NAME _____ DATE _____ PERIOD _____

Study Guide and Intervention

Multiplying a Polynomial by a Monomial

Product of Monomial and Polynomial The Distributive Property can be used to multiply a polynomial by a monomial. You can multiply horizontally or vertically. Sometimes multiplying results in like terms. The products can be simplified by combining like terms.

Example 1 **Find $-3x^2(4x^2 + 6x - 8)$.**

Horizontal Method

$-3x^2(4x^2 + 6x - 8)$
$= -3x^2(4x^2) + (-3x^2)(6x) - (-3x^2)(8)$
$= -12x^4 + (-18x^3) - (-24x^2)$
$= -12x^4 - 18x^3 + 24x^2$

Vertical Method

$$\begin{array}{rr} & 4x^2 + 6x - 8 \\ (\times) & -3x^2 \\ \hline & -12x^4 - 18x^3 + 24x^2 \end{array}$$

The product is $-12x^4 - 18x^3 + 24x^2$.

Example 2 **Simplify $-2(4x^2 + 5x) - x(x^2 + 6x)$.**

$-2(4x^2 + 5x) - x(x^2 + 6x)$
$= -2(4x^2) + (-2)(5x) + (-x)(x^2) + (-x)(6x)$
$= -8x^2 + (-10x) + (-x^3) + (-6x^2)$
$= (-x^3) + [-8x^2 + (-6x^2)] + (-10x)$
$= -x^3 - 14x^2 - 10x$

Exercises

Find each product.

1. $x(5x + x^2)$
2. $x(4x^2 + 3x + 2)$
3. $-2xy(2y + 4x^2)$
4. $-2g(g^2 - 2g + 2)$
5. $3x(x^4 + x^3 + x^2)$
6. $-4x(2x^3 - 2x + 3)$
7. $-4cx(10 + 3x)$
8. $3y(-4x - 6x^3 - 2y)$
9. $2x^2y^2(3xy + 2y + 5x)$

Simplify.

10. $x(3x - 4) - 5x$
11. $-x(2x^2 - 4x) - 6x^2$
12. $6a(2a - b) + 2a(-4a + 5b)$
13. $4r(2r^2 - 3r + 5) + 6r(4r^2 + 2r + 8)$
14. $4n(3n^2 + n - 4) - n(3 - n)$
15. $2b(b^2 + 4b + 8) - 3b(3b^2 + 9b - 18)$
16. $-2z(4z^2 - 3z + 1) - z(3z^2 + 2z - 1)$
17. $2(4x^2 - 2x) - 3(-6x^2 + 4) + 2x(x - 1)$

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Study Guide and Intervention *(continued)*

Multiplying a Polynomial by a Monomial

Solve Equations with Polynomial Expressions Many equations contain polynomials that must be added, subtracted, or multiplied before the equation can be solved.

Example **Solve $4(n - 2) + 5n = 6(3 - n) + 19$.**

$4(n - 2) + 5n = 6(3 - n) + 19$	Original equation
$4n - 8 + 5n = 18 - 6n + 19$	Distributive Property
$9n - 8 = 37 - 6n$	Combine like terms.
$15n - 8 = 37$	Add $6n$ to both sides.
$15n = 45$	Add 8 to both sides.
$n = 3$	Divide each side by 15.

The solution is 3.

Exercises

Solve each equation.

1. $2(a - 3) = 3(-2a + 6)$

2. $3(x + 5) - 6 = 18$

3. $3x(x - 5) - 3x^2 = -30$

4. $6(x^2 + 2x) = 2(3x^2 + 12)$

5. $4(2p + 1) - 12p = 2(8p + 12)$

6. $2(6x + 4) + 2 = 4(x - 4)$

7. $-2(4y - 3) - 8y + 6 = 4(y - 2)$

8. $c(c + 2) - c(c - 6) = 10c - 12$

9. $3(x^2 - 2x) = 3x^2 + 5x - 11$

10. $2(4x + 3) + 2 = -4(x + 1)$

11. $3(2h - 6) - (2h + 1) = 9$

12. $3(y + 5) - (4y - 8) = -2y + 10$

13. $3(2a - 6) - (-3a - 1) = 4a - 2$

14. $5(2x^2 - 1) - (10x^2 - 6) = -(x + 2)$

15. $3(x + 2) + 2(x + 1) = -5(x - 3)$

16. $4(3p^2 + 2p) - 12p^2 = 2(8p + 6)$