

# Binomial Products TEKS 8.2.B

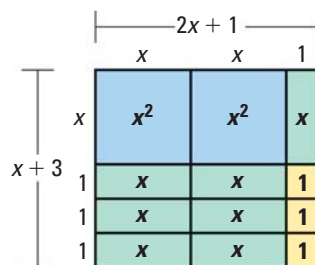
A **monomial** is a number, a variable, or the product of a number and one or more variables. A **binomial** is the sum of two monomials. In other words, a binomial is a polynomial with two terms. You can use a geometric model to find the product of two binomials.

## EXAMPLE Simplify $(2x + 1)(x + 3)$ .

Draw a rectangle with dimensions  $2x + 1$  and  $x + 3$ . Use the dimensions to divide the rectangle into parts. Then find the area of each part. The binomial product  $(2x + 1)(x + 3)$  is the sum of the areas of all the parts.

There are 2 blue parts with area  $x^2$ , 7 green parts with area  $x$ , and 3 yellow parts with area 1.

$$(2x + 1)(x + 3) = 2x^2 + 7x + 3$$



Another way to find the product of two binomials is to use the distributive property systematically. Multiply the *first* terms, the *outer* terms, the *inner* terms, and the *last* terms of the binomials. This is called **FOIL** for the words **F**irst, **O**uter, **I**nner, and **L**ast.

## EXAMPLE Simplify $(x + 2)(4x - 5)$ .

$$\begin{array}{cccc} \text{First} & \text{Outer} & \text{Inner} & \text{Last} \\ | & | & | & | \\ (x + 2)(4x - 5) & = & x(4x) + x(-5) + 2(4x) + 2(-5) \\ & = & 4x^2 - 5x + 8x - 10 \\ & = & 4x^2 + 3x - 10 \end{array}$$

Use FOIL.

Multiply.

Combine like terms.

## PRACTICE

Simplify.

- $(a + 5)(a + 3)$
- $(m + 4)(m + 11)$
- $(t + 8)(t + 7)$
- $(z + 1)(z + 6)$
- $(y + 4)(y + 2)$
- $(x + 9)(x + 9)$
- $(y - 2)^2$
- $(n + 6)^2$
- $(4 - z)^2$
- $(a + 10)(a - 10)$
- $(y + 3)(y - 7)$
- $(k + 1)^2$
- $(5x - 4)(5x + 4)$
- $(3 + n)^2$
- $(c + 5)(2c - 7)$
- $(a + 5)(a + 5)$
- $(7 - z)(7 + z)$
- $(3x - 8)(x - 6)$
- $(4a + 3)^2$
- $(3 - g)(2g + 3)$
- $(4 - x)(8 + x)$
- $(3n - 1)(n - 4)$
- $(-a + 9)(a - 9)$
- $(8x + 1)(x + 1)$
- $(5x + 2)(2x - 5)$
- $(2d - 5)(3d - 1)$
- $(-4z + 3)(6z - 1)$