

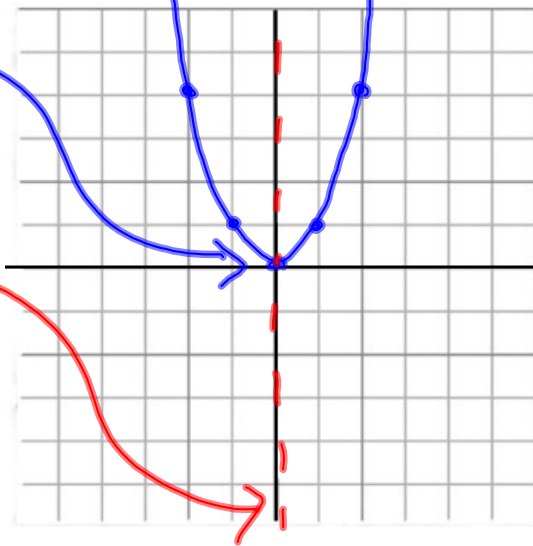
10.1 - 10.2 Graph $y=ax^2+c$ and $y = ax^2+bx+c$

Quadratic Function

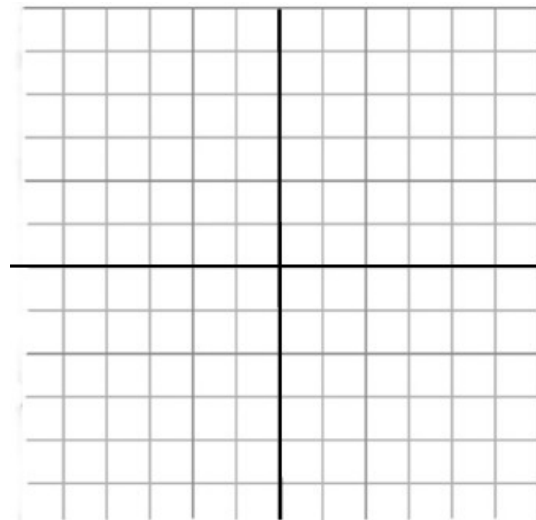
$$y = x^2$$

Vertex: Highest or lowest point of a parabola

Axis of Symmetry: Splits parabola in two equal parts



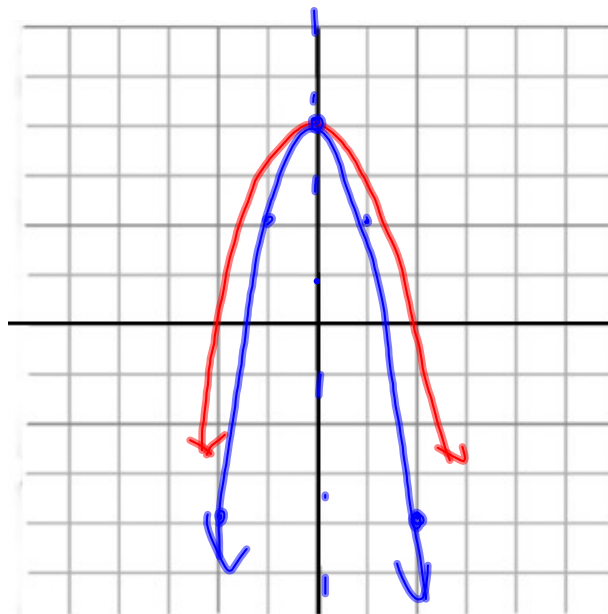
Graph $y = \frac{1}{3}x^2$



Graph $y = 3x^2 + 2$

Graph $y = -2x^2 + 4$

x	y
0	4
1	2
2	-4



Graph the following using a graphing calculator or app

How do the graphs below differ from: $y = x^2$

$$y = 4x^2$$

$$y = \frac{1}{2}x^2$$

$$y = -2x^2$$

Properties of the Graph of a Quadratic Function

The graph of $y = ax^2 + bx + c$ is a parabola that:

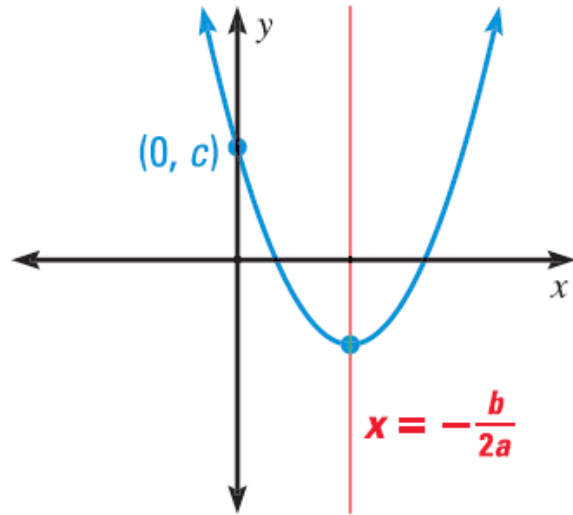
- If $a > 0$, opens up
If $a < 0$, opens down

- Axis of symmetry at $x = -\frac{b}{2a}$

- Vertex at $(-\frac{b}{2a}, Y)$

- Y-intercept is 'c'

$$y = ax^2 + bx + c, a > 0$$



Find axis of symmetry and vertex.

