



Vocabulary


Distributive Property

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 **Standard 7AF1.3**
Simplify numerical expressions by applying properties of rational numbers and justify the process used.

Standard 5AF1.3 Know and use the distributive property in equations and expressions with variables.

 **The What:** I will use the Distributive Property to simplify expressions.

 **The Why:** The Distributive Property can make it simpler to determine the cost of purchases.

At a local restaurant, Jonathan and each of his three friends ordered a hamburger, pretzels, and a lemonade. Each hamburger cost \$3. Each bag of pretzels cost \$2. Each lemonade cost \$1. There are two ways to find the total cost of the order:

Method 1: Multiply the cost of one complete order by the number of people ordering.

Jonathan and hamburger pretzels lemonade
three friends:

$$4(3 + 2 + 1) = 4(6) \\ = 24$$

Method 2: Add the costs of all the hamburgers, pretzels, and lemonades.

$$4 \text{ hamburgers} + 4 \text{ pretzels} + 4 \text{ lemonades} \\ (4 \cdot 3) + (4 \cdot 2) + (4 \cdot 1) = 12 + 8 + 4 \\ = \$24$$

Both methods produce a total of \$24. In Method 2, the 4 is multiplied by \$3, \$2, and \$1. This is an example of the Distributive Property of Multiplication over Addition.

Method 1	Method 2
$4(3 + 2 + 1)$	$(4 \cdot 3) + (4 \cdot 2) + (4 \cdot 1)$
$4(6)$	$12 + 8 + 4$
24	24

The **Distributive Property** states that multiplying the sum of two or more numbers by another number is the same as multiplying each of those numbers by the other number.

DISTRIBUTIVE PROPERTY



Numbers: $2(3 + 1) = (2 \cdot 3) + (2 \cdot 1)$ or
 $(3 + 1)2 = (3 \cdot 2) + (1 \cdot 2)$

Words: Multiplying the sum of two numbers by a third number is the same as multiplying each of the two numbers by the third.

Algebra: For any numbers a , b , and c ,
 $a(b + c) = a \cdot b + a \cdot c$, or
 $(b + c)a = b \cdot a + c \cdot a$.

EXAMPLES Distributive Property

Complete each equation.

① $5(6 + 4) = (5 \cdot 6) + (5 \cdot \underline{\quad})$

$5(6 - 4) = (5 \cdot 6) + (5 \cdot \underline{\quad})$

② $(9 + 5)10 = (\underline{\quad} \cdot \underline{\quad}) + (\underline{\quad} \cdot \underline{\quad})$

$(9 + 5)10 = (\underline{9} \cdot \underline{10}) + (\underline{5} \cdot \underline{10})$

Your Turn: Complete each equation.

a. $2(3 + 5) = (2 \cdot 3) + (2 \cdot \underline{\quad})$

b. $(7 + 1)6 = (\underline{\quad} \cdot \underline{\quad}) + (\underline{\quad} \cdot \underline{\quad})$

The Distributive Property can also be used to rewrite expressions based on common factors.

$$(5 \cdot 2) + (5 \cdot 3) = 5(2 + 3)$$

Study Tip

For mental math, think of large numbers as the sum of smaller numbers.

Example:

$$\begin{aligned} 5 \cdot 26 &= 5(20 + 6) \\ &= (5 \cdot 20) + (5 \cdot 6) \\ &= 100 + 30 \\ &= 130 \end{aligned}$$

EXAMPLES Distributive Property

Complete each equation.

③ $(5 \cdot 6) + (5 \cdot 4) = 5(6 + \underline{\quad})$

$(5 \cdot 6) + (5 \cdot 4) = 5(6 + \underline{4})$

④ $(7 \cdot 3) + (7 \cdot 2) = 7(\underline{\quad} + \underline{\quad})$

$(7 \cdot 3) + (7 \cdot 2) = 7(\underline{3} + \underline{2})$

Your Turn: Complete each equation.

c. $(10 \cdot 4) + (10 \cdot 8) = 10(4 + \underline{\quad})$

d. $(2 \cdot 9) + (2 \cdot 1) = 2(\underline{\quad} + \underline{\quad})$

Talk Math

WORK WITH A PARTNER Name a one-digit number. Name a two-digit number. Have your partner use the Distributive Property to find the product of your numbers. Then, your partner will name a one-digit number and a two-digit number for you to multiply. Talk about how the Distributive Property can make it easier to find products.

