• **Subtracting Across Zero**

• **Missing Factors**

Power Up

facts	Power Up E
count aloud	We can quickly add or subtract some numbers on a calendar. On a calendar, select a number from the middle of the month. If we move straight up from one row, we subtract 7. If we move straight down one row, we add 7. We can add or subtract two other numbers if we move diagonally. Which numbers do we add or subtract when we move one row in these directions?
mental math	a. **Money:** $4.65 + 2.99
	b. **Money:** $3.86 + $1.95
	c. **Money:** $6.24 + $2.98
	d. **Geometry:** What is the radius of a circle that has a diameter of 1 inch?
	e. **Time:** Class begins at 1:05 p.m. It ends 50 minutes later. What time does class end?
	f. **Measurement:** Patel's kite was attached to 50 yards of string. How many feet of string is that?
	g. **Estimation:** The price of the new shoes was $44.85. A package of socks was $5.30. Round each price to the nearest dollar and then add to estimate the total cost.
	h. **Calculation:** $2 \times 9 + 9 + 6 + 66$
problem solving	Choose an appropriate problem-solving strategy to solve this problem. The hands of a clock are together at 12:00. The hands of a clock are not together at 6:30 because the hour hand is halfway between the 6 and the 7 at 6:30. The hands come together at about 6:33. Name nine more times that the hands of a clock come together.

Subtracting Across Zero

In the problem below, we must regroup twice before we can subtract the ones digits.

$$\begin{array}{r} \$405 \\ -\ \$126 \end{array}$$

We cannot exchange a ten for ones because there are no tens, so the first step is to exchange 1 hundred for 10 tens.

$$\begin{array}{r} \overset{3}{\cancel{4}}^{1}05 \\ \$\ \\ -\ \$126 \end{array}$$

Now we have 10 tens, and we can exchange 1 of the tens for 10 ones.

$$\begin{array}{r} \overset{3}{\cancel{4}}\ \overset{9}{\cancel{0}}\ ^{1}5 \\ \$\ \\ -\ \$1\ 2\ 6 \end{array}$$

Now we subtract.

$$\begin{array}{r} \overset{3}{\cancel{4}}\ \overset{9}{\cancel{0}}\ ^{1}5 \\ \$\ \\ -\ \$1\ 2\ 6 \\ \hline \$2\ 7\ 9 \end{array}$$

Thinking Skill

Connect

Explain why thirty-nine $10 bills and fifteen $1 bills are equal to $405.

We can perform this regrouping in one step by looking at the numbers a little differently. We can think of the 4 and 0 as forty $10 bills (4 hundreds equals 40 tens).

$$\overbrace{\$4\ 0}^{40\ tens}\ 5$$

If we exchange one of the $10 bills, then we will have thirty-nine $10 bills.

$$\begin{array}{r} \overset{3}{\ }\ \overset{9}{\ }\ ^{1} \\ \$\cancel{4\cancel{0}}\ 5 \\ -\ \$1\ 2\ 6 \\ \hline \$2\ 7\ 9 \end{array}$$

Example 1

The Vetti waterfall in Norway is 900 feet tall. The Akaka waterfall in Hawaii is 442 feet tall. How many feet taller is the Vetti waterfall?

This is a larger − smaller = difference problem. We are asked to find the difference.

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

The Vetti waterfall is **458 feet taller** than the Akaka waterfall.

Example 2

Troy had $3.00 and spent $1.23. How much money did he have left?

We change 3 dollars to 2 dollars and 10 dimes. Then we change 10 dimes to 9 dimes and 10 pennies.

$$\begin{array}{r} \$3.00 \\ -\ \$1.23 \\ \hline \end{array} \quad\rightarrow\quad \begin{array}{r} {}^{2}\ {}^{1} \\ \$\cancel{3}.00 \\ -\ \$1.23 \\ \hline \end{array} \quad\rightarrow\quad \begin{array}{r} {}^{2}\ {}^{9}\ {}^{1} \\ \$\cancel{3}.\cancel{0}0 \\ -\ \$1.23 \\ \hline \mathbf{\$1.77} \end{array}$$

We can also think of $3 as 30 dimes. Then we exchange 1 dime for 10 pennies.

$$\begin{array}{r} \$3.00 \\ -\ \$1.23 \\ \hline \end{array} \quad\rightarrow\quad \begin{array}{r} {}^{2}\ {}^{9}\ {}^{1} \\ {}_{1} \\ \$\cancel{3}.\cancel{0}0 \\ -\ \$1.23 \\ \hline \$1.77 \end{array}$$

Troy had **$1.77** left. We check our answer by adding.

$$\begin{array}{r} \$1.23 \\ +\ \$1.77 \\ \hline \$3.00 \end{array} \quad \text{check}$$

Justify Explain why the answer is reasonable.

Missing Factors

Recall that numbers that are multiplied are called *factors* and the answer is called the *product.*

$$\text{factor} \times \text{factor} = \text{product}$$

If we know one factor and the product, we can find the other factor.

Example 3

Find the missing factors:

a. $5n = 40$ b. $a \times 4 = 36$

a. The expression $5n$ means "$5 \times n$." Since $5 \times 8 = 40$, the missing factor is **8.**

b. Since $9 \times 4 = 36$, the missing factor is **9.**

Lesson Practice Subtract:

a. $3.00
  $- 1.32

b. $405
  $- 156

c. 201
  $- 102$

d. $4.00 - $0.86   e. $304 - $128   f. $703 - 198$

Find the missing factor in each problem:
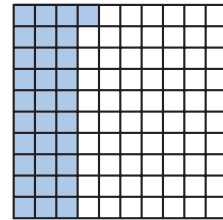
g. $8w = 32$ h. $p \times 3 = 12$

i. $5m = 30$ j. $q \times 4 = 16$

Written Practice *Distributed and Integrated*

*1. **(Represent)** The large square represents 1.
(Inv. 4) Write the shaded part of the square
a. as a fraction.   b. as a decimal number.
c. using words.

2. Takeshi had a dime, a quarter, and a penny. Write this amount using
(35) a dollar sign and a decimal point.

*3. Donna opened a 1-gallon container of milk and poured 1 quart of
(40) milk into a pitcher. How many quarts of milk were left in the
1-gallon container?

*4. **(Generalize)** Describe the rule for this sequence and find the next
(3) three numbers:

..., 4200, 4300, 4400, ____, ____, ____, ...

*5. **(Connect)** Use digits and a comparison symbol to show that the
(Inv. 4) decimal number five tenths equals the fraction one half.

6. Anando fell asleep last night at the time shown on the
(27) clock. His alarm clock was set to ring eight hours later.
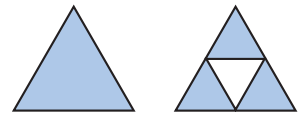What time was Anando's alarm clock set to ring?
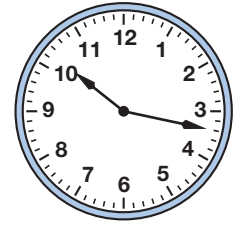
*7. Find the missing factor: $5w = 45$
(41)

*8. **Represent** The following was marked on the label of a juice container:
(Inv. 4)

$$2 \text{ qt } (1.89 \text{ L})$$

Use words to write 1.89 L.

9. What mixed number is illustrated by these shaded
(35) triangles?

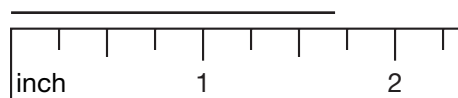**10.** Which letter below has no right angles?
(23)

F   E   Z   L

*11. **Connect** Rewrite this addition problem as a multiplication problem:
(27)

$$\$1.25 + \$1.25 + \$1.25 + \$1.25$$

12. **Estimate** How long is the line segment to the nearest quarter inch?
(39)

13. A meter equals how many centimeters?
(Inv. 2)

14. a. Five dimes are what fraction of a dollar?
(36)

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

*15. Compare:
(Inv. 4)

a. 0.5 $\bigcirc$ 0.50

b. $\dfrac{1}{2}$ $\bigcirc$ $\dfrac{1}{4}$

16. a. 3×8 **b.** 3×7 **c.** 3×6 **d.** 3×12
(38)

17. **a.** 4×8 **b.** 4×7 **c.** 4×6 **d.** 4×12
(38)

*18. $\begin{array}{r} m \\ \times\ 8 \\ \hline 64 \end{array}$
(41)

*19. $\begin{array}{r} 9 \\ \times\ n \\ \hline 54 \end{array}$
(41)

20. $\begin{array}{r} z \\ +\ 179 \\ \hline 496 \end{array}$
(24)

*21. $\begin{array}{r} \$3.00 \\ -\ \$1.84 \\ \hline \end{array}$
(41)

*22. $\begin{array}{r} \$500 \\ -\ \$167 \\ \hline \end{array}$
(41)

23. $\begin{array}{r} w \\ -\ 297 \\ \hline 486 \end{array}$
(24)

24. (**Conclude**) What are the next four numbers in this counting sequence?
(Inv. 1)

$$\ldots, 28, 21, 14, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$$

*25. (**Represent**) Use digits to write one million, fifty thousand.
(34)

*26. **Multiple Choice** If the area of a square is 36 square inches, then how
(Inv. 3) long is each side of the square?

    A 6 in.   **B** 9 in.   **C** 12 in.   **D** 18 in.

*27. The distance from Riley's house to school is 1.4 miles. Write 1.4
(Inv. 4) with words.

28. Nieve quickly started and stopped a stopwatch four times. Write
(Inv. 4) these times in order from fastest to slowest:

    0.27 second, 0.21 second, 0.24 second, 0.20 second

(**Formulate**) Write and solve equations for problems **29** and **30.**

*29. (**Justify**) The Washington Monument is 153 feet taller than the
(13) City Center building in Nashville, Tennessee, which is 402 feet tall.
How tall is the Washington Monument? Explain why your answer is
reasonable.

*30. (**Explain**) The Panther waterfall in Alberta is 600 feet tall. The Fall
(25, 41) Creek waterfall in Tennessee is 256 feet tall. How many feet taller is the
Panther waterfall? Explain how you found your answer.

• Rounding Numbers to Estimate

Power Up

facts   Power Up E

count aloud   Count by sevens from 7 to 70.

mental math
- **a. Number Sense:** $563 - 242$
- **b. Powers/Roots:** $\sqrt{9}$
- **c. Money:** $5.75 - $2.50
- **d. Money:** $8.98 - $0.72
- **e. Money:** Amelia purchased a sandwich for $4.85 and soup for $1.99. What was the total cost?
- **f. Measurement:** How many ounces is 1 cup?
- **g. Estimation:** Choose the more reasonable estimate for the capacity of a drinking glass: 1 cup or 1 gallon.
- **h. Calculation:** $9 \times 9 + 19 + 54$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Genaro wanted to measure the length of this pencil. Instead of a ruler, he only had a piece of a broken yardstick. Genaro placed the piece of the yardstick alongside the pencil, as shown below. How long is the pencil? Describe how you found your answer.
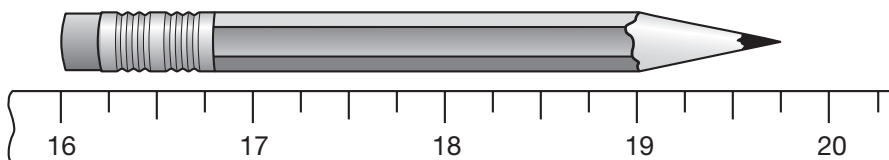
The multiples of 10 are the numbers we say when we count by 10.

10, 20, 30, 40, 50, …

Likewise, the multiples of 100 are the numbers we say when we count by 100.

100, 200, 300, 400, 500, …

When multiplying by multiples of 10 and 100, we focus our attention on the first digit of the multiple.

Example 1

Find the product: 3 × 200

We will show three ways to do this:

$$\begin{array}{r} 200 \\ 200 \\ +\ 200 \\ \hline \mathbf{600} \end{array} \qquad \begin{array}{r} 2 \text{ hundred} \\ \times\qquad 3 \\ \hline \mathbf{6 \text{ hundred}} \end{array} \qquad \begin{array}{r} 200 \\ \times\quad 3 \\ \hline \mathbf{600} \end{array}$$

We will look closely at the method on the right.

