

1.5A Quadratic Equations

Solve by Factoring

- **Solve quadratic equations by factoring**
- **Solve quadratic equations by the square root property**

LT: Solve quadratic equations by factoring

- **Definition of a Quadratic Equation**

An equation that can be written in the general form:

$$ax^2 + bx + c = 0$$

- **The Zero-Product Principle**

If the product of two algebraic expressions is zero, then at least one of the factors is equal to zero.

$$\text{If } AB = 0, \text{ then } A = 0 \text{ or } B = 0$$

Example 1:

Solving Quadratic Equations by Factoring

a. $4x^2 - 2x = 0$

$$2x(2x - 1) = 0$$

$$2x = 0 \quad 2x - 1 = 0$$

$$x = 0 \quad 2x = 1$$

$$x = \frac{1}{2}$$

b. $2x^2 + 7x = 4$

$$2x^2 + 7x - 4 = 0$$

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

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

$$x = \frac{1}{2}$$

$$x = -4$$

Your Turn 1:

Solving Quadratic Equations by Factoring

a. $3x^2 - 9x = 0$

$$3x(x - 3) = 0$$

$$3x = 0 \quad x - 3 = 0$$

$$x = 0 \quad x = 3$$

b. $2x^2 + x = 1$

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

$$(2x - 1)(x + 1) = 0$$

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

$$x = \frac{1}{2}$$

$$x = -1$$

LT: Solve quadratic equations by the square root property

- **The Square Root Property**

If $u^2 = d$, then $u = \sqrt{d}$ or $u = -\sqrt{d}$

Example 2: Solving Quadratic Equations by the Square Root Property

a. $3x^2 - 15 = 0$

$$3x^2 = 15$$

$$x^2 = 5$$

$$x = \pm\sqrt{5}$$

b. $9x^2 + 25 = 0$

$$9x^2 = -25$$

$$x^2 = \frac{-25}{9}$$

$$x = \pm\frac{5}{3}i$$

c. $(x - 2)^2 = 6$

$$x - 2 = \pm\sqrt{6}$$

$$x = 2 \pm \sqrt{6}$$

Your Turn 2: Solving Quadratic Equations by the Square Root Property

a. $3x^2 - 21 = 0$

$$3x^2 = 21$$

$$x^2 = 7$$

$$x = \pm\sqrt{7}$$

b. $5x^2 + 45 = 0$

$$5x^2 = -45$$

$$x^2 = -9$$

$$x = \pm 3i$$

c. $(x + 5)^2 = 11$

$$x + 5 = \pm\sqrt{11}$$

$$x = -5 \pm \sqrt{11}$$