

# LESSON 7

## Objective

Model and identify the Commutative Property of Multiplication.

## Common Core State Standards

- **3.OA.5** Apply properties of operations as strategies to multiply and divide. *Examples: If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative property of multiplication.)  $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.)*

## Operations and Algebraic Thinking

# Commutative Property of Multiplication

The Commutative Property of Multiplication states that you can multiply factors in any order and get the same product. For any two values,  $a$  and  $b$ ,  $a \times b = b \times a$ . Students will apply the Commutative Property in their work in algebra with variables.

**Try It!** Perform the Try It! activity on the next page.

## Talk About It

Discuss the Try It! activity.

- **Ask:** What answer did you get for  $3 \times 6$ ?  $6 \times 3$ ?
- **Ask:** What numbers can you change the order of using the Commutative Property of Multiplication? Can you switch a factor and the product? Why or why not? Model for students what will happen if a product is changed for a factor. For example, write on the board  $3 \times 4 = 12$ . **Ask:** If you change the number sentence to  $3 \times 12 = 4$ , is it still true?
- **Ask:** Do you think the Commutative Property of Multiplication works for multiplication sentences with more than two factors? Encourage students to test the property using number sentences with three factors.

## Solve It

With students, reread the problem. Have students write two multiplication sentences that could be used to find the amount of fruit each class has. Then ask them to write a sentence telling why both multiplication sentences have the same answer.

## More Ideas

For other ways to teach about the Commutative Property of Multiplication—

- Have one student model an array with Color Tiles. Then have his or her partner model an array that uses the same factors in a different order. Both students write multiplication sentences to represent the arrays.
- Prepare a paper bag that contains different multiplication sentences written on slips of paper. Have students pick a slip from the bag without looking and rewrite the multiplication sentence using the Commutative Property. Students should make arrays of Centimeter Cubes for both sentences.

## Formative Assessment

Have students try the following problem.

What is another way to write  $10 \times 12 = 120$ ?

- A.  $12 + 10 = 120$     B.  $1 \times 10 = 10$     C.  $12 \times 10 = 120$     D.  $2 \times 20 = 120$

## Try It! 30 minutes | Groups of 3

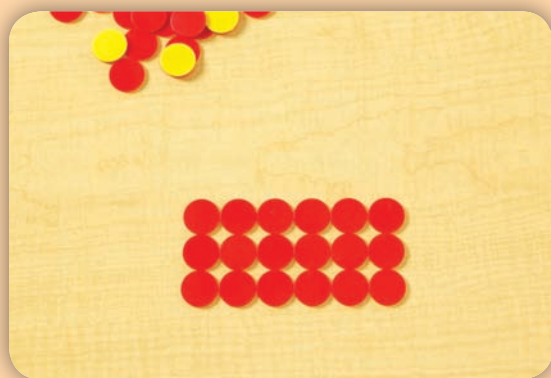
Here is a problem about the Commutative Property of Multiplication.

*Third- and fourth-grade classes can choose different kinds of fruit for a snack. Mrs. Marshall's class has 3 types of fruit and 6 pieces of each type of fruit. Mr. Kim's class has 6 types of fruit and 3 pieces of each type of fruit. How many pieces of fruit does each class have?*

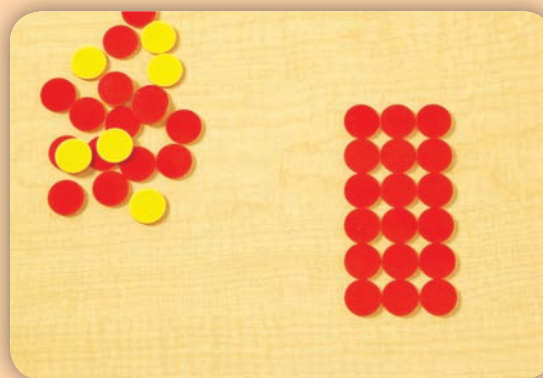
Introduce the problem. Then have students do the activity to solve the problem. Write  $3 \times 6 = \underline{\quad}$  and  $6 \times 3 = \underline{\quad}$  on the board. Distribute Two-Color Counters to each group of students. Define the terms *factor* and *product*.

### Materials

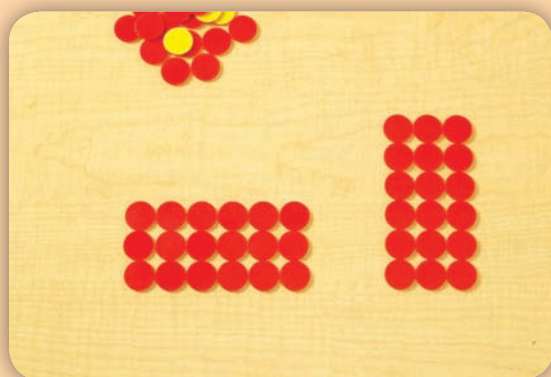
- Two-Color Counters (40 per group)



**1.** Have students model 3 groups of 6 using counters in an array. The array should have 3 rows with 6 counters in each row. Ask students to find the product. Fill in the answer for  $3 \times 6$  on the board.



