

9-1

Study Guide and Intervention

Properties

The Distributive Property

To multiply a sum by a number, multiply each addend of the sum by the number outside the parentheses.

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

$$(4 + 5)2 = 4 \times 2 + 5 \times 2$$

Commutative Properties of Addition and Multiplication

The order in which numbers are added or multiplied does not change the sum or product.

$$2 + 3 = 3 + 2$$

$$4 \times 5 = 5 \times 4$$

Associative Properties of Addition and Multiplication

The way in which numbers are grouped when added or multiplied does not change the sum or product.

$$(2 + 3) + 4 = 2 + (3 + 4)$$

$$(5 \times 6) \times 2 = 5 \times (6 \times 2)$$

Additive Identity

The sum of any number and 0 is the number.

$$5 + 0 = 5$$

$$a + 0 = a$$

Multiplicative Identity

The product of any number and 1 is the number.

$$7 \times 1 = 7$$

$$1 \times n = n$$

You can use the Distributive, Commutative, and Associative Properties to make your calculations easier to do mentally.

EXAMPLE 1 Find 5×32 mentally using the Distributive Property.

$$\begin{aligned} 5 \times 32 &= 5(30 + 2) \\ &= 5(30) + 5(2) \\ &= 150 + 10 \\ &= 160 \end{aligned}$$

Write 32 as $30 + 2$.

Distributive Property

Multiply 5 and 30 mentally. Multiply 5 and 2 mentally.

Add 150 and 10 mentally.

So, $5 \times 32 = 160$.

EXAMPLE 2 Find $12 + 27 + 18$ mentally.

- You can add 12 and 18. So, change the order of the numbers to be added.

$$12 + 27 + 18 = 12 + 18 + 27 \quad \text{Commutative Property}$$

- Now group the numbers using the Associative Property. The parentheses tell you what to do first.

$$\begin{aligned} 12 + 18 + 27 &= (12 + 18) + 27 \quad \text{Associative Property} \\ &= 30 + 27 \quad \text{Add 12 and 18 mentally.} \\ &= 57 \quad \text{Add 30 and 27 mentally.} \end{aligned}$$

EXERCISES

Find each product mentally. Use the Distributive Property.

1. 5×42

2. 2×55

3. 3×84

Rewrite each expression using the Distributive Property. Then evaluate the expression.

4. $2(10 + 3)$

5. $(30 + 4)5$

6. $11(10 + 2)$

Find each sum or product mentally.

7. $55 + 16 + 5$

8. $17 + 21 + 13$

9. $5 \times 18 \times 2$

Practice: Word Problems**Properties**

<p>1. HOMEWORK Jacy spends half an hour every night studying math and an hour every night studying science. Over five days, how much time does Jacy spend on his homework? Write two expressions you can use to find the answer. Then answer the question.</p>	<p>2. COMPUTER GAMES In Carlota's computer game, she goes up one level every time she earns 210 points. Carlota has just gone up a level for the eighth time. Use the Distributive Property to calculate mentally how many points Carlota has.</p>
<p>3. ENROLLMENT The sixth grade class at Parkview Middle School has 25 blondes, 18 redheads, and 25 brunettes. Use mental math to figure out how many students are in the sixth grade.</p>	<p>4. GYM CLASS In gym class, students were put into groups. Each group had 4 boys and 3 girls. If 7 groups were formed, how many students were in the class?</p>
<p>5. SPORTS CARS Every day for 11 days, Tylia saw 23 sports cars pass her bedroom window. Write a numerical expression to describe how many sports cars she saw in all. Rewrite the expression using the Distributive Property so that you can mentally calculate how many sports cars she saw.</p>	<p>6. MARBLES Devon has 16 blue marbles, 22 green marbles, and 14 red marbles in a bag. Write a numerical expression to describe the total number of marbles in the bag in the order given in the problem. Then rewrite the expression to make it easier to mentally calculate how many marbles are in the bag.</p>
<p>7. BOWLING It costs \$5.75 per person for one game of bowling and \$2.25 to rent one pair of shoes. What does it cost for five friends to go bowling? Write two different numerical expressions to describe the cost for five friends. Then use one to calculate the total cost for five friends.</p>	<p>8. GIFTS Ms. Bautista made 22 gift baskets for her students. Each basket had 5 apples and 3 oranges. How many pieces of fruit did Ms. Bautista use?</p>