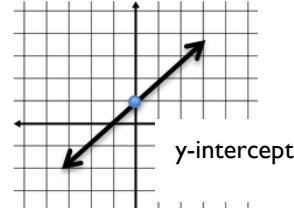
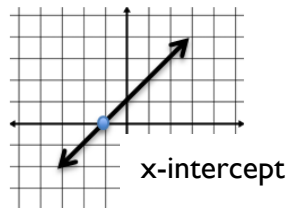


Secondary 2H: UNIT 2

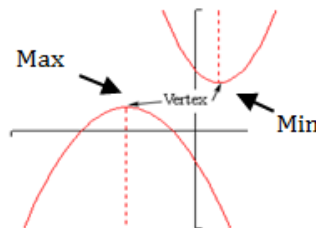
Finding Key Points on the Graph

Vocabulary

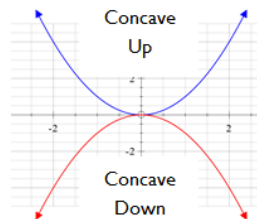
- The **x-intercept (also called zero)** is the point where a graph crosses or touches the x-axis. It is the ordered pair $(x, 0)$, where x is a real number. The **x-intercept** is where $y = 0$.
- The **y-intercept** is the point where a graph crosses or touches the y-axis. It is the ordered pair $(0, y)$, where y is a real number. The **y-intercept** is where $x = 0$.



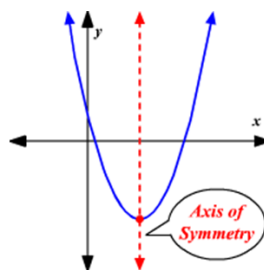
- The **vertex** of a parabola is the high point or low point in the curve. The **vertex** is also the **minimum** or **maximum** value of the parabola.
- A **maximum** occurs when the y-value is greater than all of the y-values near it. A quadratic function has only one **maximum** value.
- A **minimum** occurs when the y-value is less than all of the y-values near it. A quadratic function has only one **minimum** value.



- The parabola will be **concave up** if the leading coefficient is positive or **concave down** if the leading coefficient is negative.

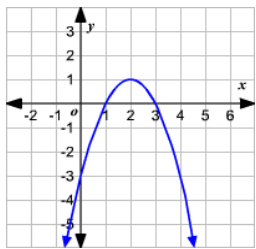


- Every parabola has an **axis of symmetry** which is the line that runs down its 'center.' This line divides the graph into two perfect halves.
- The **axis of symmetry** is the x-coordinate of its vertex or the midpoint between the x-intercepts.
- **Vertex form** of a parabola is $y = (x - h)^2 + k$. The **vertex** is (h, k) . The **axis of symmetry** in the equation $x = h$.



Finding Key Points off of a Graph

For each graph, find the x and y intercepts and the vertex. Is the vertex a maximum or a minimum? Draw a dotted line for the axis of symmetry and write the equation for the axis of symmetry.



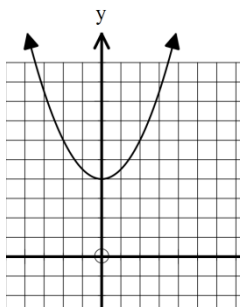
y-intercept:

x-intercept(s):

vertex:

MAX or MIN

axis of symmetry:



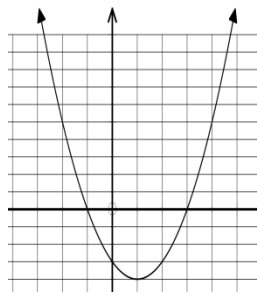
y-intercept:

x-intercept(s):

vertex:

MAX or MIN

axis of symmetry:



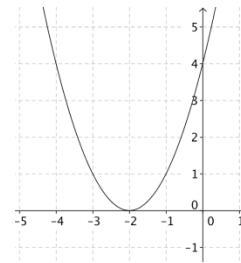
y-intercept:

x-intercept(s):

vertex:

MAX or MIN

axis of symmetry:



y-intercept:

x-intercept(s):

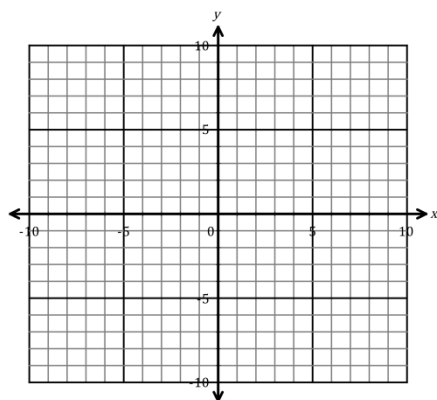
vertex:

