

Name \_\_\_\_\_

## Factors and Divisibility

**Essential Question** How can you tell whether one number is a factor of another number?



Operations and Algebraic Thinking—4.OA.B.4

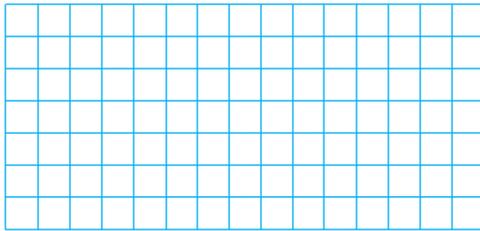
**MATHEMATICAL PRACTICES**  
MP2, MP4, MP6

### Unlock the Problem Real World

Students in Carlo's art class painted 32 square tiles for a mosaic. They will arrange the tiles to make a rectangle. Can the rectangle have 32 tiles arranged into 3 equal rows, without gaps or overlaps?

**One Way** Draw a model.

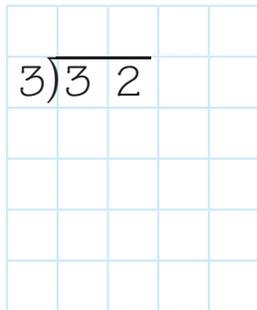
**Think:** Try to arrange the tiles into 3 equal rows to make a rectangle.



A rectangle \_\_\_\_\_ have 32 tiles arranged into 3 equal rows.

**Another Way** Use division.

If 3 is a factor of 32, then the unknown factor in  $3 \times \blacksquare = 32$  is a whole number.



**Think:** Divide to see whether the unknown factor is a whole number.

The unknown factor in  $3 \times \blacksquare = 32$  \_\_\_\_\_ a whole number.

So, a rectangle \_\_\_\_\_ have 32 tiles arranged in 3 rows.



▲ Mosaics are decorative patterns made with pieces of glass or other materials.

#### Math Idea

A factor of a number divides the number evenly. This means the quotient is a whole number and the remainder is 0.

#### Math Talk

#### MATHEMATICAL PRACTICES 4

**Interpret a Result** How does the model relate to the quotient and remainder for  $32 \div 3$ ?

- Explain how you can tell if 4 is a factor of 30.

\_\_\_\_\_

\_\_\_\_\_

**Divisibility Rules** A number is **divisible** by another number if the quotient is a counting number and the remainder is 0.

Some numbers have a divisibility rule. You can use a divisibility rule to tell whether one number is a factor of another.

 **Is 6 a factor of 72?**

**Think:** If 72 is divisible by 6, then 6 is a factor of 72.

Test for divisibility by 6:

Is 72 even? \_\_\_\_\_

What is the sum of the digits of 72?

\_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

Is the sum of the digits divisible by 3?

\_\_\_\_\_

72 is divisible by \_\_\_\_\_.

So, 6 is a factor of 72.

### Divisibility Rules

Number	Divisibility Rule
2	The number is even.
3	The sum of the digits is divisible by 3.
5	The last digit is 0 or 5.
6	The number is even and divisible by 3.
9	The sum of the digits is divisible by 9.

**Try This!** List all the factor pairs for 72 in the table.

Complete the table.

Factors of 72	
$1 \times 72 = 72$	1, 72
_____ $\times$ _____ = _____	_____, _____
_____ $\times$ _____ = _____	_____, _____
_____ $\times$ _____ = _____	_____, _____
_____ $\times$ _____ = _____	_____, _____
_____ $\times$ _____ = _____	_____, _____

Show your work.



**MATHEMATICAL PRACTICES 7**

**Identify Relationships** How are divisibility and factors related? Explain.

- How did you check if 7 is a factor of 72? Explain.

\_\_\_\_\_

\_\_\_\_\_

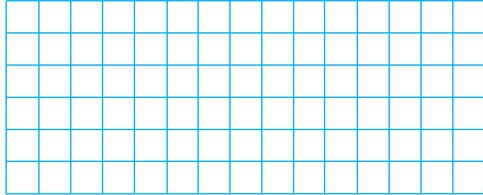
Name \_\_\_\_\_

# Share and Show



1. Is 4 a factor of 28? Draw a model to help.

Think: Can you make a rectangle with 28 squares in 4 equal rows?



4 \_\_\_\_\_ a factor of 28.

Is 5 a factor of the number? Write *yes* or *no*.

2. 27

3. 30

4. 36

5. 53

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## On Your Own

Is 9 a factor of the number? Write *yes* or *no*.

6. 54

7. 63

8. 67

9. 93

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

List all the factor pairs in the table.

10.

Factors of 24	
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____

11.

Factors of 39	
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____

**Practice: Copy and Solve** List all the factor pairs for the number. Make a table to help.

12. 56

13. 64

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_



### MATHEMATICAL PRACTICES 3

**Use Counterexamples** If 3 is a factor of a number, is 6 always a factor of the number? If not, give an example.

# Problem Solving • Applications



Use the table to solve 14–15.

14. **THINK SMARTER** Dirk bought a set of stamps. The number of stamps in the set he bought is divisible by 2, 3, 5, 6, and 9. Which set is it?



## Stamps Sets

Country	Number of stamps
Germany	90
Sweden	78
Japan	63
Canada	25

15. **GO DEEPER** Geri wants to put 6 stamps on some pages in her stamp book and 9 stamps on other pages. Explain how she could do this with the stamp set for Sweden.

16. **MATHEMATICAL PRACTICE 3** **Use Counterexamples** George said if 2 and 4 are factors of a number, then 8 is a factor of the number. Is he correct? Explain.

17. **THINK SMARTER** Classify the numbers. Some numbers may belong in more than one box.

27

45

54

72

81

84

Divisible by 5 and 9	Divisible by 3 and 9	Divisible by 2 and 6

**WRITE** *Math*

**Show Your Work**

Name \_\_\_\_\_

## Factors and Divisibility



**COMMON CORE STANDARD—4.OA.B.4**  
Gain familiarity with factors and multiples.

**Is 6 a factor of the number? Write yes or no.**

1. 36

2. 56

3. 42

4. 66

**Think:**  $6 \times 6 = 36$

yes

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Is 5 a factor of the number? Write yes or no.**

5. 38

6. 45

7. 60

8. 39

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**List all the factor pairs in the table.**

9.

Factors of 12	
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____

10.

Factors of 25	
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____

11. List all the factor pairs for 48. Make a table to help.

\_\_\_\_\_

\_\_\_\_\_

## Problem Solving



12. Bryson buys a bag of 64 plastic miniature dinosaurs. Could he distribute them equally into six storage containers and not have any left over? **Explain.**

\_\_\_\_\_

13. **WRITE** *Math* Find the factors of 42. Show and explain your work, and list the factor pairs in a table.

\_\_\_\_\_

## Lesson Check (4.OA.B.4)

1. Write three numbers greater than 20 that have 9 as a factor.
2. What digit(s) can be in the ones place of a number that has 5 as a factor?

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## Spiral Review (4.NBT.B.4, 4.NBT.B.5)

3. Write an expression that can be used to find  $4 \times 275$  using mental math and properties of numbers.
4. Jack broke apart  $5 \times 216$  as  $(5 \times 200) + (5 \times 16)$  to multiply mentally. What strategy did Jack use?

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5. Jordan has \$55. She earns \$67 by doing chores. How much money does Jordan have now?
6. Trina has 72 collector's stamps. She puts 43 of the stamps into a stamp book. How many stamps are left?

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