

## Lesson 8-7

### Example 1 The Distributive Property

Find  $(r - 6)(r + 4)$ .

**Method 1** Vertical

Multiply by 4.	Multiply by $r$ .	Add like terms.
$r - 6$	$r - 6$	$r - 6$
$(\times) r + 4$	$(\times) r + 4$	$(\times) r + 4$
$4r - 24$	$4r - 24$	$4r - 24$
	$r^2 - 6r$	$r^2 - 6r$
		$r^2 - 2r - 24$
$4(r - 6) = 4r - 24$	$r(r - 6) = r^2 - 6r$	

**Method 2** Horizontal

$$\begin{aligned}(r - 6)(r + 4) &= r(r + 4) + -6(r + 4) && \text{Distributive Property} \\ &= r(r) + r(4) + -6(r) + -6(4) && \text{Distributive Property} \\ &= r^2 + 4r - 6r - 24 && \text{Multiply.} \\ &= r^2 - 2r - 24 && \text{Combine like terms.}\end{aligned}$$

### Example 2 FOIL Method

Find each product.

a.  $(x - 9)(x - 2)$

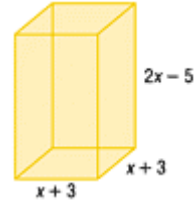
$$\begin{aligned}(x - 9)(x - 2) &= \overset{\text{F}}{(x)}(\overset{\text{O}}{x}) + \overset{\text{I}}{(x)}(\overset{\text{L}}{-2}) + \overset{\text{I}}{-9}(\overset{\text{O}}{x}) + \overset{\text{L}}{-9}(\overset{\text{L}}{-2}) && \text{FOIL method} \\ &= x^2 - 2x - 9x + 18 && \text{Multiply.} \\ &= x^2 - 11x + 18 && \text{Combine like terms.}\end{aligned}$$

b.  $(3a - 5)(5a - 2)$

$$\begin{aligned}(3a - 5)(5a - 2) &= \overset{\text{F}}{(3a)}(\overset{\text{O}}{5a}) + \overset{\text{I}}{(3a)}(\overset{\text{L}}{-2}) + \overset{\text{I}}{-5}(\overset{\text{O}}{5a}) + \overset{\text{L}}{-5}(\overset{\text{L}}{-2}) && \text{FOIL method} \\ &= 15a^2 - 6a - 25a + 10 && \text{Multiply.} \\ &= 15a^2 - 31a + 10 && \text{Combine like terms.}\end{aligned}$$

### Example 3 FOIL Method

**GEOMETRY** The surface area of a box is found by finding the area of each of the six sides. Write an expression for the surface area of the box.



Identify the area of each side.

$$\text{Area of bottom} = \text{area of top} = (x + 3)(x + 3)$$

$$\text{Area each side} = (x + 3)(2x - 5)$$

Now write the formula.

Surface

Area equals two times area of base plus four times area of a side.

$$SA = 2 \cdot (x + 3)(x + 3) + 4 \cdot (x + 3)(2x - 5)$$

$$\begin{aligned}
 SA &= 2(x + 3)(x + 3) + 4(x + 3)(2x - 5) \\
 &= 2[(x)(x) + (x)(3) + (3)(x) + (3)(3)] + 4[(x)(2x) + (x)(-5) + (3)(2x) + (3)(-5)] \\
 &= 2[x^2 + 3x + 3x + 9] + 4[2x^2 - 5x + 6x - 15] \\
 &= 2[x^2 + 6x + 9] + 4[2x^2 + x - 15] \\
 &= 2x^2 + 12x + 18 + 8x^2 + 4x - 60 \\
 &= 10x^2 + 16x - 42
 \end{aligned}$$

Original formula  
FOIL method  
Multiply  
Combine like terms.  
Distributive Property  
Combine like terms.

The surface area of the box is  $10x^2 + 16x - 42$  square units.

### Example 4 The Distributive Property

Find each product.

a.  $(2y - 3)(y^2 + 5y - 1)$

$$\begin{aligned}
 &(2y - 3)(y^2 + 5y - 1) \\
 &= 2y(y^2 + 5y - 1) - 3(y^2 + 5y - 1) && \text{Distributive Property} \\
 &= 2y^3 + 10y^2 - 2y - 3y^2 - 15y + 3 && \text{Distributive Property} \\
 &= 2y^3 + 7y^2 - 17y + 3 && \text{Combine like terms.}
 \end{aligned}$$

b.  $(2p^2 + p - 2)(p^2 + 4p - 3)$

$$\begin{aligned}
 &(2p^2 + p - 2)(p^2 + 4p - 3) \\
 &= 2p^2(p^2 + 4p - 3) + p(p^2 + 4p - 3) - 2(p^2 + 4p - 3) && \text{Distributive Property} \\
 &= 2p^4 + 8p^3 - 6p^2 + p^3 + 4p^2 - 3p - 2p^2 - 8p + 6 && \text{Distributive Property} \\
 &= 2p^4 + 9p^3 - 4p^2 - 11p + 6 && \text{Combine like terms.}
 \end{aligned}$$