MAX or MIN

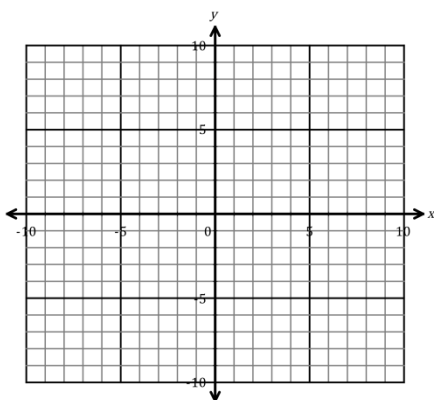
axis of symmetry:

Sketch the graph of the quadratic functions given the key features. Label the key features on your graph.

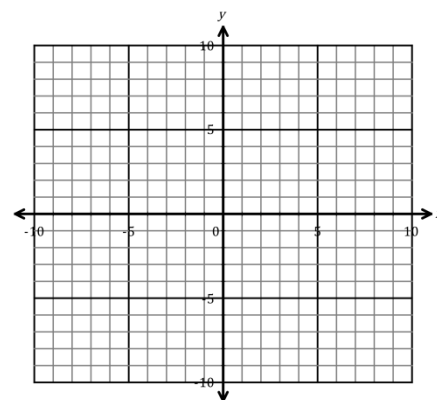
1. x-intercepts: (1, 0) & (5, 0)
y-intercept: (0, 10)
minimum: (3, -8)



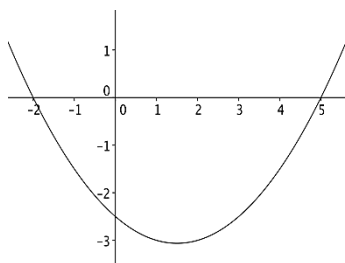
2. x-intercept: (-3, 0)
y-intercept: (0, -6)
maximum: (-3, 0)



3. x-intercept: none
y-intercept: (0, 4)
minimum: (2, 2)



You are presented with the graph below. How could you find the exact coordinates of the vertex? Will this method always work?



Finding Key Points off of a Table

Find the **minimum point (vertex)** of the function given a table of values.

1. Look for the lowest y -value.
2. Check if the lowest y -value is “evenly sandwiched” between the same value.

Find the **maximum point (vertex)** of the function given a table of values.

1. Look for the highest y -value.
2. Check if the highest y -value is “evenly sandwiched” between the same value.

Use the table to identify the x and y intercepts and the vertex. Is the vertex a maximum or a minimum? Write an equation for the axis of symmetry.

1.

x	y
0	5
1	0
2	-3
3	-4
4	-3
5	0
6	5

y -intercept:

x -intercept(s):

vertex:

MAX or MIN

axis of symmetry:

concave up or down?

2.

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

y -intercept:

x -intercept(s):

vertex:

MAX or MIN

axis of symmetry:

concave up or down?

3.

x	y
-2	1
-1	6
0	9
1	10
2	9
3	6
4	1

y -intercept:

x -intercept(s):

vertex:

MAX or MIN

axis of symmetry:

concave up or down?

Finding Key Points off of an Equation

When given an equation, we can find the key points algebraically. We will cover this in more depth Unit 4, but for now:

- To find the **y -intercept**, we

- To find the **x -intercept(s)**, we

Practice:

Find the intercepts.

1. $y = x^2 - 9$

y-intercept:

x-intercept(s):

2. $y = x^2$

y-intercept:

x-intercept(s):

3. $y = 3(x - 1)^2 + 7$

y-intercept:

x-intercept(s):

4. $y = -16x^2 + 59x + 3$

y-intercept:

x-intercept(s):

EXAMPLES:

Julie wadded up a piece of paper while sitting at her desk and threw it in the garbage can across the room. The graph represents the height and time of the paper wad during its flight.



a. What does the x-intercept on the graph represent?

b. What does the y-intercept on the graph represent?



Suppose you throw a ball straight up in the air. The height (in feet) of the ball after time (in seconds) is modeled by the equation $h(t) = -16t^2 + 48t$. The table below shows how the height of the ball changes as it goes up and then returns to the ground.



a. Describe how the height of the ball changes over the 3-second time period.

t	$h(t)$
0	0
.5	20
1	32
1.5	36
2	32
2.5	20
3	0

b. Describe the shape of the graph. Use vocabulary words. 😊

c. When does the ball reach its maximum height?