



3

Rick Hansen wheeled his chair across more miles than anyone else. What is the Greatest Common Factor of the number of continents and countries that Rick traveled through? You will find out in Lesson 9-4.

4

As of 2006, the Kingda Ka is the fastest roller coaster in the world. How can you find the prime factorization of its top speed? You will find out in Lesson 9-3.



## Review What You Know!

### Vocabulary

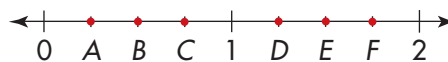
Choose the best term from the box.

- equivalent
- product
- factor
- quotient

- Two fractions which have the same value are ?.
- In the equation  $6 \times 3 = 18$ , the number 3 is a ? and 18 is the ?.
- In the equation  $56 \div 8 = 7$ , the number 7 is the ?.

### Fractions and the Number Line

Find the point on the number line that represents each fraction.



- |                   |                   |                  |
|-------------------|-------------------|------------------|
| 4. $\frac{1}{4}$  | 5. $1\frac{1}{2}$ | 6. $\frac{1}{2}$ |
| 7. $1\frac{3}{4}$ | 8. $1\frac{1}{4}$ | 9. $\frac{3}{4}$ |

### Arrays

**Writing to Explain** Write an answer for the question.

- Draw an array to show 3 rows of 8 objects. Then circle groups of 4. How many groups of 4 are in the array? What division equation is shown?



**NS 4.1 Grade 4**  
Understand that many whole numbers break down in different ways.

## Understanding Factors

How can you find all the factors of a number?

Three possible arrays of 12 buttons are shown. The arrays can help find all the factors of 12. The factors of 12 are 1, 2, 3, 4, 6, and 12.



### Another Example How can you use divisibility rules to find factors?

A **factor pair** is a pair of whole numbers whose product equals a given whole number. A factor pair for 12 is 3 and 4.

Find all the factor pairs of 32. Then list all the factors of 32.

Try	Is It a Factor?	Factor Pair
1	Yes, 1 is a factor of every whole number.	1 and 32
2	Yes, because 32 is even.	2 and 16
3	No. Since $3 + 2 = 5$ , it is not divisible by 3.	
4	Yes; 32 is divisible by 4.	4 and 8
5	No, because 32 does not end in 0 or 5.	
6	No, because 32 is not divisible by both 2 and 3.	
7	No.	
8	Yes; 32 is divisible by 8.	4 and 8

Numbers greater than 8 do not need to be tested because after 8 the factor pairs repeat. The factors of 32 are 1, 2, 4, 8, 16, and 32.

### Explain It

- Why is it helpful to know the divisibility rules?
- If 15 and 14 are factors of a number, what other numbers will be factors of the same number? Explain.

Arrays can help you find all the factors of a number. However, an easier way is to use divisibility rules.

A whole number is **divisible** by another whole number when the quotient is a whole number and the remainder is 0.

## Divisibility Rules

### A number is divisible by

- 2** → If the number is even.
- 3** → If the sum of the digits of the number is divisible by 3.
- 4** → If the last two digits are divisible by 4.
- 5** → If the last digit is 0 or 5.
- 6** → If the number is divisible by BOTH 2 and 3.
- 9** → If the sum of the digits is divisible by 9.
- 10** → If the last digit is 0.

## Guided Practice\*

### Do you know **HOW?**

In **1** through **4**, list all the factors of each number.

- 1. 25
- 2. 42
- 3. 36
- 4. 18

### Do you **UNDERSTAND?**

- 5. What factor pair does every number have?
- 6. List the possible arrays you can arrange 18 buttons in.

## Independent Practice

In **7** through **12**, name two different factor pairs of the given number.

- 7. 30
- 8. 32
- 9. 36
- 10. 40
- 11. 42
- 12. 39

In **13** through **24**, list all the factors of each number.

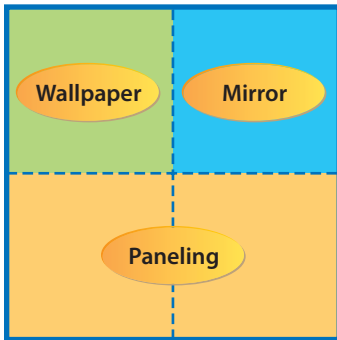
- 13. 45
- 14. 48
- 15. 50
- 16. 54
- 17. 60
- 18. 70
- 19. 84
- 20. 98
- 21. 108
- 22. 114
- 23. 8
- 24. 55



## Problem Solving

25. A restaurant wall was divided into 4 equal parts as shown. What fraction of the wall is the

- a mirror?
- b paneling?



