? How many minutes early or late was he?

(27)



9. **Connect** a. Nine dimes are what fraction of a dollar?

(36)

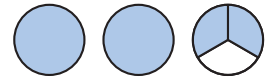
b. Write the value of nine dimes using a dollar sign and a decimal point.

10. Haruto lives about 1 kilometer from school. One kilometer is how many meters?

(Inv. 2)

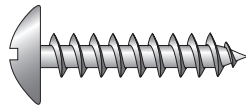
***11.** How many of these circles are shaded?

(35)



***12.** **Estimate** Use a ruler to find the length of this screw to the nearest quarter inch:

(39)



Multiply:

***13.** a. 4×3

(38)

b. 8×3

c. 8×4

d. 4×12

***14.** a. 6×3

(38)

b. 6×4

c. 7×6

d. 6×12

***15.** a. 7×3

(38)

b. 7×4

c. 8×6

d. 8×12

16. $\sqrt{64} - \sqrt{36}$

(Inv. 3)

17. $\begin{array}{r} \$4.86 \\ + \$2.47 \\ \hline \end{array}$

(22)

18. $\begin{array}{r} \$4.86 \\ - \$2.47 \\ \hline \end{array}$

(30)

19. $\begin{array}{r} 293 \\ + 678 \\ \hline \end{array}$

(13)

20. $\begin{array}{r} 893 \\ - 678 \\ \hline \end{array}$

(30)

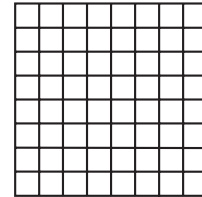
21. $\begin{array}{r} 463 \\ - \quad y \\ \hline 411 \end{array}$

(24)

22. $\begin{array}{r} 463 \\ + \quad q \\ \hline 527 \end{array}$

(24)

23. This rectangle illustrates eight squared. What multiplication fact is illustrated by the rectangle?



- *24. **Conclude** Write the next three numbers in this counting sequence:
(3) ... , 470, 480, 490, 500, _____, _____, _____, ...

25. **Represent** Draw a triangle that has three acute angles.
(23)

- *26. **Multiple Choice** Which of these does *not* equal $9 + 9$?
(27, 38)
- A 2×9 B 9×2
C 3×6 D nine squared

- *27. A realtor was writing an advertisement about houses for sale in town. The prices of five houses are listed below. Show how the realtor would arrange the prices in order from most expensive to least expensive.

\$385,900
\$189,000
\$1,280,000
\$476,000
\$299,000

28. **Justify** Lake Huron is 206 miles long. Lake Superior is 350 miles long. Anastacia estimates that Lake Superior is about 140 miles longer than Lake Huron. Is Anastacia’s estimate reasonable? Explain why or why not.
(14, 20)

- *29. **Analyze** Kyle wants to form rectangles using straws. He has two straws 6 inches long, two straws 4 inches long, and two straws 2 inches long. Using four straws attached at the ends, how many different rectangles can Kyle form? What are the perimeters of the rectangles?
(Inv. 2, 39)

- *30. The table shows a relationship between feet and inches. Use the table below to determine the number of inches in 20 feet.
(38)

Number of Feet	1	2	3	4
Number of Inches	12	24	36	48

• Capacity

Power Up

facts

Power Up D

count aloud

Count down by fours from 40 to 4.

mental math

- a. **Money:** $\$5.85 + \0.99
- b. **Money:** $\$8.63 + \0.98
- c. **Money:** $\$4.98 + \0.95
- d. **Measurement:** D'Marcus jogged 1 mile. How many feet did he jog?
- e. **Time:** What time will it be 10 hours after 1:35 p.m.?
- f. **Time:** What time will it be 11 hours after 1:35 p.m.?
- g. **Estimation:** Choose the more reasonable estimate for the width of a pencil: 1 centimeter or 1 inch.
- h. **Calculation:** $460 + 300 + 24 - 85$

problem solving

The two hands of a clock are together at noon. The next time the hands of a clock are together is about how many minutes later?

