

Good Afternoon!

Please put up your phones, take your seats,
and get your notes out.

Solving Quadratic Functions

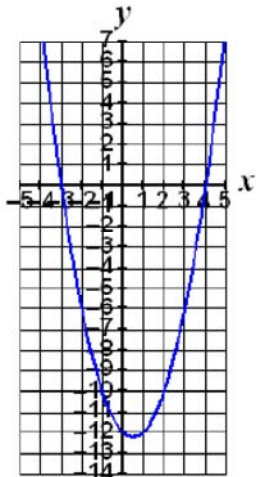
- I can solve a quadratic function by looking at the graph.
- I can solve a quadratic function by factoring.
- I can solve a quadratic function by taking the square root.
- I can solve a quadratic function using the Quadratic formula.

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

Method 1: Inspection/Graphing

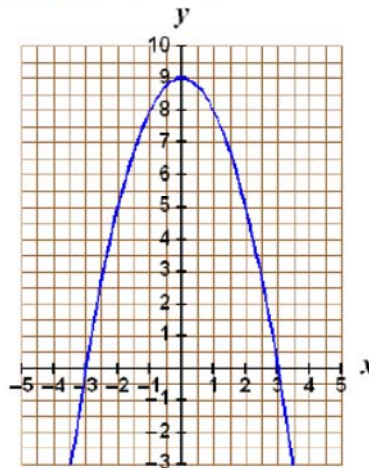
For #21-22, a quadratic function and its graph are shown. Identify the solutions, or roots, of the related quadratic equation.

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

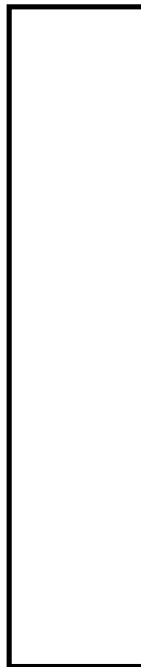


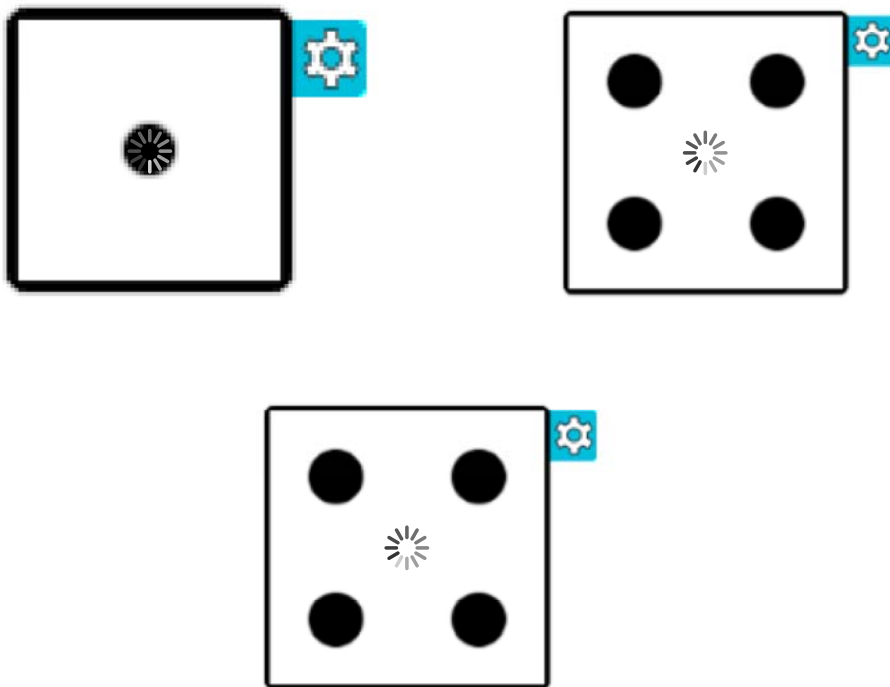
Solve: $x = \underline{-3}$ or $\underline{4}$