$2 \times 3 = 6$ → 600

2 0 0 ← Two zeros here
× 3
600 ← Two zeros here

By focusing on the first digit and counting the number of zeros, we can multiply by multiples of 10 and 100 mentally.

Discuss Why can we write zeros in the ones and tens places of the product without multiplying the values of those places?

Example 2

Six buses will be used to transport students on a field trip. Each bus has seats for 40 passengers. Altogether, how many passengers can the buses transport?

We will show two ways. We can find the product mentally, whether we think of horizontal multiplication or vertical multiplication.

$6 \times 40 = 240$

$$\begin{array}{r} 40 \\ \times\quad 6 \\ \hline 240 \end{array}$$

The buses can transport a total of **240 passengers.**

Verify Before completing the multiplication, why can we write a zero in the ones place of the product?

We have practiced rounding numbers to the nearest ten. Now we will learn to round numbers to the nearest hundred. To round a number to the nearest hundred, we choose the closest multiple of 100 (number ending in two zeros). A number line can help us understand rounding to the nearest hundred.

Example 3

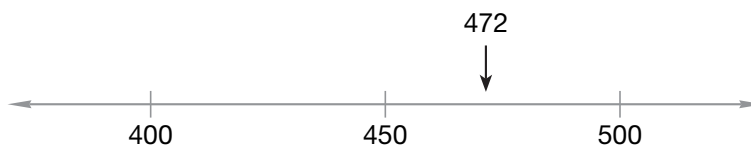**a. Round 472 to the nearest hundred.**

b. Round 472 to the nearest ten.

a. The number 472 is between 400 and 500. Halfway between 400 and 500 is 450. Since 472 is greater than 450, it is closer to 500 than it is to 400. We see this on the number line below.

472
↓

400   450   500

So 472 rounded to the nearest hundred is **500.**

b. Counting by tens, we find that 472 is between 470 and 480.

472
↓

460   470   480   490

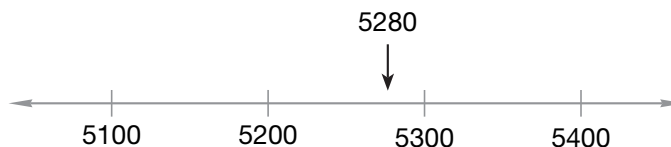Since 472 is closer to 470 than it is to 480, we round 472 to **470.**

Example 4

Erica lives about one mile from school. A mile is 5280 feet. Round 5280 feet to the nearest hundred feet.

Counting by hundreds, we find that 5280 ft is between 5200 ft and 5300 ft. It is closer to **5300 ft** than it is to 5200 ft.

5280
↓

5100   5200   5300   5400

We can also round to the nearest hundred by focusing on the digit in the tens place, that is, the digit just to the right of the hundreds place.

┌─ tens place
↓
52⑧0
↑
└─ hundreds place
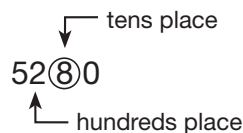
If the digit in the tens place is less than 5, the digit in the hundreds place does not change. If the digit in the tens place is 5 or more, we increase the digit in the hundreds place by one. Whether rounding up or rounding down, the digits to the right of the hundreds place become zeros.

Example 5

Round 362 and 385 to the nearest hundred. Then add the rounded numbers.

The number 362 is closer to 400 than it is to 300. The number 385 is also closer to 400 than it is to 300. Both 362 and 385 round to **400.** Now we add.

$$400 + 400 = \mathbf{800}$$

Example 6

To help prepare for the school play, the students in Mrs. Jacobsen's class arranged nine rows of chairs in the gymnasium. The students placed 44 chairs in each row. What is a reasonable estimate of the total number of chairs that were placed in the gymnasium?

To estimate, we can first round the numbers so that the arithmetic is easier. Nine rows of 44 chairs is about the same as ten rows of 40 chairs. We can multiply 10×40 to estimate the number of chairs. To multiply 40 by 10, we can simply affix a zero to 40.

$$10 \times 40 = 400$$

We estimate that there were about **400 chairs** in the gymnasium.

Lesson Practice

Find each product:

a. $\begin{array}{r} 50 \\ \times\ 7 \\ \hline \end{array}$ **b.** $\begin{array}{r} 600 \\ \times\ \ 3 \\ \hline \end{array}$ **c.** 7×40 **d.** 4×800

Round each number to the nearest hundred:

e. 813   **f.** 685   **g.** 427   **h.** 2573

i. Round 297 and 412 to the nearest hundred. Then add the rounded numbers.

j. Round 623 and 287 to the nearest hundred. Then subtract the smaller rounded number from the larger rounded number.

k. A community marching band marches in 19 rows with 5 musicians in each row. What is a reasonable estimate of the number of musicians in the entire marching band? Explain why your estimate is reasonable.

l. Six months is about how many days?

Written Practice

Distributed and Integrated

*1. **Represent** On 1-cm grid paper, draw a square with sides 5 cm long.
(Inv. 2, Inv. 3)

   a. What is the perimeter of the square?

   b. What is the area of the square?

Formulate Write and solve equations for problems **2** and **3.**

2. Wilbur had sixty-seven grapes. Then he ate some grapes. He had
(25) thirty-eight grapes left. How many grapes did Wilbur eat?

3. The distance from Whery to Radical is 42 km. The distance
(11, 14) from Whery to Appletown through Radical is 126 km. How far is it from Radical to Appletown?
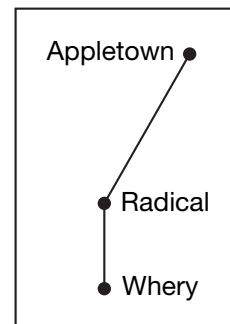
*4. Raziya arrived home from school at the time shown on the
(27) clock and began her homework half an hour later. What time did Raziya begin her homework?
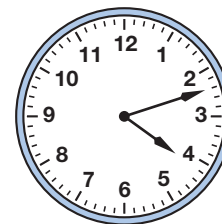
*5. **Generalize** Write a rule for this sequence and find the next three
(3, Inv. 3) numbers:

$$1, 4, 9, 16, 25, 36, 49, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$$

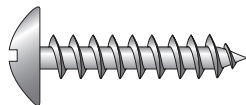***6. a.** Round 673 to the nearest hundred.
(20, 42)

    b. Round 673 to the nearest ten.

7. How many squares are shaded?
(35)

*8. a. (Estimate) Find the length of this screw to the nearest quarter inch.
(Inv. 2, 39)

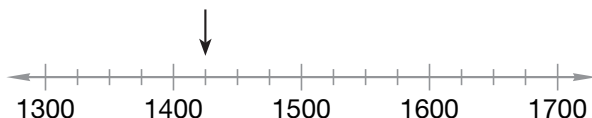   **b.** Find the length of this screw to the nearest centimeter.

9. (Connect) Rewrite this addition problem as a multiplication problem:
(27)

$$\$2.50 + \$2.50 + \$2.50$$

*10. (Conclude) Are the line segments in a plus sign parallel or perpendicular?
(23)

11. (Represent) To what number is the arrow pointing?
(Inv. 1)

    1300   1400   1500   1600   1700

*12. (Analyze) Use the digits 4, 7, and 8 to write an odd number greater
(10) than 500. Each digit may be used only once.

*13. 6×80 ***14.** 7×700 ***15.** 9×80 ***16.** 7×600
(42)   (42)   (42)   (42)

17.
(24)
$$\begin{array}{r} z \\ + \ 338 \\ \hline 507 \end{array}$$

*18.
(41)
$$\begin{array}{r} \$4.06 \\ - \ \$2.28 \\ \hline \end{array}$$

*19.
(41)
$$\begin{array}{r} w \\ \times \ 6 \\ \hline 42 \end{array}$$

20. $n - 422 = 305$ **21.** $55 + 555 + 378$
(24)   (17)

*22. a. Use words to write 5280.
(33)

    b. Which digit in 5280 is in the tens place?

23. **a.** Ten nickels are what fraction of a dollar?
(36)

    b. Write the value of ten nickels using a dollar sign and a decimal point.

*24. Compare:
(Inv. 4)

    a. $0.5 \bigcirc \dfrac{1}{2}$ **b.** $\dfrac{1}{4} \bigcirc \dfrac{1}{10}$

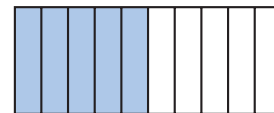**25.** What is the sum of three squared and four squared?
(Inv. 3)

*26. **Multiple Choice** Which of these numbers does *not*
(Inv. 4) describe the shaded part of this rectangle?

    A $\dfrac{5}{10}$ **B** $\dfrac{1}{2}$ **C** 5.0   **D** 0.5

*27. The decimal number 0.25 equals $\frac{1}{4}$. Write 0.25 with words.
(Inv. 4)

*28. Anisa used a stopwatch to time herself as she ran three 50-meter
(Inv. 4) dashes. Here are her times in seconds:

<div align="center">9.12, 8.43, 8.57</div>

Arrange Anisa's times in order from fastest (least time) to slowest
(greatest time).

*29. Joleen has six pieces of wood that she wants to fit together to make a
(Inv. 3, picture frame. Two pieces are 8 inches long, two are 6 inches long, and
39) two are 4 inches long. Using four of the six pieces, how many different
rectangular frames could Joleen make? What would be the areas of the
rectangles formed?

*30. **Estimate** Each of 4 school buses can carry 52 passengers. What is
(42) a reasonable estimate of the total number of passengers the four buses
can carry? Explain why your estimate is reasonable.

Early Finishers

Real-World Connection

The zoo's insect house has 35 glass cases. An average of 17 crickets
live in 22 of the cases and an average of 15 grasshoppers live in 13
of the cases. What is a reasonable estimate of the total number of
insects that live in the glass cases at the zoo? Explain why your answer
is reasonable.

• Adding and Subtracting Decimal Numbers, Part 1

Power Up

facts   Power Up E

count aloud Count down by fives from 150 to 50.

mental math

a. **Number Sense:** $80 - 5$

b. **Number Sense:** $80 - 25$ (Subtract 20. Then subtract 5 more.)

c. **Powers/Roots:** $\sqrt{16}$

d. **Money:** Monica purchased a flashlight for $6.23 and batteries for $2.98. What was the total cost?

e. **Measurement:** The perimeter of a football field is 1040 feet. Samir ran two laps along the edge of the field. How many feet did he run?

f. **Measurement:** How many cups is 1 pint?

g. **Estimation:** What numbers would you use to estimate the sum of $13.58 and $6.51?

h. **Calculation:** $7 \times 8 + 9 + 35$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Counting by halves, we say, "one half, one, one and one half, two, ..." Write the sequence of numbers you say when you count by halves from $\frac{1}{2}$ to 10. Place the numbers along a number line. Then use your drawing to find the number that is halfway between two and five.

To add or subtract money amounts written with a dollar sign, we add or subtract digits with the same place value. We line up the digits with the same place value by lining up the decimal points.

Example 1

a. $3.45 + $0.75   **b. $5.35 − $2**

a. First we line up the decimal points in order to line up places with the same place value. Then we add, remembering to write the dollar sign and the decimal point.

$$\begin{array}{r} \$3.45 \\ + \ \$0.75 \\ \hline \mathbf{\$4.20} \end{array}$$

b. First we put a decimal point and two zeros behind the $2.

$$\$2 \quad \text{means} \quad \$2.00$$

Now we line up the decimal points and subtract.

$$\begin{array}{r} \$5.35 \\ - \ \$2.00 \\ \hline \mathbf{\$3.35} \end{array}$$

Model Use money manipulatives to check the answer.

Example 2

At the craft store Maggie bought a pad of drawing paper for $3.75, charcoal for $4, and a clip for 15¢. What was the total price of the items before tax?

Before we add, we make sure that all the money amounts have the same form. We make these changes:

$$\begin{array}{ccc} \$4 & \longrightarrow & \$4.00 \\ 15¢ & \longrightarrow & \$0.15 \end{array}$$

Then we line up the decimal points and add.

$$\begin{array}{r} \$3.75 \\ \$4.00 \\ + \ \$0.15 \\ \hline \$7.90 \end{array}$$

The total price of the three items was **$7.90.**

Model Use money manipulatives to check the answer.

Thinking Skill

Discuss

To find the answer, explain how we could have changed each amount to cents.

We add or subtract decimal numbers that are not money amounts the same way; that is, we line up the decimal points and then add or subtract.

