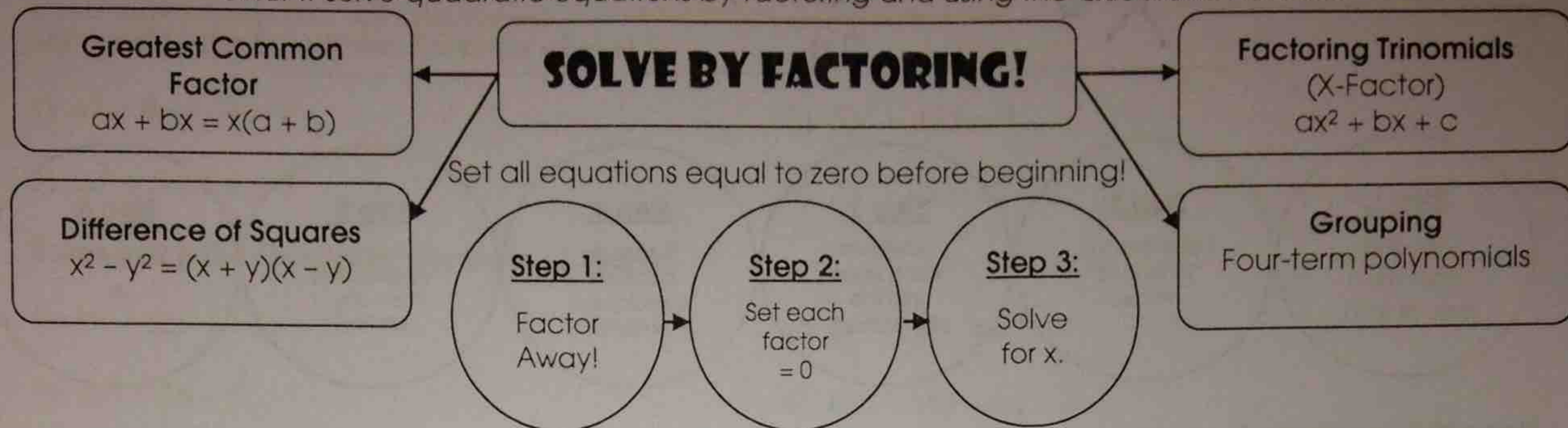


# 1.4 Solving Quadratics

SWBAT solve quadratic equations by factoring and using the Quadratic Formula.



**Directions:** Solve each of the following by factoring. Check your solutions by graphing.

- $(2x + 1)(3x - 4) = 0$
- $x(3x + 9) = 0$
- $-x^2 = -121$

$$2x + 1 = 0 \quad 3x - 4 = 0$$

$$2x = -1 \quad 3x = 4$$

$$x = -\frac{1}{2} \quad x = \frac{4}{3}$$

$\{-\frac{1}{2}, \frac{4}{3}\}$

$$x = 0 \quad 3x + 9 = 0$$

$$3x = -9$$

$$x = -3$$

$\{0, -3\}$

$$x^2 - 121 = 0$$

$$(x - 11)(x + 11) = 0$$

$$x - 11 = 0 \quad x + 11 = 0$$

$$x = 11 \quad x = -11$$

$\{-11, 11\}$

$$4. \quad 5x^2 + 32x = -28x$$

$$5x^2 + 60x = 0$$

$$5x(x + 12) = 0$$

$$5x = 0 \quad x + 12 = 0$$

$$x = 0 \quad x = -12$$

$\{0, -12\}$

$$5. \quad 45x^2 + 56x = -16$$

$$45x^2 + 56x + 16 = 0$$

$$(45x^2 + 20x)(36x + 16) = 0$$

$$5x(9x + 4) \cdot 4(9x + 4) = 0$$

$$5x + 4 = 0 \quad 9x + 4 = 0$$

$$5x = -4 \quad 9x = -4$$

$$x = -\frac{4}{5} \quad x = -\frac{4}{9}$$

$\{-\frac{4}{5}, -\frac{4}{9}\}$

$$6. \quad 3x^2 + 8x + 5 = 0$$

$$(3x^2 + 3x)(5x + 5) = 0$$

$$3x(x + 1) \cdot 5(x + 1) = 0$$

$$3x + 5 = 0 \quad x + 1 = 0$$

$$3x = -5 \quad x = -1$$

$$x = -\frac{5}{3}$$

$\{-1, -\frac{5}{3}\}$

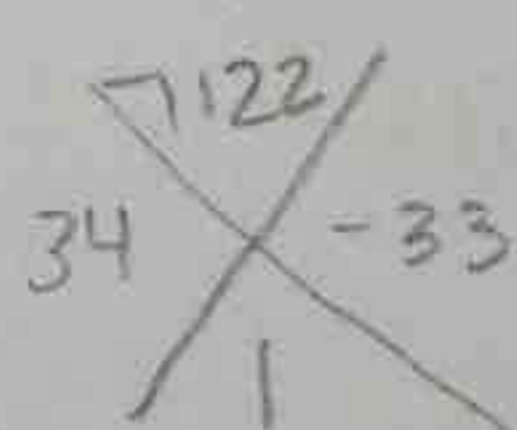
7. The product of two consecutive negative integers is 1122. What are the numbers?