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



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





Method 2: Solve by Factoring

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

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

$x = -8, 5$

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

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

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

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

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

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

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

$$\begin{array}{r} -12 \\ \hline 4 \quad 4 \\ -8 \end{array}$$

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

$$\begin{array}{r} -12 \\ \hline -\frac{3}{2} = \frac{-6}{4} \quad \frac{2}{4} = \frac{1}{2} \\ -4 \end{array}$$

$$(x - \frac{3}{2})(x + \frac{1}{2}) = 0$$

$$(2x-3)(2x+1) = 0$$

$$x^2 - 64 = 0$$

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

$$\begin{array}{r} -64 \\ \hline -8 \quad -8 \\ 0 \end{array}$$

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

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

Method 2: Solve by Factoring

Exercise:

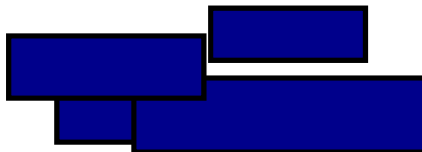
a) $x^2 + 7x + 12 = 0$

$x = -3, x = -4$



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

$x = -5, x = 4$



Exercise:

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

$x = \pm 2.5$

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

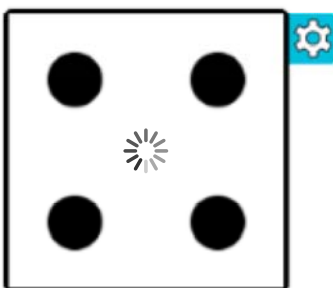
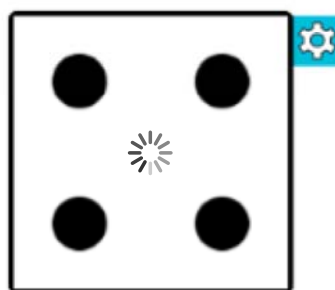
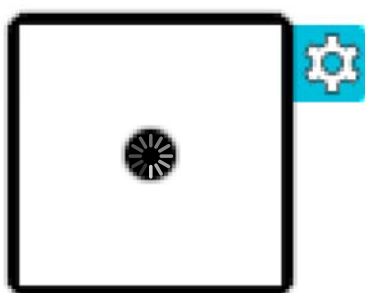
$x = 7, x = 9$

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

$x = -3, x = 2.5$

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

$x = -4$



Method 3: Solve by Taking the Square Root

$\sqrt{x^2} = \sqrt{25}$ $x = \pm 5$	$\frac{2x^2}{2} = \frac{98}{2}$ $\sqrt{x^2} = \sqrt{49}$ $x = \pm 7$
$x^2 + 64 = 0$ $\underline{-64 \quad -64}$ $\sqrt{x^2} = \sqrt{-64}$ <p>no real solution</p>	$9x^2 - 16 = 0$ $\underline{+16 \quad +16}$ $\frac{9x^2}{9} = \frac{16}{9}$ $\sqrt{x^2} = \sqrt{\frac{16}{9}} \quad x = \pm \frac{4}{3}$
$x^2 + 9 = 25$ $x = \pm 4$	$\sqrt{(x-2)^2} = \sqrt{25}$ $x-2 = \pm 5$ $x-2 = 5 \quad x-2 = -5$ $x = 7 \quad x = -3$
$(x-2)^2 + 9 = 25$ $x = 6, -2$	$4(x-2)^2 + 9 = 25$ $\underline{-9 \quad -9}$ $\frac{4(x-2)^2}{4} = \frac{16}{4}$ $\sqrt{(x-2)^2} = \sqrt{4}$ $x-2 = \pm 2$