27. The list shows all the factors for which number?

4, 8, 14, 7, 2, 1, 56, 28

- A 9
- B 28
- C 56
- D 14

29. Which number is NOT a factor of 36?

- A 1
- B 18
- C 20
- D 36

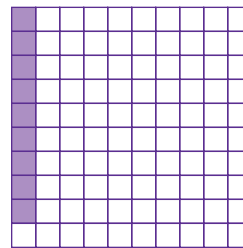
31. **Think About the Process** The town meeting hall was set up in 18 rows with 15 chairs in each row. There were also 10 chairs at the speakers' table. Which expression shows how many chairs were in the meeting hall?

- A  $(18 + 15) + 10$
- B  $(15 \times 10) + 18$
- C  $(18 \times 15) + 10$
- D  $(10 \times 15) \times 18$

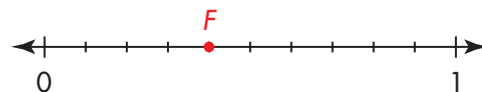
26. A museum has 80 African baskets. Which list shows all the different possible arrangements so that all the rows have the same number? Assume that an arrangement such as  $4 \times 20$  is the same as  $20 \times 4$ .

- A  $1 \times 80; 4 \times 20; 8 \times 10$
- B  $1 \times 80; 2 \times 40; 4 \times 20; 5 \times 16; 8 \times 10$
- C  $2 \times 40; 5 \times 16; 8 \times 10$
- D  $2 \times 40; 4 \times 20; 5 \times 16; 8 \times 10$

28. Name a fraction and a decimal for the shaded part of the figure below.



30. Name the fraction and decimal at  $F$ .



32. List the factors of 24. Then list the factors of 16. What factors do they share in common? Which of those common factors is the greatest number?



# Algebra Connections

## Properties and Equations

Number properties help you solve equations. Examples of each property are shown.

### Commutative Properties

Addition  $3 + 7 = 7 + 3$

Multiplication  $7 \times 9 = 9 \times 7$

### Associative Properties

Addition  $3 + (7 + 5) = (3 + 7) + 5$

Multiplication  $2 \times (4 \times 3) = (2 \times 4) \times 3$

### Identity Properties

Addition  $10 + 0 = 10$

Multiplication  $13 \times 1 = 13$

### Zero Property of Multiplication

$9 \times 0 = 0$

### Distributive Property

$3 \times (10 + 4) = (3 \times 10) + (3 \times 4)$

### Example:

Solve the following equation.

$$8 \times (10 + 2) = (8 \times 10) + (y \times 2)$$



The Distributive Property means that  $8 \times (10 + 2) = (8 \times 10) + (8 \times 2)$

So,  $y = 8$

Solve each equation.

1.  $z + 37 = 37 + 4$

2.  $38y = 38$

3.  $8 + (3 + 9) = (8 + 3) + x$

4.  $8y = 0$

5.  $21 + z = 21$

6.  $17 \times 25 = 25 \times t$

7.  $10 \times (3 \times 9) = (10 \times 3) \times z$

8.  $16 + (y + 4) = (16 + 3) + 4$

9.  $8 \times (10 + 3) = (8 \times 10) + (8 \times y)$

10.  $346y = 346$

11. One display in a store has 12 rows of 4 photos. Another display has same number of photos arranged in 4 rows. How many photos are in each row of the second display?

12. **Write a Problem** Write a real-world problem that can be solved by writing and solving the equation  $3 + 10 = x + 3$ .



Remember that  $3 \times m$  can be written as  $3m$ .



**NS 4.2 Grade 4** Know that numbers such as 2, 3, 5, 7, and 11 do not have any factors except 1 and themselves and that such numbers are called prime numbers.

## Prime and Composite Numbers

What are prime and composite numbers?

Every whole number greater than 1 is either a prime number or a composite number. A **prime number** has exactly two factors, 1 and itself. A **composite number** has more than two factors.



$$1 \times 3 = 3$$



$$1 \times 8 = 8$$



$$2 \times 4 = 8$$

### Another Example What is another way to find out if a number is prime or composite?

Eratosthenes was born in Cyrene (now Libya) about 230 B.C. He developed a method for deciding if a number is prime. It is called the Sieve of Eratosthenes because it “strains out” prime numbers from other numbers.

Use a number chart to find all the prime numbers between 1 and 60.

Cross out 1. It is neither prime nor composite.

Circle 2, the least prime number.

Cross out every second number after 2.

Circle 3, the next prime number.

Cross out every third number after 3 (even if it has already been crossed out).

Circle 5, and repeat the process.

Circle 7, and repeat the process.

