

10-6 Solving Equations by Factoring

In order to use the zero product property:

- (1) Get all the terms on one side so the other side is zero.
[Tip: Make sure the x^2 term is positive]
- (2) Factor the polynomial completely.
- (3) Set each multiplier equal to zero and solve for x .
- (4) List solutions least to greatest in $\{ \}$'s.
- (5) Check each solution in the original equation using the order of operations.

Example 1: Solve and check $11x + 10 = -3x^2$

- (1) **Get all the terms on one side so the other side is zero.**
[Tip: Make sure the x^2 term is positive]

$$\begin{array}{r} 11x + 10 = -3x^2 \\ + 3x^2 \qquad \qquad + 3x^2 \\ \hline 3x^2 + 11x + 10 = 0 \end{array}$$

- (2) **Factor the polynomial completely.**
Use the smiley face method to factor. The result will be:
 $(x + 2)(3x + 5) = 0$

- (3) **Set each multiplier equal to zero and solve for x .**
There are two multipliers: $(x + 2)$ is a multiplier and $(3x + 5)$ is a multiplier

$$\begin{array}{r} x + 2 = 0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

$$\begin{array}{r} 3x + 5 = 0 \\ -5 \quad -5 \\ \hline \frac{3x}{3} = \frac{-5}{3} \\ x = -1\frac{2}{3} \end{array}$$

- (4) **List solutions least to greatest in $\{ \}$'s**
 $\{-2, -1\frac{2}{3}\}$

- (5) **Check each solution in the original equation using the order of operations.**

$$\checkmark: x = -2$$

$$11(\quad) + 10 = -3(\quad)^2$$

$$11(-2) + 10 = -3(-2)^2$$

$$-22 + 10 = -3 \cdot 4$$

$$-12 = -12 \quad \checkmark$$

$$\checkmark: x = -1\frac{2}{3} = -\frac{5}{3} \quad (\text{Do not work with mixed numbers.})$$

$$11(\quad) + 10 = -3(\quad)^2$$

$$11\left(-\frac{5}{3}\right) + 10 = -3\left(-\frac{5}{3}\right)^2$$

$$-\frac{55}{3} + \frac{30}{3} = -3 \cdot \frac{25}{9}$$

$$-\frac{25}{3} = -\frac{25}{3} \quad \checkmark$$