

• Word Problems About Combining

Power Up

facts

Power Up B

count aloud

Count up and down by 25s between 0 and 200. Count up and down by 250s between 0 and 2000.

mental math

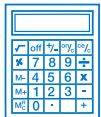
- a. **Money:** $\$6000 + \3200
- b. **Money:** $\$5000 - \3000
- c. **Addition:** $375 + 125$
- d. **Addition:** $570 + 250$
- e. **Time:** $350 \text{ seconds} - 300 \text{ seconds}$
- f. **Subtraction:** $540 - 140$
- g. **Number Sense:** $7 + 6 - 3 + 4$
- h. **Number Sense:** $10 - 3 + 7 + 10$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Hirva and Marc are the goalies for the school soccer team. Hirva started as goalie in the first two games of the season. Marc started as goalie in the next two games. If the pattern continues, who will start as goalie in the ninth game of the season?

New Concept

In action stories, a heroic character often risks danger to rescue someone who is in trouble. The details and characters of the stories might differ, but the underlying idea—the plot—is the same.



Visit www.SaxonMath.com/Int5Activities for a calculator activity.

Although there are many problems in mathematics, there are only a few *kinds* of problems. One kind of math problem has a “some plus some more” plot. Here are three “some plus some more” problems:

The troop hiked 8 miles in the morning and 7 miles in the afternoon. Altogether, how many miles did the troop hike?

After D’Wayne paid Destiny \$120 for rent, Destiny had \$645. How much money did Destiny have before D’Wayne paid Destiny for rent?

Cheryl counted 18 children on the playground before the bell rang. After the bell rang, more children ran onto the playground. Then Cheryl counted 98 children. How many children ran onto the playground after the bell rang?

In each of these problems there was “some.” Then “some more” was added to make a total. The total results from *combining* the two quantities. In mathematics the process of combining is called *addition*. Here are two ways to write the addition:

$$\begin{array}{r} \text{Some} \\ + \text{Some more} \\ \hline \text{Total} \end{array}$$

$$\text{Some} + \text{Some more} = \text{Total}$$

The expressions above are formulas for solving problems about combining. A **formula** is an expression that describes a method for solving a certain type of problem. We often write formulas with letters that stand for complete words. Here is a formula with letters that stand for some + more = total:

$$s + m = t$$

In the stories in the beginning of this lesson, we are given two numbers and asked to find the third number. In place of the letters in the formula we can write the numbers we are given. The result is an equation that we can solve to find the third number.

In each problem we are given two numbers and are asked to find a third number. We can write an addition equation to find the third number.

To answer the question in a “some plus some more” problem, we will:

Step 1: Write the equation.

Step 2: Find the missing number.

Step 3: Check whether our answer is reasonable and our arithmetic is correct.

Example 1

The troop hiked 8 miles in the morning and 7 miles in the afternoon. Altogether, how many miles did the troop hike?

This is a problem about combining some miles hiked in the morning with some more miles hiked in the afternoon. We follow three steps.

Step 1: We write an equation that follows the addition formula.

$$\text{Some} + \text{Some more} = \text{Total}$$

$$8 \text{ mi} + 7 \text{ mi} = t$$

Step 2: We find the missing number. In this problem the missing number is the total, so we add 8 miles and 7 miles.

$$8 \text{ mi} + 7 \text{ mi} = 15 \text{ mi}$$

Step 3: We check to be sure the answer is reasonable and the arithmetic is correct. It is reasonable that the total distance hiked is more than the distance hiked during either the morning or the afternoon. Also, the sum of 8 and 7 is correct. The troop hiked a total of **15 miles**.

Reading Math

We translate the problem using an addition pattern.

Troop hiked:
8 miles

Hiked some more:
7 miles

Total miles hiked: t

Example 2

After D'Wayne paid Destiny \$120 for rent, Destiny had \$645. How much money did Destiny have before D'Wayne paid Destiny for rent?

Destiny had some money. D'Wayne paid her some more money. We translate the problem using an addition formula. This time we will write the equation vertically.

$$\begin{array}{r} \text{Destiny had some money.} \quad s \\ \text{D'Wayne paid Destiny \$120.} \quad + \$120 \\ \text{Then Destiny had \$645.} \quad \underline{\$645} \end{array}$$

The missing number represents how much money Destiny had before D'Wayne paid her. We can find a missing addend by subtracting.

$$\begin{array}{r} \$645 \\ - \$120 \\ \hline \$525 \end{array}$$

Now we check whether the answer is reasonable and correct.

To check the answer, we return to the original problem and add.

$$\begin{array}{r} \text{Destiny had some money.} \quad \$525 \\ \text{D'Wayne paid Destiny \$120.} \quad + \$120 \\ \hline \text{Then Destiny had \$645.} \quad \$645 \end{array}$$

Before D'Wayne paid her, Destiny had **\$525**.

Justify Is it reasonable that Destiny had less money before D'Wayne paid her?

Example 3

Cheryl counted 18 children on the playground before the bell rang. After the bell rang, more children ran onto the playground. Then Cheryl counted 98 children. How many children ran onto the playground after the bell rang?

We translate the problem using an addition problem. There were 18 children at first. Then some more children arrived, making the total 98 children. We write an equation for the problem.

$$\begin{array}{l} \text{Some} + \text{Some more} = \text{Total} \\ 18 + m = 98 \end{array}$$

The missing number is one of the addends. We can find a missing addend by subtracting.

$$\begin{array}{r} 98 \text{ children} \\ - 18 \text{ children} \\ \hline 80 \text{ children} \end{array}$$

When the bell rang, **80 children** ran onto the playground.

Connect Why did we use subtraction to solve this problem?

Justify Is it reasonable that 80 children ran onto the playground after the bell rang? Is the arithmetic correct? We add to check the answer.

$$\begin{array}{r} 18 \text{ children} \\ + 80 \text{ children} \\ \hline 98 \text{ children} \end{array}$$

Lesson Practice

Formulate In problems **a** and **b**, write an equation and find the missing number. Then check the answer.

- a.** Tammy wants to buy a camera. She has \$24. The camera costs \$41. How much more money does Tammy need?

- b. Li Ming was swimming laps when her mother came to watch. Her mother watched Li Ming swim her final 16 laps. If Li Ming swam 30 laps in all, how many laps did Li Ming swim before her mother arrived?
- c. **Formulate** Write a word problem about combining for this equation. Then answer the question in your problem.

$$\$12 + \$24 = t$$

Written Practice

Distributed and Integrated

Formulate Write and solve equations for problems 1–3.

1. ⁽¹¹⁾ Nia scored 21 points in the game. If she scored 13 points in the first half of the game, how many points did she score in the second half?

2. ⁽¹¹⁾ Nia's team scored 62 points and won the game. If the team scored 29 points in the second half, how many points did the team score in the first half?

3. ⁽¹¹⁾ The Lees traveled 397 miles one day and 406 miles the next day. Altogether, how many miles did the Lees travel in two days?

4. ⁽⁸⁾ **Connect** For the fact family 8, 9, and 17, write two addition facts and two subtraction facts.

5. ⁽²⁾ What is the greatest three-digit even number that can be written using the digits 1, 2, and 3?

- *6. ^(4, 6)  **Explain** Compare. How can you answer the comparison without adding?

$$8 + 7 + 6 \bigcirc 6 + 7 + 8$$

7. ⁽⁷⁾ **Represent** Write this comparison using digits and a comparison symbol:

Eighty thousand is greater than eighteen thousand.

- *8. ^(5, 8) **Represent** Write this sentence using digits and symbols:
Forty minus fourteen equals twenty-six.

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

10. Use digits to write four hundred eight dollars and seventy cents.

11.
$$\begin{array}{r} \$872 \\ - \$56 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 706 \\ - 134 \\ \hline \end{array}$$

13.
$$\begin{array}{r} \$800 \\ - \$139 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 365 \\ - 285 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 578 \\ + a \\ \hline 600 \end{array}$$

16.
$$\begin{array}{r} \$640 \\ \$152 \\ + \$749 \\ \hline \end{array}$$

17.
$$\begin{array}{r} 365 \\ 294 \\ + 716 \\ \hline \end{array}$$

18.
$$\begin{array}{r} \$475 \\ \$233 \\ + \$76 \\ \hline \end{array}$$

19.
$$\begin{array}{r} \$317 \\ - \$58 \\ \hline \end{array}$$

20.
$$433 + 56 + q = 497$$

21.
$$7 + w = 15$$

22.
$$15 + y = 70$$

Conclude Write the next four terms in each counting sequence:

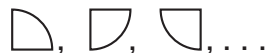
23. 9, 18, 27, 36, ...

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

- *25. **Predict** Find the tenth term of this counting sequence:

7, 14, 21, ...

- *26. **Multiple Choice** Below is a different kind of sequence. Notice how the figure turns from one term of the sequence to the next.



What is the next term in the sequence?



27. Every morning Marisol runs to the park and back. If the round trip is 3 miles, how far is it to the park?

28. Find half of 10. Then find half of half of 10. Write both answers.

- *29. **Formulate** Michael has \$18. His brother has \$15. Use this information to write a word problem about combining. Then answer the question in your word problem.

30. Some starfish have six or seven arms, but most commonly, starfish⁽¹⁾ have five arms. For those starfish that have five arms, the relationship of the number of starfish to the number of arms is shown in this table:

Number of Starfish	1	2	3	4
Number of Arms	5	10	15	20

- a. **Generalize** Write a rule that describes how to find the number of arms for any number of starfish.
- b. **Predict** How many arms do 12 starfish have altogether?

Early Finishers
Real-World Connection

A basketball team scored a total of 79 points in one game. In the first quarter, they scored 27 points; in the second quarter, they scored 19 points; and in the third quarter, they scored 17 points. How many points did the team score in the fourth quarter? Use the steps on page 66 to solve the problem.

- Lines
- Number Lines
- Tally Marks

Power Up

facts

Power Up B

count aloud

Count up and down by 25s between 0 and 300. Count up and down by 50s between 0 and 500.

mental math

- Money:** $\$6500 + \500
- Money:** $\$1000 - \500
- Addition:** $75 + 75$
- Addition:** $750 + 750$
- Subtraction:** $460 - 400$
- Subtraction:** $380 - 180$
- Measurement:** $20 \text{ in.} + 30 \text{ in.} - 5 \text{ in.}$
- Number Sense:** $16 - 8 + 4 - 2 + 1$

problem solving

Lance, Molly, and José lined up side by side for a picture. Then they changed their positions so that they were in a different side-by-side arrangement. If Lance, Molly, and José continue to change their positions, how many side-by-side arrangements can they make? List all the possible arrangements.

Focus Strategy: Act It Out

Understand To solve the problem, three students will act out the parts of Lance, Molly, and Jose by lining up in different side-by-side arrangements.

Plan To solve the problem, we will act it out. Three students will act the parts of Lance, Molly, and José by lining up side by side in different arrangements. We will first find all the arrangements with Lance in the first position, then with Molly in the first position, and then with José in the first position.

Solve Your teacher will ask for three student volunteers and line them up in the order Lance, Molly, and José. This is the first arrangement. Next, if Molly and José switch places, we have the second arrangement. These are the only two possible arrangements with Lance in the first position:

Lance, Molly, José

Lance, José, Molly

Now we find the arrangements with Molly in the first position. These are the only two possible arrangements with Molly in the first position:

Molly, Lance, José

Molly, José, Lance

Finally, the students act out the two arrangements with José first:

José, Lance, Molly

José, Molly, Lance

The six possible arrangements are

Lance, Molly, José

Molly, Lance, José

José, Lance, Molly

Lance, José, Molly

Molly, José, Lance

José, Molly, Lance

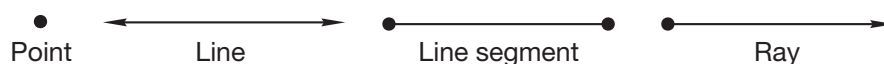
Check We know our answer is reasonable because each arrangement we listed is a way for Lance, Molly, and José to line up. We acted out the problem to help us understand the problem and to find all the arrangements.

