

Module Test A

Module 14

Determine the direction each parabola opens by inspection.

1. $y = 2x^2 - x - 3$ **up** _____

2. $y = -(x + 3)^2 + 4$ **down** _____

3. $x = -3(y + 1)^2$ **left** _____

4. $y = (x - 5)^2 + 1$ **up** _____

5. $x = 4y^2 + 4y - 15$ **right** _____

6. $x = -y^2$ **left** _____

7. $x = 6(y - 1)^2 + 7$ **right** _____

8. $y = -3x^2 + 1$ **down** _____

9. Given the equation of the parabola $y = 2x^2 + 4x - 1$, answer the following:

a. Find the axis of symmetry using the Axis of Symmetry Formula.

$x = -1$ _____

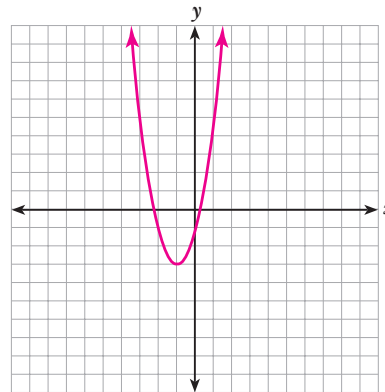
b. Identify the vertex.

$(-1, -3)$ _____

c. Find four other points on the graph.

Possible answers: $(-3, 5)$, $(-2, -1)$, $(0, -1)$, $(1, 5)$

d. Graph the parabola.



10. Given the equation of the parabola $y = -x^2 + 3x - 2$, answer the following:

a. Find the axis of symmetry using the Axis of Symmetry Formula.

$x = 1\frac{1}{2}$ _____

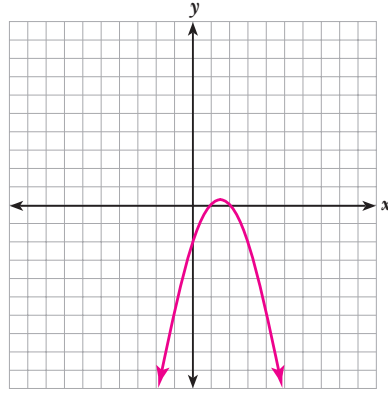
b. Identify the vertex.

$(1\frac{1}{2}, \frac{1}{4})$ _____

c. Find four other points on the graph.

Possible answers: (0, -2), (1, 0), (2, 0), (3, -2)

d. Graph the parabola.



11. Given the equation of the parabola $x = y^2 - 6y + 1$, answer the following:

a. Complete the square to write the equation in the form $x = a(y - k)^2 + h$.

$x = (y - 3)^2 - 8$

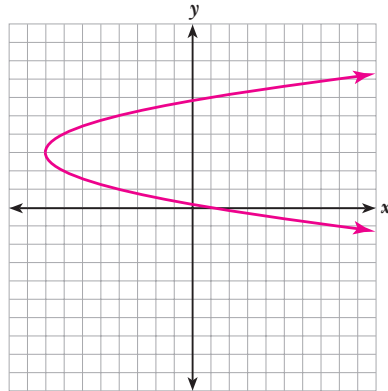
b. Identify the vertex.

(-8, 3)

c. Find four other points on the graph.

Possible answers: (-4, 1), (-7, 2), (-7, 4), (-4, 5)

d. Graph the parabola.



12. Determine whether each statement is true or false.

a. The graph of $y = 3x^2$ is narrower than the graph of $y = x^2$.

True

b. The graph of $y = 2x^2$ is narrower than the graph of $y = -2x^2$.

False

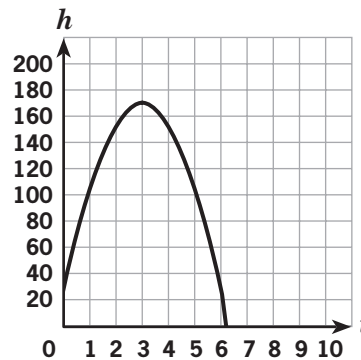
c. The graph of $x = -3y^2 + 2y - 1$ is wider than the graph of $x = -y^2 + y + 5$.

False

d. The graph of $x = 0.5y^2 + 6y$ is wider than the graph of $x = y^2$.

True

13. A rocket is fired into the air from atop a building; its height is given by the equation $h = -16t^2 + 96t + 25$, where h is the height in feet and t is time in seconds, as shown by the graph.



- a. What was the height of the building?
25 feet
- b. At what velocity was the rocket fired?
96 feet per second
- c. Using the graph, when does the rocket reach its maximum height?
three seconds
- d. Find the exact maximum height of the rocket algebraically.
 $h = 169$ feet
- e. Using the graph, approximately how long was the rocket in flight?
approximately 6.5 seconds

14. The vertex of the equation $y = -3x^2 + 6x - 4$ is _____.

- a. (0, -2) b. (1, -4) **c. (1, -1)** d. (2, -4)

15. The height of a dart thrown at a dartboard is modeled by the equation $h = -16t^2 + 6t + 5.5$, where h is in feet and t is in seconds. About how high was the dart's maximum height?

- a. 5.5 feet **b. 6 feet** c. 6.6 feet d. 7 feet

Answer the following questions:

16. Compare the graphs of $y = 3(x - 1)^2 + 2$ and $y = -(x - 1)^2 + 2$.

Both equations have a vertex of (1, 2) and an axis of symmetry of $x = 1$. The graph of $y = 3(x - 1)^2 + 2$ opens up because $a = 3$ is positive, while the graph of $y = -(x - 1)^2 + 2$ opens down because $a = -1$ is negative. The graph of $y = 3(x - 1)^2 + 2$ is narrower than the graph of $y = -(x - 1)^2 + 2$ because $|3| > |-1|$.

17. Explain why the quadratic relation $y = 2(x - 1)^2 + 3$ is a function.

The graph of the $y = 2(x - 1)^2 + 3$ is a parabola with vertex (1, 3) which opens up. The vertical line test demonstrates that the relation is a function since any vertical line drawn through the parabola only hits one point of the parabola.

