

Chapter 10: Quadratic Equations and Functions Study Guide

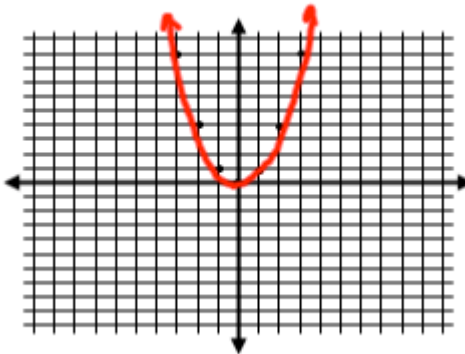
10.1: Graph $y = ax^2 + c$:

- Be able to graph a quadratic using a table and compare it to the parent function.

Graph the following quadratic equations by making a table. Compare the graph to the parent function.

Ex: $y = x^2$

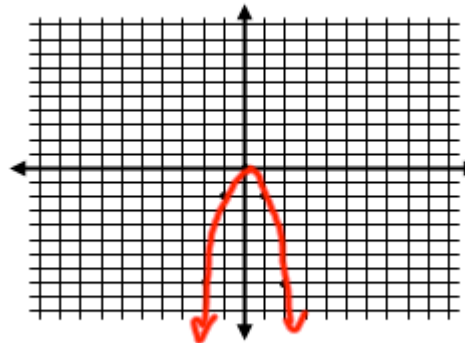
x	-2	-1	0	1	2
y	4	1	0	1	4



This is the parent quadratic function.

Ex: $y = -2x^2$

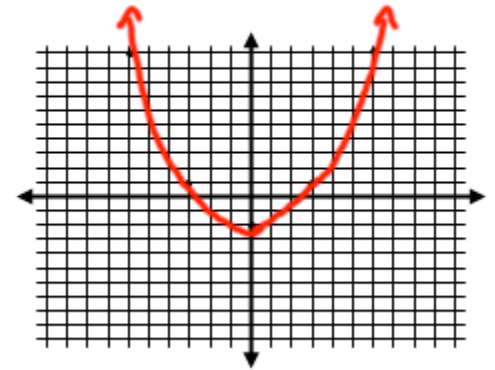
x	-2	-1	0	1	2
y	-8	-2	0	-2	-8



Narrower, has a maximum.

Ex: $y = \frac{1}{3}x^2 - 2$

x	-6	-3	0	3	6
y	10	1	-2	1	10

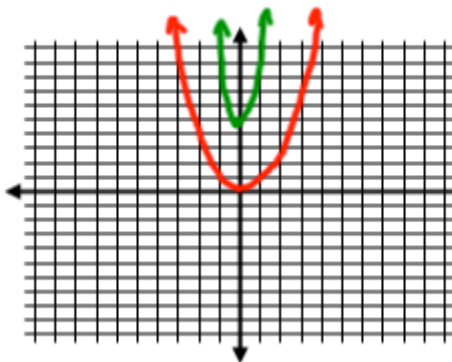


Wider, has a minimum the vertex is down 2.

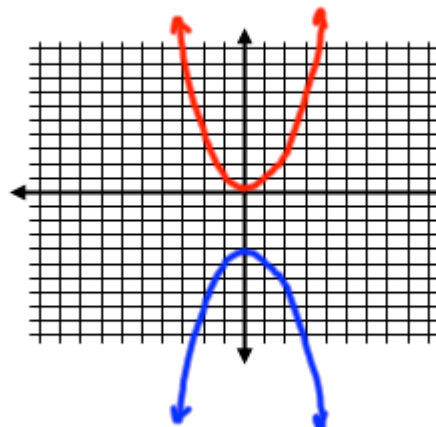
- Be able to identify characteristics of quadratic equations based on a and c changing and sketch the resulting parabola.

Sketch the parent function, then sketch the following parabolas based on the equation.