New Concepts

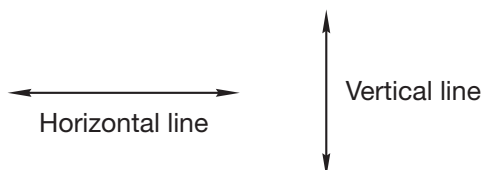
Lines

In mathematics we study numbers. We also study shapes such as circles, squares, and triangles. The study of shapes is called **geometry**. The simplest figures in geometry are the **point** and the **line**. A line does not end. Part of a line is called a **line segment** or just a *segment*. A line segment has two **endpoints**. Sometimes dots are drawn at each end of a line segment to represent the endpoints. However, segments can be drawn without the dots. The last visible point on each end of the line segment is considered to be an endpoint. A **ray** (sometimes called a *half line*) begins at a point and continues without end. Here we illustrate a point, a line, a segment, and a ray.

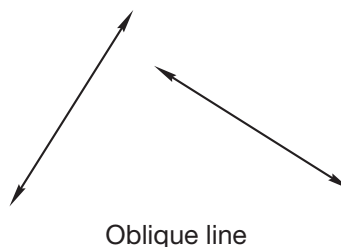
The arrowheads on the line and the ray show the directions in which those figures continue without end.



Lines, rays, and segments may be **horizontal**, **vertical**, or **oblique**. The term *horizontal* comes from the word *horizon*. When we look into the distance, the horizon is the line where the earth and sky seem to meet. A horizontal line is level with the horizon, extending left and right. A vertical line extends up and down.



A line or segment that is neither horizontal nor vertical is oblique. An oblique line appears to be slanted.



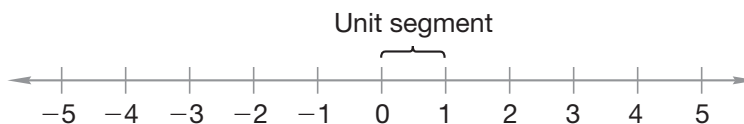
Number Lines

By carefully marking and numbering a line, we can make a **number line**. A number line shows numbers at a certain distance from zero. On the number line below, the distance from 0 to 1 is a segment of a certain length, which we call a *unit segment*. The distance from 0 to 5 is five unit segments. The arrowheads show that the number line continues in both directions. Numbers to the left of zero are called **negative numbers**. We read the minus sign by saying “negative,” so we read -3 as “negative three.” The small marks above each number are **tick marks**.

Thinking Skill

Conclude

How are counting numbers and integers alike?
How are they different?



The numbers shown on the number line above are called **integers**. Integers include all the counting numbers, the negatives of all the counting numbers, and the number zero.

Example 1

This sequence counts down by ones. Write the next six numbers in the sequence, and say the numbers aloud as a class.

5, 4, 3, ...

The next six numbers in the sequence are

2, 1, 0, -1, -2, -3

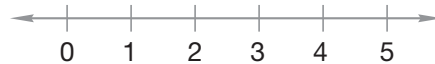
We read these numbers as “two, one, zero, negative one, negative two, negative three.”

Verify Are the numbers in this sequence ordered from greatest to least or from least to greatest? How do you know?

Example 2

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

Begin by drawing a line segment. An arrowhead should be drawn on each end of the segment to show that the number line continues without end. Make a tick mark for zero and label it “0.” Make *equally spaced* tick marks to the right of zero for the numbers 1, 2, 3, 4, and 5. Label those tick marks. When you are finished, your number line should look like this:



To count on a number line, it is important to focus our attention more on the **segments** than on the tick marks. To help us concentrate on the segments, we will solve problems such as the following:

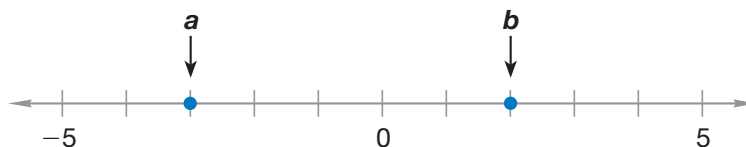
Example 3

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

On the number line above, the distance from 0 to 1 is one unit segment. We see one unit segment from 2 to 3, another from 3 to 4, and a third from 4 to 5. Thus, the number of unit segments from 2 to 5 is **three**.

Example 4

On the number line below, arrows **a** and **b** indicate integers. Write the two integers using a comparison symbol to show which integer is greater.



Arrow **a** indicates -3 and arrow **b** indicates 2 . Numbers to the right on the number line are greater than numbers to the left. We may write the comparison two ways:

$$-3 < 2 \quad \text{or} \quad 2 > -3$$

Tally Marks

Tally marks are used to keep track of a count. Each tally mark counts as one. Here we show the tallies for the numbers one through six.



Notice that the tally mark for five is a diagonal mark crossing four vertical marks.

Example 5

What number is represented by this tally? |||| |||| |||| ||

We see three groups of five, which is 15, and we see two more tally marks, which makes **17**.

Lesson Practice

a. **Multiple Choice** Which of these represents a line segment?

A

B

C

D

b. Draw a vertical line.

c. Draw a horizontal segment.

d. Draw an oblique ray.

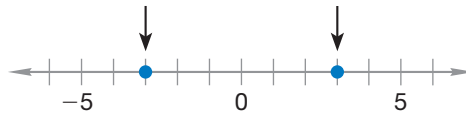
e. **Represent** Draw a number line marked with integers from -3 to 3 .

f. How many unit segments are there from -2 to 3 on the number line you drew in problem **e**?

- g. **Conclude** What are the next five numbers in this counting sequence?

10, 8, 6, ...

- h. **Represent** Write the two integers indicated on this number line, using a comparison symbol between the integers to show which is greater.



- i. **Analyze** What whole number is six unit segments to the right of -4 on the number line above?
- j. **Represent** What number is represented by this tally?
- ||||

Written Practice

Distributed and Integrated

- *1. **Analyze** How many unit segments are there from 2 to 7 on the number line?
(12)

2. **Represent** Use tally marks to show the number 7.
(12)

Formulate For problems 3 and 4, write an equation and find the answer.

- *3. Two boxes were placed on a freight elevator. One box weighed 86 pounds. The other box weighed 94 pounds. What is the total weight of the boxes?
(11)
- *4. Sydney is watching a movie that began 86 minutes ago. The movie is 110 minutes long. How long will it be until the movie ends?
(11)

$$\begin{array}{r} 5. \quad 862 \\ (9) \quad - 79 \\ \hline \end{array}$$

$$\begin{array}{r} *6. \quad \$420 \\ (9) \quad - \$137 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 508 \\ (9) \quad - 96 \\ \hline \end{array}$$

$$\begin{array}{r} *8. \quad \$500 \\ (9) \quad - \$136 \\ \hline \end{array}$$

$$\begin{array}{r} *9. \quad \$248 \\ (6) \quad \$514 \\ + \$18 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 907 \\ (6) \quad 45 \\ + 653 \\ \hline \end{array}$$

$$\begin{array}{r} *11. \quad \$367 \\ (6) \quad \$425 \\ + \$740 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad w \\ (10) \quad + 427 \\ \hline 568 \end{array}$$

$$13. \quad 38 + 427 + p = 475$$

(10)

$$14. \quad \$580 - \$94$$

(9)

- * 15. Multiple Choice** The number 57 is between which pair of numbers?
 (4) **A** 40 and 50 **B** 50 and 60 **C** 60 and 70 **D** 70 and 80
- 16. Represent** Write this comparison using digits and a comparison symbol:
 (7) *Eighteen thousand is less than eighty thousand.*
- 17. Connect** Write two addition facts and two subtraction facts for the fact family 4, 6, and 10.
 (8)
- 18. Analyze** Think of an odd number and an even number. Subtract the smaller number from the larger number. Is the answer odd or even?
 (2, 8)
- Verify** In problems **19** and **20**, find the missing number that makes the equation true.
- 19.** $18 + m = 150$
 (10)
- 20.** $12 + y = 51$
 (10)
- 21. Analyze** In this problem the letters x and y are each one-digit numbers. Compare: $x + y$ $\bigcirc$ 19
 (4, 6)
- Conclude** Write the next six terms in each counting sequence:
- 22.** 2, 4, 6, ...
 (1)
- 23.** 3, 6, 9, ...
 (1)
- 24.** 4, 8, 12, ...
 (1)
- 25.** 30, 25, 20, ...
 (1, 12)
- 26.** Use words to write 5280.
 (7)
- * 27. Predict** Is the 99th term of this counting sequence odd or even? Explain how you know.
 (1, 2)
- 2, 4, 6, 8, ...
- 28.** During the first week of summer vacation, Gia earned \$18 babysitting and \$12 mowing lawns. Use this information to write a word problem about combining and answer the question in your problem.
 (Inv. 1)
- 29.** Last night Bree studied language arts for 15 minutes, science for 20 minutes, and math for 20 minutes. Altogether, how many minutes did Bree spend studying those subjects?
 (6, 11)

- *30. The number of stories in a tall building can be used to estimate the height of the building. Each story represents about 13 feet.

Number of Stories	1	2	3	4
Height of Building	13	26	39	52

- a. **Generalize** Write a rule that describes how to estimate the height of a tall building for any number of stories.
- b. **Predict** Estimate the height of a 10-story building.

Early Finishers
Real-World Connection

Give examples of horizontal, vertical, and oblique lines or segments found in your classroom. Then draw and label a picture of each example.

- Multiplication as Repeated Addition
- Adding and Subtracting Dollars and Cents

Power Up

facts

Power Up B

count aloud

Count by 25¢ from 25¢ to \$3.00 and from \$3.00 to 25¢.

mental math

- Subtraction:** $6500 - 500$
- Subtraction:** $2000 - 100$
- Money:** Tarik purchased a one-way ticket for \$225. His return ticket was the same price. How much did the round trip cost?
- Money:** If the cost of one computer is \$750, how much do two computers cost?
- Subtraction:** $360 - 200$
- Subtraction:** $425 - 125$
- Number Sense:** $50 + 50 - 25$
- Number Sense:** $8 + 8 - 1 + 5 - 2$

problem solving

Copy this addition problem and fill in the missing digits:

$$\begin{array}{r} 3 _ 4 \\ + 23 _ \\ \hline _ 03 \end{array}$$

Focus Strategies: Work Backwards; Use Logical Reasoning

Understand We are asked to find the missing digits in an addition problem.

Plan We are shown an addition problem, but that does not mean we will add two numbers to find a sum. We will use the given information to help us find the missing digits.

Solve We could try randomly picking digits for the blanks and then checking the addition, but that might take a long time to get the correct answer. We will use *logical reasoning* and *work backwards* to fill in the missing digits.

Just like when we add two numbers, let's start with the ones column. We think, "What number plus 4 ends in 3?" We know that 4 plus 9 is 13, so we place a 9 in the ones column.

Next we focus on the tens column. We had to regroup ten from the addition of 4 and 9, so now we think, "1 plus what number plus 3 ends in 0?" Since 1 plus 6 plus 3 equals 10, we write a 6 in the tens column.

To find the final missing digit, we remember that we regrouped a 1 and carried it to the hundreds column. We think, "1 plus 3 plus 2 is what number?" The sum is 6, so we write a 6 in the final blank.

$$\begin{array}{r} 3 \underline{6} 4 \\ + 2 \underline{3} \underline{9} \\ \hline \underline{6} 0 3 \end{array}$$

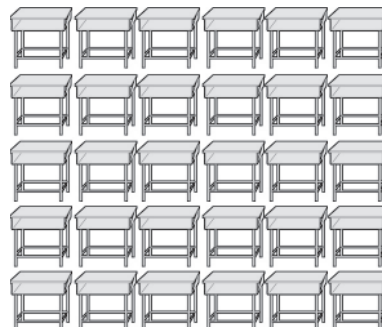
Check We find that our answer is reasonable by adding the number 364 and 239 to get a total of 603. We worked backwards and used logical reasoning to find the missing digits.

New Concepts

Multiplication as Repeated Addition

Consider this word problem:

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



Math Language

A rectangular arrangement of numbers or symbols is called an **array**.

Multiple Methods There are many methods to find an answer to this problem.

Method 1: Count the desks one at a time.

Method 2: Count the desks in one row and then count the number of rows.

Since there are 5 rows of 6 desks, we can add five 6s together, as we show here:

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

Method 3: Multiply to find the number of desks.