Continue the process for 11, 13, and so on.

The numbers left are prime.

<del>1</del>	2	3	<del>4</del>	5	<del>6</del>	7	<del>8</del>	<del>9</del>	<del>10</del>
11	<del>12</del>	13	<del>14</del>	<del>15</del>	<del>16</del>	17	<del>18</del>	19	<del>20</del>
<del>21</del>	<del>22</del>	23	<del>24</del>	<del>25</del>	<del>26</del>	<del>27</del>	<del>28</del>	29	<del>30</del>
31	<del>32</del>	<del>33</del>	<del>34</del>	<del>35</del>	<del>36</del>	37	<del>38</del>	<del>39</del>	<del>40</del>
41	<del>42</del>	43	<del>44</del>	<del>45</del>	<del>46</del>	47	<del>48</del>	<del>49</del>	<del>50</del>
<del>51</del>	<del>52</del>	53	<del>54</del>	<del>55</del>	<del>56</del>	<del>57</del>	<del>58</del>	59	<del>60</del>

### Explain It

1. What are the first 10 prime numbers? How do you know?
2. Why is 1 not a prime number?

### Prime or Composite?

Is 27 a prime number or a composite number?

You can use divisibility rules to help you decide.

Since 27 is an odd number it is not divisible by 2.

Since the sum of the digits is  $2 + 7 = 9$ , then 27 is divisible by 3. So, 27 also has factors of 3 and 9.

So, 27 is composite.

Is 11 prime or composite?

Since 11 is an odd number, it is NOT divisible by 2.

It is also NOT divisible by 3, 4, 5, 6, 7, 8, 9, or 10.

So, 11 is prime.

## Guided Practice\*

### Do you know HOW?

For 1 through 4, use divisibility rules to help you decide whether the number is prime or composite.

1. 71

2. 63

3. 86

4. 97

### Do you UNDERSTAND?

- Is every even number greater than 2 a composite number? Explain.
- Which of the first ten prime numbers are even numbers?

## Independent Practice

For 7 through 14, use divisibility rules to help you decide whether the number is prime or composite.

7. 106

8. 93

9. 87

10. 103

11. 83

12. 77

13. 89

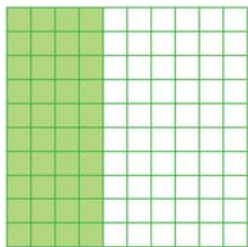
14. 287

For 15 through 17, list all of the factors for each number. Then tell if the number is prime or composite. Circle the factors that are prime.

	Number	Factors	Prime or Composite
15.	24		
16.	43		
17.	65		

\*For another example, see Set B on page 210.

18. Name two decimals shown by the model below.



21. Twin primes are two prime numbers with a difference of 2. The prime numbers 5 and 3 are twin primes because  $5 - 3 = 2$ . Which of the following pairs of numbers are NOT twin primes?
- A 41 and 43  
 B 59 and 61  
 C 71 and 73  
 D 109 and 111
23. **Algebra** If  $n$  is a prime factor of both 15 and 50, what is the value of  $n$ ?
24. The world's largest pencil is 65 feet tall. Is 65 a prime number or a composite number?
26. **Writing to Explain** Roadrunners live year-round in some parts of California and can get to a top speed of 15 miles per hour. Explain how you know that 15 is a composite number.
28. Jonah said that 143 is prime because it is not divisible by any numbers from 2 through 10. Is he right? Explain.
19. Which number has the digit 6 in the ten-thousands place?
- A 6,147,218      C 1,562,803  
 B 642,180      D 16,095
20. An emperor penguin can grow to be about 45 inches tall. A king penguin can grow to be about 3 feet tall. Which penguin grows to be taller? About how much taller?
22. **Think About the Process** Every Sunday Jay walks 6 blocks one way to his grandmother's house for lunch. After lunch, he walks 2 blocks farther to the park. He then walks home on the same exact route. Which shows how to find the number of blocks Jay walks in 4 weeks?
- A  $(6 + 2) \times (4 + 6)$   
 B  $6 \times (2 \times 4)$   
 C  $6 \times 2 \times 2$   
 D  $(6 + 2) \times 2 \times 4$
25. **Reasonableness** Shirley multiplied  $379 \times 8$  and got 3,032. Use estimation to check the reasonableness of her answer.
27. Which pair of compatible numbers would be best to estimate the sum of 249 and 752?
- A 200 and 700      C 300 and 800  
 B 250 and 750      D 400 and 700
29. Which of the following is a composite number?
- A 13      C 91  
 B 37      D 101





Find the sum. Estimate to check if the answer is reasonable.