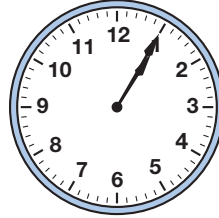
Focus Strategy: Make a Model

Understand We are told that the two hands of a clock are together at noon. We are asked to find the number of minutes that pass before the hands come together again.

Plan We can *model* the situation with an analog clock (or a wristwatch).

Solve We first set our clock (or watch) to noon. Then we turn the minute hand so that it points to the numbers in order: 1, 2, 3, and so on. We watch to see whether the hour and minute hands come together at any point before the clock reaches 1:00. We notice that they do not.

When the clock shows 1:00, the hour hand points to 1 and the minute hand points to 12. At 1:05 the minute hand will point to 1. We move the minute hand of the clock to make the time 1:05 and see that the hour and minute hands are nearly together. The time, 1:05, is one hour five minutes after noon. One hour is 60 minutes, so 1:05 is **65 minutes** after noon.



Check We know our answer is reasonable because the minute hand moves around the clock one time each hour. During that hour, the hour hand moves forward only a little bit. This means that it takes a little more than one hour for the hands to come together again.

New Concept

Math Language

Teaspoons and tablespoons are U.S. customary units of measure for smaller amounts.

1 tablespoon =

$\frac{1}{2}$ fluid ounce

1 teaspoon =

$\frac{1}{6}$ fluid ounce

In the U.S. Customary System, liquids such as milk, juice, paint, and gasoline are measured in fluid ounces, cups, pints, quarts, or gallons. This table shows the abbreviations for each of these units:

Abbreviations for U.S. Liquid Measures

fluid ounce	fl oz
cup	c
pint	pt
quart	qt
gallon	gal

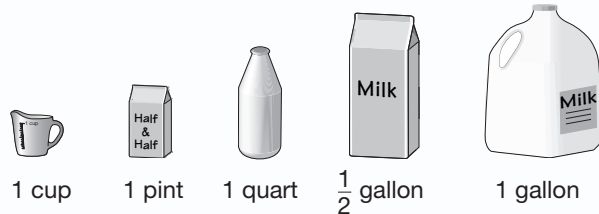
The quantity of liquid a container can hold is the **capacity** of the container.



Activity

Measuring Capacity

Model Arrange the five containers in order from smallest to largest.



Estimate the number of cups of liquid needed to fill a 1-pint container. Estimate the number of pints needed to fill a 1-quart container, and so on. After you have estimated, fill each container with water using the next-smallest container. Answer the following questions:

- How many cups of liquid equal a pint?
- How many pints of liquid equal a quart?
- How many quarts of liquid equal a half gallon?
- How many half gallons of liquid equal a gallon?
- How many quarters equal a dollar?
- How many quarts of liquid equal a gallon?
- Copy and complete this table of liquid measures from the U.S. Customary System. Notice that 8 **fluid ounces** equals 1 cup.

U.S. Liquid Measure

8 fl oz = 1 c
__ c = 1 pt
__ pt = 1 qt
__ qt = 1 gal

Liquids are also measured in **liters** (L). A liter is a metric unit of measure. Compare a one-liter container to a one-quart container (or compare a two-liter container to a half-gallon container). Which container looks larger?

Model Use a full liter (or two-liter) container to fill a quart (or half-gallon) container. Then complete these comparisons:

- Compare: 1 quart 1 liter
- Compare: $\frac{1}{2}$ gallon 2 liters

- j. **Estimate** How many liters will it take to fill a gallon container?

To measure small amounts of liquid, we may use milliliters (mL). One thousand milliliters equals one liter.

Metric Liquid Measure

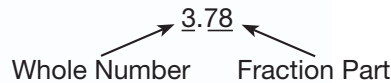
$$1000 \text{ mL} = 1 \text{ L}$$

- k. A full 2-liter bottle of liquid contains how many milliliters of liquid?