Activity

Adding and Subtracting Decimals
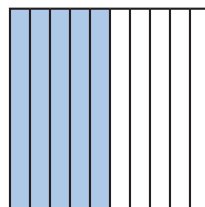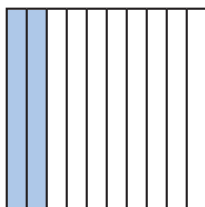
Material needed:
- **Lesson Activity 24**

(**Model**) Complete **Lesson Activity 24** to represent tenths and hundredths on a grid. Then use the representations to solve each problem in the activity.
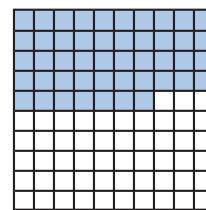
Example 3

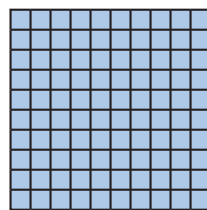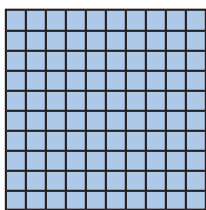**a. 0.2 + 0.5**　　　　　**b. 3.47 − 3.41**

a. We line up the decimal points and add.

$$
\begin{array}{r}
0.2 \\
+\ 0.5 \\
\hline
\mathbf{0.7}
\end{array}
$$

b. We line up the decimal points and subtract.

$$
\begin{array}{r}
3.47 \\
-\ 3.41 \\
\hline
\mathbf{0.06}
\end{array}
$$
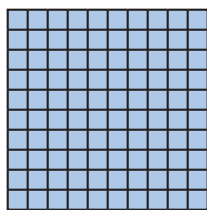
(**Justify**) Which is greater: 0.7 or 0.06? Explain your reasoning.

Example 4

One gallon of milk is about 3.78 liters. Two gallons of milk is about how many liters?

We add to find about how many liters are in two gallons.

$$
\begin{array}{r}
3.78\ \text{L} \\
+\ 3.78\ \text{L} \\
\hline
\mathbf{7.56\ L}
\end{array}
$$

Lesson Practice Find each sum or difference:

a. $6.32 + $5   **b.** $3.25 − $1.75

c. 46¢ + 64¢   **d.** 98¢ − 89¢

e. $1.46 + 87¢   **f.** 76¢ − $0.05

g. 5.6 + 5.6   **h.** 2.75 − 1.70

For problems **i** and **j**, use the models below to add and subtract.

i. 0.50 + 0.75   **j.** 0.75 − 0.50
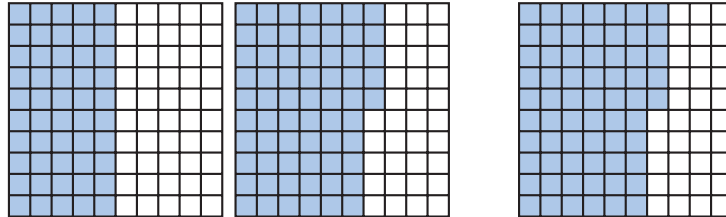
Written Practice *Distributed and Integrated*

Formulate Write and solve equations for problems **1–3.**

*1. One hundred pennies are separated into two piles. In one pile there are
(24,41) thirty-five pennies. How many pennies are in the other pile?

*2. **Estimate** Juan opened a 1-gallon bottle that held about 3.78 liters of
(25, 43) milk. He poured about 1.50 liters of milk into a pitcher. About how many
liters of milk were left in the bottle?

*3. San Francisco is 400 miles north of Los Angeles. Santa Barbara is
(11, 41) 110 miles north of Los Angeles. Stephen drove from Los Angeles to
Santa Barbara. How many miles does he still have to drive to reach
San Francisco?

*4. Draw a rectangle that is 3 cm long and 3 cm wide.
(Inv. 2, Inv. 3)

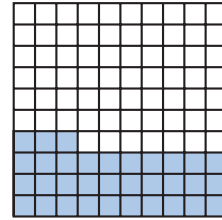   **a.** What is the perimeter of the rectangle?

   b. What is the area of the rectangle?

*5. a. Round 572 to the nearest hundred.
(20, 42)

   b. Round 572 to the nearest ten.

*6. **Represent** Write the shaded part of this square
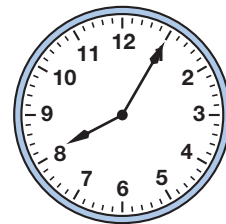(Inv. 4)

    a. as a fraction.

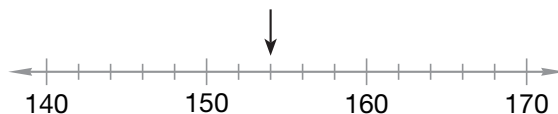   **b.** as a decimal number.

    c. using words.

7. **Conclude** Are the rails of a railroad track parallel or perpendicular?
(23)

*8. **Represent** Draw a square to show 3×3. Then shade two ninths of
(26,
Inv. 3) the square.

9. The clock shows the time Santo arrived at school. He woke
(19) up that morning at 6:05 a.m. How long after waking up did
Santo arrive at school?

10. **Represent** To what number is the arrow pointing?
(Inv. 1)

    140   150   160   170

*11. $2.45 + 4.50$ ***12.** $\$3.25 - \$2.47$
(43)   (43)

*13. $\$2.15 + \$3 + 7¢$ ***14.** $3.75 - 2.50$
(43)   (43)

15.   507   **16.** n ***17.** $\$5.00$
(24) $-\ \ \ \ n$ (24) $-\ 207$ (41) $-\ \$3.79$
      $\overline{\ \ 456\ }$ $\overline{\ \ 423\ }$

*18. 6×80 ***19.** 4×300 **20.** 7×90
(42)   (42)   (42)

*21. $8n = 32$ **22.** $\sqrt{100}$
(41)   (Inv. 3)

23. **Represent** Draw a line segment that is 2 inches long. Then measure
(Inv. 2) the line segment with a centimeter ruler. Two inches is about how many
centimeters?

24. **Represent** The population of the city was about 1,080,000. Use
(34)   words to write that number.

*25. **Multiple Choice** Which of these metric units would probably be used
(Inv. 2)   to describe the height of a tree?

   A millimeters   **B** centimeters

   C meters   **D** kilometers

*26. **Multiple Choice** Emily has a 2-liter bottle full of water and an empty
(40)   half-gallon carton. She knows 1 liter is a little more than 1 quart. If she
    pours water from the bottle into the carton, what will happen?

   A The bottle will be empty before the carton is full.

   B The carton will be full before the bottle is empty.

   C When the carton is full, the bottle will be empty.

   D The carton will be empty, and the bottle will be full.

27. Here is a list of selling prices for five houses. Arrange the prices in order
(33)   from highest selling price to lowest selling price.

$$\$179,500$$
$$\$248,000$$
$$\$219,900$$
$$\$315,000$$
$$\$232,000$$

*28. **Multiple Choice** Which group of decimal numbers is arranged in
(43)   order from least to greatest?

   A 0.23, 0.21, 0.25   **B** 0.25, 0.23, 0.21

   C 0.21, 0.23, 0.25   **D** 0.21, 0.25, 0.23

*29. An uncooked spaghetti noodle fell on the floor and broke into several
(39)   pieces. Three of the pieces were $1\frac{1}{2}$ inches long, 2 inches long, and
    $2\frac{1}{4}$ inches long. If two of the three pieces are lined up end to end, what
    are all the possible combined lengths?

*30. **Explain** At an elementary school track meet, Ra'Shawn ran a
(43)   100-meter dash in 16.5 seconds. Sabrina ran 0.4 seconds faster.
    What was Sabrina's time for the race? Explain why your answer is
    reasonable.

• Multiplying Two-Digit Numbers, Part 1

Power Up

facts	Power Up F
count aloud	Count by halves from $\frac{1}{2}$ to 10.
mental math	**a. Number Sense:** $70 - 45$
	b. Number Sense: $370 - 125$
	c. Powers/Roots: $\sqrt{9} - \sqrt{1}$
	d. Money: Lisa purchased paint for $5.96 and brushes for $3.95. How much did she spend altogether?

e. Measurement: To which number is the needle pointing on this scale?
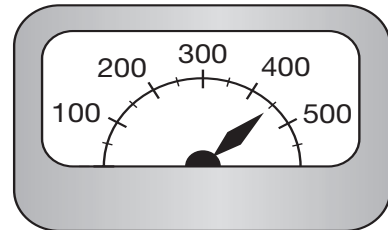
f. Measurement: How many pints is 1 quart?

g. Estimation: Choose the more reasonable estimate for the total capacity of a bathtub: 50 gallons or 50 milliliters.

h. Calculation: $560 + 24 + 306$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Each time Khanh cleans his aquarium, he drains some of the old water and adds 3 liters of fresh water. Khanh has a 5-liter container and a 2-liter container. How can he use those two containers to measure 3 liters of water?

If there are 21 children in each classroom, then how many children are in 3 classrooms?
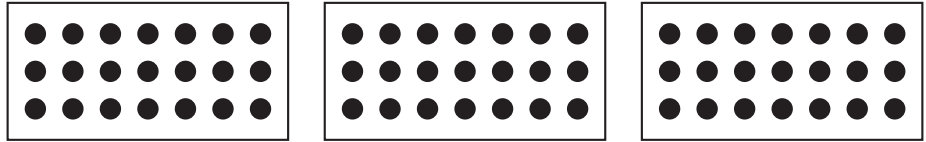
Instead of finding 21 + 21 + 21, we will solve this problem by multiplying 21 by 3. Below we show two ways to do this. The first method is helpful when multiplying mentally. The second method is a quick way to multiply using pencil and paper.

Method 1: Mental Math

Think: 21 is the same as 20 + 1.

Multiply:
$$\begin{array}{c} 20 \\ \times\ 3 \\ \hline 60 \end{array} \quad \text{and} \quad \begin{array}{c} 1 \\ \times 3 \\ \hline 3 \end{array}$$

Add: 60 + 3 = 63

Method 2: Pencil and Paper

Multiply ones and then multiply tens.
$$\begin{array}{c} 21 \\ \times\ 3 \\ \hline 63 \end{array}$$

three × twenty-one = sixty-three

Thinking Skill

Discuss

To find the sum of 21 + 21 + 21, we can multiply 21 × 3. Can we multiply to find the sum of 30 + 33 + 31? Why or why not?

Example 1

Multiply: 42 × 3

We write 42 on top and 3 underneath, directly below the 2. We multiply 2 by 3 to get 6. Then we multiply 4 (for 40) by 3 to get 12. The product is **126.**

$$\begin{array}{c} 4\,2 \\ \times\ 3 \\ \hline 6 \end{array} \rightarrow \begin{array}{c} 4\,2 \\ \times\ 3 \\ \hline 126 \end{array} \rightarrow \begin{array}{c} 42 \\ \times\ 3 \\ \hline 126 \end{array}$$

three × forty-two = one hundred twenty-six

Example 2

The walls of a bedroom have already been painted. The rectangular ceiling measures 12 feet by 9 feet and still needs to be painted a different color. Each quart of paint covers 120 square feet. Is one quart of paint enough to paint the ceiling?

We multiply the length and width of a rectangle to find its area.

$$12 \text{ ft} \times 9 \text{ ft} = 108 \text{ sq. ft}$$
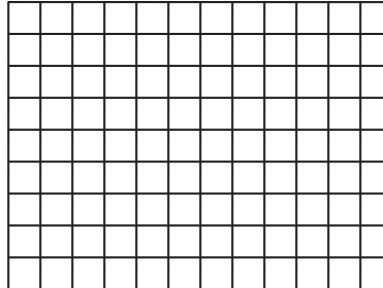
Since 108 square feet is less than 120 square feet, one quart **is enough** to paint the ceiling.

Lesson Practice   Find each product:

a.	31 × 2	**b.** 31 × 4	**c.** 42 × 4
d.	30 × 2	**e.** 30 × 4	**f.** 24 × 0

Written Practice   *Distributed and Integrated*

*1. *(Inv. 4)*   **Represent** The 1-gallon container of milk held 3.78 L of milk. Use words to write 3.78 L.

2. *(33)*   **Represent** Silviano compared two numbers. The first number was forty-two thousand, three hundred seventy-six. The second number was forty-two thousand, eleven. Use digits and a comparison symbol to show the comparison.

