

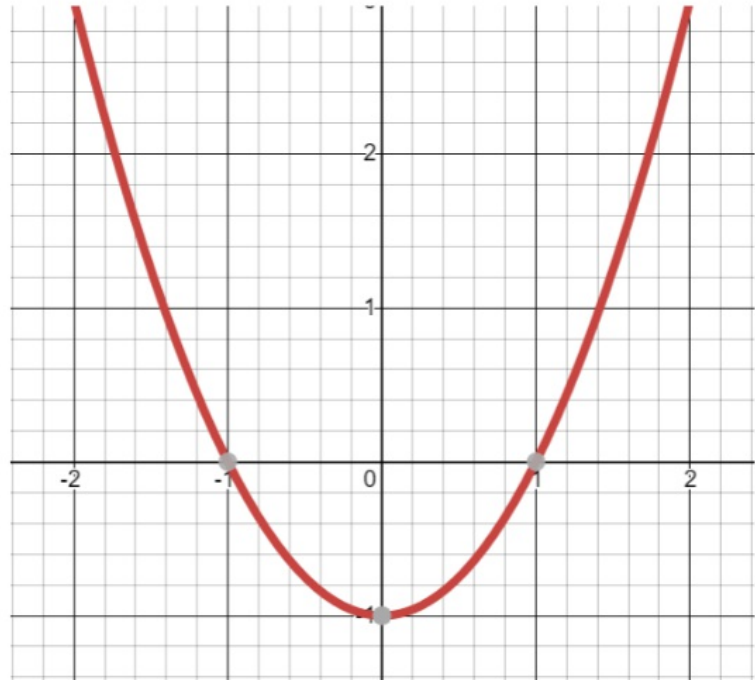
Bellwork: Algebra 1

1. Happy Wednesday!!
2. You need a calculator and Algebra Nation book.
3. Answer the following question on your WEDNESDAY Bellwork:

List some qualities of this graph.

$$y = x^2 - 1$$

$$y = mx + b$$

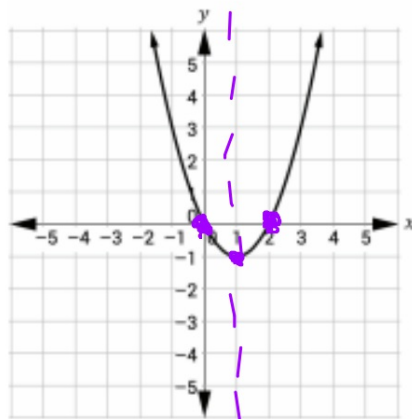


- y-int (0, -1) - opens up
- (-1, 0) (1, 0) x-int.
- parabola (x^2)

P.147

Section 6 – Topic 1 Observations from a Graph of a Quadratic Function

Let's review some things we learned earlier about the information we can gather from the graph of a quadratic function.

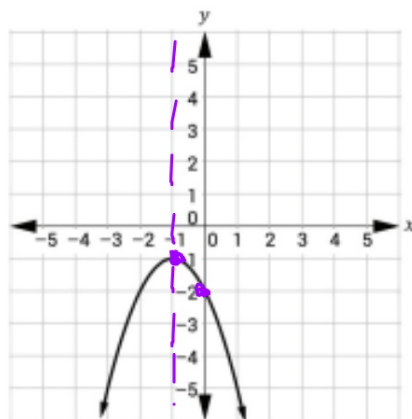


Vertex: $(1, -1)$ minimum

Axis of symmetry:
 $x = 1$

x-intercept(s):
 $(0, 0)$ $(2, 0)$

y-intercept:
 $(0, 0)$



Vertex: $(-1, -1)$ maximum

Axis of symmetry:
 $x = -1$ equal distance...

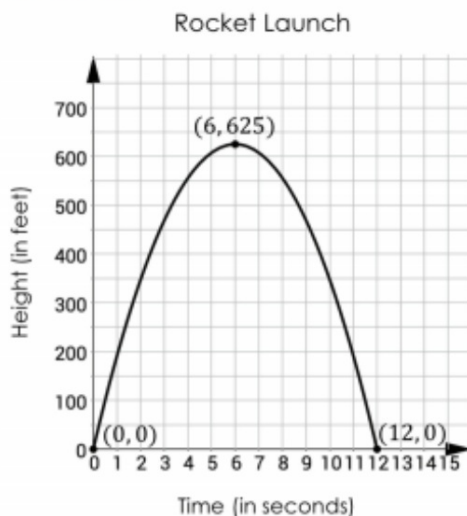
x-intercept(s):
none

y-intercept:
 $(0, -2)$

solution?
no real soluti

Let's Practice!

1. The graph shows the height of a rocket from the time it was launched from the ground. Use the graph to answer the questions below.



- a. What is the y-intercept?

$(0, 0)$

- b. What does the y-intercept represent?

Starting point

c. What are the x-intercepts?

$$(0, 0) \quad (12, 0)$$

d. What do the x-intercepts represent?

starts on ground, lands on ground

e. What is the maximum height of the rocket?

$$625 \text{ ft}$$

f. When will the rocket reach its maximum height?

$$6 \text{ seconds}$$

g. When is the graph increasing?

$$0 < x < 6$$

h. When is the graph decreasing?

$$6 < x < 12$$

i. What is the domain of the graph?

$$0 \leq x \leq 12 \quad \text{x-values}$$

j. What is the range of the graph?

$$0 \leq y \leq 625 \quad \text{y-values}$$

We can also use the graph to write the equation of the quadratic function.



Recall the standard form of a quadratic equation.

$$\underline{f(x) = ax^2 + bx + c}$$

There is another form of the quadratic equation called vertex form.

