Equipment Room

Coach's Corner Solutions

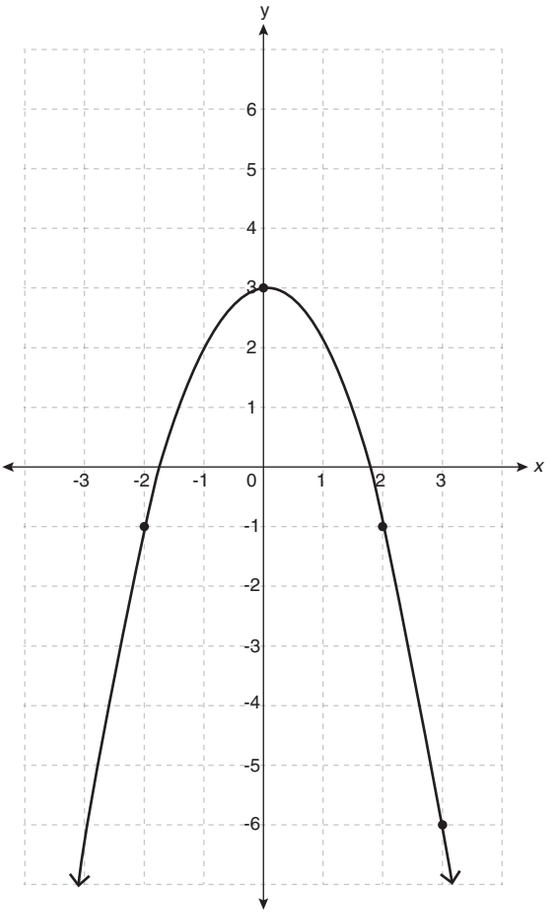
Unit 2: Quadratic Functions Lesson 2.1

Coach's Corner – I

1. a. Complete the table of values for the function $f(x) = -x^2 + 3$.

x	$f(x) = -x^2 + 3$	$(x, f(x))$
–2	$f(-2) = -((-2)^2) + 3 = -1$	(–2,–1)
–1	$f(-1) = -((-1)^2) + 3 = 2$	(–1,2)
0	$f(0) = -((0)^2) + 3 = 3$	(0,3)
1	$f(1) = -((1)^2) + 3 = 2$	(1,2)
2	$f(2) = -((2)^2) + 3 = -1$	(2,–1)
3	$f(3) = -((3)^2) + 3 = -6$	(3,–6)

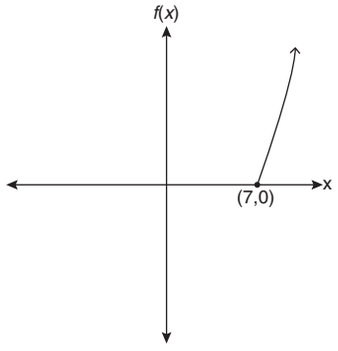
b. Graph the function using the ordered pairs from your table of values



c. Using the graph of $f(x) = -x^2 + 3$, how can you use symmetry to confirm that $f(-3) = -6$?

The graph of $f(x) = -x^2 + 3$ is symmetrical about the y-axis, making the y-axis the axis of symmetry. As such, points with x-coordinates of x and $-x$ will have the same y-coordinate.
Since it is known that $f(3) = -6$, $f(-3) = -6$ as well.