*3. *(41, 43)*   **Explain** The ticket cost $3.25. Mr. Chen paid for the ticket with a $5 bill. How much change did he receive? Is your answer reasonable? Why or why not?

4. Nine squared is how much more than the square root of nine?
(Inv. 3, 31)

*5. Find the missing factor: $8m = 48$
(41)

*6. (**Connect**) Eight fluid ounces of water is one cup of water. How many
(40) fluid ounces of water is a pint of water?

7. How many circles are shaded?
(35)

*8. (**Estimate**) Use an inch ruler to find the diameter of
(21, 39) this circle to the nearest quarter inch.
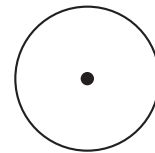
*9. Compare:
(Inv. 1, 42)
  a. $-5 \bigcirc -2$ **b.** $4 \times 60 \bigcirc 3 \times 80$
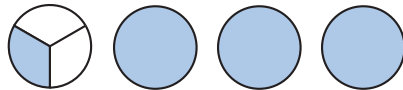
*10. *(41)*	**11.** *(43)*	**12.** *(43)*	***13.** *(41)*
$4.03 − $1.68	$4.33 + $5.28	$5.22 − $2.46	$7.08 − $0.59

*14. *(44)*	**15.** *(42)*	***16.** *(44)*	***17.** *(44)*
21 × 6	40 × 7	73 × 2	51 × 6

18. $2 + 47¢ + 21¢
(43)

19. $8.7 - 1.2$
(43)

20. $62 - n = 14$
(24)

21. $n - 472 = 276$
(24)

22. Write this addition problem as a multiplication problem:
(27)

$$2.1 + 2.1 + 2.1 + 2.1 + 2.1 + 2.1$$

*23. a. (**Connect**) Which digit in 1760 is in the hundreds place?
(33, 42)

  b. Use words to write 1760.

  c. Round 1760 to the nearest hundred.

*24. Round 738 and 183 to the nearest hundred. Then add the rounded
(42) numbers.

*25. (**Connect**) Add the decimal number one and fifty hundredths to three
(Inv. 4, and twenty-five hundredths. What is the sum?
43)

*26. Multiple Choice If the area of this rectangle is
(Inv. 3, 6 sq. cm, then the length of the rectangle is which of
41) the following?

    A 3 cm   **B** 4 cm
    C 10 cm   **D** 12 cm

2 cm

*27. a. Is $5.75 closer to $5 or to $6?
(20,
Inv. 4)
    b. Is 5.75 closer to 5 or to 6?

28. (**Explain**) How can you pay $1.23 using the fewest number of bills
(38) and coins?

(**Formulate**) Write and solve equations for problems **29** and **30.**

*29. The price of the notebook was $6.59. When sales tax was added, the
(11, 41) total was $7.05. How much was the sales tax?

*30. The Sutlej River in Asia is 900 miles long. The Po River in Europe is
(25, 41) 405 miles long. How many miles longer is the Sutlej River?

Early Finishers

Real-World Connection

The school choir is ordering new choir shirts and blouses. There are
15 girls and 11 boys in the choir. The girls' blouses cost $9 each. The
boys' shirts cost $8 each. What will be the total cost for the choir
shirts and blouses?

• Parentheses and the Associative Property
• Naming Lines and Segments

Power Up

facts	Power Up E
count aloud	Count by halves from $\frac{1}{2}$ to 10.
mental math	**a. Money:** 80¢ − 35¢
	b. Money: $1.60 − $0.25
	c. Money: $4.50 − $1.15
	d. Time: What month is 14 months after March?
	e. Time: Cynthia finished her homework in 1 hour 13 minutes. If she started at 4:05 p.m., what time did she finish?
	f. Measurement: How many milliliters is 2 liters?
	g. Estimation: D'Neece had $10.97. She spent $5.92. Round each amount to the nearest dollar and then subtract to estimate the amount D'Neece has left over.
	h. Calculation: 43 + 29 + 310
problem solving	Choose an appropriate problem-solving strategy to solve this problem. This is the sequence of numbers we say when we count by fourths. Copy this sequence on your paper, and continue the sequence to the whole number 5.

$$\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1, 1\frac{1}{4}, 1\frac{1}{2}, 1\frac{3}{4}, 2, \ldots$$

Parentheses and the Associative Property

In the following expression there are two subtractions:

$$12 - (4 - 3)$$

The parentheses show us which subtraction to perform first. The order of operations is to first subtract 3 from 4 and then to subtract that result from 12.

$$12 - (4 - 3)$$
$$12 - 1 = 11$$

Example 1

(12 − 4) − 3

We perform the subtraction within the parentheses first.

$$(12 - 4) - 3$$
$$8 - 3 = 5$$

> **Math Language**
>
> **Parentheses** are grouping symbols that indicate where to begin when simplifying an expression.

Compare Describe how changing the order of subtraction changes the results.

In the description and example above, we see that changing the order of subtraction changes the results. However, changing the order of addition does not change the final sum. If three numbers are to be added, it does not matter which two numbers we add first—the sum will be the same.

$$5 + (4 + 2) = 11 \qquad (5 + 4) + 2 = 11$$

This property of addition is called the **Associative Property of Addition.**

Example 2

Compare: 3 + (4 + 5) ◯ (3 + 4) + 5

Both sides of the comparison equal 12.

$$3 + (4 + 5) \bigcirc (3 + 4) + 5$$
$$3 + 9 \bigcirc 7 + 5$$
$$12 \bigcirc 12$$

We replace the circle with an equal sign.

$$3 + (4 + 5) = (3 + 4) + 5$$

This example illustrates the Associative Property of Addition.

The Associative Property also applies to multiplication. We will illustrate the **Associative Property of Multiplication** with a stack of blocks. On the left we see 12 blocks in front (3×4). There are also 12 blocks in back. We can multiply 12 by 2 to find the total number of blocks.
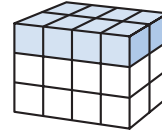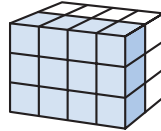
$$(3 \times 4) \times 2 = 24 \qquad 3 \times (4 \times 2) = 24$$

On the right we see 8 blocks on top (4×2). There are 3 layers of blocks. We can multiply 8 by 3 to find the total number of blocks.

Example 3

Compare: $3 \times (2 \times 5) \bigcirc (3 \times 2) \times 5$

Both sides of the comparison equal 30.

$$3 \times (2 \times 5) \bigcirc (3 \times 2) \times 5$$
$$3 \times 10 \bigcirc 6 \times 5$$
$$30 \bigcirc 30$$

We replace the circle with an equal sign.

$$3 \times (2 \times 5) = (3 \times 2) \times 5$$

This example illustrates the Associative Property of Multiplication.

Naming Lines and Segments

Recall that a line has no end. A line goes on and on in both directions. When we draw a line, we can use arrowheads to show that the line continues. One way to identify a line is to name two points on the line.

This is line *AB.* It is also line *BA.*

This line is named "line *AB*" or "line *BA.*" We can use the symbols $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$ to write the name of this line. The small line above the letters *AB* and *BA* replaces the word *line.* To read $\overleftrightarrow{AB}$, we say, "line *AB.*"

Recall that a segment is part of a line. A segment has two endpoints. We name a segment by naming its endpoints. Either letter may come first.

R ●————————————————————● S

This is segment *RS.* It is also segment *SR.*

We may use the symbols $\overline{RS}$ or $\overline{SR}$ to write the name of this segment. The small segment over the letters replaces the word *segment.* To read $\overline{RS}$, we say, "segment *RS.*"

Example 4

Which segments in this triangle are perpendicular?
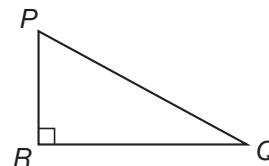
The right-angle symbol tells us this is a right triangle. $\overline{PR}$ and $\overline{RQ}$ are perpendicular because they meet and form a right angle.

Example 5

Name a pair of segments that appears to be parallel to $\overline{AB}$.
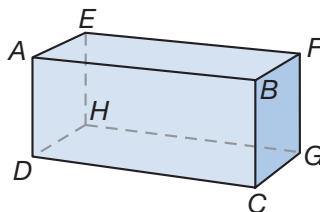
We see that $\overline{DC}$ is parallel to $\overline{AB}$. These segments are on opposite sides of the same rectangular face. $\overline{EF}$ and $\overline{HG}$ are also parallel to $\overline{AB}$.

Analyze Name two segments that appear to be perpendicular to $\overline{AB}$.

Example 6

The length of $\overline{AB}$ is 3 cm. The length of $\overline{BC}$ is 4 cm. What is the length of $\overline{AC}$?

A ●————————● B————————————● C
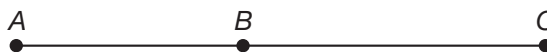
Two short segments can form a longer segment. From *A* to *B* is one segment; from *B* to *C* is a second segment. Together they form a third segment, segment *AC.* We are told the lengths of $\overline{AB}$ and $\overline{BC}$. If we add these lengths, their sum will equal the length of $\overline{AC}$.

$$3 \text{ cm} + 4 \text{ cm} = 7 \text{ cm}$$

The length of $\overline{AC}$ is **7 cm.**

Lesson Practice

a. $8 - (4 + 2)$ **b.** $(8 - 4) + 2$

c. $9 - (6 - 3)$ **d.** $(9 - 6) - 3$

e. $10 + (2 \times 3)$ **f.** $3 \times (10 + 20)$

g. Compare: $2 + (3 + 4) \bigcirc (2 + 3) + 4$

h. Compare: $3 \times (4 \times 5) \bigcirc (3 \times 4) \times 5$

i. (**Analyze**) What property of addition and multiplication is shown by the comparisons in problems **g** and **h?**

j. The length of $\overline{RS}$ is 4 cm. The length of $\overline{RT}$ is 10 cm. What is the length of $\overline{ST}$? (*Hint:* You will need to subtract.)

R   S   T
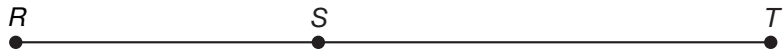
k. (**Conclude**) Which segment in this figure appears to be the diameter of the circle?
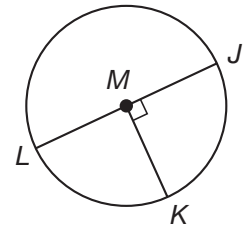
l. (**Conclude**) Which segments are perpendicular?

m. Refer to the figure in Example 5 and name two segments that are parallel to $\overline{BC}$.

Written Practice   *Distributed and Integrated*

*1. (**Connect**) Use the numbers 0.5, 0.6, and 1.1 to write two addition facts
(6, 43) and two subtraction facts.

2. A whole hour is 60 minutes. How many minutes is half of an hour?
(19)

3. (**Explain**) The space shuttle orbited 155 miles above the earth. The
(31) weather balloon floated 15 miles above the earth. The space shuttle was how much higher than the weather balloon? Explain why your answer is reasonable.

*4. (**Justify**) How much change should you get back if you give the
(41, 43) clerk $5.00 for a box of cereal that costs $3.85? How can you check your answer?

*5. (**Represent**) Write 12.5 using words.
(Inv. 4)

6. (Represent) Use digits and symbols to show that negative sixteen is
(Inv. 1) less than negative six.

7. The clock shows the time Joe left for work this morning. He
(27) ate breakfast 35 minutes before that time. What time did
Joe eat breakfast?
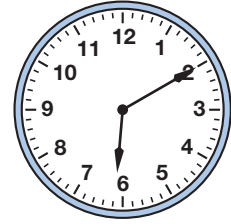
8. (Represent) Write 4060 in expanded form. Then use words to write
(16, 33) the number.

9. How many circles are shaded?
(35)
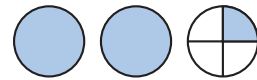
10. Compare:
(34,36)

    a. 2 quarters $\bigcirc$ half dollar

    b. 2,100,000 $\bigcirc$ one million, two hundred thousand

11. Find the missing factor: $6w = 42$
(41)

*12. a. (Estimate) Use an inch ruler to measure this line segment to the
(Inv. 2) nearest inch.

    b. (Estimate) Use a centimeter ruler to measure this line segment to
the nearest centimeter.

