

First we are going to check, correct,
& grade pg. 362 B problems.

Then we will learn 7.2.

7.2 Multiply Polynomials

Essential Question:

How can you multiply polynomials?

Core Vocabulary

FOIL Method, p. 367

Previous
polynomial
closed
binomial
trinomial

What You Will Learn

- ▶ Multiply binomials.
- ▶ Use the FOIL Method.
- ▶ Multiply binomials and trinomials.

Multiplying Binomials

The **product** of two polynomials is always a polynomial. So, like the set of integers, the set of polynomials is closed under **multiplication**. You can use the Distributive Property to multiply two binomials.

Multiply 2 binomials by distributing:

$$\square(x+5) = \square x + \square 5$$

$$\begin{array}{r} 22 \\ \times 10 \\ \hline 00 \\ + 220 \\ \hline 220 \end{array}$$

Examples: a) horizontal (22)(10) = 220 b) vertical

Find (a) $(x+2)(x+5)$ and (b) $(x+3)(x-4)$.

$$x(x) + x(5) + 2(x) + 2(5)$$

$$x^2 + 5x + 2x + 10$$

$$\boxed{x^2 + 7x + 10}$$

$$\begin{array}{r} (x+3) \\ * (x-4) \\ \hline \end{array}$$

$$-4x - 12$$

$$+ x^2 + 3x + 0$$

$$\boxed{x^2 - x - 12}$$

Example: two-way table

c) Find $(2x-3)(x+5)$.

	$2x$	-3	
x	$2x^2$	$-3x$	$2x^2 + 7x - 15$
$+5$	$10x$	-15	

ALWAYS SIMPLIFY!!

Always combine like terms in your final answer.

SOLUTION

a. Use the horizontal method.

$$\begin{aligned} (x + 2)(x + 5) &= x(x + 5) + 2(x + 5) \\ &= x(x) + x(5) + 2(x) + 2(5) \\ &= x^2 + 5x + 2x + 10 \\ &= x^2 + 7x + 10 \end{aligned}$$

Distribute $(x + 5)$ to each term of $(x + 2)$.
Distributive Property
Multiply.
Combine like terms.

▶ The product is $x^2 + 7x + 10$.

b. Use the vertical method.

$$\begin{array}{r} x + 3 \\ \times x - 4 \\ \hline -4x - 12 \\ x^2 + 3x \\ \hline x^2 - x - 12 \end{array}$$

Align like terms vertically.
Distributive Property
Distributive Property
Combine like terms.

▶ The product is $x^2 - x - 12$.

EXAMPLE 2 Multiplying Binomials Using a Table

Find $(2x - 3)(x + 5)$.

SOLUTION

Step 1 Write each binomial as a sum of terms.

$$(2x - 3)(x + 5) = [2x + (-3)](x + 5)$$

Step 2 Make a table of products.

	$2x$	-3
x	$2x^2$	$-3x$
5	$10x$	-15

▶ The product is $2x^2 - 3x + 10x - 15$, or $2x^2 + 7x - 15$.

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YOUR TURN:

Find $(x - 4)(2x + 3)$. Use all 3 methods.

a. distribute horizontally:

$$\begin{aligned} &x(2x) + x(3) - 4(2x) - 4(3) \\ &2x^2 + 3x - 8x - 12 = 2x^2 - 5x - 12 \end{aligned}$$

b: distribute vertically:

$$\begin{array}{r} x - 4 \\ 2x + 3 \\ \hline 3x - 12 \\ + 2x^2 - 8x \\ \hline 2x^2 - 5x - 12 \end{array}$$

c: two-way table:

$$2x^2 - 5x - 12$$

	x	-4
$2x$	$2x^2$	$-8x$
3	$+3x$	-12

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Using the FOIL Method

The **FOIL Method** is a shortcut for multiplying two binomials.

Core Concept: FOIL Method

To multiply two binomials using the **FOIL Method**, find the sum of the products of the...

F irst terms,	$(x + 1)(x + 2)$	\rightarrow	$x(x) = x^2$
O uter terms,	$(x + 1)(x + 2)$	\rightarrow	$x(2) = 2x$
I nner terms, and	$(x + 1)(x + 2)$	\rightarrow	$1(x) = x$
L ast terms.	$(x + 1)(x + 2)$	\rightarrow	$1(2) = 2$

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

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Examples: Find each product by foiling.

a. $(x - 3)(x - 6)$ **FOIL**

$x(x) + x(-6) - 3(x) - 3(-6)$

$x^2 - 6x - 3x + 18$

$x^2 - 9x + 18$

b. $(2x + 1)(3x - 5)$

$6x^2 - 10x + 3x - 5$

$6x^2 - 7x - 5$

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YOUR TURN:

Find each product.

**FOIL - only for
Binomial x Binomial**

a. $(x + 3)(x - 7)$

$$x^2 - 7x + 3x - 21 = x^2 - 4x - 21$$

b. $(2x - 1)(5x - 4)$

$$10x^2 - 8x - 5x + 4 = 10x^2 - 13x + 4$$

c. Check b. by using vertical multiplication or a two-way table

$$\begin{array}{r}
 2x - 1 \\
 5x - 4 \\
 \hline
 -8x + 4 \\
 10x^2 - 5x + 0 \\
 \hline
 10x^2 - 13x + 4 \quad \checkmark
 \end{array}$$

	$2x$	-1	
$5x$	$10x^2$	$-5x$	
-4	$-8x$	$+4$	\checkmark

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$$\begin{array}{l}
 x + x = 2x \\
 x'(x') = x^2
 \end{array}$$

Is this a Binomial x Binomial?

Find $(x + 5)(x^2 - 3x - 2)$.

a. product by distributing:

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

$$x^3 - 3x^2 - 2x + 5x^2 - 15x - 10$$

$$x^3 + 2x^2 - 17x - 10$$

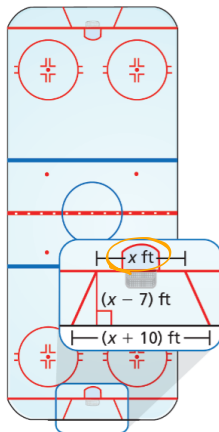
b. product using vertical multiplication or two-way table:

	x^2	$-3x$	-2
x	x^3	$-3x^2$	$-2x$
$+5$	$5x^2$	$-15x$	-10

$$x^3 + 2x^2 - 17x - 10$$

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Real-Life Problem



In hockey, a goalie behind the goal line can only play a puck in the trapezoidal region.

a. Write a polynomial that represents the area of the trapezoidal region.

$$A = \frac{1}{2}(b_1 + b_2)h$$

area

$$= \frac{1}{2}(x+10+x)(x-7)$$

P/EMDAS

b. Find the area of the trapezoidal region when the shorter base is 18 feet.

$$x = 18 \quad A = ?$$

$$= \frac{1}{2}(2x+10)(x-7)$$

$$= (x+5)(x-7)$$

$$= x^2 - 7x + 5x - 35$$

$$A = x^2 - 2x - 35$$

$$= (18)^2 - 2(18) - 35$$

$$= 324 - 36 - 35$$

$$= 253 \text{ ft}^2$$

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7.2 Multiply Polynomials

Assign:

p. 369

A: 10, 18, 20, 26, 28, 30, 32, 34, 38, 40, 42, 44, 48,
50, 54, 56, 58

B: 4, 6, 12, 14, 20, 22, 24, 26, 32, 34, 36, 38, 40, 44,
52, 54, 56, 58

C: 3, 5, 15, 17, 20, 21 – 35, 44, (c area of just the
frame), 52, 55 - 58

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