**2.** Have students model 6 groups of 3 using counters in an array. The array should have 6 rows of counters with 3 in each row. Ask students to find the product. Fill in the answer for  $6 \times 3$  on the board.



**3.** Ask students to compare the arrays they have made to confirm that both have the same number of counters. Explain that the factors in the number sentence can be switched because of the Commutative Property of Multiplication. Have students compare the two arrays side-by-side to see that they reflect the same quantities.

### Look Out!

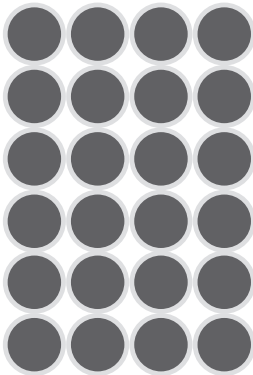
Students may believe that they can use the Commutative Property of Multiplication to exchange the product with one of the factors. Reinforce that the Commutative Property of Multiplication says that you can change the order of the factors with one another but not with the product. Use arrays of counters to show that when a factor and product are switched, the resulting number sentence will be incorrect. Also, be aware that some students may overgeneralize and try to use the Commutative Property to do division. Demonstrate with counters that when the order of numbers in a division sentence is changed, the answer is changed as well.



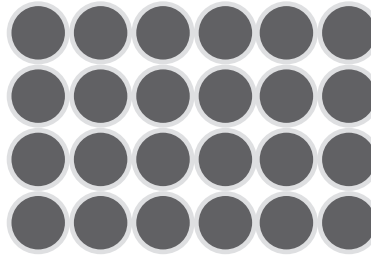
Use Two-Color Counters to build each model. Write number sentences that show the Commutative Property of Multiplication.

(Check students' work.)

1.



$$6 \times 4 = 24$$



$$4 \times 6 = 24$$

Using Two-Color Counters, model the Commutative Property of Multiplication for each pair of factors. Sketch the models. Write both number sentences.

(Check students' models.)

2. 4, 8

$$4 \times 8 = 32$$

$$8 \times 4 = 32$$

3. 3, 7

$$3 \times 7 = 21$$

$$7 \times 3 = 21$$

Write two number sentences using each pair of factors that show the Commutative Property of Multiplication.

4. 2, 8

$$2 \times 8 = 16$$

$$8 \times 2 = 16$$

5. 5, 9

$$5 \times 9 = 45$$

$$9 \times 5 = 45$$

6. 6, 7

$$6 \times 7 = 42$$

$$7 \times 6 = 42$$

7. 3, 1

$$3 \times 1 = 3$$

$$1 \times 3 = 3$$

8. 8, 3

$$8 \times 3 = 24$$

$$3 \times 8 = 24$$

9. 6, 9

$$6 \times 9 = 54$$

$$9 \times 6 = 54$$

## Answer Key

**Challenge!** Problems 1 and 8 both have products of 24. Use 24 Two-Color Counters to find another pair of factors for 24. Describe your model. Write two multiplication sentences for your model that show the Commutative Property of Multiplication.

Challenge: (Sample) 2 rows of 12 counters model a product of 24. 12 rows of 2 also model a product of 24;  $2 \times 12 = 24$ ;  $12 \times 2 = 24$ .

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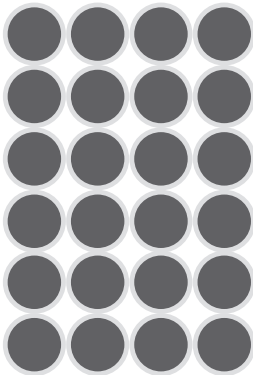
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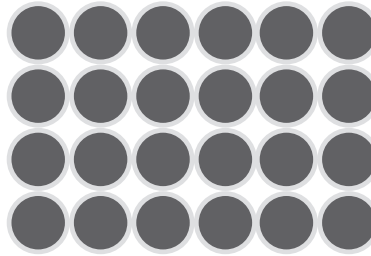
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**Use Two-Color Counters to build each model. Write number sentences that show the Commutative Property of Multiplication.**

1.



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**Using Two-Color Counters, model the Commutative Property of Multiplication for each pair of factors. Sketch the models. Write both number sentences.**

2. 4, 8

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\_\_\_\_\_

3. 3, 7

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

**Write two number sentences using each pair of factors that show the Commutative Property of Multiplication.**

4. 2, 8

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\_\_\_\_\_

5. 5, 9

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

6. 6, 7

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

7. 3, 1

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\_\_\_\_\_

8. 8, 3

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

9. 6, 9

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

Name \_\_\_\_\_

**Challenge!** Problems 1 and 8 both have products of 24. Use 24 Two-Color Counters to find another pair of factors for 24. Describe your model. Write two multiplication sentences for your model that show the Commutative Property of Multiplication.

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