Method 3: Solve by Taking the Square Root

$$200 = 8x^2$$

$$x = \pm 5$$



$$-4x^2 + 84 = 4$$

$$x = \pm 2\sqrt{5}$$



$$(x+1)^2 - 9 = 0$$

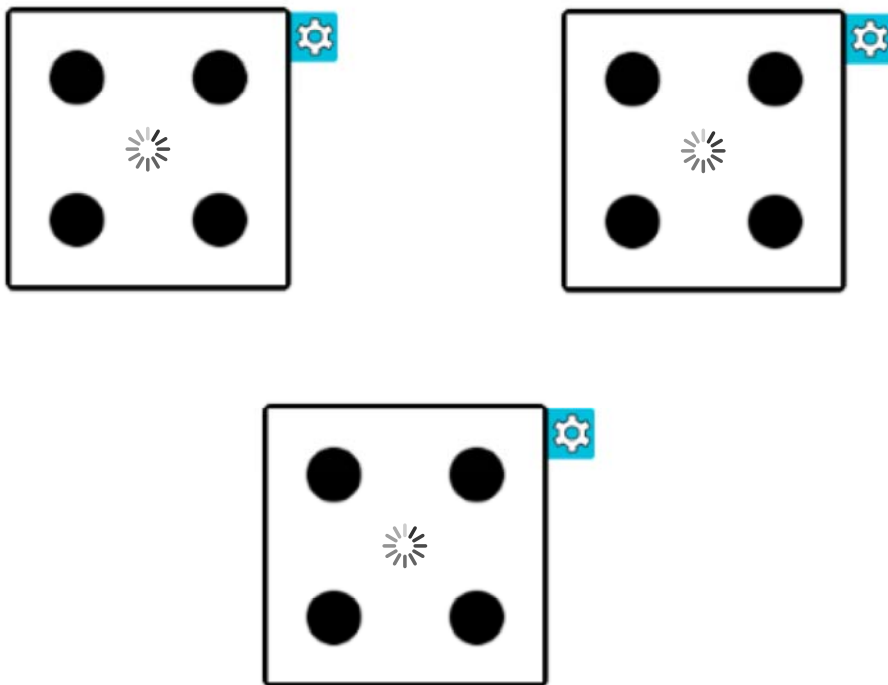
$$x = -4, x = 2$$



$$-4(x+2)^2 + 16 = 0$$

$$x = -6, x = 2$$





Method 4: Solve Using Quadratic Formula

16.) $2x^2 + 5x = -3$

$a = 2, b = 5, c = 3$

$$2x^2 + 5x + 3 = 0$$

$$x = \frac{-(5) \pm \sqrt{5^2 - 4(2)(3)}}{2(2)}$$

$$x = \frac{-5 \pm \sqrt{25 - 24}}{4} = \frac{-5 \pm \sqrt{1}}{4} = \frac{-5 \pm 1}{4}$$

$$\frac{-5+1}{4} \quad \frac{-5-1}{4}$$

$$x = 1, -\frac{3}{2}$$

17.) $2x^2 - 6 = -x$

$a = \underline{\quad}, b = \underline{\quad}, c = \underline{\quad}$

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

Method 4: Solve Using Quadratic Formula

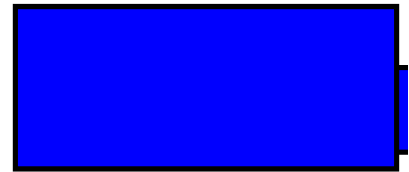
Exercise: Solving the following quadratic equations using quadratic formula.

a) $x^2 + 7x + 12 = 0$ $x = \frac{-7 \pm \sqrt{7^2 - 4(1)(12)}}{2(1)}$ $\frac{-7+1}{2} = \frac{-6}{2}$ d) $x^2 + 4x + 2 = 0$

$x = -3, -4$

$x = \frac{-7 \pm \sqrt{49 - 48}}{2} = \frac{-7 \pm 1}{2}$ $\frac{-7-1}{2} = \frac{-8}{2}$ $x = -2 \pm \sqrt{2}$

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



b) $x^2 + 8x + 16 = 0$ $\frac{-8 \pm \sqrt{8^2 - 4(1)(16)}}{2(1)}$
 $x = -4$
 $a=1$ $b=8$ $c=16$ $= \frac{-8 \pm \sqrt{64 - 64}}{2}$
 $= \frac{-8}{2}$

e) $x^2 + 5x + 3 = 0$

$x = \frac{-5 \pm \sqrt{13}}{2}$

c) $4x^2 - 25 = 0$
 $a=4$ $b=0$ $c=-25$
 $x = \pm 2.5$
 $x = \frac{0 \pm \sqrt{0^2 - 4(4)(-25)}}{2(4)}$