Inspect the labels of the liquid containers used in the activity. Liquid containers often list two measures of the quantity of liquid the containers hold. For example, the label on one gallon of milk may read

1 gal (3.78 L)

The measure 3.78 L means $3\frac{78}{100}$ liters. The number 3.78 is a *decimal number*. Decimal numbers are often used in measurement, especially in metric measurement. The number 3.78 has a whole-number part and a fraction part.



So 3.78 L means “more than three liters but a little less than four liters,” just as \$3.78 means “more than three dollars but not quite four dollars.” We read 3.78 as “three and seventy-eight hundredths.” We will learn more about decimal numbers in Investigation 4.

Math Language

Droppers used for liquid medicine usually hold one or two milliliters of liquid.

Lesson Practice

- a. Copy and complete this table to show the relationship between gallons and quarts.

Gallons	1	2	3	4	5	6	7	8
Quarts	4	8						

- b. **Predict** How many quarts is 12 gallons?
- c. One pint is 2 cups and one cup is 8 ounces. How many ounces is one pint?
- d. Estimate how many milliliters it would take to fill a $3\frac{1}{2}$ -liter container.

Formulate Write and solve equations for problems 1–3.

* 1. ⁽³¹⁾ A group of fish is called a *school*. There are twenty-five fish in the small school. There are one hundred twelve fish in the big school. How many fewer fish are in the small school?

2. ⁽²⁴⁾ A piece of ribbon that measured 1 yard was cut into two pieces. If one piece was 12 inches long, how many inches long was the other piece?

3. ^(1, 17) Mrs. Green took forty-seven digital pictures in Hawaii. Her husband took sixty-two digital pictures in Hawaii. Her son took seventy-five digital pictures. In all, how many digital pictures did the Greens take?

* 4. ^(16, 33) **Represent** Write the number 7,500,000 in expanded form. Then use words to write the number.

5. ⁽³⁴⁾ Which digit in 27,384,509 is in the thousands place?

* 6. ⁽³⁵⁾ **Connect** Use a dollar sign and a decimal point to write the value of three dollars, two quarters, one dime, and two nickels. Then write that amount of money using words.

* 7. ⁽⁴⁰⁾ A gallon of milk is how many quarts of milk?

* 8. ⁽³⁵⁾ How many squares are shaded?



* 9. ⁽³⁹⁾ **Estimate** Use a ruler to find the length of the line segment below to the nearest quarter inch.



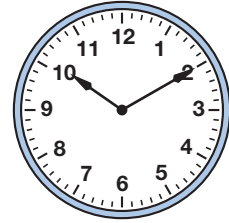
- * 10. **Connect** Printed on the label of the milk container were these words and numbers:


1 gal (3.78 L)

Use this information to compare the following:

1 gallon ○ 3 liters

11. ⁽²⁷⁾ Destiny began reading a book last night at the time shown on the clock. She read until midnight. How much time did Destiny spend reading last night?



- * 12. a. **Multiple Choice** ⁽²³⁾ What type of angle is formed by the hands of the clock shown in problem 11?
 A acute B right C obtuse D straight
- b.  **Justify** How do you know that your answer to part a is correct?

- * 13. Compare:
^(Inv. 1, 36) a. -29 ○ -32

b. $\$0.75$ ○ $\frac{3}{4}$ of a dollar

14. **Represent** ⁽²¹⁾ Draw a circle with a diameter of 2 centimeters. What is the radius of the circle?