1. 
$$\begin{array}{r} 1,247 \\ + 997 \\ \hline \end{array}$$

2. 
$$\begin{array}{r} 9,012 \\ + 3,993 \\ \hline \end{array}$$

3. 
$$\begin{array}{r} 55,391 \\ + 73,428 \\ \hline \end{array}$$

4. 
$$\begin{array}{r} 19,601 \\ + 993 \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 14,823 \\ + 16,762 \\ \hline \end{array}$$

6. 
$$\begin{array}{r} 36,228 \\ + 44,634 \\ \hline \end{array}$$

7. 
$$\begin{array}{r} 88,692 \\ + 608 \\ \hline \end{array}$$

8. 
$$\begin{array}{r} 19,832 \\ + 16,588 \\ \hline \end{array}$$

Find the product. Estimate to check if the answer is reasonable.

9. 
$$\begin{array}{r} 6,078 \\ \times 91 \\ \hline \end{array}$$

10. 
$$\begin{array}{r} 516 \\ \times 545 \\ \hline \end{array}$$

11. 
$$\begin{array}{r} 7,938 \\ \times 68 \\ \hline \end{array}$$

12. 
$$\begin{array}{r} 515 \\ \times 5 \\ \hline \end{array}$$

13. 
$$\begin{array}{r} 123 \\ \times 123 \\ \hline \end{array}$$

14. 
$$\begin{array}{r} 5,004 \\ \times 28 \\ \hline \end{array}$$

15. 
$$\begin{array}{r} 3,333 \\ \times 44 \\ \hline \end{array}$$

16. 
$$\begin{array}{r} 8,332 \\ \times 8 \\ \hline \end{array}$$

17. 
$$\begin{array}{r} 605 \\ \times 706 \\ \hline \end{array}$$

18. 
$$\begin{array}{r} 422 \\ \times 381 \\ \hline \end{array}$$

**Error Search** Find each answer that is not correct. Write it correctly and explain the error.

19. 
$$\begin{array}{r} 4,000 \\ - 2,745 \\ \hline 2,255 \end{array}$$

20. 
$$\begin{array}{r} 13.05 \\ \times 5 \\ \hline 65.05 \end{array}$$

21. 
$$\begin{array}{r} 8,605 \\ + 2,503 \\ \hline 6,102 \end{array}$$

22. 
$$\begin{array}{r} 4.55 \\ 2 \overline{)9.1} \end{array}$$

23. 
$$\begin{array}{r} 513 \text{ R}34 \\ 36 \overline{)18,502} \end{array}$$

## Number Sense

**Estimating and Reasoning** Write whether each statement is true or false. Explain your reasoning.

24. The expression  $12 \div 3 + 8 \div 2$  equals 6.
25. The product of 4.8 and 3 is between 12 and 15.
26. The sum of 4,863 and 3,990 is 10 less than 8,863.
27. The quotient of  $6,598 \div 9$  is greater than 700.
28. The expression  $20 - 8m$  equals 24 when  $m = 2$ .
29. The sum of 74,132 and 26,873 is greater than 90,000.

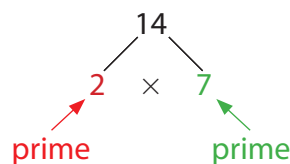


**NS.1.4** Determine the prime factors of all numbers through 50 and write the numbers as the product of their prime factors by using exponents to show multiples of a factor. (e.g.,  $24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3$ ).

## Finding Prime Factors

How can you write a number as a product of prime factors?

Every composite number can be written as a product of prime numbers. This product is the **prime factorization** of the number.



A **factor tree** is a diagram that shows the prime factorization of a composite number.

### Guided Practice\*

#### Do you know HOW?

In 1 through 4, use exponents to write each product.

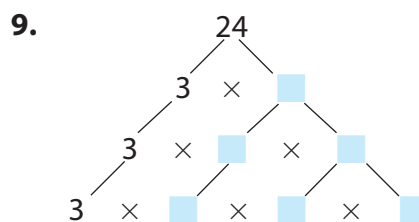
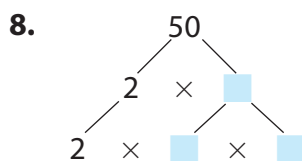
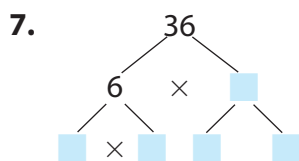
- $3 \times 3$
- $5 \times 5 \times 5$
- $2 \times 3 \times 5 \times 7 \times 7$
- $2 \times 3 \times 3$

#### Do you UNDERSTAND?

- Which property of multiplication tells you that  $2 \times 3 \times 2 = 2 \times 2 \times 3$ ?
- In the example above, if you selected 6 and 8 for the first factors, would the prime factors in the last row be different?