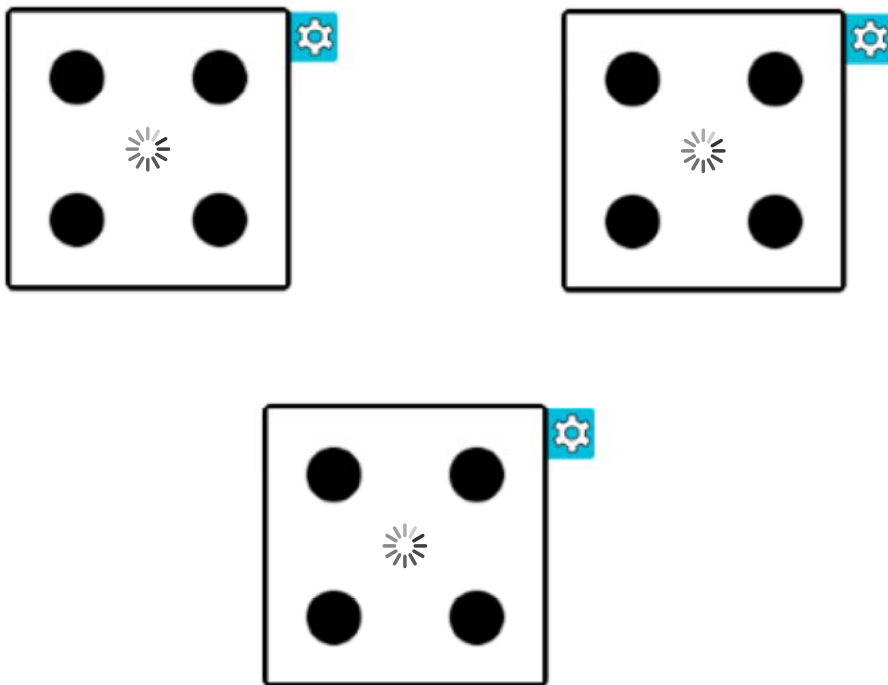
f) $12x^2 + x - 35 = 0$

$x = -1.75, x = 5/3$

$\frac{\pm \sqrt{4100}}{8} = \frac{\pm 20}{8}$ $x = \frac{-1 \pm \sqrt{1^2 - 4(12)(-35)}}{2(12)}$
 $= \pm 2.5$

