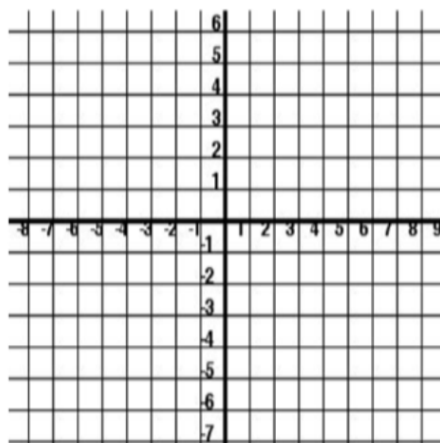


Ch. 2 Quadratic Functions

1. Let the graph of g be a translation 3 units right and 2 units up, followed by a reflection in the y -axis of the graph of $f(x) = x^2 - 5x$. Write a rule for g .



Quadratic Functions

3 ways to write the equation:

- $f(x) = ax^2 + bx + c$ **Standard Form**
- $f(x) = a(x-p)(x-q)$ **Intercept Form**
- $f(x) = a(x-h)^2 + k$ **Vertex Form**

Investigating the graphs of quadratics in the form $y=a(x-h)^2+k$

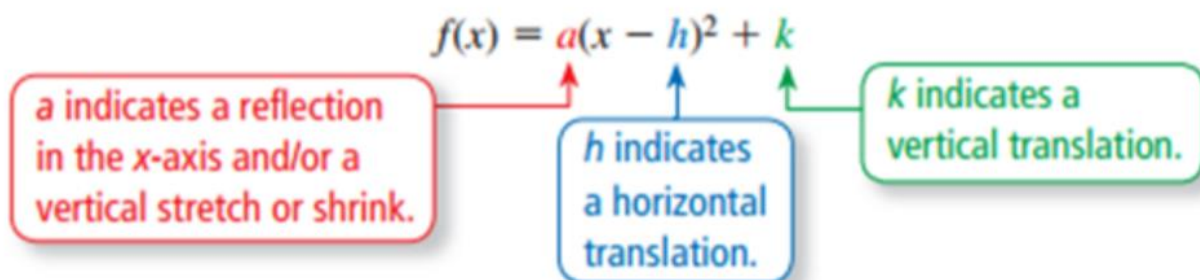
Without a calculator, describe each transformation of the following on the parent graph $y = x^2$.

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

$$y=6(x-5)^2+3$$

$$y=-6(x-5)^2+3$$

The Benefits of Vertex Form $y = a(x-h)^2+k$



Example 5

Use the vertex, axis of symmetry and y -intercept to sketch the graph of:

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

b $y = \frac{1}{2}(x+3)^2$

The Benefits of Intercept Form

- $f(x) = a(x-p)(x-q)$

Example 4

Using axis intercepts only, sketch the graphs of:

a $y = 2(x + 1)(x - 3)$

b $y = -2x(x + 2)$

Example 6

Sketch the parabola which has x -intercepts -3 and 1 , and y -intercept -2 . Find the equation of the axis of symmetry.

The Benefits of Standard Form • $f(x)=ax^2 +bx +c$

For the following quadratics, find:

- i the equation of the axis of symmetry
- ii the coordinates of the vertex
- iii the axes intercepts, if they exist.
- iv Hence, sketch the graph.

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

Example 31

Find, in the form $y = ax^2 + bx + c$, the equation of the quadratic whose graph cuts the x -axis at 4 and -3 and passes through the point $(2, -20)$.

DETERMINING THE QUADRATIC FROM A GRAPH

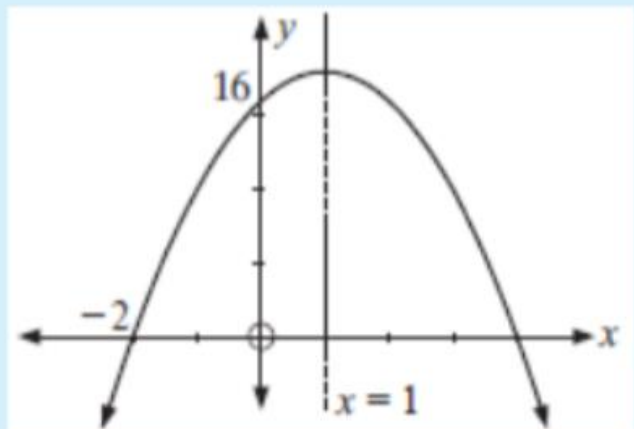
If we are given sufficient information on or about a graph we can determine the quadratic function in whatever form required.

Let's Review!

What are the forms a quadratic may be written in?
List the characteristics from a parabola would best fit each form.

Example 30

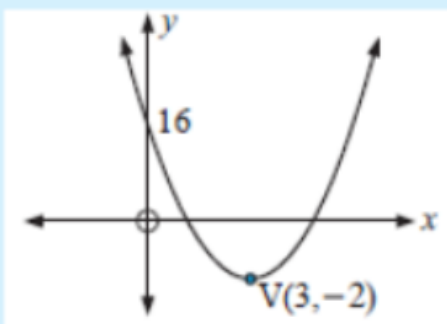
Find the equation of the quadratic with graph:



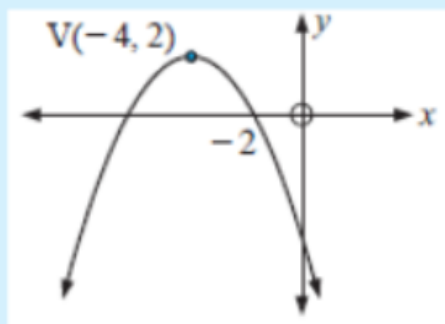
Example 32

Find the equation of the quadratic given its graph is:

a



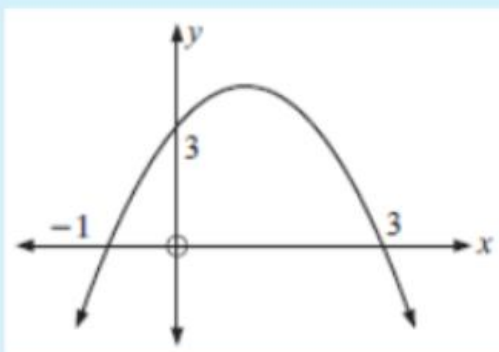
b



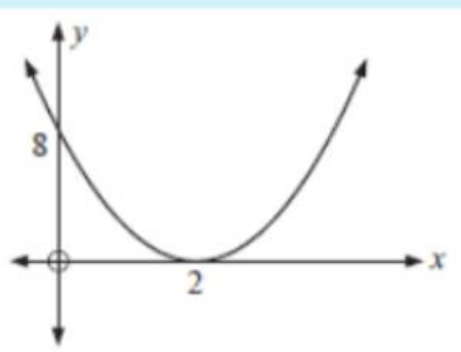
Example 29

Find the equation of the quadratic with graph:

a



b



The height h (in feet) of water spraying from a fire hose can be modeled by $h(x) = -0.03x^2 + x + 25$, where x is the horizontal distance (in feet) from the fire truck. The crew raises the ladder so that the water hits the ground 10 feet farther from the fire truck. Write a function that models the new path of the water.

To solve this problem, let's first look at the original function $h(x)$

At what distance does the water originally hit the ground?

If we want the water to hit the ground 10 feet farther, what x - value should we look at? _____