### Independent Practice

In 7 through 9, complete each factor tree.

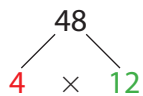


In 10 through 21, find the prime factorization of each composite number, using exponents when possible. If the number is prime, write prime.

- |        |        |        |         |
|--------|--------|--------|---------|
| 10. 20 | 11. 14 | 12. 22 | 13. 26  |
| 14. 30 | 15. 54 | 16. 48 | 17. 37  |
| 18. 93 | 19. 84 | 20. 75 | 21. 304 |

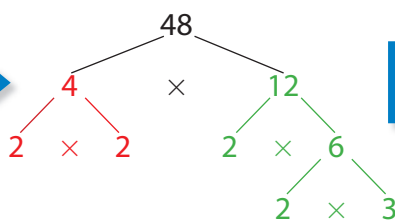


Use a factor tree to write 48 as the product of two factors.



4 and 12 are not prime.

Any factor which is not a prime is broken down further.




The process continues until each "branch" ends at a prime number.

So,  $48 = 2 \times 2 \times 2 \times 2 \times 3$ .

Using exponents, you can write  $2 \times 2 \times 2 \times 2$  as  $2^4$ .

So,  $48 = 2^4 \times 3$ .

### Problem Solving

- 22. Reasoning** What is the smallest whole number that has 2 different prime factors?
- 23.** How do you know immediately that 2,056 is not a prime number?
- 24. Writing to Explain** How do you know when a factor tree is finished?
- 25.** Evaluate  $11.4n$  when  $n = 5$ ,  $n = 6.5$ , and  $n = 10$ .
- 26. Geometry** How many edges does the cube have?
- 
- 27.** Tanya is packing her collection of snow globes in a crate with sections. The case is 2 sections high, 4 sections long, and 2 sections wide. How many globes can fit in the crate?
- 28.** As of 2006, the Kingda Ka is the fastest and tallest roller coaster in the world. Its maximum height is 456 feet, and its top speed is 128 miles per hour. What is the prime factorization of 128?
- A**  $2^2 \times 4^4$       **C**  $2^7$   
**B**  $2^6$       **D**  $2 \times 2 \times 4 \times 8$
- 29.** Marcia's birthday is in December on a day that is a prime number. Which date could it be?
- A** December 4      **C** December 27  
**B** December 20      **D** December 31
- 30.** From a catalog, Stephen ordered 3 pounds of oranges at \$3.25 per pound, and 4 pounds of pears at \$3.50 per pound. He had to pay \$6.25 for shipping. What was his total cost?
- 31.** There are 63 couples lined up for an egg-tossing contest. Each couple will get one egg. There are 12 eggs in a dozen, and eggs come in one dozen cartons. How many cartons of eggs are needed for the contest?



**NS 2.4 Grade 6** Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction).

# Common Factors and Greatest Common Factor

How can you find the greatest common factor?

A pet store has goldfish and angelfish that have to be put into the fewest number of glass containers. Each container must contain the same number of fish, and each must contain all goldfish or all angelfish.



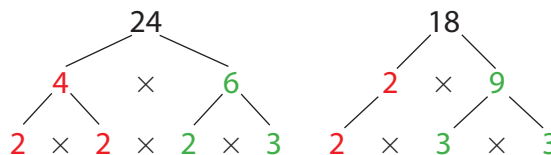
**Another Example** How can you use prime factorization to find the GCF of two numbers?

**Step 1** Find the prime factors of each number.

**Step 2** List the prime factors of each number.

$$24 = 2 \times 2 \times 2 \times 3$$

$$18 = 2 \times 3 \times 3$$



**Step 3** Circle the prime factors that both numbers share. Here they share the numbers 2 and 3.

$$24 = 2 \times 2 \times 2 \times 3$$

$$18 = 2 \times 3 \times 3$$

**Step 4** Multiply the common factors.  $2 \times 3 = 6$

So, the GCF of 18 and 24 is 6.

## Guided Practice\*

### Do you know HOW?

For 1 through 4, find the GCF of each pair of numbers.

1. 9 and 12

2. 20 and 45

3. 7 and 28

4. 18 and 32

### Do you UNDERSTAND?

5. If two numbers are prime, what is their GCF?

6. **Writing to Explain** In the example above, how would the GCF change if there were 40 goldfish?



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## One Way

Find the Greatest Common Factor (GCF) of 20 and 30 to find the greatest number of fish that could be put into each container.

If a number is a factor of two numbers, it is called a **common factor**.