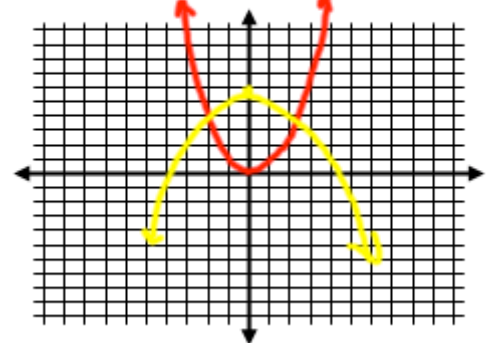
Ex: $y = 3x^2 + 5$



Ex: $y = -x^2 - 4$



Ex: $y = -\frac{2}{3}x^2 + 6$



10.2: Graph $y = ax^2 + bx + c$:

- Be able to find the axis of symmetry and vertex of a parabola.

Find the axis of symmetry and vertex of each quadratic equation.

Ex: $y = 2x^2 - 8x + 6$

Axis of symm: $x = 2$
Vertex $(2, -2)$

Ex: $y = -3x^2 + 24x - 22$

Axis of symm: $x = 4$
Vertex: $(4, 26)$

- Be able to tell if a quadratic equation has a maximum or minimum value, then find the max. or min.

Tell whether the function has a *minimum* or *maximum* value. Then find the min. or max. value.

Ex: $f(x) = -3x^2 + 12x - 20$

Maximum value of -8

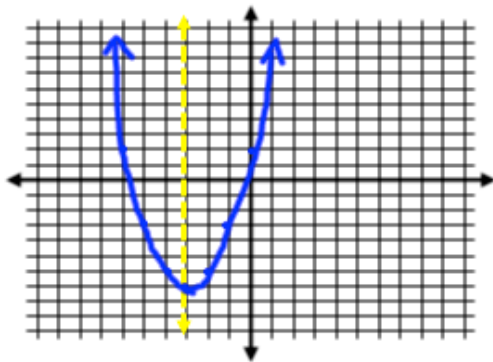
Ex: $f(x) = 4x^2 + 32x$

Minimum value of -64

- Be able to graph a quadratic function in the form $y = ax^2 + bx + c$ by finding the axis of symmetry and vertex and making a symmetrical table about the axis.

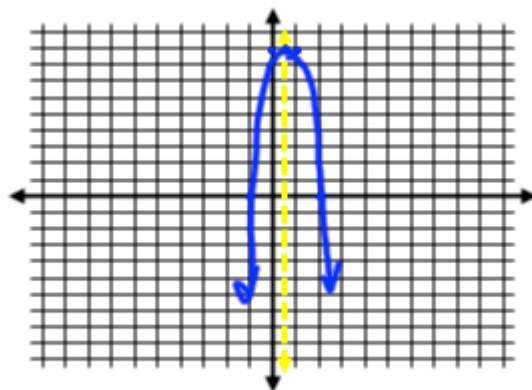
Graph the quadratic function.

Ex: $y = x^2 + 6x + 2$



x	-6	-5	-4	-3	-2	-1	0
y	2	-3	-6	-7	-6	-3	2

Ex: $y = -4x^2 + 4x + 8$



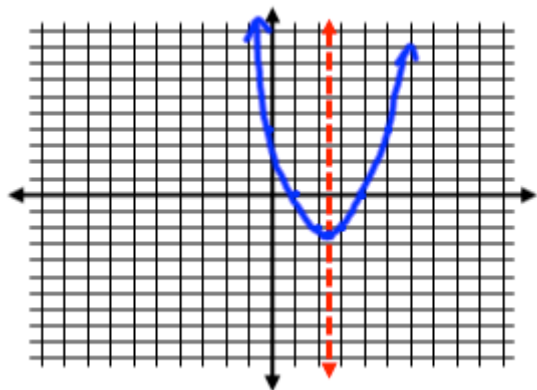
x	-1	0	$\frac{1}{2}$	1	2
y	0	8	9	8	0

10.3: Solve Quadratic Equations by Graphing:

- Be able to solve an equation by graphing.