Whenever we need to add the same number over and over, we may multiply. To find the sum of five 6s, we multiply 5 by 6. We show two ways to write this:

$$\begin{array}{r} 5 \times 6 \\ \times 5 \end{array}$$

Reading Math

The times sign translates into a sum of repeated numbers.

The $\times$ is called a multiplication sign or a **times sign**. We read 5×6 by saying “five times six.” “Five times six” means the sum of five 6s. Multiplication is a way to repeatedly add a number. In the example above, the second number (6) is added the number of times shown by the first number (5).

In the picture on the previous page, we see 5 rows of desks with 6 desks in each row. However, if we turn the book sideways, we see 6 rows of desks with 5 desks in each row. We see that six 5s is the same as five 6s.

Five 6s (5×6) means $6 + 6 + 6 + 6 + 6$, which equals 30.

Six 5s (6×5) means $5 + 5 + 5 + 5 + 5 + 5$, which also equals 30.

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

Example 1

Change this addition problem to a multiplication problem:

$$7 + 7 + 7 + 7$$

We are asked to change the addition problem into a multiplication problem. We are not asked to find the sum. We see four 7s added together. We can write four 7s as the multiplication 4×7 . We note that four 7s is also equal to 7×4 .

Adding and Subtracting Dollars and Cents

To add or subtract dollars and cents, we align the decimal points so that we add or subtract digits with the same place value. We write the decimal point in the answer.

Example 2

a. $\$3.45 + \$6.23 + \$0.50$

$$\begin{array}{r} ^1 \\ \$3.45 \\ \$6.23 \\ + \$0.50 \\ \hline \$10.18 \end{array}$$

b. $\$4.50 - \3.80

$$\begin{array}{r} ^3 \\ \$4.50 \\ - \$3.80 \\ \hline \$0.70 \end{array}$$

The answer to **a** is **\$10.18** and the answer to **b** is **70 cents**. The zero to the left of the decimal point shows that there are no dollars.

Thinking Skill**Connect**

Can a whole number be written with a decimal point? Why or why not?

A number of dollars may be written either with or without a decimal point. Both of these numbers mean “five dollars”:

\$5 \$5.00

When adding or subtracting dollars and cents, it is a good idea to write all whole-dollar amounts with a decimal point and two zeros, as we show in Example 3.

Example 3

The amounts shown below represent the cost of four field-trip souvenirs.

\$5

\$8.75

\$10

\$0.35

What is the total cost of the four souvenirs?

We rewrite the problem so that the whole-dollar amounts contain a decimal point and two zeros.

$$\$5.00 + \$8.75 + \$10.00 + \$0.35$$

Next, we set up the problem so that the decimal points line up vertically. Then we add. We place the decimal point in the answer in line with the decimal points in the problem. The total cost of the four souvenirs is **\$24.10**.

$$\begin{array}{r} \$ 5.00 \\ \$ 8.75 \\ \$10.00 \\ + \$ 0.35 \\ \hline \$24.10 \end{array}$$

Example 4

Janna brought a \$5 bill to school to pay for lunch. What amount will Janna have left after paying for a lunch that costs \$3.25?

We write \$5 as \$5.00 and subtract.

Janna will have **\$1.75** left after paying for lunch.

$$\begin{array}{r} ^4 ^9 \\ \$5.00 \\ - \$3.25 \\ \hline \$1.75 \end{array}$$

Lesson Practice

Connect Write a multiplication problem for each of these addition problems:

a. $8 + 8 + 8 + 8$

b. $25 + 25 + 25$

c. Write a multiplication problem that shows how to find the number of Xs.

XXXXXX
XXXXXX
XXXXXX

Find each sum or difference:

d. $\begin{array}{r} \$5.26 \\ + \$8.92 \\ \hline \end{array}$

e. $\begin{array}{r} \$3.27 \\ - \$2.65 \\ \hline \end{array}$

f. $\$10 + \$3.75 + \$2$

g. $\$5 - \1.87

Written Practice

Distributed and Integrated

1. **Represent** Draw a number line marked with whole numbers from 0 to 8. How many unit segments are there from 3 to 7?
(12)

2. **Represent** Use tally marks to show the number 9.
(12)

Formulate For problems 3 and 4, write an equation and find the answer.

- *3. Corina hiked 33 miles in one day. If she hiked 14 miles after noon, how many miles did she hike before noon?
(11)
- *4. Of the 23 students in the classroom, 11 were boys. How many girls were in the classroom?
(11)
- *5. **Connect** Write two addition facts and two subtraction facts for the fact family 3, 7, and 10.
(8)
6. The explorers paddled the canoe down the river 25 miles each day for 5 days. How far did they travel in 5 days?
(11, 13)

7. $\begin{array}{r} 300 \\ - 114 \\ \hline \end{array}$

8. $\begin{array}{r} \$5.60 \\ - \$2.84 \\ \hline \end{array}$

9. $\begin{array}{r} 203 \\ - 87 \\ \hline \end{array}$

10. $\begin{array}{r} \$512 \\ - \$123 \\ \hline \end{array}$

$$\begin{array}{r} 11. \quad 432 \\ (10) \quad + \quad b \\ \hline 683 \end{array}$$

$$\begin{array}{r} 12. \quad \$2.54 \\ (13) \quad \$5.36 \\ + \$0.75 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 387 \\ (6) \quad 496 \\ + 874 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad \$ 97 \\ (6) \quad \$436 \\ + \$468 \\ \hline \end{array}$$

15. **Connect** Compare: fifteen minus five $\bigcirc$ fifteen minus six
(4, 8)

* 16. **Verify** Think of two even numbers and one odd number. Add them together. Is the sum odd or even? Explain your answer.
(2, 6)

$$17. \$4.56 + \$13.76$$

(13)

$$18. \$5127 - \$49$$

(9)

$$19. n + 27 + 123 = 153$$

(10)

$$20. 2510 - 432$$

(9)

$$21. \$5 - \$3.36$$

(13)

$$22. \$5 + \$3.36 + \$0.54$$

(13)

Conclude Write the next six terms in each counting sequence:

$$23. 6, 12, 18, \dots$$

(1)

$$24. 7, 14, 21, \dots$$

(1)

$$25. 8, 16, 24, \dots$$

(1)

$$26. 9, 18, 27, \dots$$

(1)

* 27. **Analyze** Compare: $3 + 3 + 3 + 3 \bigcirc 4 + 4 + 4$
(4, 6)

28. **Connect** Change this addition problem to a multiplication problem:
(13)

$$7 + 7 + 7 + 7 + 7 + 7$$

* 29. **Represent** Write a multiplication problem that shows how to find the number of Xs.
(13)

X X X X X
X X X X X
X X X X X
X X X X X

* 30. **Analyze** Mark bought a box of pencils, two pens, and a notebook. What was the total cost of the items?
(6, 11)

Item	Price
Notebook	\$1.79
Box of pencils	\$1.50
Pen	\$0.65

• Missing Numbers in Subtraction

Power Up

facts

Power Up B

count aloud

Count by 25¢ from 25¢ to \$3.00 and from \$3.00 to 25¢. Count by 50¢ to \$5.00 and from \$5.00 to 50¢.

mental math

- Addition:** $2500 + 500$
- Subtraction:** $2500 - 500$
- Measurement:** Thuy ran 390 meters. Then he ran 450 meters. What is the total distance Thuy ran?
- Money:** $\$7.50 + \2.50
- Number Sense:** $10 + 10 - 5 + 10 - 5$
- Money:** How much money is 3 quarters? ... 4 quarters? ... 5 quarters?
- Measurement:** One foot is 12 inches. Two feet is 24 inches. How many inches is 3 feet?
- Geometry:** If a square is 5 inches on each side, what is the distance around the square?

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Copy this addition problem and fill in the missing digits:

$$\begin{array}{r} 52_ \\ + _94 \\ \hline _0_2 \end{array}$$

New Concept

Thinking Skill

Verify

Why can these problems be read in opposite directions?

The numbers in an addition fact can be read in reverse direction to form a subtraction fact.

Reading Down Three plus four is seven.	$\downarrow$	$\begin{array}{r} 3 \\ + 4 \\ \hline 7 \end{array}$	$\uparrow$	Reading Up Seven minus four is three.
---	--------------	---	------------	--

Likewise, the numbers in a subtraction fact can be read in reverse direction to form an addition fact.

Reading Down Nine minus five is four.	$\downarrow$	$\begin{array}{r} 9 \\ - 5 \\ \hline 4 \end{array}$	$\uparrow$	Reading Up Four plus five is nine.
--	--------------	---	------------	---

Example 1

Reverse the order of these numbers to make an addition equation:

$$68 - 45 = 23$$

We write the numbers in reverse order.

$$23 \quad 45 \quad 68$$

Then we insert a plus sign and an equal sign to make an equation.

$$23 + 45 = 68$$

Example 2

Reverse the order of these numbers to make an addition equation:

$$\begin{array}{r} 77 \\ - 23 \\ \hline 54 \end{array}$$

We write the numbers in reverse order, using a plus sign instead of a minus sign.

$$\begin{array}{r} 54 \\ + 23 \\ \hline 77 \end{array}$$

In this lesson we will practice finding missing numbers in subtraction problems. There are three numbers in a subtraction problem. Any one of the three numbers may be missing. Sometimes changing a subtraction problem to an addition problem can help us find the missing number.

Example 3

Find the missing number:

$$\begin{array}{r} f \\ - 15 \\ \hline 24 \end{array}$$

We need to find the first number in this subtraction problem. When 15 is subtracted from f , the difference is 24. So f must be more than 24. We will read this subtraction problem in reverse direction to form an addition problem.

Reading Down f minus fifteen is twenty-four.	$\downarrow$	$\begin{array}{r} f \\ - 15 \\ \hline 24 \end{array}$	$\uparrow$	Reading Up Twenty-four plus fifteen is f.
--	--------------	---	------------	---

Reading up, we see that 24 plus 15 is f . This means we can find f by adding 24 and 15.

$$\begin{array}{r} 24 \\ + 15 \\ \hline 39 \end{array}$$

We find that **f is 39**. To check our work, we replace f with 39 in the original problem.

Replace f with 39.

$\begin{array}{r} f \\ - 15 \\ \hline 24 \end{array}$	$\longrightarrow$	$\begin{array}{r} 39 \\ - 15 \\ \hline 24 \end{array}$
		This is correct.

From the previous example, we know the following:

$\begin{array}{r} f \\ - s \\ \hline t \end{array}$	$\longleftarrow$ The first number of a subtraction problem can be found by adding the other two numbers.
---	--

Example 4

Find the missing number:

$$\begin{array}{r} 45 \\ - s \\ \hline 21 \end{array}$$

We need to find the second number in this subtraction problem. When s is subtracted from 45, the difference is 21. We know s must be less than 45. We will read this problem in both directions.

Reading Down Forty-five minus s is twenty-one.	$\downarrow$	$\begin{array}{r} 45 \\ - s \\ \hline 21 \end{array}$	$\uparrow$	Reading Up Twenty-one plus s is forty-five.
--	--------------	---	------------	---

Reading up, we see that 21 plus s is 45. When the problem is read this way, s is a missing addend. We find a missing addend by subtracting.

$$\begin{array}{r} 45 \\ - 21 \\ \hline 24 \end{array}$$

We find that **s is 24**. Now we replace s with 24 in the original problem to check the answer.

Replace s with 24.

$$\begin{array}{r} 45 \\ - s \\ \hline 21 \end{array} \longrightarrow \begin{array}{r} 45 \\ - 24 \\ \hline 21 \end{array} \text{ This is correct.}$$

Here is another fact to remember for finding missing numbers in subtraction problems:

$\begin{array}{r} f \\ - s \\ \hline t \end{array}$	The second or third number of a subtraction problem can be found by subtracting.
---	---

Example 5

Five years from now, Kendall's grandfather will be 60 years old. Which equation can be used to find the grandfather's age in years now?

$$a + 5 = 60$$

$$a - 5 = 60$$

$$60 + 5 = a$$

We know that Kendall's grandfather is less than 60 years old. We need to solve each problem to find which answer is reasonable.

