

<h3>VERTEX FORM of a Quadratic Function</h3>	<ul style="list-style-type: none"> Vertex form of a quadratic equation: $f(x) = a(x-h)^2 + k$ (h, k) is the vertex; $x = h$ is the axis of symmetry a determines the width and direction of the parabola $+a$ up $-a$ down
<h3>Comparing to the Parent Function</h3>	<p>Describe how each function compares to the parent function. (transf)</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>1. $f(x) = x^2 + 9$</p> <p>up 9</p> </div> <div style="text-align: center;"> <p>2. $f(x) = x^2 - 2$</p> <p>down 2</p> </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>3. $f(x) = -2(x+5)^2$</p> <p>reflected stretched left 5</p> </div> <div style="text-align: center;"> <p>4. $f(x) = \frac{1}{3}(x-1)^2 + 2$</p> <p>compress right 1 up 2</p> </div> </div>
<h3>Parts of a Parabola</h3>	<p>Label the axis of symmetry, vertex, zeros, and intercepts on the graph to the right.</p>

Graphing Quadratic Functions in Vertex Form

$$a(x-h)^2 + k$$

1. Graph $f(x) = 2x^2$

Vertex: $(0, 0)$

AOS: $x = 0$

Stretch/compress

Points: a -pattern

$1a = 2$
 $3a = 6$
 $5a = 10$

D: \mathbb{R} R: $[0, \infty)$

2. Graph $f(x) = \frac{1}{2}x^2$

Vertex: $(0, 0)$

AOS: $x = 0$

Stretch/compress

Points: _____

$1a = 1/2$
 $3a = 3/2$
 $5a = 5/2$

D: \mathbb{R} R: $[0, \infty)$

3. Graph $f(x) = -x^2$

$D: \mathbb{R}$
 $R: (-\infty, 0]$

Vertex: $(0, 0)$

AOS: $x = 0$

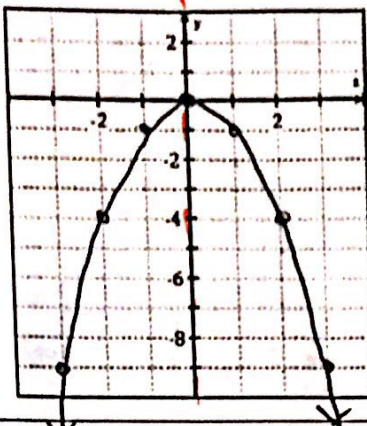
Stretch/compress $\swarrow \searrow$

Points: _____

$1a = -1$

$3a = -3$

$5a = -5$



4. Graph $f(x) = -\frac{1}{2}x^2$

Vertex: $(0, 0)$

AOS: $x = 0$

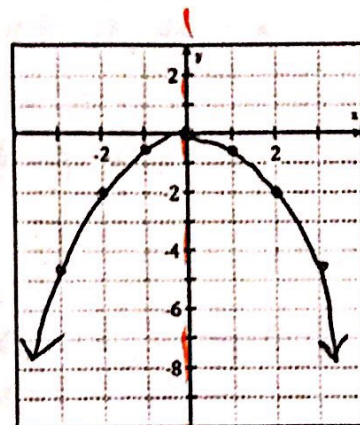
Stretch/compress

Points: _____

$1a = -\frac{1}{2}$

$3a = -\frac{3}{2}$

$5a = -\frac{5}{2}$



5. Graph $f(x) = x^2 - 2$

Vertex: $(0, -2)$

AOS: $x = 0$

Stretch/compress

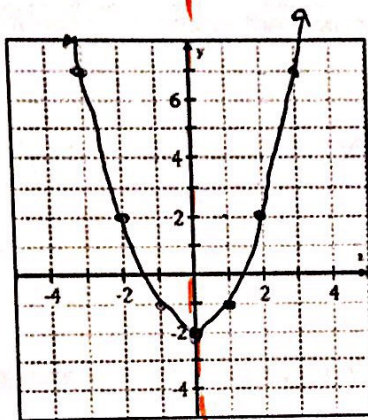
Points: _____

$1a = 1$ $3a = 3$ $5a = 5$

Transformations:

down 2

$D: \mathbb{R}$
 $R: [-2, \infty)$



6. Graph $f(x) = (x + 1)^2$

Vertex: $(-1, 0)$

AOS: $x = -1$

Stretch/compress

Points: _____

Transformations:

