# **8-3: MULTIPLYING BINOMIALS**

Lesson Objectives:

- Multiply binomials
- Multiply trinomials by binomials

## Multiplying Two Binomials

One way to organize multiplying two binomials is to use FOIL, which stands for "First, Outer, Inner, Last." The term FOIL is a memory device for applying the Distributive Property to the product of two binomials.

#### **EXAMPLE 1: MULTIPLYING USING FOIL**

Simplify.			
1. $(3x+4)(2x+5)$	2. $(3x-4)(2x+5)$	3. $(3x+4)(2x-5)$	4. $(3x-4)(2x-5)$

5. 
$$(4x+2)(3x-1)$$
  
6.  $(6x-5)(3x+1)$   
7.  $(3x-4)(3x+1)$   
8.  $(3x+4)(3x-4)$ 

9. (d+9)(d-11) 10. (b+3)(2b-5) 11. (2x-5)(x-4) 12. (2x-3y)(4x+3y)

#### **EXAMPLE 2: APPLYING MULTIPLICATION OF POLYNOMIALS**

Find the area of the shaded regions.



15.



16. The width of a rectangular painting is 3 in. more than twice the height. A frame that is 2.5 in. wide goes around the painting.

- a) Write an expression for the combined area of the painting and frame.
- b) Use the expression to find the combined area when the height of the painting is 12 in.
- c) Use the expression to find the combined area when the height of the painting is 15 in.

17. The Robertsons put a rectangular pool with a stone walkway around it in their backyard. The total length of the pool and walkway is 3 times the total width. The walkway is 2 ft. wide all around.

- a) Write an expression for the area of the pool.
- b) Find the area of the pool when the total width is 10 ft.
- c) Find the area of the pool when the total width is 9 ft.

18. The Cutting Edge frame shop makes a math by cutting out the inside of a rectangular board. Use the diagram to find the length and width of the original board if the area of the mat is 184 in<sup>2</sup>.



## Multiplying a Trinomial and a Binomial

FOIL works when you multiply two binomials but it is not helpful when multiplying a trinomial and a binomial. You can use the Distributive Property two find the SIX products and then simplify.

# **EXAMPLE 3: MULTIPLYING A TRINOMIAL AND A BINOMIAL** Simplify.

19.  $(2x+7)(3x^2-2x+3)$ 

20. 
$$(6n-8)(2n^2+n+7)$$
 21.  $(x+1)(x^2+x-1)$ 

22. 
$$(2b-1)(b^2-3b+4)$$
 23.  $(2y-3)(2y^2+y-4)$  24.  $(x^2-7x+1)(2x-9)$ 

25. 
$$(x-3)(x^2+4x+4)$$
  
26.  $(2n-3)(n^2-2n+5)$   
27.  $(5x-6)(4x^2-7x+6)$ 

Name		Practice Worksheet	Period
Simplify each product. 1. $(k+7)(k-6)$	2. $(2y+5)(y-3)$	3. $(x+6)(x-7)$	4. $(8w+2)(w+5)$
5. $(p-1)(p+10)$	6. $(a-4)(a^2-2a+1)$	7. $(12w^2 - w - 1)(4w - 2)$	8. $(p^2 - 7)(p + 8)$

9.  $(3k^2 + 2)(k + 5k^2)$  10.  $(8q - 3)(6q^2 + 2q + 1)$ 

### Find an expression for the area of each shaded region. Simplify.



13. You are planning a rectangular garden. Its length is twice its width *x*. You want a walkway 2 ft wide around the garden.

- a) Write an expression for the area of the garden and walkway.
- b) Write an expression for the area of the walkway only.

c) You have enough gravel to cover 76  $ft^2$  and want to use it all on the walkway. How big should you make the garden?