**The greatest common factor (GCF)** of two numbers is the greatest number that is a factor of both numbers.

To find the greatest common factor of 20 and 30, you can list all the factors of each number and circle all the common factors.

20: 1, 2, 4, 5, 10, 20

30: 1, 2, 3, 5, 6, 10, 15, 30

The GCF of 20 and 30 is 10.

So, the store can put 10 fish in each container.

## Independent Practice

In **7** through **18**, find the greatest common factor (GCF) of each number using prime factorization or a list of factors.

**7.** 20 and 35

**8.** 16 and 18

**9.** 15 and 6

**10.** 24 and 36

**11.** 48 and 30

**12.** 22 and 77

**13.** 100 and 96

**14.** 60 and 32

**15.** 90 and 81

**16.** 72 and 27

**17.** 11 and 15

**18.** 14 and 21

## Problem Solving

**19.** Henry wrote an example of the Associative Property as  $31 - (9 - 2) = (31 - 9) - 2$ . What is Henry's mistake?

**20.** The GCF of an odd number and an even number is 19. The greater number is 57. What is the other number?

**21.** Rick Hansen holds the record for the longest journey by wheelchair. He wheeled his wheelchair across 4 continents and 34 countries. What is the GCF of 4 and 34?

**22.** Which list shows all the common factors of 36 and 54?

**A** 1

**C** 4

**A** 1, 2, 3, 6

**B** 1, 2, 3, 6, 9

**C** 1, 2, 3, 6, 9, 18

**D** 1, 2, 3, 6, 9, 12, 18

**B** 2

**D** 17

**23.** If you buy a television for \$486, including tax, and are allowed to pay for it in 6 equal payments, how much will each payment be?

**24.** How many pairs of factors does 40 have? List them.



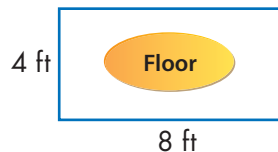


**MR 1.1** Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns. Also **MR 2.6, 3.1, MG 1.0**

### Problem Solving

## Try, Check, and Revise

Which of these square tiles can be used to completely cover the area of this floor without cutting tiles, or combining tiles of different sizes?



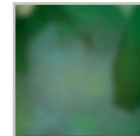
2 ft



3 ft



4 ft



5 ft

### Guided Practice\*

#### Do you know HOW?

- Which of these tiles can be used to cover a  $10\text{ ft} \times 10\text{ ft}$  floor:  $2 \times 2\text{ ft}$ ,  $3 \times 3\text{ ft}$ ,  $4 \times 4\text{ ft}$  or  $5 \times 5\text{ ft}$  tile?
- What size rectangular tile floor can be completely covered by using only  $2 \times 2\text{ ft}$  tiles OR  $3 \times 3\text{ ft}$  tiles? Remember, you can't cut tiles or combine the two tile sizes.

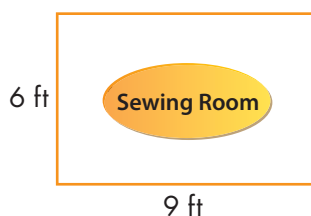
#### Do you UNDERSTAND?

- How do you use Try, Check, and Revise to help you find the solution to a problem?
- Write a Problem** Write a real-world problem that involves common factors and can be solved using the Try, Check, and Revise strategy.

### Independent Practice

For 5 through 9, use try, check, and revise to solve.

- Bert is planning to tile a floor that measures  $9\text{ ft} \times 11\text{ ft}$ . What size square tile can he use to completely cover it?
- Mrs. Gonzales wants to tile her floor with a pattern that repeats every 3 feet. Can she cover the floor without cutting off part of the pattern? Explain.

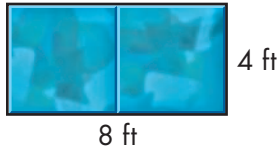


#### Stuck? Try this....

- What do I know?
- What am I asked to find?
- What diagram can I use to help understand the problem?
- Can I use addition, subtraction, multiplication, or division?
- Is all of my work correct?
- Did I answer the right question?
- Is my answer reasonable?

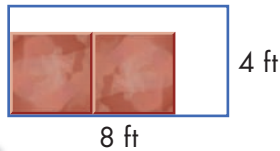
**Use reasoning to make good tries. Then check.**

One side of the floor is 4 feet so I think the  $4 \times 4$  ft tile is the only one that works.



It works!

Next I'll try the  $3 \times 3$  ft tile.



3 does not work for the 4 ft width and 8 ft length because 3 is not a factor of 4 or 8.

