

## SOLVING QUADRATIC EQUATIONS BY FACTORING



**EXAMPLE:** Solve  $2x^2 = 9x + 18$

**Write equation in standard form ( $ax^2 + bx + c = 0$ ):**

$$2x^2 - 9x - 18 = 0$$

**Factor the left side of the equation:**

$$(x - 6)(2x + 3) = 0$$

**Recognize that since the product is 0, one of the factors must be 0:**

$$x - 6 = 0 \text{ or } 2x + 3 = 0$$

**Solve for x in each possibility:**

$$x = 6 \text{ or } x = -3/2$$

**Check your x values by substituting into the original equation:**

$$\begin{aligned} \text{Check of } x = 6 \quad 2(6^2) &= 2(36) = 72 \\ 9(6) + 18 &= 54 + 18 = 72 \end{aligned}$$

$$\begin{aligned} \text{Check of } x = -3/2 \quad 2(-3/2)^2 &= 2(9/4) = 9/2 \\ 9(-3/2) + 18 &= -27/2 + 18 = 9/2 \end{aligned}$$

From the above work, we see that there are two solutions, 6 and  $-3/2$ .

### ADDITIONAL EXAMPLES:

$$x^2 + 4x = 32$$

$$3x^2 = 14x$$

$$x^2 + 4x - 32 = 0 \quad \leftarrow \text{standard form} \rightarrow \quad 3x^2 - 14x = 0$$

$$(x + 8)(x - 4) = 0 \quad \leftarrow \text{factor left side} \rightarrow \quad x(3x - 14) = 0$$

$$x + 8 = 0 \text{ or } x - 4 = 0 \quad \leftarrow \text{one factor must be 0} \rightarrow \quad x = 0 \text{ or } 3x - 14 = 0$$

$$x = -8 \text{ or } x = 4 \quad \leftarrow \text{solve for x} \rightarrow \quad x = 0 \text{ or } x = 14/3$$

$$\left. \begin{aligned} (-8)^2 + 4(-8) &= 32 \\ (4)^2 + 4(4) &= 32 \end{aligned} \right\} \leftarrow \begin{array}{l} \text{check results} \\ \text{(both work)} \end{array} \rightarrow \left\{ \begin{aligned} 3(0)^2 &= 14(0) \\ 3(14/3)^2 &= 14(14/3) \end{aligned} \right.$$

**PRACTICE:** Solve and check each of the following

$$1) x^2 + 4x = 12 \quad 2) x^2 = 5x \quad 3) 17x = 3x^2 - 6 \quad 4) 5x^2 + 7x = 0$$

Answers: 1) -6 and 2    2) 0 and 5    3) -1/3 and 6    4) 0 and -7/5