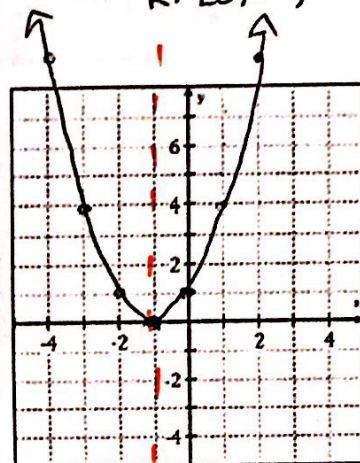
left 1

$1a = 1$

$3a = 3$

$5a = 5$

$D: \mathbb{R}$
 $R: [0, \infty)$



7. Graph $f(x) = 2(x + 2)^2 - 3$

$a = 2$

$h = -2$

$k = -3$

AOS: $x = -2$

Vertex: $(-2, -3)$

Points: _____

Domain: \mathbb{R}

Range: $[-3, \infty)$

Min or Max: min @ $y = -3$

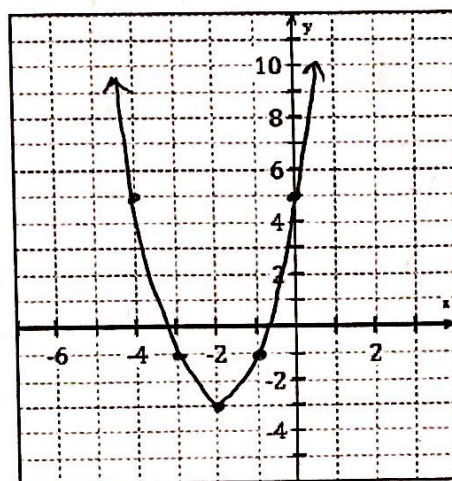
Transformations:

stretch, left 2, down 3

$1a = 2$

$3a = 6$

$5a = 10$



Directions: List the vertex, axis of symmetry, direction, max/min, transformations, and the domain and range for the following equations.

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

V: (2, 3) right 2, up 3
 AOS: $x = 2$ D: \mathbb{R}
 UP R: $[3, \infty)$
 min $y = 3$

9. $f(x) = (x+2)^2 - 3$

V: (-2, -3) left 2, down 3
 AOS: $x = -2$ D: \mathbb{R}
 UP R: $[-3, \infty)$
 min $y = -3$

10. $f(x) = -2(x-1)^2 + 2$

V: (1, 2) reflect, stretch
 right 1, up 2
 AOS: $x = 1$
 down
 max $y = 2$ D: \mathbb{R}
 R: $(-\infty, 2]$

11. $f(x) = -\frac{1}{2}(x+1)^2 - 2$

V: (-1, -2) reflect, compress
 left 1 down 2
 AOS: $x = -1$
 down
 max $y = -2$ D: \mathbb{R}
 R: $(-\infty, -2]$

12. Write a quadratic function to model the graph.

Find the following

- Vertex: (-2, -6) $a(x+2)^2 - 6$
- Point: (0, 6)

Substitute values into the vertex form and solve to find the "a"

value. $f(x) = a(x-h)^2 + k$

~~$b = a(x+2)^2 - 6$~~
 $6 = a(0+2)^2 - 6$
 $6 = a(2)^2 - 6$
 $12 = 4a$
 $3 = a$

Write the quadratic function with a, h, and k

$f(x) = 3(x+2)^2 - 6$

Name the domain, range, and the minimum value

D: \mathbb{R}
 R: $[-6, \infty)$ min $y = -6$