_____

13. Compare: $12 - (6 - 3)$ $\bigcirc$ $(12 - 6) - 3$
(45)

*14. (Explain) Look at problem **13** and your answer to the problem. Does
(45) the Associative Property apply to subtraction? Why or why not?

*15.   4.07   ***16.** $5.02   **17.** $5.83   **18.** $3.92
(43) $\underline{-\ 2.26}$ *(41)* $\underline{-\ \$2.47}$ *(43)* $\underline{-\ \$2.97}$ *(43)* $\underline{+\ \$5.14}$

*19.   42   ***20.**   83   **21.**   40   ***22.**   41
(44) $\underline{\times\ \ 3}$ *(44)* $\underline{\times\ \ 2}$ *(42)* $\underline{\times\ \ 4}$ *(44)* $\underline{\times\ \ 6}$

23. $2.75 + 50¢ + $3
(43)

*24. 3.50 + 1.75
(43)

*25. (**Model**) Draw a rectangle that is 2 in. by 1 in.
(Inv. 2,
Inv. 3)

    a. The perimeter of the rectangle is how many inches?

    b. The area of the rectangle is how many square inches?

*26. **Multiple Choice** Which of the following segments is *not* a
(21, 45) radius of the circle?

    A $\overline{RS}$ **B** $\overline{RM}$

    C $\overline{MT}$ **D** $\overline{MS}$
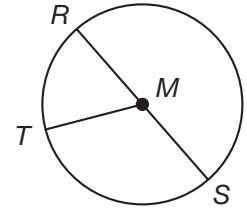
27. (**Formulate**) Estrella finished the first problem in 34 seconds. She
(31) finished the second problem in 28 seconds. The first problem took how much longer to finish than the second problem? Write an equation to solve the problem.

*28. Describe the order of operations in each expression. Then find the
(45) number each expression equals.

    a. $12 - (4 - 2)$

    b. $(12 - 4) - 2$

29. In Dodge City, Kansas, the average maximum temperature in July is 93°F.
(18) The average minimum temperature is 67°F. How many degrees warmer is a temperature of 93°F than a temperature of 67°F?

*30. (**Estimate**) The population density of Connecticut is 702.9 people
(25, 42) per square mile. The population density of Kentucky is 101.7 people per square mile. Round to the nearest hundred to estimate how many more people per square mile live in Connecticut than live in Kentucky.

• Relating Multiplication and Division, Part 1

Power Up

facts	Power Up F
count aloud	Count by fourths from $\frac{1}{4}$ to 5.

mental math

a. **Number Sense:** $300 - 50$

b. **Number Sense:** $68 + 6 + 20$

c. **Number Sense:** $536 + 45$

d. **Money:** T'Wan purchased a book for $7.90 and a snack for $1.95. How much did he spend altogether?

e. **Powers/Roots:** Compare: $\sqrt{81} \bigcirc 10$

f. **Measurement:** How many quarts is 1 gallon?

g. **Estimation:** What numbers would you use to estimate the sum of $17.23 and $3.71?

h. **Calculation:** $5 \times 7 + 5 + 29 + 220$

problem solving

The digits 1, 2, 3, and 4, in order, can be written with an equal sign and a times sign to form a multiplication fact.

$$12 = 3 \times 4$$

Write another multiplication fact using four different digits written in order.

Focus Strategy: Make an Organized List

(Understand) We are shown how the digits 1, 2, 3, and 4 can be written in order to form a multiplication fact. We are asked to find a different multiplication fact with four digits written in order.

Plan We can *make a list* of sequences of four digits written in order. Then we can look through the list to find a sequence in which we can write an equal sign and a times sign to form a multiplication fact.

Solve We list all the sequences of four digits that can be written in order:

$$1\ 2\ 3\ 4$$
$$2\ 3\ 4\ 5$$
$$3\ 4\ 5\ 6$$

$$4\ 5\ 6\ 7$$
$$5\ 6\ 7\ 8$$
$$6\ 7\ 8\ 9$$

Now we look through our list for digits that can be turned into a multiplication fact. Can we make any facts by placing a times sign between the first and second digits? We try and find that we cannot: 2×3 does not equal 45, 3×4 does not equal 56, and so on.

If we place the multiplication sign between the third and fourth digits, can we make any facts? Yes; we find that we can make two facts: $12 = 3 \times 4$ (which we were given) and **$56 = 7 \times 8$.**

Check We know that our answer is reasonable because we found a set of four digits that can be written in order to form a multiplication fact. We *made an organized list* to be sure that we considered each possibility and to save time instead of guessing and checking.

New Concept

Remember that multiplication problems have three numbers. The multiplied numbers are *factors,* and the answer is the *product.*

$$\text{Factor} \times \text{Factor} = \text{Product}$$

If we know the two factors, we multiply to find the product. If the factors are 4 and 3, the product is 12.
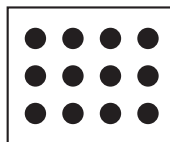
$$4 \times 3 = 12$$

If we know one factor and the product, we can find the other factor.

$$4 \times w = 12 \qquad n \times 3 = 12$$

We can use **division** to find a missing factor. Division "undoes" a multiplication.

We know how to use a multiplication table to find the product of 3 and 4. We locate the proper row and column, and then find the product where they meet.

	0	1	2	3	④
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	6	8
③	0	3	6	9	⑫
4	0	4	8	12	16

We can also use a multiplication table to find a missing factor. If we know that one factor is 3 and the product is 12, we look across the row that starts with 3 until we see 12. Then we look up to the top of the column containing 12. There we find 4, which is the missing factor.

We write the numbers 3, 4, and 12 with a division box this way:

$$3\overline{)12} \quad \text{with } 4 \text{ above}$$

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

We say, "Twelve divided by three is four."

Example 1

Divide: $4\overline{)32}$

We want to find the missing factor. We think, "Four times what number is thirty-two?" We find the missing factor using the multiplication table below. First we find the row beginning with 4. Then we follow this row across until we see 32. Then we look up this column to find that the answer is **8.**

Multiplication Table

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
④	0	4	8	12	16	20	24	28	㉜	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

(Circled 8 at top of column and circled 4 at start of row highlight the answer.)

Conclude Identify multiplication and division patterns that appear in the table. Explain your thinking.

Activity

Using a Multiplication Table to Divide

Use the multiplication table to perform the following divisions:

1. If 36 items are divided into 4 equal groups, we can find the number of items in each group by dividing 36 by 4. Find $4\overline{)36}$ by tracing the 4 row over to 36. What number is at the top of the column?

2. If 30 students gather in groups of 5, then we can find the number of groups by dividing 30 by 5. Find $5\overline{)30}$ by tracing the 5 row to 30. What number is at the top of the column?

3. If 108 musicians are arranged in rows and columns, and if there are 9 musicians in each row, then how many columns are there?

Example 2

A P.E. teacher divided a class of 18 students into 2 equal groups. How many students were in each group?

We search for the number that goes above the division box. We think, "Two times what number is eighteen?" We remember that $2 \times 9 = 18$, so the answer is **9 students.** We write "9" above the 18, like this:

$$9 $$
$$2\overline{)18}$$

Connect If the division problem above is reversed to show multiplication, what would the factors and the product be?

Lesson Practice Divide:

a. $2\overline{)12}$ **b.** $3\overline{)21}$ **c.** $4\overline{)20}$ **d.** $5\overline{)30}$

e. $6\overline{)42}$ **f.** $7\overline{)28}$ **g.** $8\overline{)48}$ **h.** $9\overline{)36}$

Written Practice *Distributed and Integrated*

Formulate Write and solve equations for problems **1** and **2.**

*1. Four hundred ninety-five oil drums were on the first train. Seven hundred
(11, 30) sixty-two oil drums were on the first two trains combined. How many oil drums were on the second train?

*2. Workers on a Montana ranch baled 82 bales of hay on the first day.
(1, 17) They baled 92 bales of hay on the second day and 78 bales of hay on the third day. How many bales of hay did the workers bale in all three days?

*3. The decimal number three and seventy-eight hundredths is how much
(Inv. 4, 43) more than two and twelve hundredths?

*4. a. Round 786 to the nearest hundred.
(20, 42)

b. Round 786 to the nearest ten.
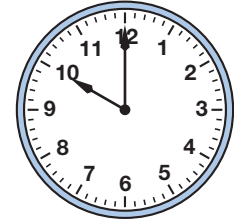
Saxon Math Intermediate 4

*5. (**Represent**) Draw and shade rectangles to show the number $2\frac{1}{3}$.
(35)

*6. (**Conclude**) The first five odd numbers are 1, 3, 5, 7, and 9.
(1,
Inv. 3)
    a. What is their sum?

    b. What is the square root of their sum?

7. The clock shows a morning time. What time was it
(27) 12 hours before that time?

*8. (**Conclude**) What type of angle is formed by the hands
(23) of this clock?

*9. (**Estimate**) **a.** Use an inch ruler to find the length of this
(23, 39) rectangle to the nearest quarter inch.

    A   *B*
    D   *C*
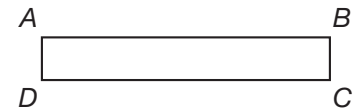
    b. Which segment is parallel to $\overline{AB}$?

10. (**Estimate**) Kita took two dozen BIG steps. About how many meters
(Inv. 2) did she walk?

*11. (**Connect**) To what mixed number is the arrow pointing?
(37)

            10   11

*12. $64 + (9 \times 40)$
(45)

*13. $6.25 + 39¢ + $3
(43)

*14. $4.02
(41) $- 2.47

*15. $5.00
(41) $- 2.48

*16. n
(24, 43) $+ 2.5$
        3.7

*17.   4.3
(16, 43) $- \quad c$
        3.2

*18.   42
(44) $\times \quad 3$

*19.   81
(44) $\times \quad 5$

*20. $6\overline{)30}$
(46)

*21. $7\overline{)21}$
(46)

*22. $8\overline{)56}$
(46)

*23. $9\overline{)81}$
(46)

*24. $7\overline{)28}$
(46)

*25. $3\overline{)15}$
(46)

*26. **Model** Draw a rectangle 3 in. long and 1 in. wide.
(Inv. 2, Inv. 3)

　　a. What is its perimeter?

　　b. What is its area?

*27. **Multiple Choice** Rosario noticed that the distance from the pole
(21) in the center of the tetherball circle to the painted circle was about six feet. What was the approximate radius of the tetherball circle?

　　A 12 ft　　　　　**B** 4 yd　　　　　**C** 3 ft　　　　　**D** 2 yd

*28. Tyrique, Dominic, and Tamasha checked their pockets for change.
(4, 22) Tyrique had two dimes and a penny. Dominic had three nickels and two pennies. Tamasha had a nickel, a dime, and a penny. Using dollar signs and decimal points list the three amounts in order from least to greatest.

29. **Predict** What is the twelfth term of the sequence below?
(3, 32)

$$12, 24, 36, 48, 60, \ldots$$

30. **Generalize** Write a rule that describes the relationship of the data
(3) in the table.

Number of Teachers	1	2	3	4	5
Number of Students	7	14	21	28	35

Early Finishers

Real-World Connection

Cecilia's book had 58 pages. She read for 6 hours and had 4 pages left.

　a. About how many pages did Cecilia read each hour? Write a division problem to solve the problem.

　b. What number will go in the division box? Explain why.

• Relating Multiplication and Division, Part 2

Power Up

facts Power Up F

count aloud As a class, count by halves from $\frac{1}{2}$ to 10.

mental math Add hundreds, then tens, and then ones. Regroup the tens.

a. **Number Sense:** $365 + 240$

b. **Number Sense:** $456 + 252$

c. **Number Sense:** $584 + 41$

d. **Money:** $\$6.00 - \$1.50$

e. **Money:** Zakia bought a box of cereal for $4.56 and a gallon of milk for $2.99. How much did she spend?

f. **Time:** Bree left her home at 7:20 a.m. She arrived at school at 7:45 a.m. How long did it take Bree to get to school?

g. **Estimation:** Kaneisha estimated that each story of the building was 10 feet tall. Kaneisha counted 6 stories. Estimate the total height of the building.

h. **Calculation:** $2 \times 9 + 30 + 29 + 110$

problem solving Choose an appropriate problem-solving strategy to solve this problem. Counting by fourths we say, "one fourth, one half, three fourths, one, ..." Draw a number line from 0 to 4 that is divided into fourths. Use the quarter-inch marks on a ruler to place each tick mark on the number line. Label each tick mark. Which number is halfway between $2\frac{1}{2}$ and 3? Which number is halfway between 3 and 4?