Multiply:

15. a. 6×6 b. 7×7 c. 8×8 d. 12×12
^(Inv. 3)



16. a. 7×9 b. 6×9 c. 9×9 d. 9×12
⁽³²⁾

17. a. 7×8 b. 6×7 c. 8×4 d. 12×7
⁽³⁸⁾

18. $\$4.98 + \7.65 19. $m - \$6.70 = \3.30
⁽²²⁾ ⁽²⁴⁾

20. $416 - z = 179$ 21. $536 + z = 721$
⁽²⁴⁾ ⁽²⁴⁾

22. $\sqrt{1} + \sqrt{4} + \sqrt{9}$
^(Inv. 3)

- * 23. **Represent** Draw an array of Xs to show 7×3 .
(Inv. 3)
24. **Represent** Use words to write $10\frac{1}{10}$.
(35)
- * 25. a. **Connect** Two quarters are what fraction of a dollar?
(36)
b. Write the value of two quarters using a dollar sign and a decimal point.
- * 26. **Multiple Choice** A rectangle has an area of 24 square inches. Which
(Inv. 3) of these areas could be the length and width of the rectangle?
A 6 in. by 6 in. B 12 in. by 12 in.
C 8 in. by 4 in. D 8 in. by 3 in.
- * 27. **Represent** Tarik measured the width of his notebook paper and said
(39) that the paper was $8\frac{2}{4}$ inches wide. What is another way to write $8\frac{2}{4}$?
- * 28.  **Justify** A gardener plans to build a fence around his 24-by-12-foot
(Inv. 2) rectangular vegetable garden. Fencing for the garden can be purchased in 50-foot, 75-foot, or 100-foot rolls. Which roll of fencing should the gardener buy? Explain why.
- * 29.  **Estimate** At a gardening center, one pair of gardening gloves
(22) costs \$12.00, not including a sales tax of 66¢. What is a reasonable estimate of the cost of two pairs of gloves? Explain why your estimate is reasonable.
- * 30. **Analyze** How many different three-digit numbers can you write using
(10) the digits 6, 2, and 0? Each digit may be used only once, and the digit 0 may not be used in the hundreds place. Label the numbers you write as even or odd.

Focus on

• Tenths and Hundredths

The basic unit of our currency system is the dollar. To make fractions of a dollar, we use coins. Below the illustrated coins, we see the value of each coin expressed as a fraction of a dollar and as a decimal part of a dollar.



$$\frac{1}{4} = \$0.25$$



$$\frac{1}{10} = \$0.10$$



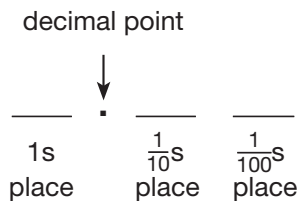
$$\frac{1}{20} = \$0.05$$



$$\frac{1}{100} = \$0.01$$

Notice that a dime is $\frac{1}{10}$ of a dollar and that a penny is $\frac{1}{10}$ of a dime and $\frac{1}{100}$ of a dollar.

Recall that our number system is a **base-ten system** in which the value of each place is ten times the value of the place to its right. This means that the value of each place is also $\frac{1}{10}$ (one **tenth**) of the value of the place to its left. To the right of the ones place is the $\frac{1}{10}$ s place, and to the right of the $\frac{1}{10}$ s place is the $\frac{1}{100}$ s (**hundredths**) place.



We can represent these **decimal places** with dimes and pennies as we see in the following activity.

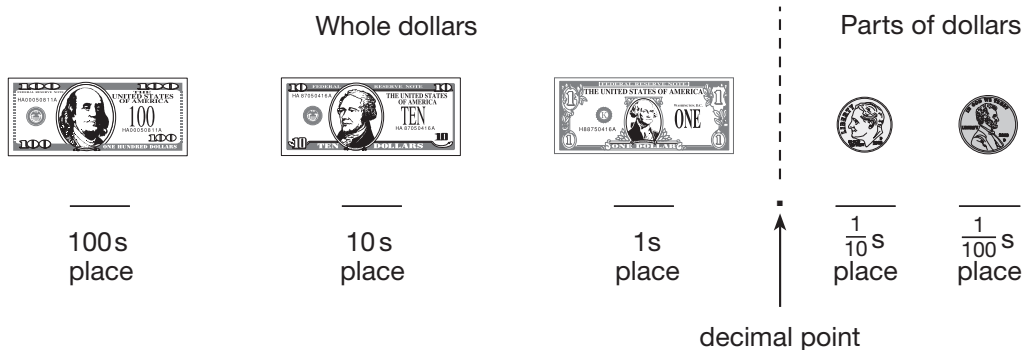
Activity 1

Using Money Manipulatives to Represent Decimal Numbers

Materials needed:

- money manipulatives (from **Lesson Activities 2, 3, 4, 8, and 9**)

In this activity we will use bills, dimes, and pennies to represent decimal numbers.



