

# Unit 5, Day 0, next day

## I. Model Problems

A **binomial** is a polynomial with two terms. To multiply two binomials, use the FOIL method. FOIL stands for **F**irst, **I**nnner, **O**uter, **L**ast. To use this method, calculate the products of the first, inner, outer and last terms; then add. This is shown in the example.

**Example 1** Simplify  $(x + 7)(y + 2)$ .

Use the FOIL method as shown:

The product of the **F**irst terms is  $xy$ .

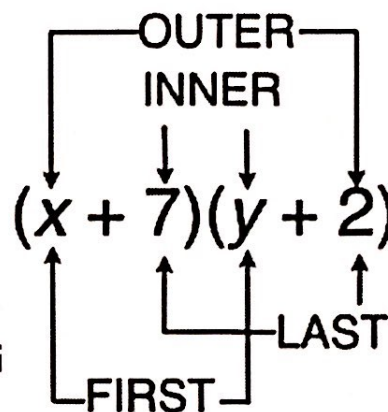
The product of the **O**uter terms is  $2x$ .

The product of the **I**nnner terms is  $7y$ .

The product of the **L**ast terms is  $14$ .

The sum of the first, inner, outer and last terms is  $xy + 7y + 2x + 14$ .

**The answer is  $xy + 7y + 2x + 14$ .**



**Example 2** Simplify  $(x + 2)(x + 5)$ .

The product of the **F**irst terms is  $x \cdot x = x^2$ .

The product of the **O**uter terms is  $5x$ .

The product of the **I**nnner terms is  $2x$ .

The product of the **L**ast terms is  $10$ .

The sum of the first, inner, outer and last terms is:

$$x^2 + 2x + 5x + 10 = x^2 + 7x + 10.$$

**The answer is  $x^2 + 7x + 10$ .**

**Example 2** Simplify  $(x^3 + 2x)(2x^6 - x^3)$ .

The product of the **F**irst terms is  $x^3 \cdot 2x^6 = 2x^9$ .  
The product of the **O**uter terms is  $x^3 \cdot -x^3 = -x^6$ .  
The product of the **I**nnner terms is  $2x \cdot 2x^6 = 4x^7$ .  
The product of the **L**ast terms is  $2x \cdot -x^3 = -2x^4$ .

Sum:

$$2x^9 - x^6 + 4x^7 - 2x^4$$

Simplify:

$$2x^9 + 4x^7 - x^6 - 2x^4$$

Cannot combine further.

★ choose 10 problems to practice, plus 1 problem from the challenge problems to try.

## II. Practice

Simplify.

1.  $(x + 1)(x - 15)$

2.  $(x + 13)(x - 2)$

3.  $(x - 3)(x - 14)$

4.  $(x - 11)(x - 4)$

5.  $(x + 5)(x + 13)$

6.  $(x + 9)(x + 6)$

7.  $(x - 7)(x + 12)$

8.  $(x - 7)(x + 8)$

9.  $(x + 9)(x - 11)$

10.  $(x + 5)(x - 10)$

11.  $(x - 11)(x - 10)$

12.  $(x - 3)(x - 12)$

13.  $(2x + 13)(3x + 9)$

14.  $(3x + 1)(2x + 14)$

15.  $(2x - 15)(x + 8)$

16.  $(2x - 2)(x + 13)$

17.  $(5x + 2)(2x - 7)$

18.  $(x + 4)(3x - 11)$

19.  $(9x - 4)(x - 6)$

20.  $(7x - 6)(3x - 9)$

21.  $(-5x + 6)(x + 5)$

22.  $(-3x + 8)(x^2 + 7)$

23.  $(x^2 - 8)(x + 4)$

24.  $(x^2 - 10)(x + y)$

25.  $(x^2 + 10x)(x - 3)$

26.  $(x^2 + 12)(x^2 - 2y)$

27.  $(x^2 - 12)(y - 2)$

28.  $(x^2 - 1)(y^2 - 2)$

29.  $(2x^2 + 14x)(-x^2 + 1)$

30.  $(3x^2 + 5x)(x + 2x^2)$

## III. Challenge Problems

31. What is the area of a rectangle with length  $(2x + 1)$  inches and

width  $(4x + 5)$  inches? Write your answer as an expression in terms of  $x$ .

**32.** What is the product of  $(x + a)(x - a)$  for any constant  $a$ ?

*hint:* Try multiplying the following pairs of binomials:

$(x + 1)(x - 1)$ ,  $(x + 2)(x - 2)$ ,  $(x + 3)(x - 3)$ . Do you notice a pattern?

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**33.** Correct the Error

There is an error in the student work shown below:

Question: Simplify  $(x - 2)(x - 6)$ .

Solution:

$$\begin{aligned} & (x - 2)(x - 6) \\ &= x \cdot x - 6 \cdot x - 2 \cdot x - 12 \\ &= x^2 - 8x - 12 \end{aligned}$$

What is the error? Explain how to solve the problem.

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