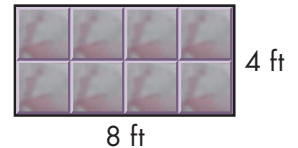
**Revise what you know.**

4 works for the 4 ft width.

4 works for the 8 ft length.

5 is not a factor of 4 or 8, so the  $5 \times 5$  ft tile won't work.

2 is a factor of 4 and 8, so the  $2 \times 2$  ft tile will work too.



7. You buy a baseball and a bat and spend \$31. The bat costs \$19 more than the baseball. What is the price of the baseball? What is the price of the bat?

8. The difference between the prices of two bikes is \$22. The sum of the prices is \$328. How much does each bike cost?

For 9, use the picture at the right.

9. Kyle's mother spent \$115 on shirts and pairs of socks for him. If she bought at least 3 shirts, how many pairs of socks and how many shirts did she buy?



For 10, draw a picture, write an equation, and solve.

10. Each of the 13 members of a basketball team bought a team emblem. The emblems cost the team \$78. How much did it cost each member of the team for an emblem?
11. A group of 168 students are going to a ball game. They will travel on buses that hold 36 students. How many buses could be completely filled? How many buses will be needed? How many seats are left on the bus that is not filled?
12. It costs \$2 for each person to ride the bus in the city. A transfer costs \$0.50. If 10 people get on the bus, and 5 of those people want a transfer, what is the total amount the bus driver collects?
13. A farmer has 9 cows, 10 pigs, and 25 sheep on his farm. Special food for all the animals costs \$3 a pound. If the farmer needs to buy 100 pounds of food for each animal, what will his total cost be?

1. A leap year occurs during years that are divisible by 4. Which of the following will help determine if the year 2078 will be a leap year? (9-1)
- A** Because 8 is divisible by 4, 2078 is divisible by 4.
- B** Because 2078 is even, it is divisible by 4.
- C** Because  $2 + 7 + 8 = 17$  and 17 is not divisible by 4, 2078 is not divisible by 4.
- D** Because 78 is not divisible by 4, 2078 is not divisible by 4.
2. Which of the following lists all the common factors of 45 and 60? (9-4)
- A** 1, 3, 5
- B** 1, 3, 5, 15
- C** 1, 2, 3, 5
- D** 1, 15
3. What is the prime factorization of 84? (9-3)
- A**  $2^2 \times 3 \times 7$
- B**  $3 \times 4 \times 7$
- C**  $2^2 \times 21$
- D**  $2^3 \times 7$
4. In 1999, there were 64 teams chosen to play in the NCAA basketball tournament. Which list includes all the factors of 64? (9-1)
- A** 1 and 64
- B** 1, 2, 32, and 64
- C** 1, 2, 4, 8, 16, 32, and 64
- D** 1, 2, 3, 4, 8, 16, 32, and 64
5. Mr. Santorico likes to have a composite number of students enrolled in his class so that he can divide them into groups. Which of the following numbers is composite? (9-2)
- A** 17
- B** 19
- C** 21
- D** 23
6. The I-95 interstate highway crosses 16 states, the most of any interstate. What is the prime factorization of 16? (9-3)
- A**  $8 \times 8 = 8^2$
- B**  $4 \times 4 = 4^2$
- C**  $2 \times 2 \times 2 = 2^3$
- D**  $2 \times 2 \times 2 \times 2 = 2^4$
7. The table shows the scores of several games played by a football team. During one game, the home team scored only field goals, which are 3 points each. For which game does the score shown make that possible? (9-1)

Game	Home	Visitor
1	13	6
2	16	10
3	20	22
4	21	7

- A** Game 1
- B** Game 2
- C** Game 3
- D** Game 4

8. Casey has \$56 to spend on juice and crackers for a party. Juice costs \$2 per bottle, and crackers cost \$3 per box. If Casey would like to buy 2 more boxes of crackers than bottles of juice, how many of each should Casey buy to spend exactly \$56? (9-5)
- A 12 bottles of juice and 10 boxes of crackers  
 B 8 bottles of juice and 10 boxes of crackers  
 C 10 bottles of juice and 12 boxes of crackers  
 D 7 bottles of juice and 14 boxes of crackers
9. What is the missing exponent in the equation showing the prime factorization of 50? (9-3)
- $$50 = 5^{\square} \times 2$$
- A 2  
 B 3  
 C 5  
 D 10
10. There are 32 boys and 28 girls in the fifth grade. If they are to be divided into groups of equal size with each group having only boys or only girls, what is the largest number that can be in each group? (9-4)
- A 16  
 B 14  
 C 4  
 D 2
11. Which number of apple pieces can not be divided equally except by giving one piece to each person? (9-2)
- A 14  
 B 19  
 C 27  
 D 39
12. What is the prime factorization of 90? (9-3)
- A  $2 \times 3^2 \times 5$   
 B  $2^2 \times 3 \times 5$   
 C  $2 \times 3 \times 5^2$   
 D  $4 \times 3 \times 5$
13. Which number is prime? (9-2)
- A 21  
 B 14  
 C 12  
 D 11
14. The table shows the number of items received by a charity for back to school packets. If each packet contains only one type of item with the same number of items in each packet, what is the greatest number of items that can be in each packet? (9-4)