New Concept

In Lesson 46 we found division answers using a multiplication table. We showed division with a division box. We can show division in more than one way. Here we show "fifteen divided by three" three different ways:

$$3\overline{)15} \qquad 15 \div 3 \qquad \frac{15}{3}$$

The first way uses a division box. The second way uses a division sign. The third way uses a division bar. The green arrows show the order in which we read the numbers.

Example 1

Use digits and division symbols to show "twenty-four divided by six" three ways.

$$6\overline{)24} \qquad 24 \div 6 \qquad \frac{24}{6}$$

Example 2

Thinking Skill

Connect

Name the factors and the products for the multiplication problem related to each division problem.

Solve:

a. $28 \div 4$ 　　　　　　　b. $\dfrac{27}{3}$

a. We read this as "twenty-eight divided by four." It means the same thing as $4\overline{)28}$.

$$28 \div 4 = 7$$

b. We read this as "twenty-seven divided by three." It means the same thing as $3\overline{)27}$.

$$\frac{27}{3} = 9$$

Example 3

Solve:

a. $8 \div 1$ 　　　　b. $\dfrac{9}{9}$ 　　　　　　c. $4\overline{)0}$

a. "Eight divided by one" means, "How many ones are in eight?" The answer is **8.**

b. "Nine divided by nine" means, "How many nines are in nine?" The answer is **1.**

c. "Zero divided by four" means, "How many fours are in zero?" The answer is **0.**

A multiplication fact has three numbers. We can form one other multiplication fact and two division facts with these three numbers. Together, all four facts form a multiplication and division fact family.

$$6 \times 4 = 24 \qquad 24 \div 4 = 6$$
$$4 \times 6 = 24 \qquad 24 \div 6 = 4$$
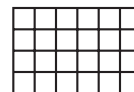
Example 4

Use the numbers 3, 5, and 15 to write two multiplication facts and two division facts.

$$3 \times 5 = 15 \qquad 15 \div 5 = 3$$
$$5 \times 3 = 15 \qquad 15 \div 3 = 5$$

Verify Why can we write a fact family of multiplication and division equations?

Example 5

For a science project, Sh'Vaughn timed the speeds at which garden snails moved. One snail moved 11 cm in 1 minute. At that rate, how far would it move in 12 minutes?

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

We are asked to find how far the snail could move in 12 minutes. One way to find the answer is to continue the table. Another way is to multiply 11 inches per minute by 12 minutes.

$$11 \times 12 = 132$$

The snail could move **132 inches** in 12 minutes.

Generalize What division rule describes the relationship of the data in this table?

Lesson Practice Divide:

a. $49 \div 7$ **b.** $45 \div 9$ **c.** $40 \div 8$

d. $\dfrac{6}{6}$ **e.** $\dfrac{32}{8}$ **f.** $\dfrac{27}{3}$

Represent Use digits and three different division symbols to show each division:

g. twenty-seven divided by nine

h. twenty-eight divided by seven

i. (Connect) Use the numbers 12, 3, and 4 to write two multiplication facts and two division facts.

j. Write two division facts using the numbers 36, 4, and 9.

Written Practice
Distributed and Integrated

*1. (Formulate) Brand A costs two dollars and forty-three cents. Brand B costs five dollars and seven cents. Brand B costs how much more than Brand A? Write an equation and solve this problem.
(31, 41)

*2. (Connect) The numbers 3, 4, and 12 form a multiplication and division fact family.
(47)

$$3 \times 4 = 12 \qquad 12 \div 4 = 3$$
$$4 \times 3 = 12 \qquad 12 \div 3 = 4$$

Write four multiplication/division facts using the numbers 4, 5, and 20.

*3. What is the sum of the decimal numbers two and three tenths and eight and nine tenths?
(Inv. 4, 43)

*4. (Conclude) Use the digits 1, 5, 6, and 8 to write an even number greater than 8420. Each digit may be used only once.
(10)

5. a. Compare: $1\frac{1}{2} \bigcirc 1.75$
(7, Inv. 4)

b. Use words to write the greater of the two numbers you compared in part **a.**

6. (Analyze) Carlos will use square floor tiles that measure one foot on each side to cover a hallway that is eight feet long and four feet wide. How many floor tiles will Carlos need?
(Inv. 3)

7. (Represent) To what number is the arrow pointing?
(Inv. 1)
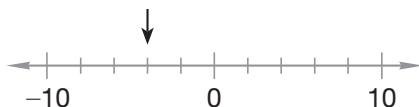
8. a. Five dimes are what fraction of a dollar?
(36)

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

*9. The length of segment *PQ* is 2 cm. The length of segment *PR* is 11 cm.
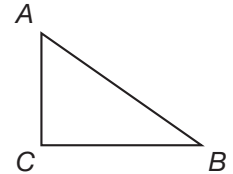(11) How long is segment *QR*?

$$\underset{\bullet}{P} \qquad \underset{\bullet}{Q} \qquad\qquad\qquad\qquad\qquad\qquad\qquad \underset{\bullet}{R}$$

*10. (**Conclude**) Which segment in this triangle appears to be
(23, 45) perpendicular to segment *AC?*

11. Round 3296 to the nearest hundred.
(42)

12. Use words to write 15,000,000.
(33)

*13. $95 - (7 \times \sqrt{64})$ **14.** $2.53 + 45¢ + $3
(Inv. 3, 45)   (43)

*15. n **16.**   40   ***17.**   51
(24, 43) $\underline{-\ 5.1}$ (44) $\underline{\times\ \ 3}$ (44) $\underline{\times\ \ 5}$
       2.3

*18. $28 \div 7$ ***19.** $81 \div 9$ ***20.** $35 \div 7$ ***21.** $16 \div 4$
(47)   (47)   (47)   (47)

*22. $\dfrac{28}{4}$ ***23.** $\dfrac{42}{7}$ ***24.** $\dfrac{48}{8}$ ***25.** $\dfrac{0}{5}$
(47)   (47)   (47)   (47)

*26. Multiple Choice Which of these does *not* show 24 divided by 4?
(47)

    A $24\overline{)4}$ **B** $\dfrac{24}{4}$ **C** $24 \div 4$ **D** $4\overline{)24}$

27. a. Is $12.90 closer to $12 or to $13?
(20)

    b. Is 12.9 closer to 12 or to 13?

*28. Describe the order of operations in these expressions, and find the
(45) number each expression equals.

    a. 12 ÷ (6 ÷ 2)

    b. (12 ÷ 6) ÷ 2

    c. (Conclude) Does the Associative Property apply to division?
    Explain.

29. In the year 2003, each visitor to the country of Mexico spent an average
(11, 13) of $540. Each visitor to the country of Canada spent an average of
$557. How many more dollars did each visitor to Canada spend in
2003?

*30. (Estimate) One of the largest hammerhead sharks ever caught weighed
(25, 42) 991 pounds. One of the largest porbeagle sharks ever caught weighed
507 pounds. Round to the nearest hundred pounds to estimate the
weight difference of those two sharks.

Early Finishers

Real-World Connection

The band played for 18 minutes during halftime at the football game.
Each song was 3 minutes long. How many songs did the band play
during halftime?

    a. Write a division equation that could be used to find the answer.

    b. Write a multiplication equation that could be used to find 18 ÷ 3.

    c. Explain how multiplication and division are related.

• Multiplying Two-Digit Numbers, Part 2

Power Up

facts   Power Up F

count aloud   Count by fourths from $\frac{1}{4}$ to 5.

mental math   Add hundreds, then tens, and then ones, regrouping tens.

    a. Number Sense: $466 + 72$

    b. Number Sense: $572 + 186$

    c. Number Sense: $682 + 173$

    d. Money: $\$3.59 + \$2.50$

    e. Money: Cassie has $4.60. Victoria has $2.45. How much money do the girls have altogether?

    f. Money: Enrique has $6.24. Kalila has $2.98. How much money do they have altogether?

    g. Estimation: Estimate the total cost of items that are priced $2.98, $3.05, and $8.49.

    h. Calculation: $\sqrt{64} \times 5 + 410 + 37$

problem solving   Choose an appropriate problem-solving strategy to solve this problem. On D'Janelle's morning ride to school, she saw a sign that displayed an outdoor temperature of 29°F. On D'Janelle's afternoon ride home, the sign displayed a temperature of 4°C. Did the outdoor temperature rise or fall during the day? How can you tell?

New Concept

In Lesson 44 we practiced multiplying two-digit numbers. First we multiplied the digit in the ones place. Then we multiplied the digit in the tens place.

Multiply Ones

$$\begin{array}{r} 12 \\ \times\ \ 4 \\ \hline 8 \end{array}$$

Multiply Tens

$$\begin{array}{r} 12 \\ \times\ \ 4 \\ \hline 48 \end{array}$$

Often when we multiply the ones, the result is a two-digit number. When this happens, we do not write both digits below the line. Instead we write the second digit below the line in the ones column and write the first digit above the tens column.

Seven times two is 14.

We write the four below the line and write the 1 ten above the tens place.

$$\begin{array}{r} 1\ \ \ \\ 12 \\ \times\ \ 7 \\ \hline 4 \end{array}$$

Then we multiply the tens digit and add the digit that we wrote above this column.

Seven times one is seven, plus one is eight.

$$\begin{array}{r} 1\ \ \ \\ 12 \\ \times\ \ 7 \\ \hline 84 \end{array}$$

Model We can demonstrate this multiplication with $10 bills and $1 bills. To do this, we count out $12 seven times. We use one $10 bill and two $1 bills to make each set of $12. When we are finished, we have seven $10 bills and fourteen $1 bills.
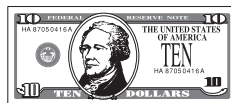

7   14

We exchange ten $1 bills for one $10 bill. We add this bill to the stack of $10 bills, giving us a new total of eight $10 bills and four $1 bills.

8   4

Example 1

The contractor purchased 8 doors for $64 each. What was the total price of the doors before tax?

We write the two-digit number above the one-digit number. We think of $64 as 6 tens and 4 ones. We multiply 4 ones by 8 and the total is 32 ones ($32). We write the 2 of $32 below the line. The 3 of $32 is 3 tens, so we write "3" above the tens column.

$$\begin{array}{r} 3 \\ \$64 \\ \times \quad 8 \\ \hline 2 \end{array}$$

Then we multiply 6 tens by 8, which is 48 tens. We add the 3 tens to this and get a total of 51 tens. We write "51" below the line. The product is $512. The total price of the doors was **$512.**

$$\begin{array}{r} 3 \\ \$64 \\ \times \quad 8 \\ \hline \$512 \end{array}$$

Example 2

A chef uses 2 cups of milk to make one pot of soup. About how many quarts of milk does he need to make 18 pots of soup?

Each pot of soup includes 2 cups of milk, so 18 pots of soup contains 18×2 cups of milk. We only need an estimate, so we round 18 to 20 before multiplying.

$$20 \times 2 \text{ cups} = 40 \text{ cups}$$

The chef needs about 40 cups of milk, but we are asked for the number of quarts. Since 4 cups equals a quart, we divide 40 by 4.

$$40 \text{ cups} \div 4 = 10 \text{ quarts}$$

The chef will need a little less than **10 quarts** of milk.

Lesson Practice   Find each product:

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

b. $\begin{array}{r} 24 \\ \times \quad 3 \\ \hline \end{array}$

c. $\begin{array}{r} \$45 \\ \times \quad 6 \\ \hline \end{array}$

d. 53×7

e. 35×8

f. 64×9

g. (**Model**) Use money manipulatives to demonstrate this multiplication:

$$\$14 \times 3$$

h. (**Estimate**) The restaurant orders 19 gallons of milk per day. Estimate the number of quarts that would equal 19 gallons. Then estimate the number of liters of milk the restaurant orders per day.

Formulate Write and solve equations for problems **1** and **2.**

*1. There were four hundred seventy-two birds in the first flock. There were
 (31) one hundred forty-seven birds in the second flock. How many fewer
 birds were in the second flock?

*2. Raina hiked forty-two miles. Then she hiked seventy-five more miles.
 (1, 17) How many miles did she hike in all?