For the first equation, we find the missing addend by subtracting.

$$60 - 5 = 55$$

For the second equation, we reverse the order of the numbers to change a subtraction equation to an addition equation.

$$60 + 5 = 65$$

For the third equation, we add to find the sum.

$$60 + 5 = 65$$

The **first equation** is correct because 55 is less than 60.

Lesson Practice

Reverse the order of the numbers to change each subtraction equation to an addition equation:

a. $34 - 12 = 22$

b.
$$\begin{array}{r} 56 \\ - 29 \\ \hline 27 \end{array}$$

Find the missing number in each subtraction problem:

c. $w - 8 = 6$

d. $23 - y = 17$

e.
$$\begin{array}{r} n \\ - 24 \\ \hline 48 \end{array}$$

f.
$$\begin{array}{r} 63 \\ - p \\ \hline 20 \end{array}$$

g.
$$\begin{array}{r} q \\ - 36 \\ \hline 14 \end{array}$$

h.
$$\begin{array}{r} 42 \\ - r \\ \hline 24 \end{array}$$

Written Practice

Distributed and Integrated

1. **Represent** Draw a number line marked with integers from -5 to 5 .
(12) How many unit segments are there from 1 to 5 ?

2. **Represent** Use words to name $\$4.48$.
(5)

3. **Represent** Use digits to write eight hundred eighteen thousand,
(7) eighty.

4. John used tally marks to keep track of the number of votes each
(12) candidate received. The winner received 11 votes. Use tally marks to show the number 11 .

Formulate For problems **5** and **6**, write an equation and find the answer.

- *5. Janet is reading a 260 -page book. She has read 85 pages. How many
(11) more pages does she have left to read?
6. Esmerelda mixed 32 ounces of soda with 24 ounces of juice to make
(11) punch. How many ounces of punch did she make?

7. **Represent** Write this comparison using digits and a comparison symbol:
(4, 5)

Fifty-six is less than sixty-five.

- *8. **Analyze** Write the greatest three-digit even number that contains the digits 1, 2, and 3.
(2)

$$\begin{array}{r} \text{9. } \$43.10 \\ (13) \quad - \$1.54 \\ \hline \end{array}$$

$$\begin{array}{r} \text{10. } \$3.01 \\ (13) \quad - \$1.03 \\ \hline \end{array}$$

$$\begin{array}{r} \text{11. } 600 \\ (14) \quad - m \\ \hline 364 \end{array}$$

$$\begin{array}{r} \text{12. } 4625 \\ (9) \quad - 1387 \\ \hline \end{array}$$

$$\begin{array}{r} \text{13. } \$3.67 \\ (13) \quad \$4.12 \\ \quad + \$5.01 \\ \hline \end{array}$$

$$\begin{array}{r} \text{14. } \$573 \\ (6) \quad \$96 \\ \quad + \$427 \\ \hline \end{array}$$

$$\begin{array}{r} \text{15. } 68 \\ (6) \quad 532 \\ \quad + 176 \\ \hline \end{array}$$

$$\begin{array}{r} \text{16. } 436 \\ (10) \quad + y \\ \hline 634 \end{array}$$

$$\text{17. } 100 - n = 48$$

(14)

$$\text{18. } \$31.40 - \$13.40$$

(13)

$$\text{19. } 6 + 48 + 9 + w = 100$$

(10)

$$\text{20. } 3714 + 56 + 459$$

(6)

21. **Connect** Reverse the order of the numbers to change this subtraction equation to an addition equation:
(14)

$$50 - 18 = 32$$

- *22. **Conclude** This sequence counts down by threes. What are the next six terms in the sequence?
(1, 12)

12, 9, 6, ...

23. **Connect** Write two addition facts and two subtraction facts for the fact family 2, 8, and 10.
(8)

$$\begin{array}{r} \text{24. } n \\ (14) \quad - 17 \\ \hline 12 \end{array}$$

$$\begin{array}{r} \text{25. } p \\ (14) \quad - 175 \\ \hline 125 \end{array}$$

26. **Connect** Change this addition problem to a multiplication problem:
(13)

$$10 + 10 + 10 + 10$$

-  **27. Estimate** In a class of 23 students, there are 12 girls. Do girls make up more than or less than half the class? Explain your reasoning.

- 28.** Draw a horizontal segment and a vertical ray.

- 29.** Some word problems about combining have more than two addends. The word problem below has four addends. Answer the question in this problem:

The football team scored 6 points in the first quarter, 13 points in the second quarter, 7 points in the third quarter, and 6 points in the fourth quarter. How many points did the team score in all four quarters?

- 30. Formulate** Grace has \$7.00 in her wallet and \$4.37 in a coin jar. Use this information to write a word problem about combining, and answer the question in your problem.

Early Finishers

Real-World Connection

Ethan had a collection of arrowheads. He gave Rachel 17 arrowheads. Ethan now has 56 arrowheads in his collection. Write a subtraction equation that can be used to find the number of arrowheads Ethan had before he gave some away. Solve the problem and explain how to check the answer.

• Making a Multiplication Table

Power Up

facts

Power Up B

count aloud

Count up and down by 50s between 0 and 500.

mental math

- a. **Addition:** $50 + 50 + 50$
- b. **Addition:** $500 + 500 + 500$
- c. **Addition:** $24 + 26$
- d. **Addition:** $240 + 260$
- e. **Subtraction:** $480 - 200$
- f. **Addition:** $270 + 280$
- g. **Money:** Mike had \$4.50. He purchased a magazine for \$1.25. How much money did Mike have left over?
- h. **Number Sense:** $10 + 6 - 1 + 5 + 10$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Billy, Ricardo, and Shakia finished first, second, and third in the race, though not necessarily in that order. List the different orders in which they could have finished.

New Concept

Below we list several sequences of numbers. Together, these sequences form an important pattern.

Zeros	0	0	0	0	0	0
Ones	1	2	3	4	5	6
Twos	2	4	6	8	10	12
Threes	3	6	9	12	15	18
Fours	4	8	12	16	20	24
Fives	5	10	15	20	25	30
Sixes	6	12	18	24	30	36

Math Language

A *multiple* is a product of a given number and a counting number.

This pattern is sometimes called a **multiplication table**. A multiplication table usually lists the first ten or more **multiples** of the first ten or more whole numbers. On a multiplication table, we can find the answer to questions such as, “How much is three 4s?” We do this by using the rows and columns on the table. (Rows run left to right, and columns run top to bottom.)

To find how much three 4s equals, we locate the row that begins with 3 and the column that begins with 4. Then we look across the row and down the column for the number where the row and column meet.

Thinking Skills

Connect

Describe the relationships between the numbers in the table.

Column
↓

	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6
2	0	2	4	6	8	10	12
3	0	3	6	9	12	15	18
4	0	4	8	12	16	20	24
5	0	5	10	15	20	25	30
6	0	6	12	18	24	30	36

Row →

We find that three 4s equals 12.

Numbers that are multiplied together are called **factors**. The factors in the problem above are 3 and 4. The answer to a multiplication problem is called a **product**. From the table we see that the product of 3 and 4 is 12. The table shows us that 12 is also the product of 4 and 3. (Find the number where row 4 and column 3 meet.) Thus, the **Commutative Property** applies to multiplication as well as to addition. We may choose the order of factors when we multiply.

Thinking Skills

Represent

Give another example of each property.

Notice the row and column of zeros. When we multiply by zero, the product is zero. This fact is called the **Property of Zero for Multiplication**. We may think of 2×0 or 10×0 or 100×0 as two 0s or ten 0s or one hundred 0s added together. In each case the product is zero.

Notice also that 1 times any number is that number. For example, one 5 is 5 and five 1s is 5. This fact is called the **Identity Property of Multiplication**.

Activity

Multiplication Table

Material needed:

- Lesson Activity 22

The multiplication table in this lesson has 7 columns and 7 rows. Using **Lesson Activity 22**, make a multiplication table with 11 columns and 11 rows. Make sure to line up the numbers carefully. Use your multiplication table to answer the problems below.

Lesson Practice

In your multiplication table, find where the indicated row and column meet. Write that number as your answer.

- a. $\begin{array}{c} 4 \\ \downarrow \\ 5 \longrightarrow ? \end{array}$ b. $\begin{array}{c} 2 \\ \downarrow \\ 6 \longrightarrow ? \end{array}$ c. $\begin{array}{c} 6 \\ \downarrow \\ 3 \longrightarrow ? \end{array}$ d. $\begin{array}{c} 10 \\ \downarrow \\ 8 \longrightarrow ? \end{array}$

Find each product:

- e. 6×7 f. 8×9
g. 8×4 h. 3×10
i. 50×0 j. 25×1
k. **Connect** The answer to a multiplication problem is called the *product*. What do we call the numbers that are multiplied together?

Written Practice

Distributed and Integrated

- Represent** Draw a number line marked with integers from -3 to 10 .
(12) How many unit segments are there from 3 to 8 ?
- Analyze** Kwame was the ninth person in line. How many people were
(7) in front of him?
- Represent** M'Kea used tally marks to count the number of trucks,
(12) cars, and motorcycles that drove by her house. Thirteen cars drove by her house. Use tally marks to show the number 13 .

4. **Connect** Write two addition facts and two subtraction facts for the fact family 1, 9, and 10.

Formulate For problems 5 and 6, write an equation and find the answer.
(Hint: Problem 6 has three addends.)

- *5. Season tickets to an amusement park are on sale for \$100 each. On the first day of sale, the amusement park sold one hundred and sixty four tickets. After three days, the amusement park sold a total of 239 tickets. How many tickets did the amusement park sell on the second day?

6. The lengths of three bridges are shown in this table:

Bridge Name	Location	Length (ft)
Lincoln Memorial	Illinois	619
Perrine	Idaho	993
Rip Van Winkle	New York	800

What is the sum of the lengths of the bridges?

7. 3×6

8. 4×8

9. 7×9

*10. 9×10

11.
$$\begin{array}{r} a \\ - 819 \\ \hline 100 \end{array}$$

12.
$$\begin{array}{r} \$6.00 \\ - \$5.43 \\ \hline \end{array}$$

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

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

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

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

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

18.
$$\begin{array}{r} \$4.36 \\ \$2.18 \\ + \$3.94 \\ \hline \end{array}$$

19. $360 + 47 + b = 518$

20. $\$10 - \9.18

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

22. **Explain** Compare. How can you answer the comparison without adding or multiplying?

$$5 + 5 + 5 \bigcirc 3 \times 5$$

23. **Represent** Use digits and symbols to write “twelve equals ten plus two.”
(4, 6)

24. **Connect** What term is missing in this counting sequence?
(1)

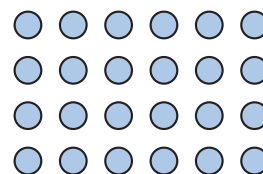
..., 32, 40, 48, ____, 64, ...

25. **Represent** Use digits to write eight hundred eighty dollars and eight cents.
(5)

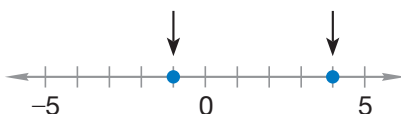
26. Compare: 346,129 ○ 346,132
(7)

*27. **Analyze** A dozen is 12. How many is half of half a dozen?
(2)

28. Write a multiplication problem that shows how to find the total number of circles.
(13)



29. **Represent** Two integers are indicated by arrows on this number line. Write the two integers using a comparison symbol to show which number is greater and which is less.
(4, 12)



30. The relationship between yards and feet is shown in this table:
(1)

Number of Yards	1	2	3	4
Number of Feet	3	6	9	12

a. **Generalize** Write a rule that describes how to find the number of feet for any number of yards.

b. **Predict** How many feet is 20 yards?

• Word Problems About Separating

Power Up

facts

mental math

Power Up C

- Multiplication:** 3×5
- Multiplication:** 3×50
- Multiplication:** 3×500
- Multiplication:** 5×6
- Multiplication:** 5×60
- Multiplication:** 5×600
- Money:** Carlos had \$3.75. He spent \$2.50 on popcorn and a drink. How much money did Carlos have left?
- Number Sense:** $20 + 15 - 5 + 10 + 4$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Copy this addition problem and fill in the missing digits:

$$\begin{array}{r} _6_ \\ + 37_ \\ \hline _248 \end{array}$$

New Concept



Visit www.SaxonMath.com/Int5Activities for a calculator activity.