$\frac{-1+41}{24}$ $x = \frac{-1 \pm \sqrt{1+1680}}{24}$

$\frac{-1-41}{24}$ $x = \frac{-1 \pm \sqrt{1681}}{24} = \frac{-1 \pm 41}{24}$



5. Exercise: Solve the following equations by appropriate method.

a) $x^2 - 5x + 4 = 0$

$x = 1, x = 4$

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

b) $9x^2 + 24x + 16 = 0$

$x = -4/3$

$x = \frac{-24 \pm \sqrt{24^2 - 4(9)(16)}}{2(9)}$

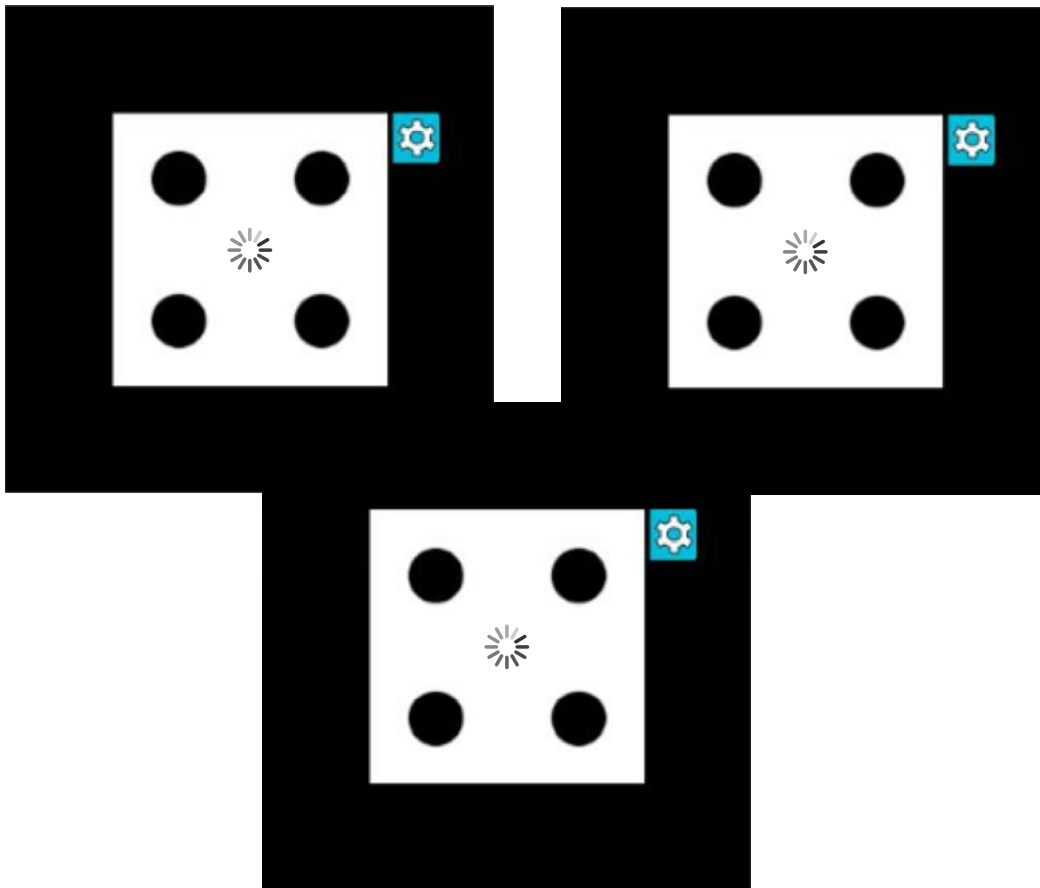
$\frac{-24}{18} = \left(-\frac{4}{3}\right)$

c) $x^2 + 3x + 1 = 0$

$x = \frac{-3 \pm \sqrt{5}}{2}$

d) $25x^2 - 36 = 0$

$x = \pm 6/5$



You may sign up for a presentation slot for Thursday up front.

26.) Which method can't you use to solve this problem? $x^2 - 47 = 0$

Circle one: Factoring Square Roots Quadratic Formula

Explain why:

27.) Which method can't you use to solve this problem? $x^2 + 7x = 0$

Circle one: Factoring Square Roots Quadratic Formula

Explain why:

28.) Which method can you use to solve all quadratic equations?

Circle one: Factoring Square Roots Quadratic Formula

Explain why:

29.) What are the **two mistakes** in setting up the quadratic formula:

Solve: $2x^2 - x - 6 = 0$

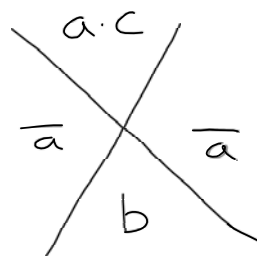
$$x = \frac{-1 \pm \sqrt{(-1)^2 - 4(2)(6)}}{2(2)}$$

Good Afternoon!

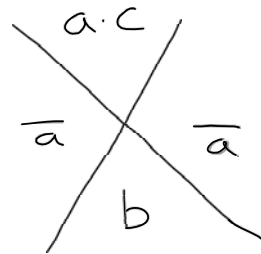
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Get ready for the quiz.

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



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



Once you have finished, please grab a chromebook and submit your best image from your project in the Google Form on Classroom. We will vote once all classes are finished.

Put the chromebook up when you are finished.

$$\begin{array}{r} (n-1)^2 - 16 = 0 \\ +16 \quad +16 \\ \hline \sqrt{(n-1)^2} = \sqrt{16} \\ n-1 = \pm 4 \end{array}$$

$$\begin{array}{r} n-1=4 \quad n-1=-4 \\ +1 \quad +1 \quad +1 \quad +1 \\ \hline n=5 \quad n=-3 \end{array}$$