8-6 Multiplying a Polynomial by a Monomial *(Pages 444–449)*

Use the distributive property to multiply a polynomial by a monomial. You may find it easier to multiply a polynomial by a monomial if you combine all like terms in the polynomial before you multiply.

Examples

a. Find $4z^2(z^2 + 7z - 3z^2)$.

Combine like terms in the polynomial and then multiply using the distributive property.

$4z^2(z^2 + 7z - 3z^2)$
$= 4z^2(-2z^2 + 7z)$
$= 4z^2(-2z^2) + 4z^2(7z)$
$= -8z^4 + 28z^3$

b. Solve $4(n - 5) + 2 = 5(6 - n) + 3n$.

$4(n - 5) + 2 = 5(6 - n) + 3n$
$4(n) - 4(5) + 2 = 5(6) - 5(n) + 3n$
$4n - 20 + 2 = 30 - 5n + 3n$
$4n - 18 = 30 - 2n$
$6n - 18 = 30$
$6n = 48$
$n = 8$

Try These Together

Find each product.

1. $-2(2a + 8)$

2. $cd(6c^2 + 3cd)$

HINT: Use the distributive property to multiply the monomial by every term in the polynomial.

Practice

Find each product.

3. $2n(9n^2 - 2n - 12)$

4. $8g^2h(g^2 + 9h - 6gh - 2h)$

5. $8s^2(2s^2 - 4s + 4)$

6. $-\frac{1}{2}xy^2\left(\frac{2}{3}xyz + \frac{1}{3}x - 8\right)$

Simplify.

7. $u(7u - 2) + 25u$

8. $5b(-b^2 + 7b - 1) + 9(3b^3 - 6b + 2)$

9. $4r^2(3r - 7) + r(7r^2 - 5r + 2) - 4(r^2 + 9r)$

10. $\frac{1}{3}c(3c^3 + 3c - 6) + \frac{4}{3}(3c^2 - 6c)$

Solve each equation.

11. $4(-6x + 9) + 4 = -4(-5x + 12)$

12. $12(2y - 9) = 6(y - 17)$

13. $21 + \frac{3}{2}s(s - 4) = \frac{1}{2}s(3s + 36) - 12s$

14. $a(3a + 2) + a(6a + 2) + 4 = 6a\left(a + \frac{1}{2}a\right) + 9$

15. Gardening A rectangular garden is x feet wide. The length of the garden is 3 feet more than twice the width. Write a polynomial that represents the area of the garden in square feet.

16. Standardized Test Practice Simplify $-2x(3x - 4) + 6x$.

A $8x$ **B** $7x - 4$ **C** $-6x^2 - 2x$ **D** $-6x^2 + 14x$

Answers: 1. $-4a - 16$ 2. $6c^3d + 3c^2d^2$ 3. $18n^3 - 4n^2 - 24n$ 4. $8g^4h - 48g^3h^2 + 56g^2h^2$ 5. $16s^4 - 32s^3 + 32s^2$
6. $-\frac{1}{3}x^2y^3z - \frac{1}{6}x^2y^2 + 4xy^2$ 7. $7u^2 + 23u$ 8. $22b^3 + 35b^2 - 59b + 18$ 9. $19r^3 - 37r^2 - 34r$ 10. $c^4 + 5c^2 - 10c$ 11. 2
12. $\frac{1}{7}$ 13. $\frac{7}{4}$ 14. $1\frac{1}{4}$ 15. $2x^2 + 3x$ 16. D