

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Notes

Algebra Section 9.6

Pages 593-599



**Goal:** “You will factor trinomials of the form  $x^2 + bx + c$ ”

\*Remember that when factoring trinomials you are essentially **un-F.O.I.L.ing**

Recall that when you foil:

- The **first** term of the final answer is obtained by:
- The **last** term of the final answer is obtained by:
- The **second/middle** term of the final answer is obtained by:

$$(d + e)(f + g) = ax^2 + bx + c$$

**Factor each trinomial into the product of two binomials:**

**Ex:**  $2x^2 - 7x + 3$

$$(2x - 1)(2x - 3)$$

**Ex:**  $3n^2 + 14n - 5$

$$(3n - 1)(n + 5)$$

**Ex:**  $3t^2 + 8t + 4$

$$(3t + 2)(t + 2)$$

**Ex:**  $4s^2 - 9s + 5$

$$(4s - 5)(s - 1)$$

**Ex:**  $2n^2 + 13n - 7$

$$(2n - 1)(n + 7)$$

**Ex:**  $2x^2 - 13x + 6$

$$(2x - 1)(x - 6)$$

**Factor:**

**Ex:**  $-4x^2 + 12x + 7$

$-(2x + 1)(x - 7)$

**Ex:**  $-2y^2 - 5y - 3$

$-(2y + 3)(y + 1)$

**Ex:**  $-5m^2 + 6m - 1$

$-(5m - 1)(m - 1)$

**Ex:**  $-3x^2 - x + 2$

$-(3x - 2)(x + 1)$

**Ex:**  $-3x^2 - 13x - 4$

$-(3x + 1)(x + 4)$

**Ex:** An athlete throws a discus from an initial height of 6 feet and with an initial vertical velocity of 46 ft/s.

- a. Write an equation that gives the height of the discus as a function of time (in seconds) since it left the athlete's hand.

$h = -16t^2 + 46t + 6$

- b. After how many seconds does it hit the ground?

The discus will hit the ground when  $h = 0$  so replace  $h$  with 0 and solve by factoring

$0 = -16t^2 + 46t + 6$

$0 = -2(8t + 1)(t - 3)$

$t$  cannot be negative since its time so it must be 3



**Ex:** A soccer goalie throws the ball into the air with an initial vertical velocity of 28 ft/s, from an initial height of 8 feet.

- a. Write an equation that gives the height of the soccer ball as a function of time.

$$h = -16t^2 + 28t + 8$$

- b. How long does it take for the ball to reach the ground?

$$0 = -(4t + 1)(t - 2)$$

$$t = 2 \text{ seconds}$$

**Ex:** A rectangle's length is 13 meters more than 3 times its width. The area is 10 square meters. What is the width?

$$l \cdot w$$

$$w(13 + 3w) = 10$$

$$13w + 3w^2 = 10$$

$$3w^2 + 13w - 10 = 0$$

$$(3w - 2)(w + 5) = 0 \quad w \text{ cannot be negative since it is a dimension so } w = 2/3$$

**Ex:** A rectangles length is 5 feet more than 4 times the width. The area is 6 square feet. What is the width?

$$w(5 + 4w) = 6$$

$$4w^2 + 5w - 6 = 0$$

$$(4w - 3)(w + 2) = 0$$

$$w = 3/4$$

**Factoring  $ax^2 + bx + c$  FORMULA:** You still must check your answer by FOILing...even if using the steps below.

**Ex:** Factor  $2x^2 - 7x + 3$  using the following steps:

1. Multiply  $a \cdot c$

$$a = 2 \quad c = 3$$

$$a \cdot c = 6$$

2. Find the factors of  $a \cdot c$  whose sum is  $b$

Find the factors of 6 that add up to  $-7$

$$m = -6, n = -1$$

3. Call these factors  $m$  and  $n$  and plug into the formula:  $ax^2 + mx + nx + c$

$$2x^2 + -6x + -1x + 3$$

4. Separate into two binomials

\*\*Not changing the value, just creating two groups

$$(2x^2 + -6x) + (-1x + 3)$$

5. Find the GCF in each set of parenthesis **separately**. You want the leftover binomial (the stuff in parenthesis) to match.

$$2x(x - 3) + -1(x - 3)$$

6. The matching binomial is a **common factor** so factor it out, just like you would a **GCF**.

$$(x - 3)(2x - 1)$$

7. Check your answer by FOILing.

**Factor the following examples using the formula:**

**Ex:**  $3x^2 + 10x + 3$

$$(3x^2 + 9x) + (1x + 3)$$
$$3x(x + 3) + 1(x + 3)$$
$$(3x + 1)(x + 3)$$

**Ex:**  $2x^2 + 5x - 63$

$$(2x^2 + 14x) + (-9x - 63)$$
$$2x(x + 7) + -9(x + 7)$$
$$(2x - 9)(x + 7)$$

**Ex:**  $2x^2 - 7x + 3$

$$(2x - 1)(x - 3)$$

**Ex:**  $3x^2 - 17x + 10$

$$(3x - 15)(x - 2)$$

**Ex:**  $4x^2 + 16x + 15$

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

**Ex:**  $8x^2 - 2x - 3$

$$(4x - 3)(2x + 1)$$