Using the Distributive Property can make calculations easier to do. Remember the two methods used to find Jonathan's total order at the beginning of the lesson. Use these two methods to find Luanda's total grocery purchase.

Real-World EXAMPLE

RETAIL Luanda went to the store and bought 4 cans of soup and 4 cans of corn. Each can of soup cost \$3. Each can of corn cost \$2.

- 15 Write two equations representing the total amount of money T Luanda spent at the store.

Equation 1: $T = 4(3) + 4(2)$

Equation 2: $T = 4(3 + 2)$

- 16 Determine the total amount Luanda spent at the store.

Equation 1:

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

$$= 12 + 8$$

$$= 20$$

Multiply 4 and 3. Multiply 4 and 2.

Add 12 and 8.

Equation 2:

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

$$= 4(5)$$

$$= 20$$

Add 3 and 2.

Multiply 4 and 5.

Using either method, Luanda spent \$20 at the store.

Your Turn

ENTERTAINMENT A family purchased tickets for 3 adults and 3 children to an amusement park. Each adult's ticket cost \$25. Each child's ticket cost \$15.

- e. Write two equations representing the total cost T of the tickets.
- f. Determine the family's total ticket cost.



ENTERTAINMENT Suppose one adult could not go to the amusement park. What is the new total ticket cost?

Examples 1-4
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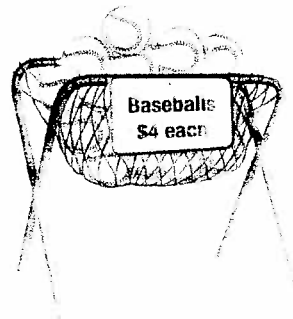
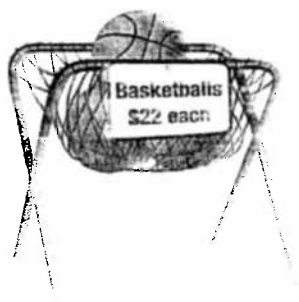
1. **VOCABULARY** Write an equation that shows the Distributive Property.

Copy and complete each equation using the Distributive Property.

2. $3(2 + 6) = (3 \cdot 2) + (3 \cdot \underline{\quad ? \quad})$
3. $(3 + 7)10 = (\underline{\quad ? \quad} \cdot \underline{\quad ? \quad}) + (\underline{\quad ? \quad} \cdot \underline{\quad ? \quad})$
4. $(6 \cdot 11) + (6 \cdot 3) = 6(11 + \underline{\quad ? \quad})$
5. $(5 \cdot 4) + (5 \cdot 2) = 5(\underline{\quad ? \quad} + \underline{\quad ? \quad})$

Examples 5-6
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- SPORTS** Rich bought two baseballs and two basketballs.



6. Write two equations representing the total amount of money T Rich spent for his purchases.
7. Determine the total amount Rich spent at the store.

RETAIL Isabela bought three apples, three peaches, and three bananas. Apples cost 49¢ each, peaches are 59¢ each, and bananas are 22¢ each.

8. Write two equations representing the total amount of money T spent for the fruit Isabela bought.
9. Determine the total cost for the fruit.

Skills, Concepts, and Problem Solving

HOMEWORK HELP

For Exercises	See Example(s)
10-13	1-2
14-17	3-4
18-25	5-6

Copy and complete each equation using the Distributive Property.

10. $2(3 + 7) = (2 \cdot 3) + (2 \cdot \underline{\quad ? \quad})$
11. $2(6 + 1) = (2 \cdot 6) + (2 \cdot \underline{\quad ? \quad})$
12. $(9 + 1)8 = (\underline{\quad ? \quad} \cdot \underline{\quad ? \quad}) + (\underline{\quad ? \quad} \cdot \underline{\quad ? \quad})$
13. $(4 + 1)8 = (\underline{\quad ? \quad} \cdot \underline{\quad ? \quad}) + (\underline{\quad ? \quad} \cdot \underline{\quad ? \quad})$
14. $(12 \cdot 10) + (12 \cdot 7) = 12(10 + \underline{\quad ? \quad})$
15. $6 \cdot 9 + 6 \cdot 3 = 6(9 + \underline{\quad ? \quad})$
16. $8 \cdot 3 + 8 \cdot 2 = 8(\underline{\quad ? \quad} + \underline{\quad ? \quad})$
17. $7 \cdot 2 + 7 \cdot 5 = 7(\underline{\quad ? \quad} + \underline{\quad ? \quad})$