Problems about combining have an addition formula. In this lesson we will consider problems about separating. Problems about separating have a subtraction formula.

Here are two ways to write the formula for problems about separating:

$$\begin{array}{r} \text{Some} \\ - \text{Some went away} \\ \hline \text{What is left} \end{array}$$

$$\text{Some} - \text{Some went away} = \text{What is left}$$

Example 1

Reading Math

We translate the problem using a subtraction pattern.

Cullen had \$28.

Cullen spent \$12.

Cullen had / dollars left.

Cullen had \$28. After he spent \$12, how much money did Cullen have?

Cullen had some money (\$28). Then he spent some of his money (\$12), so some went away. He still had some money left. We write the equation using a subtraction formula.

$$s - a = l$$

$$\$28 - \$12 = l$$

To find what is left, we subtract.

$$\begin{array}{r} \$28 \\ - \$12 \\ \hline \$16 \end{array}$$

Then we check to see if our answer is reasonable and our arithmetic is correct. The answer is reasonable because Cullen has less money than he started with. We can check the arithmetic by “adding up.”

$$\begin{array}{r} \$28 \\ - \$12 \\ \hline \$16 \end{array} \quad \begin{array}{l} \uparrow \\ \text{Add Up} \\ \$16 \text{ plus } \$12 \text{ is } \$28. \\ \text{The answer is correct.} \end{array}$$

After spending \$12, Cullen had **\$16** left.

Example 2

After losing 234 pounds, Jumbo the elephant still weighed 4368 pounds. How much did Jumbo weigh before he lost the weight?

We translate the problem using a “some went away” pattern.

$$\begin{array}{r} \text{Before, Jumbo weighed ...} \quad w \text{ pounds} \\ \text{Then Jumbo lost ...} \quad - 234 \text{ pounds} \\ \hline \text{Jumbo still weighed ...} \quad 4368 \text{ pounds} \end{array}$$

To find the first number of a subtraction problem, we add.

$$\begin{array}{r} 11 \\ 4368 \text{ pounds} \\ + 234 \text{ pounds} \\ \hline 4602 \text{ pounds} \end{array}$$

Now we check the answer.

Justify Is it reasonable? Why or why not?

Is the arithmetic correct? We can check the arithmetic by using the answer in the original equation.

$$\begin{array}{r} w \longrightarrow \begin{array}{r} 59 \\ 4602 \\ - 234 \\ \hline 4368 \end{array} \end{array} \quad \begin{array}{r} 59 \\ 4602 \\ - 234 \\ \hline 4368 \end{array} \quad \text{This is correct.}$$

Before losing weight, Jumbo weighed **4602 pounds**.

Example 3

Four hundred runners started the race, but some runners dropped out along the way. If 287 runners finished the race, then how many runners dropped out of the race?

We translate the problem using a “some went away” formula.

$$\begin{array}{rcl} 400 \text{ runners started.} & & 400 \text{ runners} \\ \text{Some dropped out.} & - & d \text{ runners} \\ \hline 287 \text{ runners finished.} & & 287 \text{ runners} \end{array}$$

We find the missing number by subtracting.

$$\begin{array}{r} 39 \\ 400 \text{ runners} \\ - 287 \text{ runners} \\ \hline 113 \text{ runners} \end{array}$$

Justify Is the answer reasonable? Why or why not?

We check the arithmetic as follows:

$$\begin{array}{r} 400 \\ - d \longrightarrow \begin{array}{r} 39 \\ 400 \\ - 113 \\ \hline 287 \end{array} \end{array} \quad \begin{array}{r} 39 \\ 400 \\ - 113 \\ \hline 287 \end{array} \quad \text{This is correct.}$$

There were **113 runners** who dropped out of the race.

Lesson Practice

Formulate In problems **a–c**, write an equation for the word problem. Then answer the question.

- Five hundred runners started the race. Only 293 finished the race. How many runners dropped out of the race?
- After paying \$85 rent, Kaamil still had \$326. How much money did Kaamil have before he paid the rent?
- The 26 members of the hiking club split into two groups. Fourteen members hiked into the mountains, while the rest hiked down to the river. How many members hiked down to the river?

- d. **Formulate** For the following equation, write a word problem about separating. Then answer the question in your problem.

$$\$20 - \$12 = \text{?}$$

Written Practice

Distributed and Integrated

1. The price went up from \$26 to \$32. By how many dollars did the price increase? Write an equation and find the missing number.

- *2. **Represent** Use tally marks to show the number 15.

3. **Represent** Use words to name \$205.50.

- *4. **Connect** For the fact family 6, 8, and 14, write two addition facts and two subtraction facts.

Formulate For problems 5–7, write an equation and find the answer.

5. School officials estimated that 400 people attended an afternoon performance of a school play and 600 people attended the evening performance. What is a reasonable estimate of the total attendance for those performances?

6. The custodian put away 24 chairs, leaving 52 chairs in the room. How many chairs were in the room before the custodian put some away? Use a subtraction formula to solve the problem.

7. Azura had \$24. She spent \$8. How much money did Azura have left?

8. 3×7

9. 6×7

10. 3×8

11. 7×10

12.
$$\begin{array}{r} b \\ - 256 \\ \hline 56 \end{array}$$

13.
$$\begin{array}{r} 900 \\ - c \\ \hline 90 \end{array}$$

14.
$$\begin{array}{r} \$4.18 \\ - \$2.88 \\ \hline \end{array}$$

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

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

17.
$$\begin{array}{r} g \\ + 843 \\ \hline 1000 \end{array}$$

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

19.
$$\begin{array}{r} \$3.15 \\ \$2.87 \\ + \$1.98 \\ \hline \end{array}$$

- *20.**  **Verify** Think of two one-digit odd numbers. Multiply them. Is the product odd or even? Explain how you know.
(2, 15)

- *21. Multiple Choice** Which of these is a horizontal line?
(12)



- 22. Represent** Use digits and a comparison symbol to write this comparison:
(4)

Eight hundred forty is greater than eight hundred fourteen.

- 23. Connect** What number is missing in this counting sequence?
(1)

..., 24, 30, 36, ____, 48, 54, ...

- 24.** Compare: 4×3 2×6
(4, 15)

- 25. Multiple Choice** The letter y stands for what number in this equation?
(10)

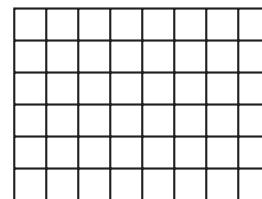
$$36 + y = 63$$

A 24 **B** 32 **C** 99 **D** 27

- 26.** What word is used to describe a line that goes straight up and down?
(12)

- 27.** How many cents is half a dollar? How many cents is half of half a dollar?
(2)

- 28.** Write a multiplication problem that shows how to find the number of small squares in this rectangle.
(13)



- *29. Formulate** Josefina had \$32. She spent \$15. Use this information to write a word problem about separating. Then answer the question in your problem.
(16)

- *30. **Formulate** (11) Nine students completed a science project early, fifteen students completed the project on time, and two students completed the project late. Use this information to write a word problem about combining. Then answer the question in your problem.

Early Finishers
Real-World Connection

A museum has \$9000 in their budget to spend on artwork.
The museum bought a painting for \$5675 and a statue for \$1859.
How much more can the museum spend on artwork?

• Multiplying by One-Digit Numbers

Power Up

facts

Power Up C

count aloud

Count up and down by 5s between 1 and 51 (1, 6, 11, 16, ...).
Count by 50¢ to \$5.00 and from \$5.00 to 50¢.

mental math

- a. **Multiplication:** 4×6
- b. **Multiplication:** 4×60
- c. **Multiplication:** 4×600
- d. **Multiplication:** 5×8
- e. **Multiplication:** 5×80
- f. **Multiplication:** 5×800
- g. **Measurement:** The string was 580 cm long. Oded cut a 60-cm piece from one end. How much string was left in the longer piece?
- h. **Number Sense:** $5 \times 6 + 12 - 2 + 10 - 1$

problem solving

Quarters, dimes, nickels, and pennies are often put into paper or plastic rolls to make their value easier to identify. Quarters are put into rolls of 40 quarters. Dimes are put into rolls of 50 dimes. One roll of quarters has the same value as how many rolls of dimes?

Focus Strategy: Write an Equation

Understand We are told that coins are often put into rolls. Quarters are put into rolls of 40 quarters, and dimes are put into rolls of 50 dimes. We are asked to find how many rolls of dimes have the same value as one roll of quarters.

Plan We know the value of a quarter is 25¢ and the value of a dime is 10¢. As a first step, we can *write equations* to represent the total value of each coin roll. After we find the value of each coin roll, we will calculate how many dime rolls equal the value of one quarter roll.

Solve One quarter is 25¢, and there are 40 quarters in a roll. The equation to show the value of a roll of quarters is

$$40 \times 25¢ = \underline{\hspace{2cm}}$$

We can calculate this mentally. We think, “4 quarters is \$1, and 40 quarters is ten times 4 quarters, so 40 quarters is \$10.”

One dime is 10¢, and there are 50 dimes in a roll. The equation for the value of a roll of dimes is

$$50 \times 10¢ = \underline{\hspace{2cm}}$$

We think, “5 dimes is 50¢, so 50 dimes is $10 \times 50¢$, which is 500¢, or simply \$5.”

Now we know the value of a roll of quarters (\$10) and the value of roll of dimes (\$5). It is easy to see that **two rolls of dimes** have the same value as one roll of quarters:

$$2 \times \$5 = \$10$$

Check We know that our answer is reasonable because one roll of dimes has half the value of one roll of quarters, so two rolls of dimes have the same value as one roll of quarters.

New Concept

We may solve the following problem either by adding or by multiplying:

A ticket to the basketball game costs \$24. How much would three tickets cost?

To find the answer by adding, we add the price of three tickets.

$$\begin{array}{r} 1 \\ \$24 \\ \$24 \\ + \$24 \\ \hline \$72 \end{array}$$

Thinking Skill

Discuss

How is multiplying whole dollars the same as multiplying whole numbers? How is it different?

To find the answer by multiplying, we multiply \$24 by 3. First we multiply the 4 ones by 3. This makes 12 ones, which is the same as 1 ten and 2 ones. We write the 2 ones below the line and the 1 ten above the tens column.

$$\begin{array}{r} 1 \\ \$24 \\ \times 3 \\ \hline 2 \end{array}$$

Next we multiply the 2 tens by 3, making 6 tens. Then we add the 1 ten to make 7 tens.

$$\begin{array}{r} 1 \\ \$24 \\ \times 3 \\ \hline \$72 \end{array}$$

Example 1

A ticket to the show costs \$12. How much would four tickets cost?

We may find the answer by adding or by multiplying.

$$\$12 + \$12 + \$12 + \$12 = \$48 \quad 4 \times \$12 = \$48$$

Four tickets would cost **\$48**.

Example 2

Six different times next month, a salesperson must make a 325-mile round trip. How many total miles will the salesperson travel next month?

We multiply 5 ones by 6 and get 30. We write “0” below the line and “3” above the tens column. Next we multiply 2 tens by 6, making 12 tens, and add the 3 tens to get 15 tens. We write “5” below the line and “1” above the next digit. Then we multiply 3 hundreds by 6 and add the 1 hundred.

$$\begin{array}{r} 13 \\ 325 \\ \times 6 \\ \hline 1950 \end{array}$$

In six trips, the salesperson will travel **1950 miles**.

Thinking Skill

Connect

What is another name for the numbers 325 and 6?

Example 3

Use dimes and pennies to illustrate $3 \times \$0.14$.

One dime and four pennies is \$0.14. We lay out three sets of these coins to show $3 \times \$0.14$.



We see that the total is 3 dimes and 12 pennies. Since 12 pennies is more than a dime, we trade ten pennies for a dime. The result is 4 dimes and 2 pennies. So $3 \times \$0.14$ is **\$0.42**.



Discuss Why are dimes and pennies a good model for multiplying cents?

Example 4

Pens cost \$0.25 each. What is the cost of 6 pens?

