

2 Solve Equations with Polynomial Expressions

We can use the Distributive Property to solve equations that involve the products of monomials and polynomials.

StudyTip

Combining Like Terms When simplifying a long expression, it may be helpful to put a circle around one set of like terms, a rectangle around another set, a triangle around another set, and so on.

Example 4 Equations with Polynomials on Both Sides

$$\text{Solve } 2a(5a - 2) + 3a(2a + 6) + 8 = a(4a + 1) + 2a(6a - 4) + 50.$$

$2a(5a - 2) + 3a(2a + 6) + 8 = a(4a + 1) + 2a(6a - 4) + 50$	Original equation
$10a^2 - 4a + 6a^2 + 18a + 8 = 4a^2 + a + 12a^2 - 8a + 50$	Distributive Property
$16a^2 + 14a + 8 = 16a^2 - 7a + 50$	Combine like terms.
$14a + 8 = -7a + 50$	Subtract $16a^2$ from each side.
$21a + 8 = 50$	Add $7a$ to each side.
$21a = 42$	Subtract 8 from each side.
$a = 2$	Divide each side by 21.

CHECK

$2a(5a - 2) + 3a(2a + 6) + 8 = a(4a + 1) + 2a(6a - 4) + 50$	
$2(2)[5(2) - 2] + 3(2)[2(2) + 6] + 8 \stackrel{?}{=} 2[4(2) + 1] + 2(2)[6(2) - 4] + 50$	
$4(8) + 6(10) + 8 \stackrel{?}{=} 2(9) + 4(8) + 50$	Simplify.
$32 + 60 + 8 \stackrel{?}{=} 18 + 32 + 50$	Multiply.
$100 = 100 \checkmark$	Add and subtract.

Guided Practice

Solve each equation.

4A. $2x(x + 4) + 7 = (x + 8) + 2x(x + 1) + 12$

4B. $d(d + 3) - d(d - 4) = 9d - 16$

Check Your Understanding

 = Step-by-Step Solutions begin on page R13.



Example 1 Find each product.

1. $5w(-3w^2 + 2w - 4)$

2. $6g^2(3g^3 + 4g^2 + 10g - 1)$

3. $4km^2(8km^2 + 2k^2m + 5k)$

4. $-3p^4r^3(2p^2r^4 - 6p^6r^3 - 5)$

5. $2ab(7a^4b^2 + a^5b - 2a)$

6. $c^2d^3(5cd^7 - 3c^3d^2 - 4d^5)$

Example 2 Simplify each expression.

7. $t(4t^2 + 15t + 4) - 4(3t - 1)$

8. $x(3x^2 + 4) + 2(7x - 3)$

9. $-2d(d^3c^2 - 4dc^2 + 2d^2c) + c^2(dc^2 - 3d^4)$

10. $-5w^2(8w^2x - 11wx^2) + 6x(9wx^4 - 4w - 3x^2)$

Example 3 11. GRIDDED RESPONSE

Marlene is buying a new plasma television. The height of the screen of the television is one half the width plus 5 inches. The width is 30 inches. Find the height of the screen in inches.

Example 4 Solve each equation.

12. $-6(11 - 2c) = 7(-2 - 2c)$

13. $t(2t + 3) + 20 = 2t(t - 3)$

14. $-2(w + 1) + w = 7 - 4w$

15. $3(y - 2) + 2y = 4y + 14$

16. $a(a + 3) + a(a - 6) + 35 = a(a - 5) + a(a + 7)$

17. $n(n - 4) + n(n + 8) = n(n - 13) + n(n + 1) + 16$

