

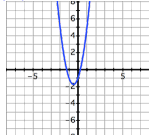
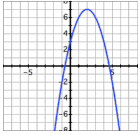
Name _____

Maximum and Minimum Values of a Quadratic Function

How can you tell if the graph of $f(x)$ will be face up or face down, just by looking at the function?

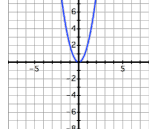
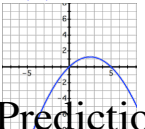
$$f(x) = -x^2 + 4x + 3$$

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



$$f(x) = -0.2x^2 + x$$

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



Prediction:

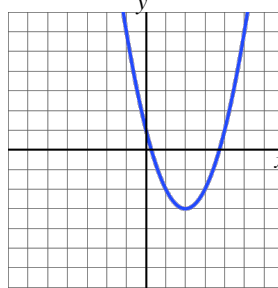
Finding the vertex, using the function alone

Axis of symmetry?

Standard Form of a Quadratic:

$$f(x) = \underline{\hspace{2cm}}$$

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



Axis of Symmetry Formula
(x-value of Vertex)

Vertex @: (__ , __)

A Poptart shoots out of a toaster. The height, in feet, of the Poptart is given by $f(x) = -0.1x^2 + x + 5$, based off of x number of seconds after it shot out of the toaster.

a. How many seconds does the Poptart take to reach its maximum height?

b. What is the Poptarts maximum height?

Example 1: $f(x) = -2 + 3x^2 - \frac{1}{3}x$

1) Standard Form:

2) $a = \underline{\hspace{1cm}}$ $b = \underline{\hspace{1cm}}$ $c = \underline{\hspace{1cm}}$

3) Find the Vertex

4) Is it a Maximum or Minimum?

Example 2: $f(x) = \frac{3}{4}x^2 + 3x - 5$

1) Standard Form:

2) $a = \underline{\hspace{1cm}}$ $b = \underline{\hspace{1cm}}$ $c = \underline{\hspace{1cm}}$

3) Find the Vertex

4) Is it a Maximum or Minimum?

1) A Poptart shoots out of a toaster. The height, in feet, of the Poptart is given by $f(x) = -2x^2 + 4x + 8$, based off of x number of seconds after it shot out of the toaster.

a. How many seconds does the Poptart take to reach its maximum height?

b. What is the Poptarts maximum height?

Find the vertex of the parabola based on the given quadratic function. Specify if the vertex is a maximum or minimum.

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

3) $f(x) = x^2 + 16x + 71$

4) $f(x) = x^2 - 9 + 4x$

Name _____

Maximum and Minimum Values of a Quadratic Function

Find the vertex. Is it a maximum or a minimum?

5) $f(x) = \frac{1}{2}x^2 - 8x + 2$

6) $f(x) = 2x^2 + 36x + 170$

7) $f(x) = -6x^2 - 12x - 13$

8) $f(x) = x^2 + 10x + 33$

9) Jeffrey throws a football into the air. The height of the ball is given by the function $h(t) = -10t^2 + 40t + 6$, where t is the number of seconds after the ball was thrown.

a. How many seconds does it take for the ball to reach its maximum height?

b. What is the maximum height of the ball?

10) Rachel bungee jumps off of a bridge. Her height above the water in feet is represented by $F(s) = 0.5s^2 - 10s + 52$, s seconds after the jump.

a. How many seconds does it take for Rachel to reach the minimum height?

b. What is Rachel's height above the water, when she reaches this lowest point.

Find the vertex of each function, and specify if it is a maximum or minimum.

11) $f(x) = 170 + 36x + 2x^2$

12) $f(x) = x^2 + 9x + 20$ (fractional answer)

13) $f(x) = -x^2 - 14x - 59$

14) $f(x) = x^2 + 4x$