The bills and coins above can be combined to demonstrate different amounts of money. For example, we can show \$234.21 like this:



Model Arrange bills and coins to form the money amounts in problems 1–4. Place each denomination of bills and coins in a separate stack. The stacks should be arranged so that the largest denomination is on the left and the smallest denomination is on the right.

- | | | | |
|-------------|-----------|-----------|-----------|
| 1. \$345.23 | 2. \$0.42 | 3. \$5.20 | 4. \$3.02 |
|-------------|-----------|-----------|-----------|

Write the amount shown by each picture:

- | | | |
|--|--|--|
| 5.  | 6.  | 7.  |
|--|--|--|

Model Use money manipulatives to help compare each amount:

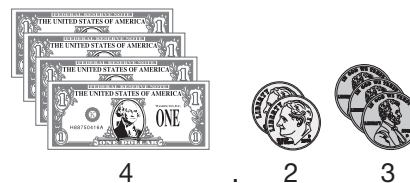
- | | |
|--|--------------------|
| 8.  ○  | 9. \$0.40 ○ \$0.07 |
|--|--------------------|

Write these amounts in order from greatest to least:

10.   

11. \$1.09 \$0.97 \$1.20

Now we will use bills and coins to represent decimal numbers that are not money amounts. At right we show an example of money representing the number 4.23 (four and twenty-three hundredths).

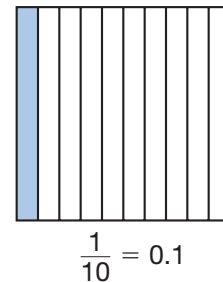


Model Use bills and coins to represent these decimal numbers:

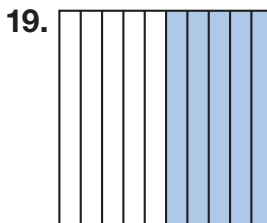
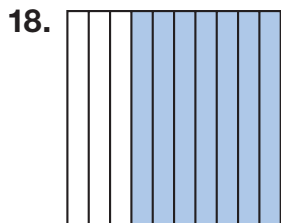
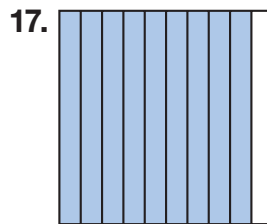
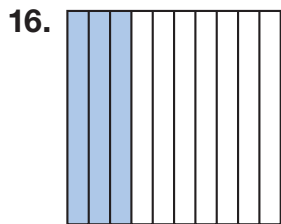
- 12. 3.42 (three and forty-two hundredths)
- 13. 0.24 (twenty-four hundredths)
- 14. 12.03 (twelve and three hundredths)
- 15. 1.3 (one and three tenths)

In the activity we used money to represent decimal numbers. Another model we can use to represent decimal numbers is a unit square. The whole square represents 1. Parts of the square represent fractions that can be named using decimal numbers.

The square at right is divided into ten equal parts. One tenth of the square is shaded. We may write one tenth as a fraction ($\frac{1}{10}$) or as a decimal number (0.1).

