

Name _____

Model Factors

Essential Question How can you use models to find factors?



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

MATHEMATICAL PRACTICES
MP1, MP4

Unlock the Problem

A **factor** is a number multiplied by another number to find a product. Every whole number greater than 1 has at least two factors, that number and 1.

$$18 = 1 \times 18 \quad 7 = 7 \times 1 \quad 342 = 1 \times 342$$

$\uparrow \quad \uparrow$
 factor factor

Many numbers can be broken into factors in different ways.

$$16 = 1 \times 16 \quad 16 = 4 \times 4 \quad 16 = 2 \times 8$$

Activity Model and record the factors of 24.

Materials ■ square tiles

Use all 24 tiles to make as many different arrays as you can. Record the arrays in the grid, and write the factors modeled.

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_____ × _____ = 24 _____ × _____ = 24 _____ × _____ = 24

Factors: _____, _____ Factors: _____, _____ Factors: _____, _____

The factors of 24, from least to greatest, are

_____, _____, _____, _____, _____, _____, _____, and _____.

Two factors that make a product are sometimes called a factor pair. How many factor pairs does 24 have? Explain.



Math Idea

When you are asked to find factors of a whole number, only list factors that are also whole numbers.

$$2 \times 12 = 24$$

Factors: _____, _____



MATHEMATICAL PRACTICES 2

Reason Abstractly Can you arrange the tiles in each array another way and show the same factors? Explain.

Name _____

On Your Own

Practice: Copy and Solve Use tiles to find all the factors of the product. Record the arrays on grid paper and write the factors shown.

5. 9

6. 21

7. 17

8. 18

Problem Solving • Applications



Use the diagram for 9–10.

9. **MATHEMATICAL PRACTICE 6** Pablo is using 36 tiles to make a patio. Can he arrange the tiles in another way and show the same factors? Draw a quick picture and **explain**.

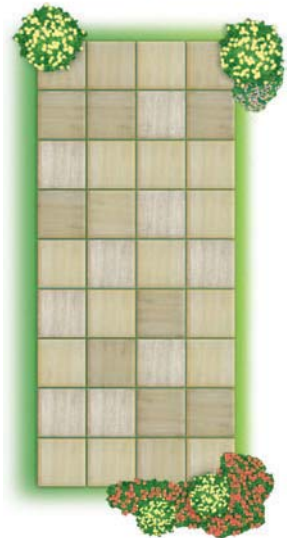


10. **THINK SMARTER** How many different rectangular arrays can Pablo make with all 36 tiles, so none of the arrays show the same factors?

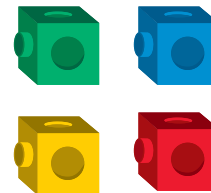
11. If 6 is a factor of a number, what other numbers must be factors of the number?

12. **GO DEEPER** Jean spent \$16 on new T-shirts. If each shirt cost the same whole-dollar amount, how many could she have bought?

Pablo's Tiles



Unlock the Problem



13. **GO DEEPER** Carmen has 18 connecting cubes. She wants to model a house shaped like a rectangle. If the model has a height of one connecting cube, how many different ways can Carmen model the house using all 18 connecting cubes?

a. What do you need to know? _____

b. How is finding the number of ways to model a rectangular house related to finding factor pairs? _____

c. Why is finding the factor pairs only the first step in solving the problem? _____

d. Show the steps you used to solve the problem.

e. Complete the sentences. Factor pairs for 18 are _____

There are _____ different ways Carmen can arrange the cubes to model the house.

14. **THINK SMARTER** Sarah was organizing vocabulary words using index cards. She arranged 40 index cards in the shape of a rectangle on a poster. For 14a–14e, choose Yes or No to tell whether a possible arrangement of cards is shown.

14a. 4 rows of 10 cards Yes No

14d. 40 rows of 1 card Yes No

14b. 6 rows of 8 cards Yes No

14e. 35 rows of 5 cards Yes No

14c. 20 rows of 2 cards Yes No

Name _____

Model Factors



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

**Use tiles to find all the factors of the product.
Record the arrays on grid paper and write the factors shown.**

1. 15

$1 \times 15 = 15$

$3 \times 5 = 15$

1, 3, 5, 15

2. 30

3. 45

4. 19

5. 40

6. 36

7. 22

8. 4

Problem Solving



9. Brooke has to set up 70 chairs in equal rows for the class talent show. But, there is not room for more than 20 rows. What are the possible number of rows that Brooke could set up?

10. Eduardo thinks of a number between 1 and 20 that has exactly 5 factors. What number is he thinking of?

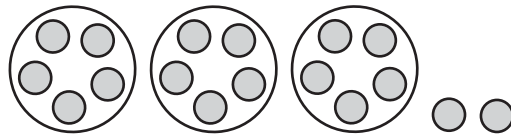
11. **WRITE** *Math* Have students write the answer to the Essential Question and draw examples to explain their answer.

Lesson Check (4.OA.B.4)

1. List all the factors of 24.
2. Natalia has 48 tiles. Write a factor pair for the number 48.

Spiral Review (4.OA.A.1, 4.NBT.B.5, 4.NBT.B.6)

3. The Pumpkin Patch is open every day. If it sells 2,750 pounds of pumpkins each day, about how many pounds does it sell in 7 days?
4. What is the remainder in the division problem modeled below?



5. Represent the model shown below using a multiplication equation.
6. Channing jogs 10 miles a week. How many miles will she jog in 52 weeks?