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

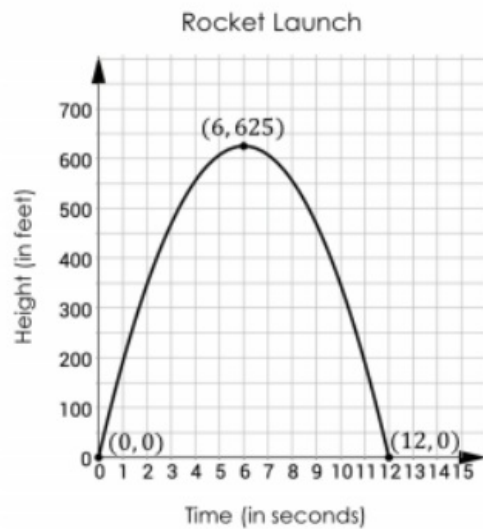
- (h, k) is the vertex of the graph.
- a determines if the graph opens up or down.
- a also determines if the parabola is vertically compressed or stretched.

$+ a =$ open up 
 $- a =$ open down 

To write an equation in vertex form from a graph, follow these steps:

- Step 1: Substitute the vertex, (h, k) , and the coordinates of another point on the graph, $(x, f(x))$, into $f(x) = a(x - h)^2 + k$.
- Step 2: Solve for a .
- Step 3: Substitute (h, k) and a into vertex form.

2. Recall our graph from exercise 1.



$$\begin{matrix} (6, 625) \\ h & k \end{matrix}$$

$$(0, 0)$$

- a. Substitute the vertex, (h, k) , and the coordinates of another point on the graph, $(x, f(x))$, into $f(x) = a(x - h)^2 + k$, and solve for a .

$$\begin{aligned} \rightarrow f(x) &= a(x - 6)^2 + 625 \\ 0 &= a(0 - 6)^2 + 625 \\ 0 &= 36a + 625 \end{aligned}$$

- b. Write the function for the graph in vertex form.

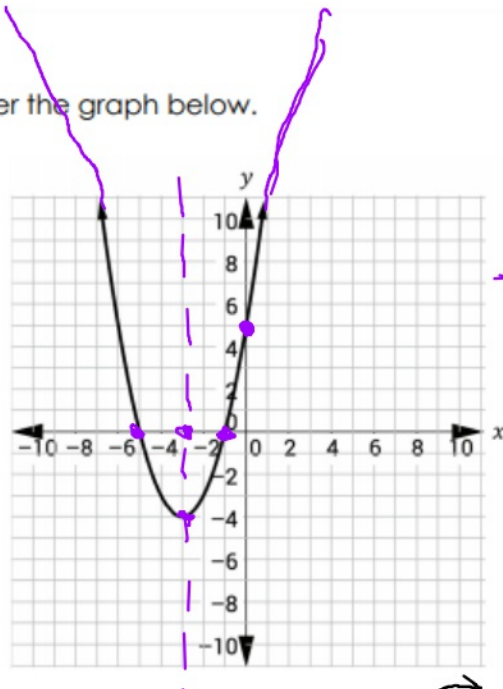
$$\begin{aligned} -625 &= 36a \\ \frac{-625}{36} &= \frac{36a}{36} \end{aligned}$$

$$a = -17.4$$

$$f(x) = -17.4(x - 6)^2 + 625$$

Try It!

3. Consider the graph below.



domain
range

$$-\infty < x < \infty$$

$$y \geq -4$$

vertex $(-3, -4)$

x-intercepts $(-5, 0)$

y-intercepts $(0, 5)$

axis of symm. x
opens which way?

a. State five observations about the graph.

$$\begin{matrix} h & k \\ (-3, -4) \end{matrix}$$

$$\begin{matrix} x & y \\ (-1, 0) \end{matrix}$$

b. Write the equation of the graph.

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

$$f(x) = a(x+3)^2 - 4$$

$$0 = a(-1+3)^2 - 4$$

$$0 = a(2)^2 - 4$$

$$0 = 4a - 4$$

$$+4 \quad +4$$

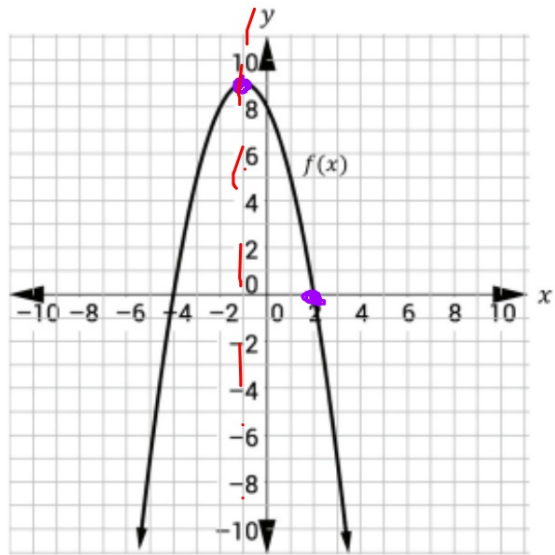
$$4 = 4a$$

$$a = 1$$

$$f(x) = 1(x+3)^2 - 4$$

BEAT THE TEST!

1. The graph of a quadratic function is shown below.



Which statements about this graph are true? Select all that apply.

- The graph has a y-intercept at (0, 8).
- The graph has a maximum point at (-1, 9).
- The graph has an x-intercept at (2, 0).
- The graph's line of symmetry is the y-axis.
- The graph has zeros of -4 and 2.
- The graph represents the function $f(x) = -(x - 1)^2 + 9$.

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