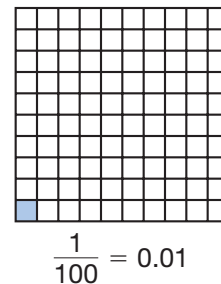


Name the shaded part of each square as a fraction and as a decimal number:

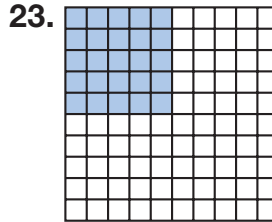
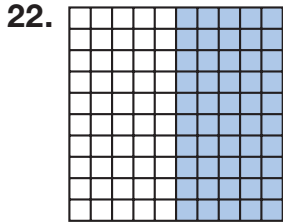
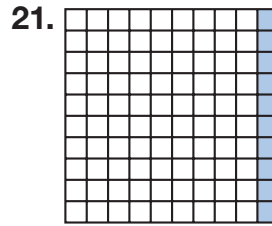
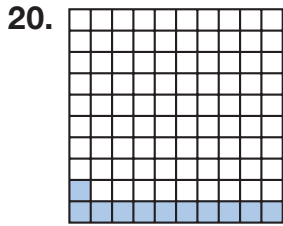


Represent Use the squares above to arrange the decimal numbers 0.5, 0.3, 0.7, and 0.8 in order from least to greatest.

The squares above were divided into ten equal parts. The squares at right and on the top of the next page are divided into 100 equal parts. Each part is one hundredth of the whole square. We may write one hundredth as a fraction ($\frac{1}{100}$) or as a decimal number (0.01).



Each of these squares is divided into 100 equal parts. Name the shaded part of each square as a fraction and as a decimal number.

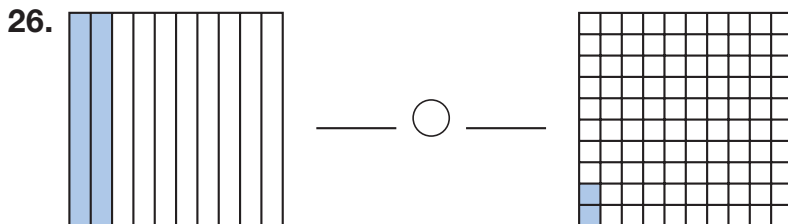
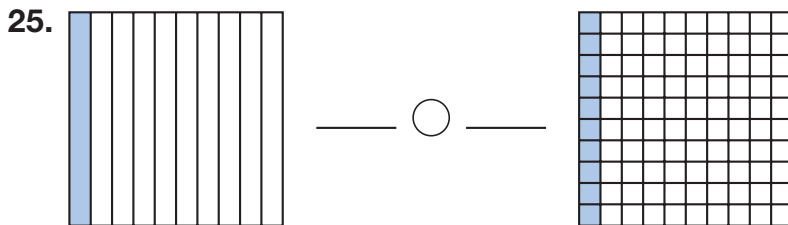


Notice in problem **21** that $\frac{10}{100}$ of the square is shaded. However, one column is one tenth of the square, so $\frac{10}{100}$ is equal to $\frac{1}{10}$, just like one dime is $\frac{10}{100}$ of a dollar and $\frac{1}{10}$ of a dollar.

In problem **22**, half of the square is shaded. We see that the fraction $\frac{50}{100}$ equals $\frac{1}{2}$. The decimal number 0.50 also equals $\frac{1}{2}$, just as \$0.50 equals $\frac{1}{2}$ of a dollar. In problem **23** we see that a fourth of the square is shaded. The decimal number 0.25 equals $\frac{1}{4}$, just as \$0.25 equals $\frac{1}{4}$ of a dollar.

- 24. Multiple Choice** Which of the following numbers does *not* equal one half?
A $\frac{5}{10}$ **B** 0.5 **C** $\frac{50}{100}$ **D** 0.05

Write a decimal number to represent the shaded portion of each square. Then complete each comparison.