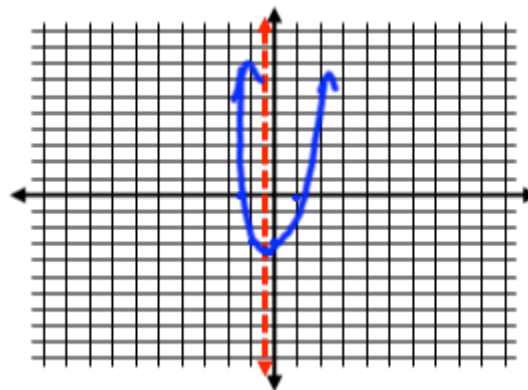
Solve the following quadratic equations by graphing.

Ex: $x^2 - 5x + 4 = 0$



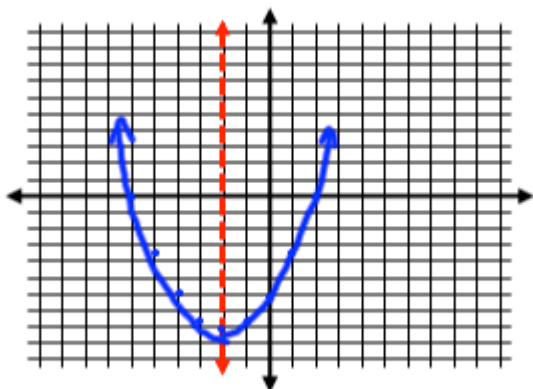
$x = 4$ and $x = 1$

Ex: $2x^2 + x = 3$



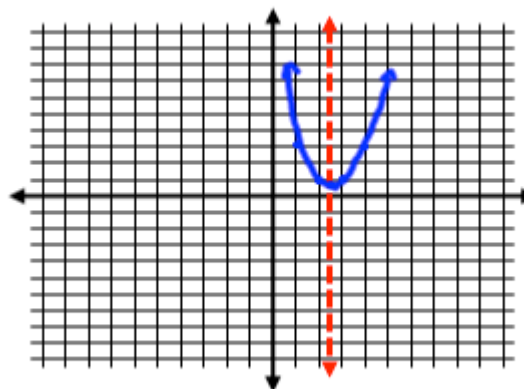
$x = 1$ and $x = -1.5$

Ex: $\frac{1}{2}x^2 + 2x = 6$



$x = 2$ and $x = -6$

Ex: $x^2 - 5x + 7 = 0$



no solution

- Be able to approximate zeros of a function to the nearest tenth by making a table.

Approximate the zeros of the function to the nearest tenth.

Ex: $f(x) = x^2 + 4x - 5$

Ex: $f(x) = -3x^2 + 8x - 2$

10.4: Use Square Roots to Solve Quadratic Equations:

- Be able to solve a quadratic equation using square roots

Solve the following quadratic equations.

Ex: $4x^2 - 400 = 0$

$x = \pm 10$

Ex: $3z^2 - 18 = -18$

$z = 0$

Ex: $3x^2 - 35 = 45 - 2x^2$

$x = \pm 4$

Ex: $11\left(\frac{w-7}{2}\right)^2 - 20 = 101$

$w = 13.63$ and $w = 0.37$

10.6: Solve Quadratic Equations by the Quadratic Formula:

- Be able to solve quadratic equations by using the quadratic formula

Solve:

Ex: $x^2 + 5x - 104 = 0$

$x = 8$ and $x = -13$

Ex: $4t^2 - 3t = 5 - 3t^2$

$t = 1.09$ and $t = -0.66$

Ex: $x^2 - 8x = -16$

$x = 4$

Ex: $(x + 13)^2 = 25$

$x = -8$ and $x = -18$

10.7: Interpret the Discriminant:

- Be able to identify the value of the discriminant and use it to determine the number of solutions to a quadratic equation.

Tell whether the equation has *two solutions*, *one solution*, or *no solution*.

Ex: $x^2 + x + 1 = 0$

Ex: $-2x^2 + 8x - 4 = 0$

Discriminant = -3 , no solution

Discriminant = 32 , two solutions

Ex: $-3g^2 - 4g = \frac{4}{3}$

Ex: $10 = x^2 - 5x$

Discriminant = 0 , one solution

Discriminant = 65 , two solutions