

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. $(a + 6)(a - 3)$
$a^2 + 3a - 18$ | 2. $(b - 4)(b + 5)$
$b^2 + b - 20$ | 3. $(c + 3)(c + 7)$
$c^2 + 10c + 21$ |
| 4. $(2d + 4)(3d - 2)$
$6d^2 + 8d - 8$ | 5. $(4e - 5)(3e + 3)$
$12e^2 - 3e - 15$ | 6. $(3f - 2)(2f - 4)$
$6f^2 - 16f + 8$ |
| 7. $(5g + 3)(g - 3)$
$5g^2 - 12g - 9$ | 8. $(4h + 4)(2h + 5)$
$8h^2 + 28h + 20$ | 9. $(3j - 5)(4j - 3)$
$12j^2 - 29j + 15$ |

8-3 **Reteaching** (continued)

Multiplying Binomials

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.

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

Multiply each part of the trinomial by 3x.

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

$6x^3 + 9x^2 - 12x$

Add the partial products.

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

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. $(w^2 + 3w - 4)(2w + 3)$
 $2w^3 + 9w^2 + w - 12$

11. $(x^2 - 8x + 6)(3x - 4)$
 $3x^3 - 28x^2 + 50x - 24$

12. $(2y^2 + 4y - 5)(4y + 2)$
 $8y^3 + 20y^2 - 12y - 10$

13. $(3z^2 - 6z + 4)(4z + 1)$
 $12z^3 - 21z^2 + 10z + 4$