$$x = -\frac{b}{2a}$$

$$(-\frac{b}{2a}, Y)$$

~~$$y = x^2 + 2x + 1$$~~

$$y = x^2 - 4x + 5$$

$$a = 1 \quad b = -4 \quad c = 5$$

axis of symmetry

$$x = -\frac{-4}{2(1)} = \frac{4}{2} = 2$$

$$\boxed{x = 2}$$

Vertex

$$y = (2)^2 - 4(2) + 5$$

$$4 - 8 + 5$$

$$y = 1$$

$$\boxed{(2, 1)}$$

~~$$y = 2x^2 + 4x - 5$$~~

$$y = 2x^2 + 4x - 5$$

$$a = 2 \quad b = 4 \quad c = -5$$

$$x = -\frac{4}{2(2)} = -1$$

$$\text{axis of symmetry } \boxed{x = -1}$$

Vertex

$$2(-1)^2 + 4(-1) - 5$$

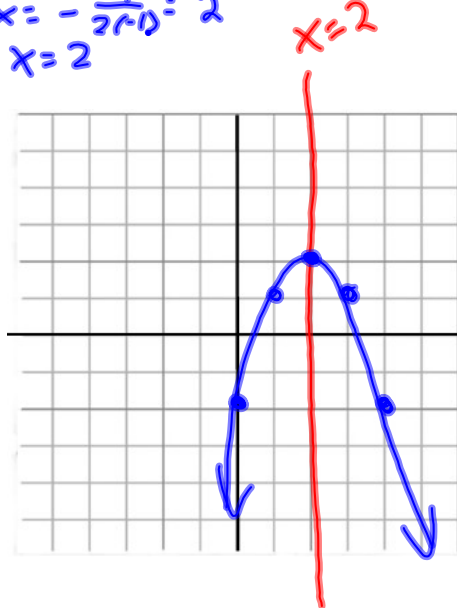
$$2 - 4 - 5 = -7$$

$$(-1, -7)$$

Graph the quadratic equations

19. $y = -x^2 + 4x - 2$

$a = -1$ $b = 4$ $c = -2$
 $x = -\frac{b}{2a} = 2$
 $x = 2$



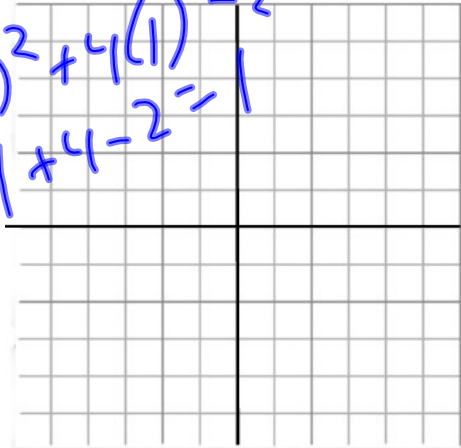
vertex
(2, 2)

x	y
2	2
0	-2
1	1

21. $y = -2x^2 + 8x - 3$

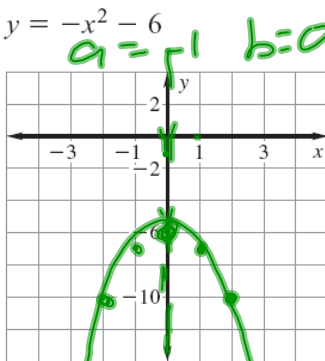
$y = -(2)^2 + 4(2) - 2$
 $-4 + 8 - 2$
 2

$-(1)^2 + 4(1) - 2 = 1$
 $-1 + 4 - 2 = 1$



Graph the function. Label the vertex and axis of symmetry.

32. $y = -x^2 - 6$



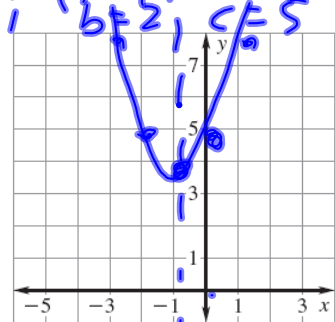
$a = -1$ $b = 0$ $c = -6$

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

x	y
1	-7
2	-10

$-(0)^2 - 6 = (0, -6)$
 $-(1)^2 - 6 = -7$
 $-(2)^2 - 6 = -10$

34. $y = x^2 + 2x + 5$



$a = 1$ $b = 2$ $c = 5$

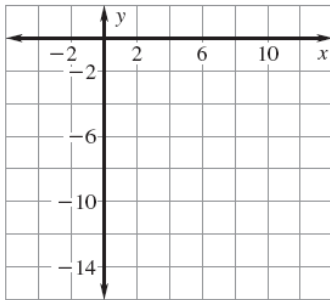
$x = -\frac{2}{2(1)}$
 $x = -1$

x	y
0	5
1	8

$(-1)^2 + 2(-1) + 5 = 4$
 $(-1, 4)$
 $(1)^2 + 2(1) + 5 = 8$
 $(1, 8)$

Graph the function. Label the vertex and axis of symmetry.

35. $y = x^2 - 8x + 1$



37. $y = -x^2 - 4x + 3$