*3. **Connect** Write four multiplication/division facts using the numbers 3,
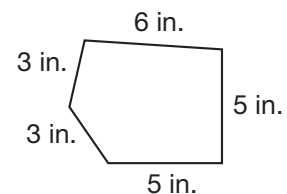 (47) 5, and 15.

*4. Use the digits 1, 3, 6, and 8 to write an odd number between 8000 and
 (10) 8350. Each digit may be used only once.

*5. **Represent** Write 306,020 in expanded form. Then use words to write
 (16, 33) the number.

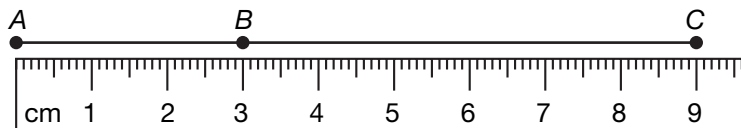***6.** **Represent** Draw and shade circles to show the number $2\frac{1}{8}$.
 (35)

7. One mile is how many feet?
 (Inv. 2)

8. What is the perimeter of this pentagon?
 (Inv. 2)

6 in.

3 in.

5 in.

3 in.

5 in.

9. A board that had a length of 1 meter was cut into two pieces. If one piece
 (11, Inv. 2) of the board was 54 cm long, how long was the other piece?

*10. Find the length of segment *BC.*
 (39)

A   B   C

cm 1   2   3   4   5   6   7   8   9

*11. $100 + (4 \times 50)$
(45)

12. $\$3.25 + 37¢ + \$3$
(43)

13. $\sqrt{4} \times \sqrt{9}$
(Inv. 3)

*14. $\begin{array}{r} 33 \\ \times\ 6 \\ \hline \end{array}$
(48)

*15. $\begin{array}{r} 24 \\ \times\ 5 \\ \hline \end{array}$
(48)

*16. $\begin{array}{r} 90 \\ \times\ 6 \\ \hline \end{array}$
(48)

*17. $\begin{array}{r} \$42 \\ \times\ \ 7 \\ \hline \end{array}$
(48)

18. $\begin{array}{r} \$5.06 \\ -\ \$2.28 \\ \hline \end{array}$
(41)

*19. $\begin{array}{r} 1.45 \\ +\ 2.70 \\ \hline \end{array}$
(43)

*20. $\begin{array}{r} 3.25 \\ -\ 1.50 \\ \hline \end{array}$
(43)

21. $\begin{array}{r} 14 \\ 28 \\ 45 \\ 36 \\ 92 \\ +\ 47 \\ \hline \end{array}$
(17)

*22. $28 \div 7$
(47)

23. $5\overline{)35}$
(46)

24. $6\overline{)54}$
(46)

*25. $\dfrac{63}{7}$
(47)

*26. Multiple Choice A rectangle has an area of 12 sq. in. Which of these
(Inv. 3) could *not* be the length and width of the rectangle?

A 4 in. by 3 in.

B 6 in. by 2 in.

C 12 in. by 1 in.

D 4 in. by 2 in.

*27. **Justify** Which property of multiplication is shown here?
(45)

$$5 \times (2 \times 7) = (5 \times 2) \times 7$$

*28. Use digits and three different division symbols to show "twenty-four
(47) divided by three."

*29. **Estimate** D'Ron mailed nine invitations and placed a 39¢ stamp
(48) on each invitation. Estimate the total postage cost for the 9 invitations.
Explain how you estimated the total.

*30. **Model** Draw a number line and show the locations of 2, 3, 1.5, and $2\frac{1}{4}$.
(Inv. 1)

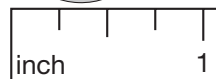# • Word Problems About Equal Groups, Part 1

Power Up

facts	Power Up G
count aloud	Count by sevens from 7 to 42 and back down to 7.
mental math	Add hundreds, then tens, and then ones, regrouping tens and ones.

    a. Money: $258 + $154

    b. Money: $587 + $354

    c. Money: $367 + $265

    d. Number Sense: $480 - 115$

    e. Measurement: What is the diameter of this coin?

    f. Estimation: Choose the more reasonable estimate for the length of a dollar bill: 6 inches or 6 millimeters.

    g. Calculation: $620 + 40 + 115$

    h. Calculation: $95 + 50 + 19 + 110$

problem solving	Choose an appropriate problem-solving strategy to solve this problem. Paige earns $2 for each day she completes her chores. Normally, Paige is paid $14 each Saturday for the entire previous week. This week, though, Paige wants to ask for an early payment so she can purchase a new game. If Paige asks to be paid for the chores she has already completed Sunday through Thursday, how much money will she ask for? Explain how you arrived at your answer.

In this lesson we will practice solving word problems about equal groups. Problems with an **"equal groups"** plot can be solved using a multiplication formula. Consider this problem:
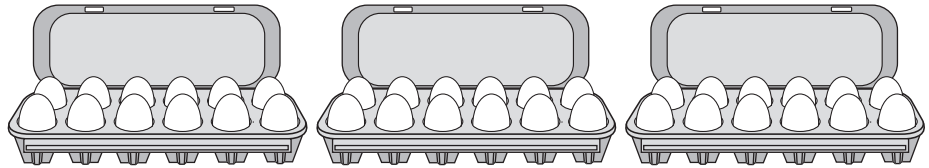
Azura bought 3 cartons of eggs. There were 12 eggs in each carton. Altogether, Azura bought 36 eggs.

In this problem there are equal groups (cartons) of 12 eggs. Here is how we place these numbers into a multiplication formula:

Formula	Problem
Number **in** each group	12 eggs in each carton
× Number **of** groups	× 3 cartons
Total	36 eggs

Formula:
Number **of** groups × Number **in** each group = Total

Problem:
3 cartons × 12 eggs in each carton = 36 eggs

We multiply the number in each group by the number of groups to find the total. If we want to find the number of groups or the number in each group, we divide.

> **Reading Math**
>
> We translate the problem using a multiplication formula:
>
> Number of groups: 3 cartons
>
> Number in each group: 12 eggs
>
> Total: 36 eggs

Example 1

Tyrone has 5 cans of tennis balls. There are 3 tennis balls in each can. How many tennis balls does Tyrone have?

The words *in each* are a clue to this problem. The words *in each* usually mean that the problem has an "equal groups" plot.

We write the number and the words that go with *in each* on the first line. This is the number in each group. We write the number and word *5 cans* as the number of groups. To find the total, we multiply.

Formula	Problem
Number **in** each group	3 tennis balls in each can
× Number **of** groups	× 5 cans
Total	**15 tennis balls**

Here we write the formula horizontally:

Formula:
Number **of** groups $\times$ Number **in** each group = Total

Problem:
5 cans $\times$ 3 tennis balls in each can = 15 tennis balls

Example 2

Twelve eggs equals a dozen eggs. Find the number of eggs that equals five dozen.

There are twelve eggs in each dozen.

Formula:
Number **of** groups $\times$ Number **in** each group = Total

Problem:
5 dozen $\times$ 12 eggs in each dozen = 60 eggs

We find that **60 eggs** equals five dozen.

Example 3

One human foot has 26 bones. About how many bones are in two human feet?

Since 25 is close to 26, we can estimate the total number of bones in two feet by multiplying 25 by 2.

$$2 \times 25 = 50$$

There are **about 50 bones** in two human feet.

(Explain) Describe how the estimate helps you find the exact number of bones in two feet.

Lesson Practice

(Formulate) Write and solve an equation for each "equal groups" problem.

a. There were 8 birds in each flock. There were 6 flocks. How many birds were there in all?

b. There are 6 people in each car. There are 9 cars. How many people are there in all?

c. A bakery display case contained 4 dozen muffins. How many individual muffins were in the display case?

d. (Estimate) One human hand has 27 bones. About how many bones are in two human hands? Explain how you found your answer.

Written Practice

Distributed and Integrated

Formulate Write and solve equations for problems **1** and **2**.

*1. There were 8 boys in each row. There were 4 rows. How many boys
(49) were in all 4 rows?

*2. There were 7 girls in each row. There were 9 rows. How many girls were
(49) in all 9 rows?

3. A llama weighs about 375 pounds. A coyote weighs about 75 pounds.
(31) A llama weighs about how many pounds more than a coyote?

*4. **Connect** Write four multiplication/division facts using 5, 6, and 30.
(47)

*5. **Represent** Draw and shade circles to show the number $2\frac{3}{4}$.
(35)

*6. To what mixed number and decimal number is the arrow pointing?
(37)
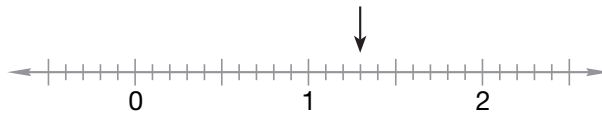
7. Tika is a college student. She began her homework last
(27) night at the time shown on the clock. She finished two
and one half hours later. What time did Tika finish her
homework?
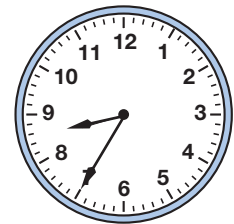
*8. **Represent** Draw a rectangle that is 4 cm by 2 cm. Shade $\frac{7}{8}$ of it.
(21, 26)

9. **Represent** Use digits to write three million, seven hundred fifty thousand.
(33, 34) Which digit is in the hundred-thousands place?

*10. **Connect** Use the decimal numbers 1.4, 0.7, and 2.1 to write two
(6) addition facts and two subtraction facts.

*11. 56 ÷ 7   ***12.** 64 ÷ 8   ***13.** $\frac{45}{9}$
(47)   (47)   (47)

*14. The length of segment *RT* is 9 cm. The length of segment *ST* is 5 cm.
(6) What is the length of segment *RS*?

$$R \qquad\qquad S \qquad\qquad\qquad T$$

●————————●————————————●

15. $3.07
(41) − $2.28

16. 4.78
(43) − 3.90

*17. $(4 + 3) \times \sqrt{64}$
(Inv. 3, 45)

18. 7.07
(24, 43) − *n*
‾‾‾‾‾‾‾
4.85

19. *c*
(16, 43) − 2.3
‾‾‾‾
4.8

*20. $403 − (5 \times 80)$
(45)

21. $6n = 30$
(41)

22. $(587 − 238) + 415$
(45)

*23. 45
(48) × 6

*24. 23
(48) × 7

*25. $34
(48) × 8

*26. **Multiple Choice** The radius of a circle is 3 ft. Which of the following
(Inv. 2, 21) is *not* the diameter of the circle?

    A 36 in.   **B** 6 ft   **C** 2 yd   **D** 72 in.

*27. **Multiple Choice** Which of these angles is acute?
(23)

    A   **B**

    C   **D**
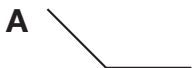
*28. Solve:
(47)

    a. $\dfrac{5}{5}$ **b.** $9 \div 1$ **c.** $6\overline{)0}$

29. *Estimate* One human hand has 27 bones. One human foot has
(49) 26 bones. About how many bones are in two hands plus two feet? Explain
why your estimate is reasonable.

*30. *Estimate* The land area of Booker T. Washington National
(11, 17) Monument in Virginia is 239 acres. The land area of Cabrillo National
Monument in California is 160 acres. What is a reasonable estimate of
the total acreage of these two national monuments? Explain why your
estimate is reasonable.

• Adding and Subtracting Decimal Numbers, Part 2

Power Up

facts   Power Up G

count aloud Count by fourths from $\frac{1}{4}$ to 5.

mental math Add hundreds, then tens, and then ones, regrouping tens and ones.

    a. Number Sense: $589 + 46$

    b. Number Sense: $375 + 425$

    c. Money: $\$389 + \$195$

    d. Money: D'Trina paid $5.64 for a dog collar and $1.46 for a tag. Altogether, how much did D'Trina spend?

    e. Time: Jamal started reading his book at 2:25 p.m. and read for 45 minutes. At what time did he finish reading?

    f. Measurement: There were 4 gallons of water in the bucket. How many quarts of water is that?

    g. Estimation: JaNeeva wants to buy a CD that costs $12.65 and a pair of headphones that costs $15.30. Round each price to the nearest 25 cents and then add to estimate the cost of the items.

    h. Calculation: $\sqrt{36} \times 8 + 40 + 9 + 15$

problem solving Choose an appropriate problem-solving strategy to solve this problem. Sunee is making a sequence out of money. She lined up the bills shown below. Which money amounts can she use to extend the sequence to include two more terms?
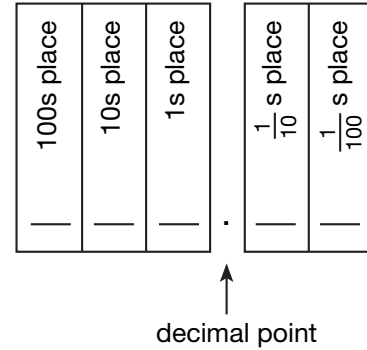
, , , . . .