Each pen costs a quarter. We can find that 6 quarters is \$1.50 using mental math. However, we will use this problem to practice the pencil-and-paper algorithm for multiplication. Think of \$0.25 as 2 dimes and 5 pennies. First we multiply 5 pennies by 6, which makes 30 pennies. Since 30 pennies equals 3 dimes and 0 pennies, we write “0” below the line and “3” above the dimes column.

$$\begin{array}{r} 3 \\ \$0.25 \\ \times 6 \\ \hline 0 \end{array}$$

Next we multiply 2 dimes by 6, making 12 dimes. Then we add the 3 dimes to make 15 dimes. Fifteen dimes equals 1 dollar and 5 dimes, so we write “5” below the line and “1” above the dollars column.

$$\begin{array}{r} 13 \\ \$0.25 \\ \times 6 \\ \hline 50 \end{array}$$

Thinking Skill

Verify

How can we use mental math to decide if the answer is reasonable?

There are no dollars to multiply, so we write the 1 in the dollars place below the line. Finally, we insert the decimal point two places from the right-hand end and write the dollar sign.

$$\begin{array}{r} 13 \\ \$0.25 \\ \times \quad 6 \\ \hline \$1.50 \end{array}$$

Six pens cost **\$1.50**.

Discuss Why do we place the decimal point two places from the right?

Lesson Practice

Find each product:

a. $\$36 \times 5$

b. 50×8

c. $7 \times \$0.43$

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

e. $\begin{array}{r} \$7.68 \\ \times 4 \\ \hline \end{array}$

f. $\begin{array}{r} 560 \\ \times 6 \\ \hline \end{array}$

g. $\begin{array}{r} \$394 \\ \times 7 \\ \hline \end{array}$

h. $\begin{array}{r} 607 \\ \times 9 \\ \hline \end{array}$

i. $\begin{array}{r} \$9.68 \\ \times 3 \\ \hline \end{array}$

- j. Each morning class at Lakeview School is 45 minutes long. There are 4 classes every morning. How many minutes do Lakeview School students attend classes each morning? Show how to find the number of minutes by adding and by multiplying.
- k. Devon bought three bottles of milk for \$2.14 each. Altogether, how much did the milk cost? Find the answer by multiplying.
- l. Nathan had five quarters in his pocket. Write and solve a multiplication equation that shows the value of the quarters in Nathan's pocket.

Written Practice

Distributed and Integrated

- *1. **Represent** Draw a vertical line segment.

(12)

2. Cedric read 3 books. Each book had 120 pages. How many pages did Cedric read? Find the answer once by adding and again by multiplying.

(17)

Formulate For problems 3 and 4, write an equation and find the answer.

- *3. ⁽¹⁷⁾ The spider spun its web for 6 hours the first night and for some more hours the second night. If the spider spent a total of 14 hours spinning its web those two nights, how many hours did the spider spin the second night?

- *4. ⁽¹⁶⁾ After buying a notebook for \$1.45, Carmela had \$2.65. How much money did Carmela have before she bought the notebook?

5. ⁽¹⁷⁾
$$\begin{array}{r} 24 \\ \times 3 \\ \hline \end{array}$$

6. ⁽¹⁷⁾
$$\begin{array}{r} \$36 \\ \times 4 \\ \hline \end{array}$$

7. ⁽¹⁷⁾
$$\begin{array}{r} 45 \\ \times 5 \\ \hline \end{array}$$

8. ⁽¹⁷⁾
$$\begin{array}{r} \$56 \\ \times 6 \\ \hline \end{array}$$

9. ⁽¹⁷⁾
$$\begin{array}{r} \$3.25 \\ \times 6 \\ \hline \end{array}$$

10. ⁽¹⁷⁾
$$\begin{array}{r} 432 \\ \times 9 \\ \hline \end{array}$$

11. ⁽¹⁷⁾
$$\begin{array}{r} \$2.46 \\ \times 7 \\ \hline \end{array}$$

12. ⁽¹⁷⁾
$$\begin{array}{r} 364 \\ \times 8 \\ \hline \end{array}$$

13. ⁽¹⁰⁾
$$\begin{array}{r} c \\ + 147 \\ \hline 316 \end{array}$$

14. ⁽¹³⁾
$$\begin{array}{r} \$4.20 \\ - \$3.75 \\ \hline \end{array}$$

15. ⁽¹⁴⁾
$$\begin{array}{r} 604 \\ - w \\ \hline 406 \end{array}$$

16. ⁽¹⁴⁾
$$\begin{array}{r} m \\ - 73 \\ \hline 800 \end{array}$$

17. ⁽¹⁰⁾ $3 + n + 15 + 9 = 60$

18. ⁽¹³⁾ $\$90 + \$6.75 + \$7.98 + \0.02

- *19. ^(13, 17) **Connect** Doreen bought five pens for \$0.24 each. Altogether, how much did the pens cost? Find the answer to the problem by changing this addition problem into a multiplication problem:

$$\$0.24 + \$0.24 + \$0.24 + \$0.24 + \$0.24$$

20. ⁽¹⁷⁾ Find the product: 26×7

21. ^(2, 15) Think of two one-digit even numbers. Multiply them. Is the product odd or even?

*22. ^(4, 15) Compare: $12 \times 1 \bigcirc 24 \times 0$

- 23. Represent** Use digits and a comparison symbol to write this comparison:
Five hundred four thousand is less than five hundred fourteen thousand.

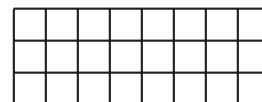
- 24. Connect** What number is missing in this counting sequence?
 ..., 21, 28, 35, —, 49, 56, ...

- 25.** Which digit in 375 shows the number of hundreds?
 (3)

- 26. Represent** What number is 10 more than these tally marks?
 (12)
- |||| |||

- *27. Predict** Is the 100th term of this counting sequence odd or even?
 (1, 2) Explain how you know.
- 1, 3, 5, 7, ...

- 28.** Write a multiplication problem that shows how to find the number of small squares in this rectangle.
 (13)



- 29. Connect** Use the Commutative Property to change the order of factors. Then multiply. Show your work.
 (15)

$$\begin{array}{r} 5 \\ \times 24 \\ \hline \end{array}$$

- *30. Multiple Choice** Tika's math class began 18 minutes ago. The class will end in 37 minutes. Which equation can be used to find the length in minutes of Tika's math class?
 (Inv. 1)

A $18 + m = 37$

B $m - 37 = 18$

C $37 - m = 18$

D $18 - m = 37$

Early Finishers

Real-World Connection

Andres decided to add more fish to his aquarium. He bought 3 tetras that cost \$1.89 each and 4 mollies that cost \$2.75 each. Find the total cost of the fish that Andres added to his aquarium. Then show two different ways that the total cost can be found and use both methods to find the total. Compare the answers to see if they are the same.

• Multiplying Three Factors and Missing Factors

Power Up

facts

Power Up C

count aloud

Count up and down by 5s between 1 and 51. Count up and down by 200s between 0 and 2000.

mental math

- a. **Number Sense:** 3×30 plus 3×2
- b. **Number Sense:** 4×20 plus 4×3
- c. **Number Sense:** 5×30 plus 5×4
- d. **Money:** $6 \times \$700$
- e. **Measurement:** One meter is 1000 millimeters. How many millimeters is 1 meter minus 100 millimeters?
- f. **Measurement:** Liliana hit the baseball 320 feet. Then the ball rolled 32 feet until it stopped. How far did the baseball travel?
- g. **Money:** $\$3.75 - \1.25
- h. **Number Sense:** $6 \times 4 + 1 + 10 - 5 + 3$

problem solving

All of the digits 1 through 9 are used in this addition problem. Copy the problem and fill in the missing digits.

$$\begin{array}{r} 3_ \\ + 452 \\ \hline _ _ \end{array}$$

Focus Strategy: Guess and Check

Understand We are shown an addition problem and asked to find the missing digits. We are told that all of the digits 1 through 9 are used in the problem. There are 9 total digits in the problem, so each digit is used only once.

Plan We already know where the digits 2, 3, 4, and 5 appear. This means we must find places for the digits 1, 6, 7, 8, and 9. We can try using the strategy *guess and check*.

Solve We think, “Which two digits could go in the ones column?” Six plus 2 equals 8, so we guess 6 for the top addend and 8 for the sum. Now, we check our guess by trying to place the digits 1, 7, and 9 in the remaining blanks. In the hundreds column, we try placing the digit 7. This leaves us with the digits 1 and 9 for the tens column. However, we cannot place the 1 and 9 and get a valid addition problem ($316 + 452 \neq 798$ and $396 + 452 \neq 718$).

Our initial guess was incorrect, so we try another guess. We again try to find two digits for the ones column. We try placing 7 in the addend and 9 in the sum. Now we must place the digits 1, 6, and 8. The only possibility for the hundreds column is 8. This leaves us with the digits 1 and 6 for the tens column. We think, “6 plus 5 equals 11, which ends with a 1.” So we put 6 on top and 1 in the sum, and we know that by regrouping, the 8 in the hundreds column is correct. So we have $367 + 452 = 819$.

$$\begin{array}{r} 367 \\ + 452 \\ \hline 819 \end{array}$$

Check We find that our answer is reasonable by adding the numbers 367 and 452 to get a total of 819. We made educated guesses for two of the digits to get us started in finding the other missing digits. When we discovered that our initial guess was incorrect, we revised our guess and tried again until we found the correct answer.

New Concept

In this lesson we will learn how to multiply three numbers together. Remember that numbers multiplied together are called *factors*. In the problem below we see three factors.

$$9 \times 8 \times 7$$

To multiply three factors, we first multiply two of the factors together. Then we multiply the product we get by the third factor.

First we multiply 9 by 8 to get 72.

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

Then we multiply 72 by 7 to get 504.

$$\begin{array}{l} \swarrow \searrow \\ 72 \times 7 = 504 \end{array}$$

Since multiplication is commutative, we may multiply numbers in any order. Sometimes changing the order of the factors can make a multiplication problem easier, as we see in example 1.

Example 1

Find the product: $6 \times 3 \times 5$

To find the product of three factors, we first multiply two of the factors. Then we multiply the product we get by the third factor. We may choose to rearrange the factors to make the problem easier. In this problem we choose to multiply 6 and 5 first. Then we multiply the resulting product by 3.

$$6 \times 3 \times 5$$

Given problem

$$6 \times 5 \times 3$$

Commutative Property

$$30 \times 3$$

Multiplied 6×5

$$90$$

Multiplied 30×3

Analyze How did changing the order of the factors make the multiplication easier?

Example 2

Show how to rearrange the factors to more easily find the product: $5 \times 7 \times 12$

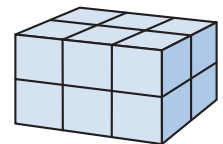
The order in which we choose to multiply can affect the difficulty of the problem. If we multiply 5 by 7 first, we must then multiply 35 by 12. But if we multiply 5 by 12 first, we would multiply 60 by 7 next. The second way is easier and can be done mentally. Using the Commutative Property, we rearrange the factors 7 and 12. Then we multiply 5 and 12 first.

$$\begin{array}{c} 5 \times 12 \times 7 \\ \swarrow \searrow \\ 60 \times 7 = 420 \end{array}$$

Example 3

How many blocks were used to build this shape?

We may count all the blocks, or we may multiply three numbers. We can see that the top layer has 2 rows of 3 blocks. So we know there are 2×3 blocks in each layer. Since there are two layers, we multiply the number in each layer by 2.



$$2 \times 3 \times 2 = 12$$

The shape was built with **12 blocks**.

Now we will practice finding missing factors in multiplication problems. In this type of problem we are given one factor and a product.

Example 4

Find each missing factor:

$$\begin{array}{r} \text{a. } w \\ \times 3 \\ \hline 18 \end{array}$$

$$\text{b. } 3n = 24$$

$$\text{c. } 6 \times 5 = 3 \times y$$

Reading Math

An **expression** is a number, a letter, or a combination of both. $3n$ is an expression that can also be written as $3 \times n$.

Before we start, we must understand what each equation means. In **a**, the equation means “some number times 3 equals 18.” In **b**, $3n$ means “3 times n .” In **c**, if we multiply 6 and 5, we see that the equation means $30 = 3 \times y$. Now we are ready to find the missing factors.

