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Properties of Operations

Focus Lesson

The **commutative property of multiplication** states that the order of factors does not change the product. The commutative property is **not** true for division.

$6 \times 3 = 18$ $\qquad$ $3 \times 6 = 18$

The **associative property of multiplication** states that when the grouping of factors is changed, the product stays the same. The associative property is **not** true for division.

$7 \times (3 \times 4)$ is the same as $(7 \times 3) \times 4$

$7 \times 12 = 84$ $\qquad$ $21 \times 4 = 84$

The **distributive property** states that you can multiply a sum by multiplying each addend separately and then adding the products.

$5 \times 7 = 35 \longrightarrow (5 \times 5) + (5 \times 2) = 25 + 10 = 35$

The **identity property** states that any number multiplied by 1 is that number. Any number divided by 1 is that number.

$5 \times 1 = 5$ $\qquad$ $5 \div 1 = 5$

Use the distributive property to help you multiply.

$14 \times 4 =$ _____

1 Break 14 into two one-digit numbers. _____

2 Rewrite the problem using the distributive property. _____

3 What is the value of the first set of parentheses? _____

4 What is the value of the second set of parentheses? _____

5 What operation do you use to combine the two values from steps 3 and 4?

_____

6 Write a number sentence to show step 5. Find the answer.

_____

What is the product of 14×4?

Guided Practice

Tammy wrote the number sentence $4 \times 2 = 8$. She drew a matching array shown below.

Use the commutative property to write a number sentence with the same product. Draw an array to match the new number sentence.

_____

How do you change the factors in the number sentence? 1 1 1 1 1 1 1 1

1 What does the commutative property say?

_____

You will still have 8 counters with an equal number in each row. 2 2 2 2 2

2 How can you change the array to show the new multiplication sentence?

_____

Write the new number sentence. Draw the new array.

Solve the following problems.

1 Samuel and Orlando are working on the problem shown.

$$5 \times (3 \times 4) = \square$$

Orlando rewrites the problem as $(5 \times 4) \times 3 = \square$. Samuel rewrites the problem as $5 \times (4 \times 3) = \square$. Will either student still get the problem correct? Explain. Show your work for all three problems and solve.

2 Place a check mark in the box next to the number sentences that are true. Mark all that apply.

- ☐ $5 \times 1 = 5$
- ☐ $4 \div 1 = 1$
- ☐ $6 \times 4 = 4 \times 6$
- ☐ $2 \times 5 = 2 + 5$
- ☐ $27 \times 5 = (20 \times 5) + (7 \times 5)$
- ☐ $22 \times 3 = (12 \times 2) + (10 \times 1)$

3 Billy earns $22 each day for 5 days. Which equation will show how much Billy earns for the 5 days? Mark all that apply.

A $(22 \times 5) + (22 \div 5)$

B $(20 \times 2) + (2 + 3)$

C $(20 \times 5) + (2 \times 5)$

D $(10 \times 5) + (12 \times 5)$

E $(20 \times 5) \times (2 \times 5)$

F $(17 + 5) \times (5 + 5)$

4 Look at the multiplication problem below.

$$6 \times (3 \times 4)$$

Choose the ways to rewrite the problem and still get the correct answer. Mark all that apply.

☐ $6 \times (4 \times 3)$

☐ $4 \times (3 \times 6)$

☐ $6 + (3 \times 4)$

☐ $4 \times (3 + 6)$

☐ $4 + 6 + 3$

☐ $4 \times 3 \times 6$

5 Match the equation with its property by placing the letter in the correct column of the table. Not all choices will be used.

A $5 \div 1 = 5$

B $2 \times 2 = 1$

C $1 \times 5 = 5$

D $4 \times 2 = 2 \times 4$

E $6 \times 4 = 4 + 6$

F $(3 \times 1) \times 4 = 3 \times (1 \times 4)$

Identity Property	Commutative Property	Associative Property

6 Rob writes the following two number sentences.

$2 \times 4 = 8$ and $4 \times 2 = 8$

Cindy writes the following two number sentences.

$4 \div 2 = 2$ and $2 \div 4 = 2$

Are both students correct? Explain.

Rob is [correct, incorrect] because _____

_____

Cindy is [correct, incorrect] because _____

_____

7 Cara is multiplying two numbers. She uses the distributive property to break a large number into two smaller numbers. The equation she has now is $(20 \times 7) + (7 \times 7)$. What was Cara's original equation?

_____

8 A bag of coffee weighs 1 pound. Write a multiplication sentence that will show how many pounds 9 bags weigh.

_____ × _____ = _____