Data

Item	Number
Notebook	30
Markers	36

- A 15  
 B 6  
 C 3  
 D 2

## Set A, pages 194–196

Determine the factor pairs for 12.

Factors are numbers you multiply to give a particular product. Two factors form a factor pair.

$$1 \times 12 = 12, 2 \times 6 = 12, 3 \times 4 = 12$$

1 and 12, 2 and 6, and 3 and 4 form factor pairs.

Each of these factor pairs gives the product 12.

**Remember** to use divisibility rules to help you find factors of a number.

Determine the factor pairs for each number.

- |       |       |
|-------|-------|
| 1. 15 | 2. 20 |
| 3. 24 | 4. 36 |
| 5. 70 | 6. 80 |

## Set B, pages 198–200

Is 6 a prime or composite number?

A prime number is a whole number with no other factors besides 1 and itself. A composite number is a number that is not prime; it has factors other than 1 and itself.

**Factors of 6:** 1 and 6, and 2 and 3

6 is a composite number.

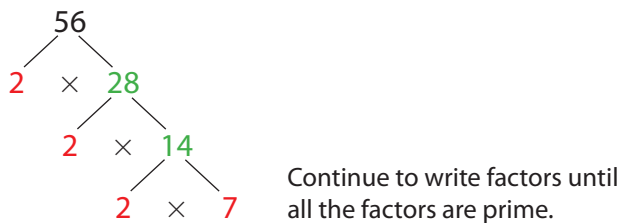
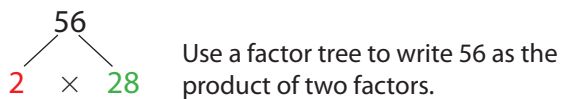
**Remember** that a prime number is a whole number greater than 1 that has exactly two factors, 1 and itself.

Classify each as prime or composite.

- |       |       |
|-------|-------|
| 1. 11 | 2. 15 |
| 3. 18 | 4. 19 |
| 5. 27 | 6. 33 |

## Set C, pages 202–203

Find the prime factorization of 56.



So,  $56 = 2 \times 2 \times 2 \times 7$ . Using exponents, you can write 56 as  $2^3 \times 7$ .

**Remember** that you can use exponents when you write the prime factorization of a number.

Find the prime factorization of each number. If the number is prime, write prime.

- |        |       |
|--------|-------|
| 1. 40  | 2. 32 |
| 3. 18  | 4. 17 |
| 5. 100 | 6. 60 |



**Set D**, pages 204–205

What is the greatest common factor of 10 and 35?

**Common factors** are factors shared by a group of numbers. The **GCF** is the largest factor shared by a group of numbers.

List factors for 10 and 35.

**10:** 1, 2, 5, 10

**35:** 1, 5, 7, 35

Circle common factors. The greatest common factor is the GCF.

**10:** 1, 2, 5, 10

**35:** 1, 5, 7, 35

Common factors of 10 and 35 are 1 and 5.  
The GCF of 10 and 35 is 5.

**Remember** that the GCF is the greatest common factor of the numbers.

Find the GCF for each pair of numbers.

- 15, 45
- 60, 80
- 12, 14
- 24, 56
- 24, 36
- 21, 30
- 27, 45
- 12, 18
- 16, 32
- 18, 27

**Set E**, pages 206–207

When you use *Try*, *Check*, and *Revise* to solve a problem, follow these steps:

**Step 1**

Think to make a reasonable first try.

**Step 2**

Check by using information given in the problem.

**Step 3**

Revise by using your first try to make a reasonable second try. Check.

**Step 4**

Use previous tries to continue trying and checking until you find the answer.

**Remember** that *Try*, *Check*, and *Revise* can help when there is no clear way to solve a problem.

Solve each problem.

- Mr. Herrera wants to tile his living room floor with a square pattern that repeats every 3 feet. Could he cover the floor without cutting off part of the pattern? Explain.



- Hector is planning to cover a floor that measures  $6\text{ ft} \times 15\text{ ft}$ . What size of square tile could he use to cover it exactly?