

8-3 Reteaching

Multiplying Binomials

You can multiply binomials by using the FOIL method. FOIL stands for First, Outer, Inner, and Last.

Problem

What is the simplified form of $(4x + 3)(2x + 6)$?

Use the FOIL method to simplify the binomial.

Solve	$4x \cdot 2x = 8x^2$	Multiply the First terms.
	$4x \cdot 6 = 24x$	Multiply the Outer terms.
	$3 \cdot 2x = 6x$	Multiply the Inner terms.
	$3 \cdot 6 = 18$	Multiply the Last terms.
	$8x^2 + 24x + 6x + 18$	Add the products.
	$8x^2 + 30x + 18$	Add the like terms.

Check Substitute any number for x . Try $x = 2$. If the two sides of the equation are equal the simplification may be correct.

$$\begin{aligned} (4x+3)(2x+6) &\stackrel{?}{=} 8x^2 + 30x + 18 \\ (4 \cdot 2+3)(2 \cdot 2 + 6) &\stackrel{?}{=} (8 \cdot 2^2) + (30 \cdot 2) + 18 \\ (11)(10) &\stackrel{?}{=} 32 + 60 + 18 \\ 110 &= 110 \checkmark \end{aligned}$$

Solution: The simplified form of $(4x + 3)(2x + 6)$ is $8x^2 + 30x + 18$.

Exercises

Simplify each product.

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

2. $(b - 4)(b + 5)$

3. $(c + 3)(c + 7)$

4. $(2d + 4)(3d - 2)$

5. $(4e - 5)(3e + 3)$

6. $(3f - 2)(2f - 4)$

7. $(5g + 3)(g - 3)$

8. $(4h + 4)(2h + 5)$

9. $(3j - 5)(4j - 3)$

To multiply a trinomial by a binomial, use the same steps as you would to multiply a 3-digit number by a 2-digit number. Find the partial products for each term of the binomial and then add the like terms of the partial products.

Problem

What is the simplified form of $(2x^2 + 3x - 4)(3x + 2)$?

Solve Start by arranging the polynomials vertically.

Multiply each part of the trinomial by 2.

$$\begin{array}{r} 2x^2 + 3x - 4 \\ \underline{ 3x + 2} \\ 4x^2 + 6x - 8 \end{array} \qquad \begin{array}{l} 2x^2 \cdot 2 = 4x^2 \\ 3x \cdot 2 = 6x \\ -4 \cdot 2 = -8 \end{array}$$

Multiply each part of the trinomial by $3x$.

$$\begin{array}{r} 2x^2 + 3x - 4 \\ 3x + 2 \\ \underline{ 4x^2 + 6x - 8} \\ 6x^3 + 9x^2 - 12x \end{array} \qquad \begin{array}{l} 2x^2 \cdot 3x = 6x^3 \\ 3x \cdot 3x = 9x^2 \\ -4 \cdot 3x = -12x \end{array}$$

Add the partial products.

$$\begin{array}{r} 4x^2 + 6x - 8 \\ \underline{6x^3 + 9x^2 - 12x} \\ 6x^3 + 13x^2 - 6x - 8 \end{array}$$

Check Substitute any number for x . Try $x = 2$. If the two sides of the equation are equal, the simplification may be correct.

$$\begin{aligned} (2x^2 + 3x - 4)(3x + 2) &\stackrel{?}{=} 6x^3 + 13x^2 - 6x - 8 \\ (8 + 6 - 4)(6 + 2) &\stackrel{?}{=} 48 + 52 - 12 - 8 \\ 80 &= 80 \checkmark \end{aligned}$$

Solution: The simplified form of $(2x^2 + 3x - 4)(3x + 2)$ is $6x^3 + 13x^2 - 6x - 8$.

Exercises

Simplify each product.

10. $(w^2 + 3w - 4)(2w + 3)$

11. $(x^2 - 8x + 6)(3x - 4)$

12. $(2y^2 + 4y - 5)(4y + 2)$

13. $(3z^2 - 6z + 4)(4z + 1)$