Grab a Week #9 Packet

Bell Ringer

Monday 10/14

Watch the following video: https://ed.ted.com/featured/PP00zCty Video

1. Reflect on what you learned in this video: Grit is trying even when it's really hard.
2. How does this apply to you in your school work?

Week #8 Packet due tomorrow!

All Ch 2 hw due Tues 10/22

Standards 2A and 2B Retakes due Wed 10/23

Find the the vertex of each function.

$f(x) = ax^2 + bx + c$

$\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

$\left(-\frac{1}{6}, \frac{23}{12}\right)$

1. $y = -4x^2$

$a = -4$ $(0,0)$
$b = 0$
$c = 0$

$\frac{-(0)}{2(-4)}$ $\frac{0}{-8} = 0$

2. $y = x^2 + 2$

$a = 1$
$b = 0$
$c = 2$

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

$\frac{0}{2} = (0,2)$

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

$a = 3$
$b = 1$
$c = 2$

$\frac{-(1)}{2(3)} = \frac{-1}{6}$

$y = 3\left(-\frac{1}{6}\right)^2 + \left(-\frac{1}{6}\right) + 2$

$\frac{23}{12}$

Essential Question

How can you describe the graph of $f(x) = a(x - h)^2$?

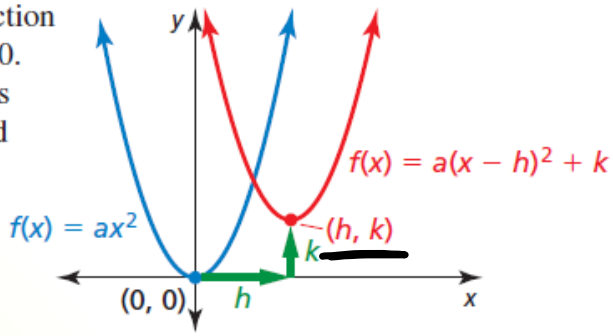
Core Concept

a(x-h)+k

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

The **vertex form** of a quadratic function is $f(x) = a(x - h)^2 + k$, where $a \neq 0$. The graph of $f(x) = a(x - h)^2 + k$ is a translation h units horizontally and k units vertically of the graph of $f(x) = ax^2$.

The vertex of the graph of $f(x) = a(x - h)^2 + k$ is (h, k), and the axis of symmetry is $x = h$.



Equation of a parabola in Vertex Form:

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

Vertex: (h, k)

Axis of symmetry: $x = h$

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

Identify the vertex (h, k) and the axis of symmetry

$$f(x) = x^2$$

Vertex: (0,0)

Axis of Symmetry:

x=0

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

Identify the vertex (h, k) and the axis of symmetry

$$f(x) = x^2 + 5$$

Vertex: (0, 5)

Axis of Symmetry: x = 0

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

Identify the vertex (h, k) and the axis of symmetry

$$f(x) = (x - 11)^2$$

Vertex: (11, 0)

Axis of Symmetry: $x = 11$

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

Identify the vertex (h, k) and the axis of symmetry

$f(x) = (x - 2)^2 + 7$

x - h + k

Vertex: (h, k) (2, 7)

Axis of Symmetry: x = 2

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

Identify the vertex (h, k) and the axis of symmetry

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

x - h + k

x - (-2)

Vertex: (-2, -2)

Axis of Symmetry: x = -2

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

Identify the vertex (h, k) and the axis of symmetry

$$f(x) = -(x+3)^2 - 5$$

Vertex: $(-3, -5)$

Axis of Symmetry: $x = -3$

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

Identify the vertex (h, k) and the axis of symmetry

$$y = (x - 1)^2 + 1$$

Vertex: (1, 1)

Axis of Symmetry: $x = 1$

Identify the vertex of g(x) and describe the transformations done to the parent function $f(x) = x^2$

$$g(x) = (x - 2)^2 + 1$$

Vertex: (2, 1)

Transformations:

→ 2, ↑ 1

Identify the vertex of g(x) and describe the transformations done to the parent function $f(x) = x^2$

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

Vertex: $(-3, 0)$

Transformations:

← 3 reflect over x axis

compress by $\frac{1}{2}$

Identify the vertex of g(x) and describe the transformations done to the parent function $f(x) = x^2$

$$g(x) = -(x-4)^2$$

Vertex: (4, 0)

Transformations:

reflect over x axis

→ 4

Identify the vertex of g(x) and describe the transformations done to the parent function $f(x) = x^2$

$$g(x) = (x+1)^2 - 5$$

Vertex: $(-1, -5)$

Transformations: $\downarrow 5 \leftarrow 1$

Sketch the graph of the function $g(x) = -(x + 3)^2$

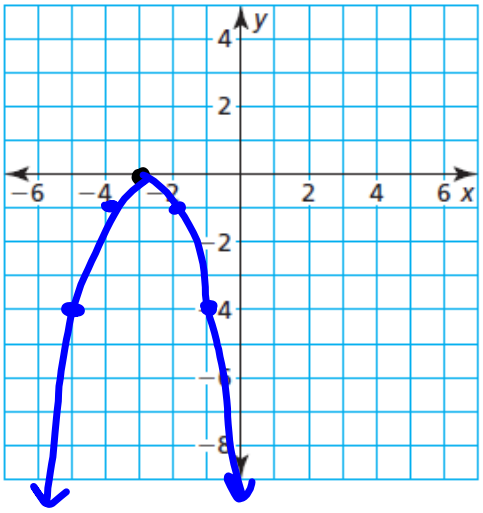
vertex:

(-3, 0)

out 1 up -1

out 2 up -4

out 3 up -9



y-intercept:

(0, -9)

$g(0) = -(0+3)^2$

-9

Sketch the graph of the function $g(x) = \frac{1}{2}(x - 4)^2$.