2. For the graph of the function below, the domain is:



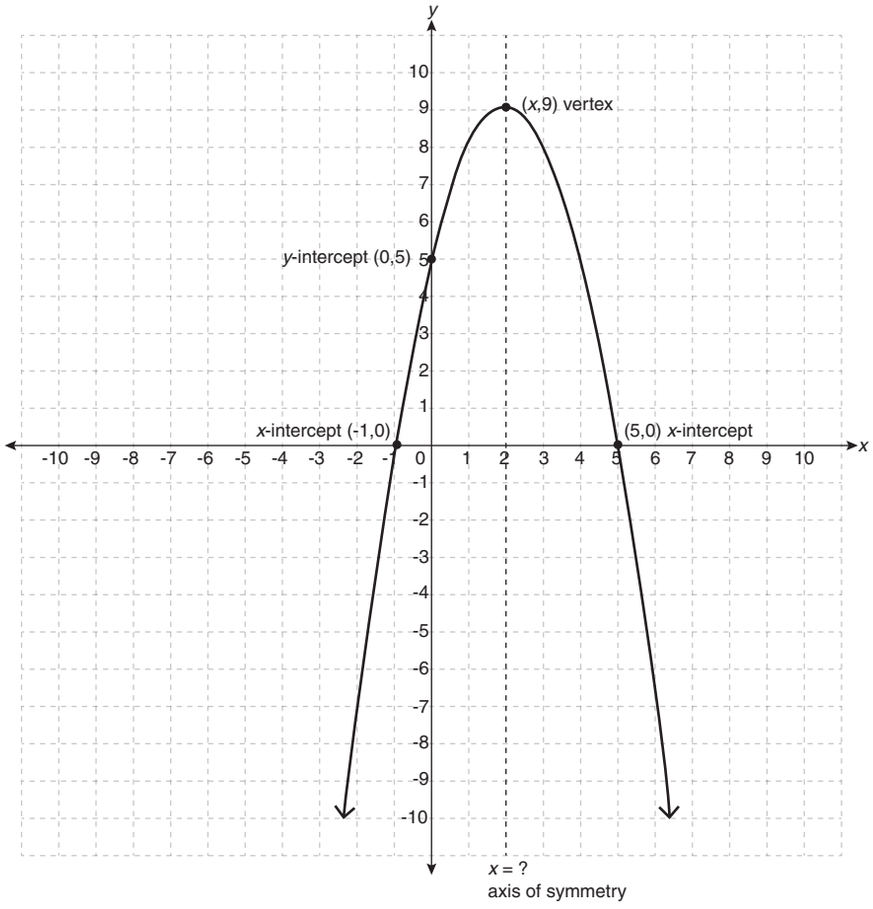
a. $\{x \mid x \in \mathrm{R}\}$

b. $\{x \mid x = 7\}$

c. $\{x \mid x \geq 0, x \in \mathrm{R}\}$

d. $\{x \mid x \geq 7, x \in \mathrm{R}\}$

3. Consider the quadratic function represented in the graph below.



Determine

- the equation of the axis of symmetry.

$$x = \frac{(-1+5)}{2} = \frac{4}{2} = 2$$

$$x = 2$$

- the x-coordinate of the vertex.

  The x-coordinate of the vertex corresponds to the axis of symmetry.
  $x = 2$

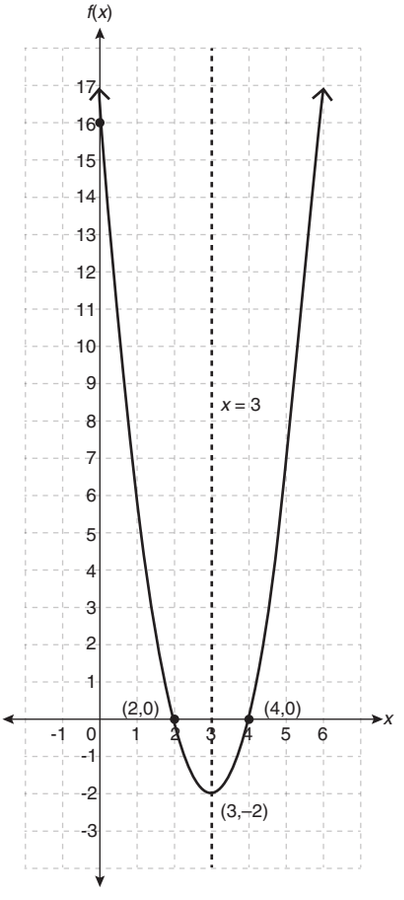
- whether the quadratic function has a maximum value or a minimum value. Explain.

  The graph of the function has a maximum value because the graph of the function opens downward.

- the maximum or minimum value.

  The function has a maximum value of $y = 9$ (y-coordinate of the vertex).

4. The function $f(x) = 2x^2 - 12x + 16$ has a zero at $x = 2$ and its vertex is located at (3, –2). Use characteristics of the graphs of quadratic functions to sketch the graph of the function $f(x) = 2x^2 - 12x + 16$ without using a table of values.



The graph of the function opens upward since $a > 0$. As such, the location of the vertex corresponds to the minimum on the graph of the function.

The axis of symmetry passes through the vertex. The equation of the axis of symmetry is $x = 3$.

The zeros are symmetrical about the axis of symmetry. The given zero is one unit to the left of the axis of symmetry, so the other zero will be one unit to the right of the axis of symmetry. As such, the second zero will be at $x = 4$.

The y-intercept can be found when $x = 0$.

$$f(x) = 2x^2 - 12x + 16$$
$$f(0) = 2(0)^2 - 12(0) + 16$$
$$= 16$$

The y-intercept is 16.