Multiple Methods There are many ways to do this.

Method 1: We could count how many 3s add up to 18, to 24, and to 30.

Method 2: We could use a multiplication table.

In the table below, look across the 3s row to 18, 24, and 30, and then look to the top of each column for the missing factor. We see that the missing factors are 6, 8, and 10.

Method 3: The fastest way to find missing factors is to recall the multiplication facts. Since $3 \times 6 = 18$, $3 \times 8 = 24$, and $3 \times 10 = 30$, we know the missing factors are $w = 6$, $n = 8$, and $y = 10$.

Lesson Practice

For problems **a–d**, copy each problem and then multiply. Show which numbers you chose to multiply first.

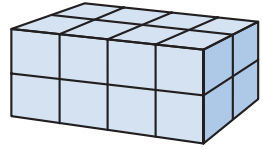
$$\text{a. } 5 \times 7 \times 6$$

$$\text{b. } 10 \times 9 \times 8$$

$$\text{c. } 3 \times 4 \times 25$$

d. Connect There are 12 inches in a foot and 3 feet in a yard. How many inches long is a wall that is 5 yards long? Show how you ordered the factors to multiply.

- e. How many blocks were used to build this figure? Give a multiplication problem that provides the answer.



Find each missing factor:

f. $5m = 30$

g. $3b = 21$

h. $3 \times 4 = n \times 2$

i.
$$\begin{array}{r} p \\ \times 4 \\ \hline 24 \end{array}$$

j.
$$\begin{array}{r} 9 \\ \times q \\ \hline 81 \end{array}$$

k.
$$\begin{array}{r} w \\ \times 9 \\ \hline 0 \end{array}$$

Written Practice

Distributed and Integrated

1. **Represent** Draw a horizontal line and a vertical line. Then write the words *horizontal* and *vertical* to label each line.

Formulate Formulate For problems 2–4, write an equation and find the answer.

- *2. Once Reggie started exercising regularly, his resting heart rate dropped from 86 beats per minute to 68 beats per minute. By how many beats per minute did Reggie's resting heart rate drop?
- *3. In one class there are 33 students. Fourteen of the students are boys. How many girls are in the class?
- *4. In another class there are 17 boys and 14 girls. How many students are in the class?

For problems 5–8, find each product mentally. Then check using pencil and paper.

*5. $6 \times 4 \times 5$

*6. $5 \times 6 \times 12$

*7. $5 \times 10 \times 6$

*8. $9 \times 7 \times 10$

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

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

11. $\begin{array}{r} \$4.86 \\ \times \quad 9 \\ \hline \end{array}$

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

13. $9g = 36$

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

15. $8h = 48$

16. $\begin{array}{r} \$7.68 \\ \times \quad 4 \\ \hline \end{array}$

17. $456 + 78 + f = 904$

18. $34 + 75 + 123 + 9$

19. $\$36.70 - \7.93

20. $h - 354 = 46$

21. What is the eleventh term in this counting sequence?

9, 18, 27, 36, ...

*22.  **Verify** Think of a one-digit odd number and a one-digit even number. Multiply them. Is the product odd or even? Explain how you know.

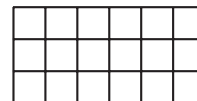
23. Find the missing factor:

$$6 \times 4 = 8 \times n$$

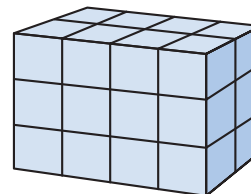
*24. **Represent** Use digits and symbols to write this comparison:
Eight times eight is greater than nine times seven.

25. **Connect** For the fact family 7, 8, and 15, write two addition facts and two subtraction facts.

26. Write a multiplication fact that shows the number of squares in this rectangle.



*27. Write a three-factor multiplication fact that shows the number of blocks in this figure.



- 28.** **Conclude** What are the next three integers in this counting sequence?
(1, 12)

8, 6, 4, 2, ...

- *29.** **Analyze** Taydren and his friend each purchased a bookcase. The friend's bookcase is half the height of Taydren's bookcase. If his friend's bookcase is 3 feet tall, how tall is Taydren's bookcase?
(2)
- *30.** Masoud bought four folders for \$0.37 each. Altogether, how much money did the folders cost?
(13, 17)

Early Finishers

Real-World Connection

A card store needs to order 120 note cards. The cards come packaged in groups of 10. Then packages are placed in boxes and shipped. Show three different ways the 120 cards can be shipped.

___ boxes $\times$ ___ packages $\times$ 10 cards = 120 cards

• Relationship Between Multiplication and Division

Power Up

facts

Power Up C

count aloud

Count up and down by 5s between 2 and 52 (2, 7, 12, 17, ...).

mental math

- a. **Number Sense:** $2 \times 5 \times 6$
- b. **Number Sense:** $6 \times 5 \times 3$
- c. **Number Sense:** 6×30 plus 6×2
- d. **Number Sense:** 4×60 plus 4×5
- e. **Measurement:** $1000 \text{ mm} - 800 \text{ mm}$
- f. **Number Sense:** Claudia scored 640 points while playing a video game. Then she scored 24 more points. How many points total did she score?
- g. **Money:** Jazmyn had \$5.00. She spent \$0.50. How much did Jazmyn have left?
- h. **Number Sense:** $9 \times 9 - 1 + 10 + 10$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. For breakfast, lunch, and dinner, Bethany ate soup and eggs and chicken, one for each meal, but not necessarily in that order. List all the possible arrangements of meals Bethany could have eaten. If Bethany never eats eggs for lunch, how many arrangements of meals are possible?

New Concept

Searching for a missing factor is called **division**. A division problem is like a miniature multiplication table. The product is shown inside a symbol called a *division box* ($\overline{)}$). The two factors are outside the box. One factor is in front, and the other is on top. In the problem below, the factor on top is missing.

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

To solve this problem, we need to know what number times 3 equals 12. Since $3 \times 4 = 12$, we know that the missing factor is 4. We write our answer this way:

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

Example 1

What is the missing number in this problem?

$$\begin{array}{r} ? \\ 4 \overline{)20} \end{array}$$

To find the missing number, we think, “Four times what number equals 20?” We find that the missing number is 5, which we write above the division box:

$$\begin{array}{r} 5 \\ 4 \overline{)20} \end{array}$$

The missing number is **5**.

Example 2

To play a game during physical education class, 18 students must separate into 3 equal teams. What number of students will be on each team?

We need to find the missing number that goes above the box. We think, “Three times what number equals 18?” We remember that $3 \times 6 = 18$, so the answer to the division problem is 6.

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

There will be **6 students** on each team.

Thinking Skills

Connect

Name the factors and the product.

Example 3

An art teacher plans to distribute 80 sheets of construction paper equally to each of 10 students. How many sheets of construction paper should each student receive?

We think, "How many 10s make 80?" Since $8 \times 10 = 80$, the answer is 8.

$$\begin{array}{r} 8 \\ 10 \overline{)80} \end{array}$$

Each student should receive **8 sheets**.

Thinking Skills

Connect

Why can we write a fact family using multiplication and division?

Multiplication and division are inverse operations. One operation undoes the other. If we start with 5 and multiply by 6, we get a product of 30. If we then divide 30 by 6, the result is 5, which is the number we started with. The division by 6 undid the multiplication by 6. Using the Commutative Property and inverse operations, we find that the three numbers that form a multiplication fact also form division facts.

Example 4

Write two multiplication facts and two division facts for the fact family 5, 6, and 30.

$$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$$

$$\begin{array}{r} 5 \\ \times 6 \\ \hline 30 \end{array}$$

$$5 \overline{)30}$$

$$6 \overline{)30}$$

Lesson

Find the missing number in each division fact:

a. $2 \overline{)16}$

b. $4 \overline{)24}$

c. $6 \overline{)30}$

d. $8 \overline{)56}$

e. $3 \overline{)21}$

f. $10 \overline{)30}$

g. $8 \overline{)56}$

h. $9 \overline{)36}$

- i. **Connect** Write two multiplication facts and two division facts for the fact family 3, 8, and 24.

Written Practice

Distributed and Integrated

Formulate For problems 1 and 2, write an equation and find the answer.

- *1. ⁽¹⁶⁾ The \$45 dress was marked down to \$29. By how many dollars had the dress been marked down?

2. Room 15 collected 243 aluminum cans. Room 16 collected 487 cans.
 (11) Room 17 collected 608 cans. How many cans did the three rooms collect in all?

3. There are 5 rows of desks with 6 desks in each row. How many
 (11, 13) desks are there in all? Find the answer once by adding and again by multiplying.

*4. **Represent** Use words to name \$4,587.20.
 (5, 7)

5. **Connect** For the fact family 7, 8, and 56, write two multiplication
 (19) facts and two division facts.

6. $3 \overline{)24}$
 (19)

7. $6 \overline{)18}$
 (19)

8. $4 \overline{)32}$
 (19)

9. $10 \overline{)40}$
 (19)

10. $\begin{array}{r} \$4.83 \\ \times \quad 7 \\ \hline \end{array}$
 (17)

11. $\begin{array}{r} 659 \\ \times \quad 8 \\ \hline \end{array}$
 (17)

12. $\begin{array}{r} \$706 \\ \times \quad 4 \\ \hline \end{array}$
 (17)

13. $9m = 54$
 (18)

14. $8 \times 10 \times 7$
 (18)

15. $9 \times 8 \times 5$
 (18)

16. $\begin{array}{r} \$65.40 \\ - \$19.18 \\ \hline \end{array}$
 (13)

17. $\begin{array}{r} 4000 \\ - \quad t \\ \hline 1357 \end{array}$
 (14)

18. $\begin{array}{r} r \\ - 1915 \\ \hline 269 \end{array}$
 (14)

19. $\begin{array}{r} 907 \\ 415 \\ + 653 \\ \hline \end{array}$
 (6)

20. $\begin{array}{r} \$3.67 \\ \$4.25 \\ + \$7.40 \\ \hline \end{array}$
 (13)

21. $\begin{array}{r} 427 \\ + \quad k \\ \hline 813 \end{array}$
 (10)

22. $356 + l + 67 = 500$
 (10)

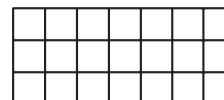
23. $86 + w = 250$
 (10)

24. Find the missing factor: $6 \times 6 = 4n$
 (18)

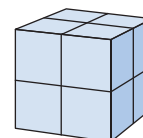
*25. **Represent** Use digits and symbols to write this comparison:
 (4, 15) *Eight times six is less than seven times seven.*

26.  **Explain** Dequon cut a 15-inch-long piece of wood in half. How
 (2) long was each half? Explain your answer.

27. Write a multiplication fact that shows how many squares cover this rectangle.



28. Write a three-factor multiplication fact that shows how many blocks form this figure.



29. **Analyze** The Mississippi River begins in Minnesota. From there it flows 2340 miles to the Gulf of Mexico. The Missouri River is 2315 miles long and begins in Montana. The Colorado River is the longest river in the U.S. west of the Rocky Mountains. It starts in the Rocky Mountains and flows 1450 miles to the Gulf of California. Write the names of the three rivers in order from shortest to longest.

30. Write and solve a subtraction word problem that uses data from this table:

Large Meteor Craters

Location	Diameter (miles)
Sudbury, Canada	125
Vredefort, South Africa	87
Popigai, Russia	62

Early Finishers
Real-World Connection

Four students earned a total of \$136 doing various jobs. They had one hundred dollar bill, 3 ten dollar bills, and 6 one dollar bills. How can the students divide the money equally? Use your money manipulatives to solve the problem.

• Three Ways to Show Division

Power Up

facts

Power Up D

count aloud

Count up and down by 5s between 2 and 52.

mental math

- a. **Number Sense:** 4×32 equals 4×30 plus 4×2 . Find 4×32 .
- b. **Number Sense:** $5 \times 8 \times 3$
- c. **Number Sense:** $4 \times 5 \times 6$
- d. **Number Sense:** 4×23
- e. **Number Sense:** 4×54
- f. **Measurement:** One meter is 1000 mm. How many millimeters is 1 meter minus 990 mm?
- g. **Number Sense:** $7 \times 7 + 1 + 25 + 25$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Copy this addition problem and fill in the missing digits:

$$\begin{array}{r} _3_ \\ + _1_ \\ \hline _3_ \end{array}$$

New Concept

We use different ways to show division. Here are three ways to show “twelve divided by four”:

Math Language

Another name for division written with a division bar is a *fraction*.