- 27. Represent** Arrange these decimal numbers, shown in the pictures above, in order from least to greatest:

0.1 0.2 0.02

Focus on


- **Relating Decimals and Fractions**


Activity 2
Using Unit Squares to Relate Fractions and Decimal Numbers

Material needed:

- **Lesson Activity 23**

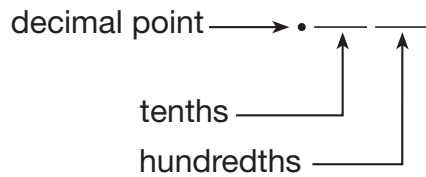
On **Lesson Activity 23**, complete the following activities:

28. Shade nine of the ten columns. Then name the shaded part of the square as a fraction, as a decimal number, and with words.
29. Shade 33 of the 100 small squares. Then name the shaded part of the square as a fraction, as a decimal number, and with words.
30. Shade two whole squares and seven of the 100 parts of the third square. Then name the number of shaded squares as a mixed number, as a decimal number, and with words.
31. Shade one column of the square on the left. Shade nine small squares of the square on the right. Then name the shaded part of each square as a fraction and as a decimal. Then compare the two decimal numbers by writing the two decimal numbers with the correct comparison symbol between them.
32.  **Connect** Describe how a large square, a column or row, and a small square relate to a \$1 bill, a dime, and a penny.

As we have seen, fractions and decimals are two ways to describe parts of a whole. When we write a fraction, we show both a numerator and a denominator. When we write a decimal number, the denominator is not shown but is indicated by the number of places to the right of the decimal point (the number of decimal places). Look at these examples:

one decimal place	two decimal places
$0.1 = \frac{1}{10}$	$0.12 = \frac{12}{100}$

To name a decimal number, we name the numerator shown by the digits and then we name the denominator indicated by the number of decimal places.



As a class, read each of these numbers:

33. a. $\frac{75}{100}$

b. 0.75

34. a. $\frac{7}{100}$

b. 0.07

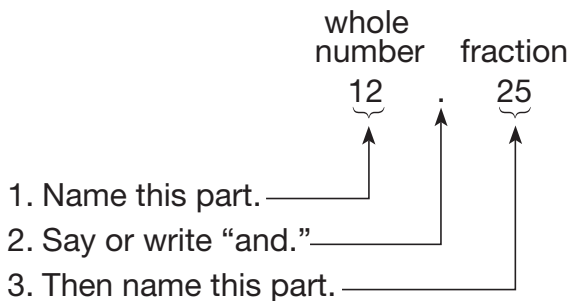
35. a. $\frac{3}{10}$

b. 0.3

36. a. $\frac{2}{10}$

b. 0.2

A decimal number greater than 1 has one or more digits other than 0 to the left of the decimal point, such as 12.25. To name 12.25, we mentally split it at the decimal point and name the whole-number part and fraction part separately.



This decimal number is read as “twelve and twenty-five hundredths.”

As a class, read each of these numbers. Then use words to write each number on your paper.

37. a. 10.75

b. 12.5

38. a. 6.42

b. 10.1

Use digits to write each of these decimal numbers:

39. one and three tenths

40. two and twenty-five hundredths

41. three and twelve hundredths

42. four and five tenths

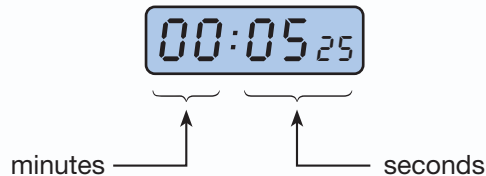
Activity 3

Using Decimal Numbers on Stopwatch Displays

Material needed:

- stopwatch with digital display

Use a stopwatch to generate decimal numbers. Here we show a typical stopwatch display:



This display shows that 5.25 seconds passed between starting and stopping the watch.

- 43.** Start and then stop the stopwatch as quickly as possible. Record each generated time on the board, and read the times aloud. Who stopped the watch in the quickest time?
- 44.** Test your time-estimating skills by starting the stopwatch and then, without looking, stopping the watch five seconds later. Record each generated time using digits. Determine which time is closest to 5.00 seconds.
- 45.** As a class, arrange selected times from problem **44** in order from least to greatest.