

## Solving Quadratic Functions

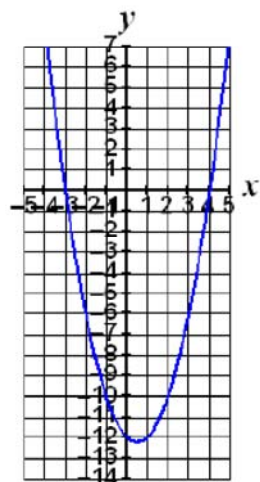
- I can solve a quadratic function by looking at the graph.
- I can solve a quadratic function by factoring.
- I can solve a quadratic function by taking the square root.
- I can solve a quadratic function using the Quadratic formula.

What does it mean to "solve" a quadratic function?

## Method 1: Inspection/Graphing

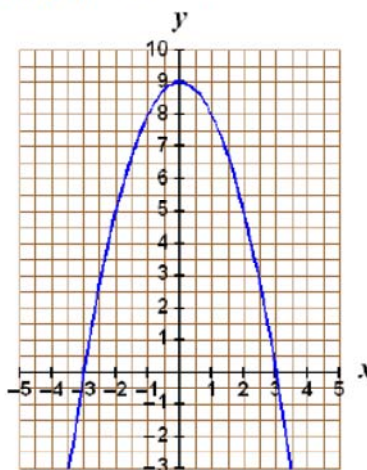
For #21-22, a quadratic function and its graph are shown. Identify the solutions, or roots, of the related quadratic equation.

21.)  $f(x) = x^2 - x - 12$

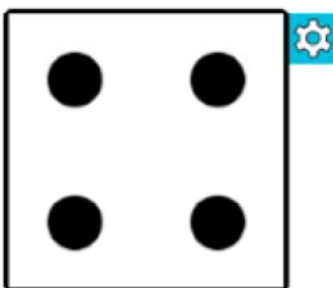
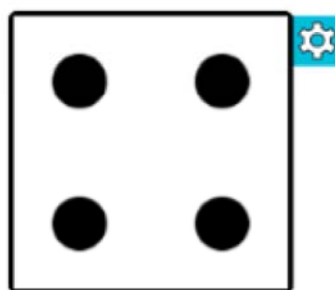
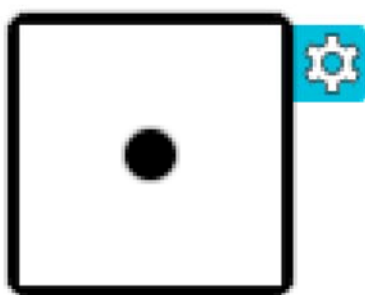


Solve:  $x = \underline{-3}$  or  $\underline{4}$

22.)  $y = -x^2 + 9$



Solve:  $x = \underline{-3}$  or  $\underline{3}$



## Method 2: Solve by Factoring

$$x^2 + 3x = 40$$


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$$x^2 + 3x - 40 = 0$$

$$\begin{array}{r} -40 \\ 8 \quad -5 \\ \hline 3 \end{array}$$

$$(x + 8)(x - 5) = 0$$

$$\begin{array}{l} x + 8 = 0 \quad x - 5 = 0 \\ \hline x = -8 \quad x = +5 \end{array}$$

$$4x^2 - 8x = 3$$


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$$4x^2 - 8x - 3 = 0$$

$$x^2 - 64 = 0 \quad x = 8, -8$$

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

$$(x + 8)(x - 8) = 0$$

$$\begin{array}{l} x + 8 = 0 \quad x - 8 = 0 \\ \hline x = -8 \quad x = 8 \end{array}$$

$$\begin{array}{r} -12 \\ \hline -8 \end{array}$$

## Method 2: Solve by Factoring

**Exercise:**

a)  $x^2 + 7x + 12 = 0$



c)  $x^2 - 16x + 63 = 0$



b)  $x^2 + x - 20 = 0$



d)  $2x^2 + x - 15 = 0$



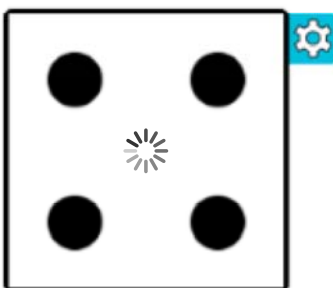
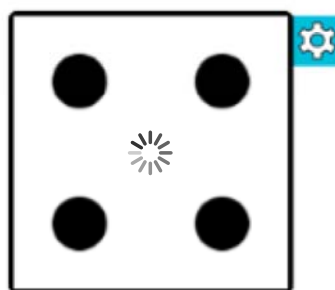
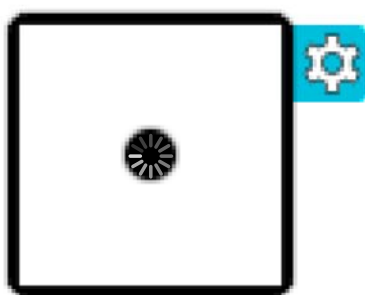
**Exercise:**

a)  $4x^2 - 25 = 0$



b)  $x^2 + 8x + 16 = 0$





## Method 3: Solve by Taking the Square Root

$\sqrt{x^2} = \sqrt{25}$ $x = \pm 5$	$\frac{2x^2}{2} = \frac{98}{2}$ $\sqrt{x^2} = \sqrt{49}$ $x = \pm 7$
$x^2 + 64 = 0$ $\frac{-64 - 64}{-64 - 64}$ $\sqrt{x^2} = \sqrt{64}$ $x = \pm 8i$	$9x^2 - 16 = 0$ $\frac{+16 + 16}{+16 + 16}$ $\frac{9x^2}{9} = \frac{16}{9}$ $\sqrt{x^2} = \sqrt{\frac{16}{9}}$ $x = \pm \frac{4}{3}$
$x^2 + 9 = 25$ $\frac{-9 - 9}{-9 - 9}$ $\sqrt{x^2} = \sqrt{16}$ $x = \pm 4$	$\sqrt{(x-2)^2} = \sqrt{25}$ $x-2 = \pm 5$ $\frac{x-2=5}{+2 +2} \quad \frac{x-2=-5}{+2 +2}$ $x = 7 \quad x = -3$
$(x-2)^2 + 9 = 25$ $\frac{-9 - 9}{-9 - 9}$ $\sqrt{(x-2)^2} = \sqrt{16}$ $x-2 = \pm 4$ $\frac{x-2=4}{+2 +2} \quad \frac{x-2=-4}{+2 +2}$ $x = 6 \quad x = -2$	$4(x-2)^2 + 9 = 25$ $\frac{-9 - 9}{-9 - 9}$ $\frac{4(x-2)^2}{4} = \frac{16}{4}$ $(x-2)^2 = 4$