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

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

Three numbers are involved in every division problem:

1. the number being divided: $15 \div 3 = 5$
2. the number by which it is divided: $15 \div 3 = 5$
3. the answer to the division: $15 \div 3 = 5$

Math Language

The answer to a division problem is called a *quotient*.

These numbers are called the **dividend**, **divisor**, and **quotient**. In the example above, the dividend is 15, the divisor is 3, and the quotient is 5. The location of these numbers in each form is shown below.

Positions of Divisor, Dividend, and Quotient

Division box	$\begin{array}{r} \text{quotient} \\ \text{divisor} \overline{) \text{dividend}} \end{array}$
Division sign	$\text{dividend} \div \text{divisor} = \text{quotient}$
Division bar	$\frac{\text{dividend}}{\text{divisor}} = \text{quotient}$

Example 1

Use words to show how each division problem is read:

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

For all three division symbols, we say “divided by.” The division in **a** is read from left to right: “twelve divided by six.”

The division in **b** is read from top to bottom: “twelve divided by six.”

The division in **c** is written with a division box. We read the number inside the box first: “twelve divided by six.”

We see that all three problems are read the same. Each problem shows the same division “**twelve divided by six.**”

Example 2

Write this division problem in two other forms:

$$15 \div 3$$

We read this problem as “fifteen divided by three.” Fifteen is the dividend.

To show division with a division bar, we write the dividend on top.

$$\frac{15}{3}$$

To show division with a division box, we write the dividend inside the box.

$$3 \overline{)15}$$

Example 3

Divide: $\frac{15}{5}$

The division bar is a way to show division. This means “five times what number is 15?” The answer is **3**.

Example 4

In the following equation, which number is the divisor, which number is the dividend, and which number is the quotient?

$$\frac{56}{7} = 8$$

The **dividend**, 56, is divided by the **divisor**, 7. The answer is the **quotient**, 8.

Lesson Practice

a. **Represent** Show “10 divided by 2” in three different forms.

b. **Represent** Use three different division forms to show “24 divided by 6.”

Use words to show how each division problem is read.

c. $3 \overline{)21}$

d. $12 \div 6$

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

Rewrite each division problem with a division box.

f. $63 \div 7$

g. $\frac{42}{6}$

h. 30 divided by 6

i. **Connect** Identify the quotient, dividend, and divisor in this equation:

$$63 \div 9 = 7$$

Find the answer (quotient) to each division problem:

j. $\frac{60}{10}$

k. $\frac{42}{7}$

l. $28 \div 4$

m. $36 \div 6$

n. Compare: $24 \div 4$ $\bigcirc$ $24 \div 6$

*1. **Represent** Draw a horizontal number line marked with even integers from -6 to 6 .
(12)

2. **Connect** Write two multiplication facts and two division facts for the fact family 4 , 9 , and 36 .
(19)

3. **Represent** Use tally marks to show the number 16 .
(12)

4. Ayoka reads 40 pages per day. How many pages does Ayoka read in 4 days? Find the answer once by adding and again by multiplying.
(11, 17)

5. There are 806 students at Gidley School. If there are 397 girls, how many boys are there? Write an equation and find the answer.
(11)

*6. **Connect** What is the sum of five hundred twenty-six and six hundred eighty-four?
(5, 6)

Represent Use words to show how problems **7** and **8** are read.

7. $6 \overline{)24}$
(20)

8. $15 \div 3$
(20)

9. Compare: $\frac{15}{3} \bigcirc \frac{15}{5}$
(4, 20)

10. $8m = 24$
(18)

11. $10 \overline{)90}$
(20)

12. $\frac{27}{3}$
(20)

13. $\begin{array}{r} \$23.18 \\ \times \quad 6 \\ \hline \end{array}$
(17)

14. $\begin{array}{r} 4726 \\ \times \quad 8 \\ \hline \end{array}$
(17)

15. $\begin{array}{r} \$34.09 \\ \times \quad 7 \\ \hline \end{array}$
(17)

*16. **Explain** Compare. Why can you answer the comparison without multiplying?
(4, 18)

$$5 \times 6 \times 7 \bigcirc 7 \times 6 \times 5$$

17. Eighty minutes of music can be placed on a compact disc. How many hours of music can be placed on three compact discs?
(17)

18. $\begin{array}{r} \$40.00 \\ - \$24.68 \\ \hline \end{array}$
(13)

19. $\begin{array}{r} 1207 \\ - \quad r \\ \hline 943 \end{array}$
(14)

20. $\begin{array}{r} z \\ - 1358 \\ \hline 4444 \end{array}$
(14)

$$\begin{array}{r} 21. \quad 3426 \\ (6) \quad 1547 \\ + 2684 \\ \hline \end{array}$$

$$\begin{array}{r} 22. \quad 4318 \\ (10) \quad + \quad m \\ \hline 4343 \end{array}$$

$$\begin{array}{r} 23. \quad \$13.06 \\ (13) \quad \$ 4.90 \\ + \$60.75 \\ \hline \end{array}$$

24. **Represent** Use digits and symbols to write this comparison:
 (4) *Ten times two is greater than ten plus two.*

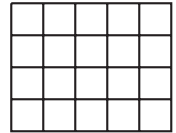
- *25. **Conclude** What are the next three terms in this counting sequence? Explain how you know.
 (1, 12)

24, 18, 12, 6, ...

26. In this equation, which number is the divisor?
 (20)

$$27 \div 3 = 9$$

27. Write a multiplication equation that shows the number of squares in this rectangle.
 (13)



28. Rebeka went to the store with \$35 and came home with \$9. Use this information to write a story problem about separating. Then answer the question in your story problem.
 (16)

29. Arrange these years in order from earliest to latest:
 (4)

1620 The Pilgrims landed at Plymouth Rock.

1789 George Washington became the first U.S. president.

1492 Columbus landed in what we now call the Islands of the Bahamas.

1776 The Declaration of Independence was signed.

30. Snider bought five notebooks for \$3.52 each. What was the total cost of the five notebooks? Change this addition problem to a multiplication problem and find the total.
 (13, 17)

$$\$3.52 + \$3.52 + \$3.52 + \$3.52 + \$3.52$$

Focus on**• Fractions: Halves, Fourths, and Tenths**

A **fraction** describes part of a whole. The “whole” may be a single thing, such as a whole pie or a whole inch, or the “whole” may be a group, such as a whole class of students or a whole bag of marbles.

We use two numbers to write a fraction. The bottom number, the **denominator**, shows the number of *equal parts* in the whole. The top number, the **numerator**, shows how many of the equal parts of the whole are counted.

$$\begin{array}{rcl} \frac{1}{2} & \longleftarrow & \text{Numerator} \\ & \longleftarrow & \text{Denominator} \end{array}$$

We read fractions from top to bottom, as shown below.

$$\frac{1}{2} \quad \text{“one half” (sometimes we just say “half”)}$$

$$\frac{1}{4} \quad \text{“one fourth” or “one quarter”}$$

$$\frac{3}{4} \quad \text{“three fourths” or “three quarters”}$$

$$\frac{1}{10} \quad \text{“one tenth”}$$

Many fraction problems are “equal groups” problems. The denominator of the fraction shows the number of equal groups. We divide the total by the denominator to find the number in each group.

Example 1

Half of the 18 students in the class are girls. How many girls are in the class?

The word *half* means “one of two equal groups.” In this problem, one group is girls and the other is boys. We find the number in each group by dividing the total number of students by 2.

$$18 \div 2 = 9$$

There are 9 students in each group. This means there are **9 girls** in the class.

Example 2

- a. How many cents is one fourth of a dollar?
- b. How many cents is three fourths of a dollar?

The word *fourth* means that the whole dollar (100 cents) is divided into four equal parts.

$$100 \div 4 = 25$$

In each fourth there are 25 cents.

- a. One fourth of a dollar is **twenty-five cents** or **\$0.25**.
- b. Three fourths of a dollar is **seventy-five cents** or **\$0.75**.

Analyze The coin we call a quarter has a value of \$0.25. How many quarters are in a half-dollar? In one dollar?

Example 3

One tenth of the 30 students finished the test early. How many students finished the test early?

One tenth means “one of ten equal parts.” We can find one tenth of 30 by dividing 30 by 10.

$$30 \div 10 = 3$$

One tenth of 30 is 3, so **3 students** finished the test early.

Use the information below to answer problems 1–4.

There were 20 pumpkins in the garden. One fourth of the pumpkins were too small, one tenth were too large, and one half were just the right size. The rest of the pumpkins were not yet ripe.

1. How many of the pumpkins were too small?
2. How many of the pumpkins were too large?
3. How many of the pumpkins were just the right size?
4. How many of the pumpkins were not yet ripe?

Use the information below to answer problems 5 and 6.

During the hike, Sanjiv found that he could carry a pack $\frac{1}{4}$ his weight for half a mile without resting. He could carry a pack $\frac{1}{10}$ his weight for two miles without resting. Sanjiv weighs 80 pounds.

5. How heavy a pack could Sanjiv carry for half a mile without resting?
6. How heavy a pack could Sanjiv carry for 2 miles without resting?

Activity

Using Fraction Manipulatives

Materials needed:

- fraction manipulatives from **Lesson Activities 24, 25, and 26**
- scissors
- envelope or zip-top bag to store fraction pieces

Preparation:

To make your own fraction manipulatives, cut out the fraction circles on the **Lesson Activities 24, 25, and 26**. Then cut each fraction circle into its parts.

Model Use your fraction manipulatives to solve each problem below.

7. Show that two quarters equals one half.
8. Two quarters of a circle is what decimal part of a whole circle?
9. How many tenths equal a whole circle?
10. Is one tenth plus two tenths more or less than one half?
11. One tenth of a circle plus two tenths of a circle is what decimal part of a whole circle?
12. One half of a circle plus four tenths of a circle is what decimal part of a whole circle?

Two half circles can be put together to form a whole circle. The equations below both state that two halves equal a whole.

$$\frac{1}{2} + \frac{1}{2} = 1 \qquad \frac{2}{2} = 1$$

The fractions in the first equation have like denominators.

Model Use your fraction manipulatives to solve problems **13–20**.

13. Find other ways to form a whole circle using fractions with *like* denominators. Write an equation for each way you find.

14.  **Analyze** Is the sum of the fractions below more or less than 1? Explain how you know.

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{10}$$

Compare:

15. $\frac{1}{10} + \frac{1}{10} \bigcirc \frac{1}{2}$

16. $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} \bigcirc \frac{1}{4}$

17. $\frac{1}{4} \bigcirc 0.25$

18. $\frac{7}{10} \bigcirc 0.75$

19. $\frac{1}{4} + \frac{1}{4} \bigcirc \frac{1}{2}$

20. $\frac{6}{10} \bigcirc 0.5$

One half circle and two quarter circles can also be put together to form a whole circle.

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{4} = 1 \qquad \frac{1}{2} + \frac{2}{4} = 1$$

The fractions in both equations have unlike denominators.

21. Use your fraction manipulatives to find other ways to form a whole circle using fractions with *unlike* denominators. Write an equation for each way you find.
22. One fourth of a circle plus one tenth of a circle is what decimal part of a whole circle? Explain how you found your answer.
23. Two fourths of a circle plus two tenths of a circle is what decimal part of a whole circle?
24. What decimal part of a circle is one half plus one fourth plus one tenth?
25. Which fraction manipulative piece covers one half of a half circle?

Compare:

26. $\frac{3}{4} \bigcirc 0.75$

27. $\frac{3}{10} \bigcirc 0.25$

28. $0.50 \bigcirc \frac{1}{4} + \frac{1}{4}$

29. $0.30 \bigcirc \frac{1}{4} + \frac{1}{10}$

30. $\frac{1}{2} + \frac{1}{4} + \frac{1}{10} \bigcirc 0.90$

31. $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} \bigcirc 1$