We have added and subtracted decimal numbers by lining up the decimal points and then adding or subtracting the digits in each column. We line up the decimal points to ensure that we are adding and subtracting digits with the same place value.

Thinking Skill

Generalize

How does the value of the places to the left of the ones place compare to the value of the places to the right of the ones place?

The chart shows place values from hundreds to hundredths. We use the decimal point as a guide for finding the value of each place. To the left of the decimal point is the ones place, then the tens place, and then the hundreds place. To the right of the decimal point is the tenths ($\frac{1}{10}$) place and then the hundredths ($\frac{1}{100}$) place.

100s place	10s place	1s place		$\frac{1}{10}$ s place	$\frac{1}{100}$ s place
__	__	__	.	__	__

↑
decimal point

Example 1

Name the place value of the 3 in each number:

    a. 23.4   **b. 2.34**   **c. 32.4**   **d. 4.23**

Use the chart above to find the place value.

    a. ones   **b. tenths**

    c. tens   **d. hundredths**

In this lesson we will begin adding and subtracting decimal numbers that do not have the same number of decimal places.

Example 2

Add: 3.75 + 12.5 + 2.47

To add decimal numbers with pencil and paper, we focus on lining up the decimal points—not the last digits.

Line up decimal points.
↓

$$
\begin{array}{r}
\overset{1\ 1}{}\ \\
3.75 \\
12.5 \\
+\ \ 2.47 \\
\hline
18.72
\end{array}
$$

← Treat an "empty place" like a zero.

Example 3

Subtract: 4.25 − 2.5

We line up the decimal points and subtract.

Line up decimal points.

$$\begin{array}{r} \overset{3}{\cancel{4}}\overset{1}{.}25 \\ -\ 2.5 \\ \hline 1.75 \end{array}$$

← Treat an "empty place" like a zero.

Activity

Adding and Subtracting Decimals

Material needed:
- **Lesson Activity 25**

Model Complete **Lesson Activity 25** to represent tenths and hundredths on a grid.

Lesson Practice

a. Which digit in 23.5 is in the tenths place?

b. Which digit in 245.67 is in the hundredths place?

c. Which digit in 12.5 is in the same place as the 7 in 3.75?

Find each sum or difference:

d. 4.35 + 2.6   **e.** 4.35 − 2.6

f. 12.1 + 3.25   **g.** 15.25 − 2.5

h. 0.75 + 0.5   **i.** 0.75 − 0.7

j. Find *n* in the equation *n* + 1.5 = 4.75.

Written Practice   *Distributed and Integrated*

Formulate Write and solve equations for problems **1–3.**

＊1. Each of the 3 boats carried 12 people. In all, how many people were in
(49)   the 3 boats?

＊2. The book cost $6.98. The tax was 42¢. What was the total price?
(22, 35)

*3. Claire read six hundred twenty minutes for an afterschool reading program. Ashanti read four hundred seventeen minutes. Claire read how many more minutes than Ashanti?
(31)

*4. (Connect) Use the numbers 4, 12, and 48 to write two multiplication facts and two division facts.
(47)

5. Justin ran the perimeter of the block. How far did Justin run? The measurements of the block are shown on the figure below.
(Inv. 2)

100 yd
50 yd   50 yd
100 yd
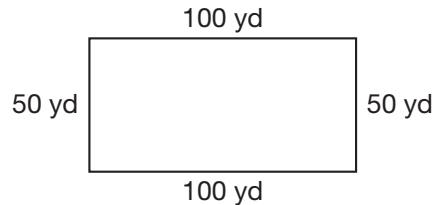
*6. Justin ran around the block in 58.7 seconds. Write "58.7" with words.
(Inv. 4)

7. (Represent) Use digits to write twelve million, seven hundred fifty thousand. Which digit is in the hundred-thousands place?
(33, 34)

*8. (Estimate) Round 783 and 217 to the nearest hundred. Then subtract the smaller rounded number from the larger rounded number.
(42)

9. The time shown on the clock is an evening time. Alyssa's school day begins 9 hours 30 minutes later than that time. What time does Alyssa's school day begin?
(19)
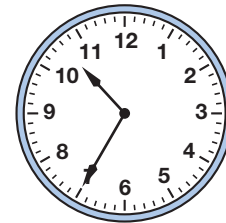
10. (Connect) Write this addition problem as a multiplication problem:
(27)

$$\$3.75 + \$3.75 + \$3.75 + \$3.75$$

*11. $(4 \times 50) - \sqrt{36}$
(Inv. 3, 45)

*12. $3.6 + 4.35 + 4.2$
(50)

13. $\$4.63 + \$2 + 47¢ + 65¢$
(43)

*14.   43
(48) $\times\ 6$

*15.   54
(48) $\times\ 8$

*16.   37
(48) $\times\ 3$

*17. $40
(48) $\times\ 4$

18. $4.7 + 5.5 + 8.4 + 6.3 + 2.4 + 2.7$
(43)

19. $\$5.00 - \$4.29$
(41)

20. $7.03 - 4.2$
(50)

21.
(12, 24)
$$\begin{array}{r} n \\ - 27.9 \\ \hline 48.4 \end{array}$$

22.
(24, 43)
$$\begin{array}{r} 46.2 \\ + \quad c \\ \hline 52.9 \end{array}$$

23. $\dfrac{24}{3}$
(47)

24. $\dfrac{36}{9}$
(47)

25. The length of segment AB is 5 cm. The length of segment BC is 4 cm.
(1, 45) What is the length of segment AC?

A   B   C

26. (Represent) Draw and shade circles to show the number $3\frac{3}{8}$.
(35)

27. Compare: 1 minute ◯ 58.7 seconds
(Inv. 4,
50)

28. **Multiple Choice** Which of the following is more than one second but
(19,
Inv. 4) less than two seconds?

   A 0.15 sec   **B** 1.5 sec
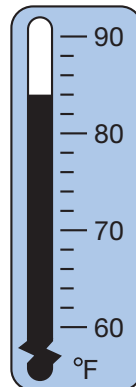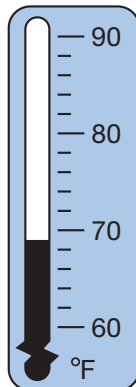
   C 2.1 sec   **D** 2.15 sec

29. Write these numbers in order from least to greatest:
(33)

        250,000   47,000   9000   3,100,000   600

30. These thermometers show the average daily minimum and maximum
(18) temperatures in New York City's Central Park during the month of July.
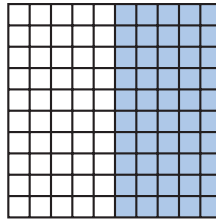What is the difference in degrees between the two temperatures?

Focus on

• Percents

A part of a whole can be named with a fraction, with a decimal number, or with a percent. **Percent** means per hundred. Fifty of the 100 squares below are shaded, or $\frac{50}{100}$. This means that 50% are shaded.

$\frac{1}{2}$ of the square is shaded.
0.50 of the square is shaded.
50% of the square is shaded.

We read 50% as "fifty percent." A percent is expressed as a fraction with a denominator of 100. The percent sign (%) represents the denominator 100.
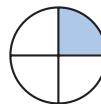
$$50\% \text{ means } \frac{50}{100}$$

Just as 50 cents is $\frac{1}{2}$ of a whole dollar, 50 percent is $\frac{1}{2}$ of a whole. The close relationship between cents and percents can help us understand percents.

One half of a dollar   One half is shaded.
is 50 cents.   50% is shaded.
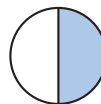
One fourth of a   One fourth is shaded.
dollar is 25 cents.   25% is shaded.

One tenth of a   One tenth is shaded.
dollar is 10 cents.   10% is shaded.

Naming Percents of a Dollar

Connect Solve:

  1. A quarter is what fraction of a dollar?

  2. A quarter is what percent of a dollar?

  3. A dime is what fraction of a dollar?

  4. A dime is what percent of a dollar?

Discuss One dollar is what fraction of five dollars? Explain the relationship as a percent.
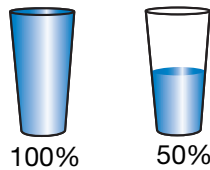
    5. A penny is what fraction of a dollar?

    6. A penny is what percent of a dollar?

    7. A nickel is what fraction of a dollar?

    8. A nickel is what percent of a dollar?

Estimating Percents of a Whole

In the picture below, the glass on the left is 100% full. The glass on the right is 50% full.

100%   50%

Multiple Choice In problems **9–12,** estimate to find the best choice for how full each glass is.

    9. This glass is about what percent full?
        A 20%   **B** 40%
        C 60%   **D** 80%

    10. This glass is about what percent full?
        A 25%   **B** 50%
        C 75%   **D** 100%

    11. This glass is about what percent full?
        A 20%   **B** 40%
        C 60%   **D** 80%

    12. This glass is about what percent full?
        A 20%   **B** 40%
        C 60%   **D** 80%

Analyze One cup is what percent of one quart?

Finding the Remaining Percent of a Whole

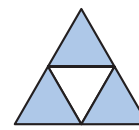The parts of a whole total 100%. This means that if 25% of this circle is shaded, then 75% is *not* shaded.

25% + 75% = 100%

Analyze Write each percent:

13. If 40% of this circle is shaded, then what percent is *not* shaded?

14. Seventy-five percent of the figure is shaded. What percent is *not* shaded?

15. If 80% of the answers were correct, then what percent of the answers were *not* correct?

Connect Write the answers for problems **13** and **15** as a fraction and as a decimal.

16. **Analyze** If the chance of rain is 10%, then what is the chance that it will *not* rain?

Comparing Percents to one Half

Explain Complete each comparison in problems **17–19,** and explain the reason for each of your answers.

17. Compare: 48% $\bigcirc$ $\frac{1}{2}$

18. Compare: 52% $\bigcirc$ $\frac{1}{2}$

19. Compare: 50% $\bigcirc$ $\frac{1}{3}$

20. Forty percent of the students in the class were boys. Were there more boys or girls in the class? Explain your answer.

Finding 50% of a Number

To find one half of a number, we divide the number into two equal parts. Since 50% equals $\frac{1}{2}$, we find 50% of a number by dividing it into two equal parts.

Explain Answer these questions about 50% of a number, and describe how to find each answer.

21. How many eggs is 50% of a dozen?

22. How many minutes is 50% of an hour?

23. How much money is 50% of $10?

24. How many hours is 50% of a day?

Activity

Percent

Material needed:
- **Lesson Activity 26**

Model Shade each figure to show the percent given. Then find the percent of the figure that is *not* shaded.

Investigate Further

a. Write the shaded part of each figure below as a fraction and as a decimal.

b. Choose two figures and write an "is less than" comparison statement using fraction notation.

c. Choose two different figures and write an "is greater than" comparison statement using decimal notation.
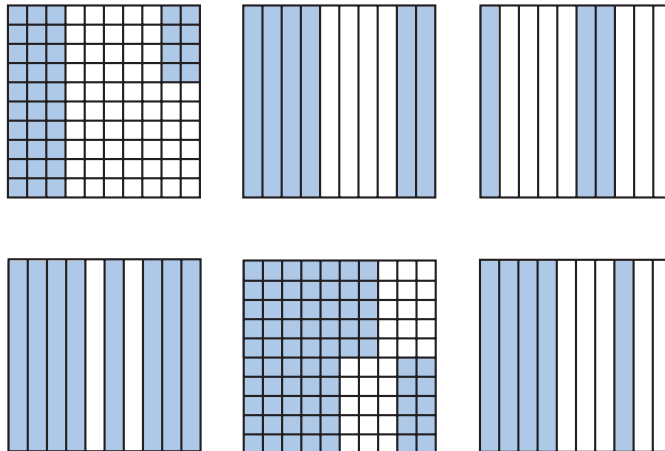
d. Write the decimal numbers in order from **least to greatest.**

e. Write the fractions in order from **greatest to least.**