

# Study Guide and Intervention

## Simplifying Algebraic Expressions

The Distributive Property can be used to simplify algebraic expressions.

**EXAMPLES** Use the Distributive Property to rewrite each expression.

1  $3(a + 5)$

$$\begin{aligned} 3(a + 5) &= 3(a) + 3(5) && \text{Distributive Property} \\ &= 3a + 15 && \text{Simplify.} \end{aligned}$$

2  $-2(d - 3)$

$$\begin{aligned} -2(d - 3) &= -2[d + (-3)] && \text{Rewrite } d - 3 \text{ as } d + (-3). \\ &= -2(d) + (-2)(-3) && \text{Distributive Property} \\ &= -2(d) + 6 && \text{Simplify.} \end{aligned}$$

When a plus sign separates an algebraic expression into parts, each part is called a **term**. In terms that contain a variable, the numerical part of the term is called the **coefficient** of the variable. A term without a variable is called a **constant**. **Like terms** contain the same variables, such as  $3x$  and  $2x$ .

**EXAMPLE 3** Identify the terms, like terms, coefficients, and constants in the expression  $7x - 5 + x - 3x$ .

$$\begin{aligned} 7x - 5 + x - 3x &= 7x + (-5) + x + (-3x) && \text{Definition of subtraction} \\ &= 7x + (-5) + 1x + (-3x) && \text{Identity Property; } x = 1x \end{aligned}$$

The terms are  $7x$ ,  $-5$ ,  $x$ , and  $-3x$ . The like terms are  $7x$ ,  $x$ , and  $-3x$ . The coefficients are 7, 1, and  $-3$ . The constant is  $-5$ .

An algebraic expression is in **simplest form** if it has no like terms and no parentheses.

**EXAMPLE 4** Simplify the expression  $-2m + 5 + 6m - 3$ .

$-2m$  and  $6m$  are like terms.  $5$  and  $-3$  are also like terms.

$$\begin{aligned} -2m + 5 + 6m - 3 &= -2m + 5 + 6m + (-3) && \text{Definition of subtraction} \\ &= -2m + 6m + 5 + (-3) && \text{Commutative Property} \\ &= (-2 + 6)m + 5 + (-3) && \text{Distributive Property} \\ &= 4m + 2 && \text{Simplify.} \end{aligned}$$

### EXERCISES

Use the Distributive Property to rewrite each expression.

1.  $2(c + 6)$

2.  $-4(w + 6)$

3.  $(b - 4)(-3)$

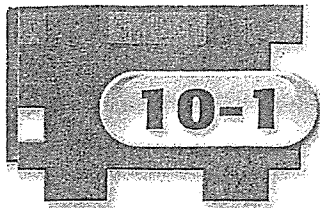
4. Identify the terms, like terms, coefficients, and constants in the expression  $4m - 2 + 3m + 5$ .

Simplify each expression.

5.  $3d + 6d$

6.  $2 + 5s - 4$

7.  $2z + 3 + 9z - 8$

**Practice: Skills*****Simplifying Algebraic Expressions***

Use the Distributive Property to rewrite each expression.

- |                  |                    |                   |
|------------------|--------------------|-------------------|
| 1. $4(j + 4)$    | 2. $5(n + 2)$      | 3. $(c + 9)3$     |
| 4. $2(w - 8)$    | 5. $(s - 7)7$      | 6. $-4(e + 6)$    |
| 7. $(b + 3)(-7)$ | 8. $-8(v - 7)$     | 9. $(2n + 3)6$    |
| 10. $5(c + d)$   | 11. $-7(3x - 1)$   | 12. $(e - f)3$    |
| 13. $2(-3m + 1)$ | 14. $(2b - 3)(-9)$ | 15. $-5(s + 7)$   |
| 16. $(t + 7)3$   | 17. $6(-2v + 4)$   | 18. $(m - n)(-3)$ |

Identify the terms, like terms, coefficients, and constants in each expression.

19.  $4e + 7e + 5$
20.  $5 - 4x - 8$
21.  $-3h - 2h + 6h + 9$
22.  $7 - 5y + 2 + 1$
23.  $9k + 7 - k + 4$
24.  $4z + 3 - 2z - z$

Simplify each expression.

- |                        |                        |                        |
|------------------------|------------------------|------------------------|
| 25. $3t + 6t$          | 26. $4r + r$           | 27. $7f - 2f$          |
| 28. $9a - 8a$          | 29. $5c + 8c$          | 30. $2g - 5g$          |
| 31. $8k + 3 + 4k$      | 32. $7m - 5m - 6$      | 33. $9 - 6x + 5$       |
| 34. $7p - 1 - 9p + 5$  | 35. $-b - 3b + 8b + 4$ | 36. $5h - 6 - 8 + 7h$  |
| 37. $8b + 6 - 8b + 1$  | 38. $t - 5 - 2t + 5$   | 39. $4w - 5w + w$      |
| 40. $6m - 7 + 2m + 7$  | 41. $5f - 7f + f$      | 42. $12y - 8 + 4y + y$ |
| 43. $9a + 5 - 7a - 2a$ | 44. $6g - 7g + 13$     | 45. $7x + 6 - 9x - 3$  |