$= 9(3x + 2y)$ Distributive Property

Got It? **Do these problems to find out.**

e. Simplify $3x + 9y + 2x$.

f. Simplify $7(3x + y)$.

g. Factor $12x + 8y$.

work.

e. $5x + 9y$

f. $21x + 7y$

g. $4(3x + 24)$

Simplify each expression. (Examples 1, 3, and 4)

1. $5(6x) =$ $30x$

$5 \cdot 6 \cdot x$

Show your work.

2. $2x + 5y + 7x =$ $9x + 5y$

3. $4(2x + 5y) =$ $8x + 20y$

4. Factor $35x + 28y$. (Example 5) $7(5x + 4y)$

5. Mikayla bought five skirts at $\$x$ each. Three of the five skirts came with a matching top for an additional \$9 each. Write and simplify an expression that represents the total cost of her purchase. (Example 2)

$5x + 3(9)$

6. The gift bag from Claire Cosmetics includes 5 bottles of nail polish and 2 tubes of lip gloss. Use p to represent the cost of each bottle of nail polish and g to represent the cost of each tube of lip gloss. Write and simplify an expression that represents the total cost of 8 gift bags. (Example 6)

$8(5p + 2g) = 40p + 16g$

7. **Building on the Essential Question** How can properties help to write equivalent algebraic expressions?

Sample answer: To find equivalent algebraic expressions, apply the properties and combine like terms, if needed.

Independent Practice

Go online for Step-by-Step Soluti

Simplify each expression. (Examples 1, 3, and 4)

1. $x + 4x + 6x =$ 11x

2. $3x + 4x + 5x =$ 12x

3. $9(5x) =$ 45x

Show your work.

4. $3x + 8y + 13x =$
16x + 8y

5. $7(3x + 5y) =$
21x + 35y

6. $3x + 6x + 2x =$
11x

4(4x + 10y)

Factor each expression. (Example 5)

7. $24x + 18y =$ 6(4x + 3y)

8. $16x + 40y =$ 8(2y + 5y)

9. Eight friends went to a hockey game. The price of admission per person was $\$x$. Four of the friends paid an extra \$6 each for a player guide book. Write and simplify an expression that represents the total cost. (Example 2)

$4(x + 6) + 4x$; $\$8x + \$24$

10. Gabriella is x years old. Her sister, Felicia, is six years older than she is. Their mother is twice as old as Felicia. Their aunt, Tanya, is x years older than their mother. Write and simplify an expression that represents Tanya's age in years. (Example 2)

$2(x + 6) + x$; $3x + 12$

11 A DVD box set includes 3 thriller movies and 2 comedies. Use t to represent the cost of each thriller and c to represent the cost of each comedy. Write and simplify an expression that represents the total cost of 6 box sets. (Example 6)

$6(3t + 2c) = 18t + 12c$

12. A fall candle gift set has 4 vanilla candles and 6 pumpkin spice candles. Use v to represent the cost of each vanilla candle and p to represent the cost of each pumpkin candle. Write and simplify an expression that represents the total cost of 4 sets. (Example 6)

$4(4v + 6p) = 16v + 24p$

13. $3x + 6x = yx$ **9**

14. $x + 5 + 11x = 12x + y$ **5**

15. CCSS **Use Math Tools** Pizza Palace charges $\$x$ for a large cheese pizza and an additional fee based on the number of toppings ordered.

Pizza Palace Prices	
Pizza	**Price ($)**
large cheese	x
add 1 topping	add \$0.75
add 2 toppings	add \$1.50
add 3 toppings	add \$2.25
add 4 toppings	add \$3.00

a. Two large cheese pizzas and three large pepperoni pizzas are ordered. Write and simplify an expression that represents the total cost. **$3(x + 0.75) + 2x$; $\$5x + \$2.25$**

b. Write and simplify an expression that represents the total cost of eight large pizzas, if two are cheese and six have four toppings each.

$6(x + 3) + 2x$; $\$8x + \$18$

c. Elsa orders three large cheese pizzas, a large pepperoni and mushroom pizza, and a large green pepper and onion pizza. Write and simplify an expression that represents the total cost.

$2(x + 1.50) + 3x$; $\$5x + \$3$

H.O.T. Problems Higher Order Thinking

16. **Identify Structure** Write an expression that, when simplified, is equivalent to $15x + 7$. **Sample answer: $8x + 7 + 7x$**

17. **Reason Inductively** Explain why the expressions $y + y + y$ and $3y$ are equivalent.

Sample answer: The expressions are equivalent because they name the same number regardless of which number stands for y.

Persevere with Problems **For Exercises 18 and 19, simplify each expression.**

18. $7x + 5(x + 3) + 4x + x + 2$ **$17x + 17$**

19. $6 + 2(x + 8) + 3x + 11 + x$ **$6x + 33$**

20. **Reason Abstractly** The algebraic expression shown below is missing two whole-number constants. Determine the constants so that the expression simplifies to $14x + 11$.

$$4x + 8(x + \boxed{1}) + \boxed{3} + 2x$$