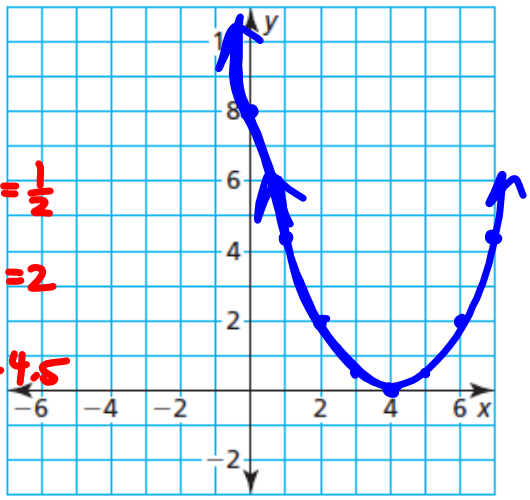
vertex:

(4, 0)

out 1 up 1 $(\frac{1}{2}) = \frac{1}{2}$

out 2 up 4 $(\frac{1}{2}) = 2$

out 3 up 9 $(\frac{1}{2}) = 4.5$



y-intercept:

$\frac{1}{2}(0-4)^2$

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

$= \frac{1}{2}(16)$

$= 8$

Sketch the graph of the function $g(x) = 2(x + 5)^2$

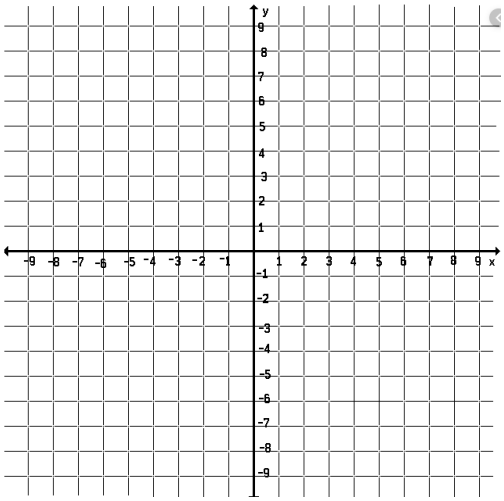
vertex:

y-intercept:

out 1 up 1

out 2 up 4

out 3 up 9



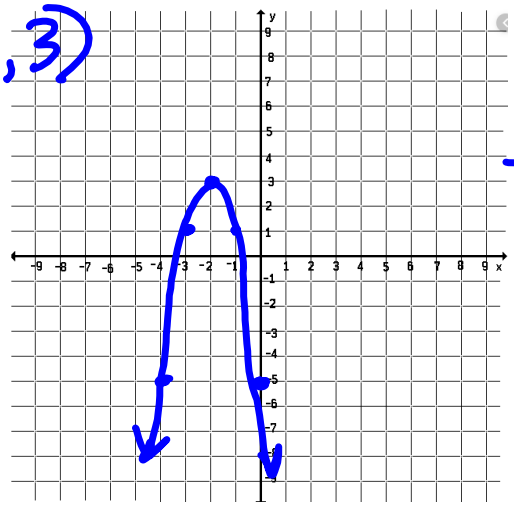
Sketch the graph of the function $g(x) = -2(x + 2)^2 + 3$.

vertex: (-2, 3)

out 1 up 1 (-2)

out 2 up 4 (-2)

out 3 up 9 (-2)



y-intercept:

$-2(0+2)^2+3$

$-2(4)+3$

$-8+3$

-5

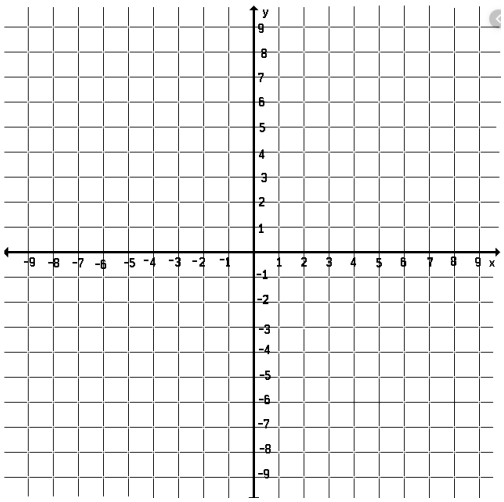
Sketch the graph of the function $f(x) = -2(x + 1)^2 + 3$.

vertex:

out 1 up 1

out 2 up 4

out 3 up 9



y-intercept:

Water fountains are usually designed to give a specific visual effect. For example, the water fountain shown consists of streams of water that are shaped like parabolas. Notice how the streams are designed to land on the underwater spotlights. Write and graph a quadratic function that models the path of a stream of water with a maximum height of 5 feet, represented by a vertex of (3, 5), landing on a spotlight 6 feet from the water jet, represented by (6, 0).

3.4 Day 1 hw pg 150-151 #s 2, 4, 19-25 odd, 30, 31-41 odd, 80, 81