

The QUADRATIC FORMULA can be used to find the roots (x) of a quadratic.

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

The DISCRIMINANT can be used to determine the number of roots.

Ex.  $\frac{4}{a}x^2 - \frac{12}{b}x - \frac{91}{c} \rightarrow x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(4)(-91)}}{2(4)}$

$$(-12)^2 - 4(4)(-91)$$

↓

$$\boxed{1600}$$

$$\boxed{2 \text{ roots}}$$

$$x = \frac{12 \pm \sqrt{144 + 1456}}{8}$$

$$x = \frac{12 \pm \sqrt{1600}}{8}$$

$$x = \frac{12 \pm 40}{8}$$

$$x = \frac{12 + 40}{8}$$

$$x = \frac{52}{8}$$

$$\boxed{x = \frac{13}{2}}$$

$$x = \frac{12 - 40}{8}$$

$$x = \frac{-28}{8}$$

$$\boxed{x = -\frac{7}{2}}$$

discriminant  $> 0$  ... 2 roots

discriminant  $< 0$  ... no roots

discriminant  $= 0$  ... 1 root

$$b. \quad 2x^2 - 7 = x^2 - 24x + 9 + y$$

$$\begin{array}{r} +24x - x^2 - 9 \\ -x^2 + 24x - 9 \\ \hline \end{array}$$

$$24x + x^2 - 16 = y$$

$$y = \boxed{x^2 + 24x} - 16 \longrightarrow \begin{array}{c} -16 \\ \times \\ 24 \end{array} \text{ CAN'T FACTOR!}$$

$$y = (x^2 + 24x + 144) - 16 - 144$$

$$y = (x + 12)^2 - 160$$

$$0 = (x + 12)^2 - 160$$

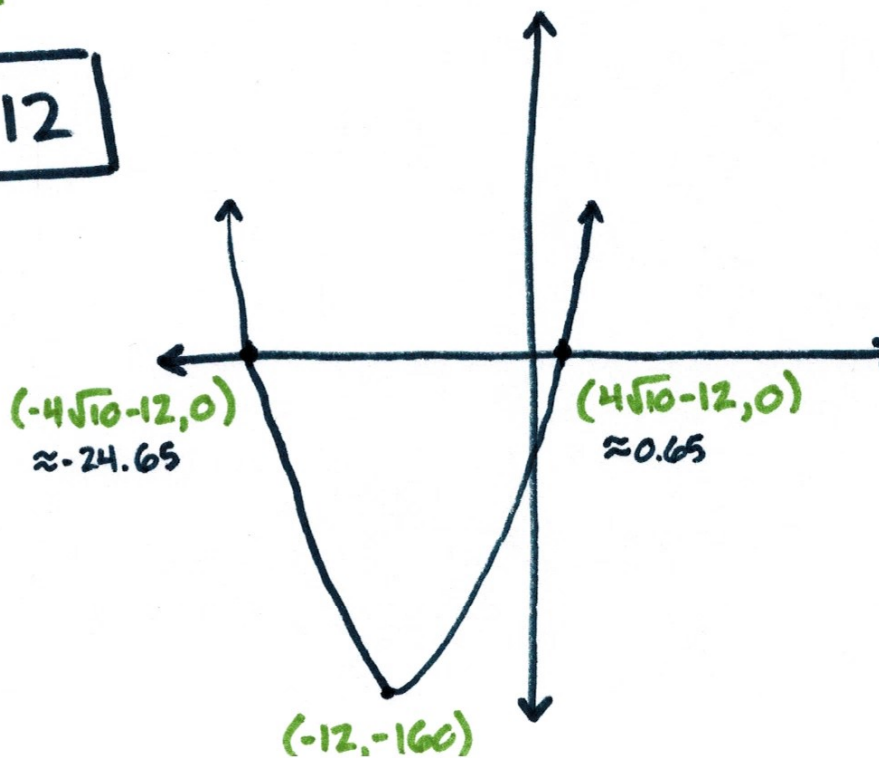
$$\sqrt{160} = \sqrt{(x + 12)^2}$$

$$\sqrt{16} \quad \sqrt{10}$$

$$\pm 4$$

$$\pm 4\sqrt{10} = x + 12$$

$$\boxed{x = \pm 4\sqrt{10} - 12}$$



# Warm Up

5/2/2018

1. Find the roots of each quadratic.

a.  $-5x^2 + 27 - x = y - 2x^2 + 6 + 17x$

b.  $2x^2 - 7 = x^2 - 24x + 9 + y$

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a. 
$$\begin{array}{r} -5x^2 + 27 - x = y - 2x^2 + 6 + 17x \\ +2x^2 \quad -6 \quad -17x \quad +2x^2 \quad -6 \quad -17x \\ \hline \end{array}$$

$$-3x^2 + 21 - 18x = y$$

$$y = \frac{-3x^2 - 18x + 21}{-3}$$

$$y = -3(x^2 + 6x - 7)$$

$$y = -3((x^2 + 6x + 9) - 7 - 9)$$

$$y = -3((x+3)^2 - 16)$$

$$y = -3(x+3)^2 + 48$$

$$0 = -3(x+3)^2 + 48$$

$$\frac{-48}{-3} = \frac{-3(x+3)^2}{-3}$$

$$\sqrt{16} = \sqrt{(x+3)^2}$$

$$\pm 4 = x + 3$$

$$\boxed{x = 1, -7}$$

$$y = -3x^2 - 18x + 21$$

$$y = -3(x^2 + 6x - 7)$$

$$\begin{array}{cc} \textcircled{7} & \textcircled{-1} \\ \times & \\ \textcircled{6} & \end{array}$$

$$y = -3(x+7)(x-1)$$

$$\begin{array}{r} x+7=0 \\ -7 \quad -7 \\ \hline \end{array}$$

$$\boxed{x = -7}$$

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

$$\boxed{x = 1}$$