Lesson 7-1 The Distributive Property



Getting Started

Real-World Link

Essential

Question

Common Core **State Standards Content Standards** 7.NS.2, 7.NS.2c, 7.EE.1,

Vocabulary

Why are algebraic

rules useful?

7.EE.2 Mathematical

Practices

1, 3, 4, 5

^ab_c

Notes

What You'll Learn

- Use the Distributive Property to write equivalent numerical expressions.
- Use the Distributive Property to write equivalent algebraic expressions.



Real-World Link

Entertainment The Newport Aquarium in Kentucky has acrylic tunnels that allow visitors to walk underneath aquatic life. The cost of admission is \$23 per person. The aquarium also offers Behind-the-Scenes Tours for \$15 per person and Penguin Encounters for \$25 per person.



Numerical Expressions

Expressions are **equivalent expressions** when they have the same value. Example 1 shows how the **Distributive Property** relates to equivalent expressions.



Example 1

Use the Distributive Property to write each expression as an equivalent numeric expression. Then evaluate the expression.

a. 5(12 + 4)			b. (20 – 3)8.2				
$5(12+4) = 5 \cdot 12 + 5 \cdot 4$			(20-3) 8.2 = 20 • 8.2 - 3 • 8.2				
	= 60 + 20	Multiply.	= 164 - 24	.6 Multiply.			
	= 80	Add.	= 139.4	Subtract.			
Got It? Do these problems to find out.							

1b. $\frac{3}{4}(9-2)$ **5** $\frac{1}{4}$

Digital Zoo/Digital Vision/Getty

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Tutor

The Distributive Property allows you to find some products mentally. For example, you can find 7 \cdot 34 mentally by evaluating 7 \cdot (30 + 4).

 $7 \cdot (30 + 4) = 7 \cdot 30 + 7 \cdot 4$ = 210 + 28 Think: $7 \cdot 30 = 210$ = 238 Think: 210 + 28 = 238



Financial Literacy On a school visit to Washington, D.C., Dichali and his class visited the Smithsonian National Air and Space Museum. Tickets to the IMAX movie cost \$8.99. Find the total cost for 20 students to see the IMAX movie.

Tutor

You can use the Distributive Property and mental math to find the total cost for the movie. To find the total cost mentally, find 20(\$9.00 - \$0.01).

20(\$9.00 - \$0.01) = 20(\$9.00) - 20(\$0.01)	Distributive Property
= \$180 - \$0.20	Multiply.
= \$179.80	Subtract.

So, the total cost is \$179.80.

You can check your result by multiplying $20 \cdot \$9$ to get \$180. Since \$180 is close to \$179.80, the answer is reasonable.

Gof If? Do these problems to find out.

- 2a. A spaghetti dinner at the Italian Village restaurant costs \$10.25. Use the Distributive Property and mental math to find the total cost of the dinner for Sherita, her brother, and her parents. 4(\$10 + \$0.25); 4 (\$10) + 4 (\$0.25); \$41
- 2b. After dinner, they each order gelato for \$1.50. What is the new total? 4(\$1 + \$0.50); 4 (\$1) + 4 (\$0.50); \$6; \$47 total

Algebraic Expressions

Vocabulary Link

Distribute *Everyday Use* to deliver to each member of a group

Math Use a property that allows you to multiply each member of a sum by a number You can model the Distributive Property by using algebra tiles and variables.



The expressions 2(x + 4) and 2x + 8 are equivalent expressions because no matter what the value of x is, these expressions have the same value.

Example 3

Use the Distributive Property to write each expression as an equivalent algebraic expression.

Tools Tutor

Tools Tutor

Check



Example 4

Use the Distributive Property to write each expression as an equivalent algebraic expression.

	5 1	
a.	3(<i>m</i> - 4)	
	3(m-4) = 3[m+(-4)]	Rewrite $m - 4$ as $m + (-4)$.
	$= 3 \cdot m + 3 \cdot (-4)$	Distributive Property
	= 3m + (-12)	Simplify.
	= 3m - 12	Definition of subtraction
b.	-9.5(n-7)	
	-9.5(n-7) = -9.5[n + (-7)]	Rewrite $n - 7$ as $n + (-7)$.
	$= -9.5 \cdot n + (-9.5)(-7)$	Distributive Property
	= -9.5n + 66.5	Simplify.

Got It? Do these problems to find out.

4a.
$$\frac{2}{3}(d-3) = \frac{2}{3}d-2$$

4b. -7(e-4) **-7e + 28**

Guided Practice

Watch Out!

parentheses.

Use the Distributive Property to write each expression as an equivalent numeric expression. Then evaluate the expression. (Example 1)

- **1.** 7(9+3) **7 9 + 7 3;84**
- 3. (7 + 8)2.2 7 2.2 + 8 2.2; 33

2. $\frac{2}{5}(3+5)$ $\frac{2}{5} \cdot 3 + \frac{2}{5} \cdot 5; 3\frac{1}{5}$ 4. (5+6)8 5 • 8 + 6 • 8:88

5. You purchase 3 blue notebooks and 2 red notebooks. Each notebook costs \$1.30. Use mental math to find the total cost of the notebooks. Justify your answer by using the Distributive Property. (Example 2) (5.50; 5(\$1 + \$0.30) = 5(\$1) + 5(\$0.30)

Use the Distributive Property to write each expression as an equivalent algebraic expression. (Examples 3 and 4)

6. $\frac{3}{4}(m+4)$ $\frac{3}{4}m+3$	7. (<i>p</i> + 4)5 5 <i>p</i> + 20
8. $-6(b-5)$ -6b + 30	9. 9.5(<i>a</i> – 10) 9.5<i>a</i> – 95