

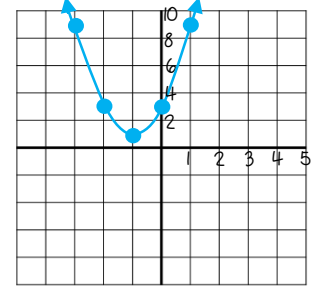
Graphing Quadratic Functions

1. Write the equation in standard form: $y = ax^2 + bx + c$.
2. Find the equation of the axis of symmetry: $x = \frac{-b}{2a}$.
3. Find the vertex of the parabola. The x-coordinate is $\frac{-b}{2a}$. To find the y-coordinate, substitute the x-coordinate for x in the equation and solve for y.
4. Make a table of values by choosing 2 x-values to the left of the axis of symmetry and 2 x-values to the right of the axis of symmetry and substituting them into the equation to find the y-values.
5. Connect the points to form a parabola.

Ex: Graph $y = 2x^2 + 4x + 3$

axis of symmetry: $x = \frac{-4}{2(2)} = -1$

x	y
-3	9
-2	3
-1	1
0	3
1	9



Solving Quadratic Equations by Factoring

1. Write the quadratic equation in Standard Form ($ax^2 + bx + c = 0$).
2. Factor the left side of the equation.
3. Use the zero-product property to solve the equation by setting each factor equal to zero and solving for x.

Ex: $x^2 - 6x = 16$

$$\rightarrow x^2 - 6x - 16 = 0$$

$$\rightarrow (x - 8)(x + 2) = 0$$

$$\rightarrow x - 8 = 0 \quad x + 2 = 0$$

$$x = 8 \quad \text{or} \quad x = -2$$

Solving Quadratic Equations Using Square Roots

*** Only for quadratic equations where $b = 0$. ***

1. Write the equation in the form $ax^2 = c$.
2. Divide both sides of the equation by a.
3. Take the square root of both sides of the equation. Be sure to find both the positive and negative square root!

Ex: $4x^2 - 32 = 0$

$$4x^2 = 32$$

$$\rightarrow x^2 = 8$$

$$\rightarrow x = \pm\sqrt{8} \approx \pm 2.83$$

Solving Quadratic Equations Using the Quadratic Formula

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

1. Write the quadratic equation in Standard Form ($ax^2 + bx + c = 0$).
2. Substitute a, b, and c into the quadratic formula to find the solution(s) for x.

Ex: $3x^2 + 7x - 8 = 0$

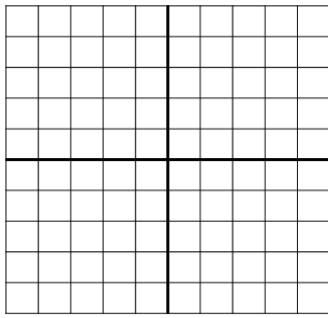
$$x = \frac{-7 + \sqrt{7^2 - 4(3)(-8)}}{2(3)} \rightarrow x \approx 0.84$$

$$x = \frac{-7 - \sqrt{7^2 - 4(3)(-8)}}{2(3)} \rightarrow x \approx -3.17$$

Graph each quadratic equation.

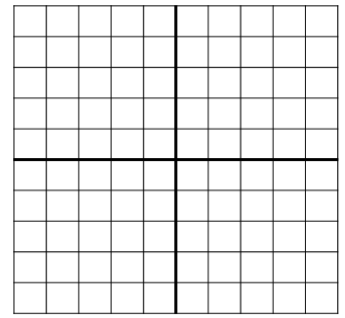
106. $y = x^2 - 4x + 1$

x	y



107. $y = -x^2 + 2x + 3$

x	y



Solve each quadratic equation using the method of your choice. Round to the nearest tenth.

108. $x^2 - 3x + 2 = 0$

109. $4x^2 - 40 = 0$

110. $2x^2 + x = 45$

111. $7x^2 + 5x = -2$

112. $x^2 - 9x = 0$

113. $x^2 - 20x = 84$

114. $-15x^2 = -900$

115. $-5x^2 + 17x + 13 = 0$

116. $x^2 - 24x + 22 = -22$

Solve each word problem using a quadratic equation.

117. The height of an object t seconds after it is thrown from a height of h feet is modelled by the equation $h(t) = -16t^2 + vt + h$. If the ball is thrown from a point 6 feet above ground with an initial velocity, v , of 30 feet per second, how long will it take for the ball to hit the ground?

118. The length of a rectangle is 3mm less than four times the width. If the area of the rectangle is $1,387 \text{ mm}^2$, what are the dimensions of the rectangle?