

EXAMPLE 3 Multiply polynomials vertically

Find the product $(b^2 + 6b - 7)(3b - 4)$.

Solution

STEP 1 Multiply by -4 .

$$\begin{array}{r} b^2 + 6b - 7 \\ \times \quad 3b - 4 \\ \hline -4b^2 - 24b + 28 \end{array}$$

STEP 2 Multiply by $3b$.

$$\begin{array}{r} b^2 + 6b - 7 \\ \times \quad 3b - 4 \\ \hline -4b^2 - 24b + 28 \\ 3b^3 + 18b^2 - 21b \end{array}$$

STEP 3 Add products.

$$\begin{array}{r} b^2 + 6b - 7 \\ \times \quad 3b - 4 \\ \hline -4b^2 - 24b + 28 \\ 3b^3 + 18b^2 - 21b \\ \hline 3b^3 + 14b^2 - 45b + 28 \end{array}$$

AVOID ERRORS

Remember that the terms of $(3b - 4)$ are $3b$ and -4 . They are *not* $3b$ and 4 .

EXAMPLE 4 Multiply polynomials horizontally

Find the product $(2x^2 + 5x - 1)(4x - 3)$.

$$(2x^2 + 5x - 1)(4x - 3)$$

$$= 2x^2(4x - 3) + 5x(4x - 3) - 1(4x - 3)$$

$$= 8x^3 - 6x^2 + 20x^2 - 15x - 4x + 3$$

$$= 8x^3 + 14x^2 - 19x + 3$$

Write product.

Distributive property

Distributive property

Combine like terms.

FOIL PATTERN The letters of the word FOIL can help you to remember how to use the distributive property to multiply binomials. The letters should remind you of the words First, Outer, Inner, and Last.

$$(2x + 3)(4x + 1) = 8x^2 + 2x + 12x + 3$$

EXAMPLE 5 Multiply binomials using the FOIL pattern

Find the product $(3a + 4)(a - 2)$.

$$(3a + 4)(a - 2)$$

$$= (3a)(a) + (3a)(-2) + (4)(a) + (4)(-2)$$

$$= 3a^2 + (-6a) + 4a + (-8)$$

$$= 3a^2 - 2a - 8$$

Write products of terms.

Multiply.

Combine like terms.



GUIDED PRACTICE for Examples 3, 4, and 5

Find the product.

4. $(x^2 + 2x + 1)(x + 2)$

5. $(3y^2 - y + 5)(2y - 3)$

6. $(4b - 5)(b - 2)$