1st:  $x$   
2nd:  $x + 1$

$$x(x + 1) = 1122$$

$$x^2 + 1x = 1122$$

$$x^2 + 1x - 1122 = 0$$



$$(x + 34)(x - 33) = 0$$

$$x + 34 = 0 \quad x - 33 = 0$$

$$x = -34$$

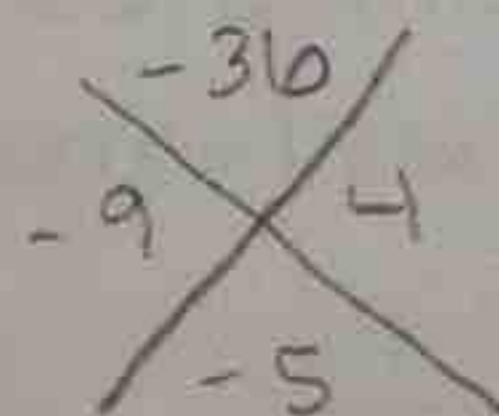
$-34$   
 $-33$

8. The width of a rectangle is  $(x + 1)$  and the length is  $(x - 6)$ . What is the length and width of the rectangle if the area is 30 square feet?

$$(x + 1)(x - 6) = 30$$

$$x^2 - 5x - 6 = 30$$

$$x^2 - 5x - 36 = 0$$



$$(x - 9)(x + 4) = 0$$

$$x - 9 = 0 \quad x + 4 = 0$$

$$x = 9 \quad x = -4$$

width =  $9 + 1 = 10$  ft  
length =  $9 - 6 = 3$  ft

↑  
Width can't be negative.

9. The area of a triangular lot is 225 square feet. The base of the lot is 7 more than its height. Find the length of the base and the height.

base =  $h + 7$   
height =  $h$

$$A = \frac{bh}{2}$$

$$\frac{h(h + 7)}{2} = 225$$

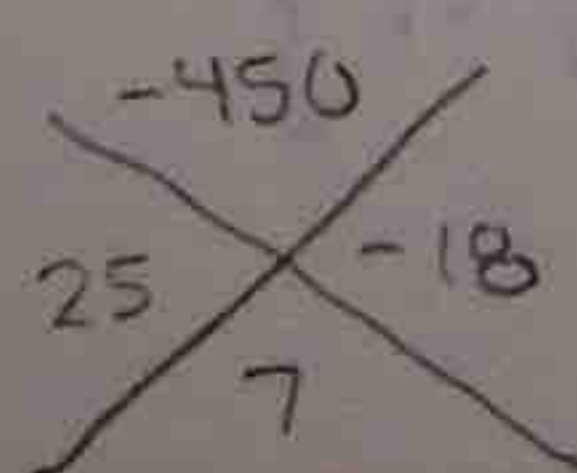
$$(h + 25)(h - 18) = 0$$

$$h + 25 = 0 \quad h - 18 = 0$$

$$h = -25 \quad h = 18$$

base = 25  
height = 18

↑  
height can't be negative



$$h^2 + 7h = 450$$

$$h^2 + 7h - 450 = 0$$

The Quadratic Formula

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Step 1:**

Set the equation equal to 0.

**Step 2:**

Label the "a", "b" and "c" terms.

**Step 3:**

Substitute each value into the discriminant.

**Step 4:**

Substitute back into formula and simplify.

**Step 5:**

Split the equation into the + and - solutions

**Step 6:**

Solve for x.

Using the Quadratic Formula

What are the roots of the equation  $2x^2 - 4x + 7 = 0$ ? Use the quadratic formula to solve.

$a = 2$   
 $b = -4$   
 $c = 7$

$$X = \frac{4 \pm \sqrt{(-4)^2 - 4(2)(7)}}{2(2)}$$

$$X = \frac{4 \pm \sqrt{-40}}{4}$$

$$X = \frac{4 \pm i\sqrt{40}}{4}$$

40  
4 10  
2 2 25

$$X = \frac{4 \pm 2i\sqrt{10}}{4}$$

$$X = \frac{2 \pm i\sqrt{10}}{2}$$

Don't divide the radicand! we already simplified it!

$$\left\{ \frac{2+i\sqrt{10}}{2}, \frac{2-i\sqrt{10}}{2} \right\}$$

What are the solutions of  $x^2 - 34x + 289 = 0$ ? Use the quadratic formula to solve.

$a = 1$   
 $b = -34$   
 $c = 289$

$$X = \frac{34 \pm \sqrt{(-34)^2 - 4(1)(289)}}{2(1)}$$

$$X = \frac{34 \pm \sqrt{0}}{2}$$

$$X = \frac{34 \pm 0}{2}$$

$$X = \frac{34 + 0}{2}$$

$$X = 17$$

$$X = \frac{34 - 0}{2}$$

$$X = 17$$

$$\{17\}$$

What are the roots of the equation  $x^2 - 8x = 33$ ? Use the quadratic formula to solve.

$$x^2 - 8x - 33 = 0$$

$a = 1$   
 $b = -8$   
 $c = -33$

$$X = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(-33)}}{2(1)}$$

$$X = \frac{8 \pm \sqrt{196}}{2}$$

$$X = \frac{8 \pm 14}{2}$$

$$X = \frac{8 + 14}{2}$$

$$X = 11$$

$$X = \frac{8 - 14}{2}$$

$$X = -3$$

$$\{-3, 11\}$$