

8.2**Graphing $f(x) = ax^2 + c$**

For use with Exploration 8.2

Essential Question How does the value of c affect the graph of $f(x) = ax^2 + c$?

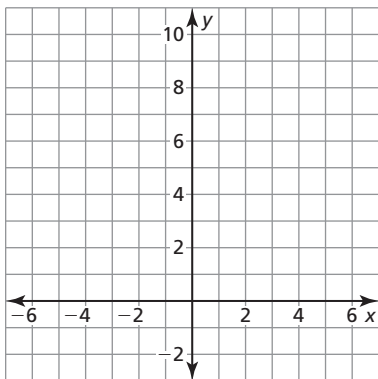
1 EXPLORATION: Graphing $y = ax^2 + c$

Go to BigIdeasMath.com for an interactive tool to investigate this exploration.

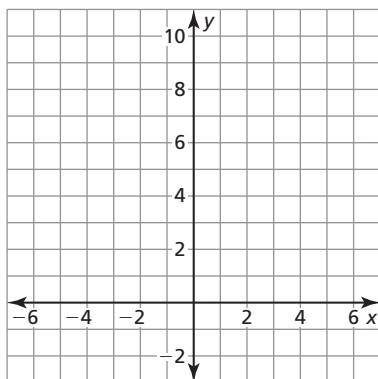
Work with a partner. Sketch the graphs of the functions in the same coordinate plane.

What do you notice?

a. $f(x) = x^2$ and $g(x) = x^2 + 2$



b. $f(x) = 2x^2$ and $g(x) = 2x^2 - 2$



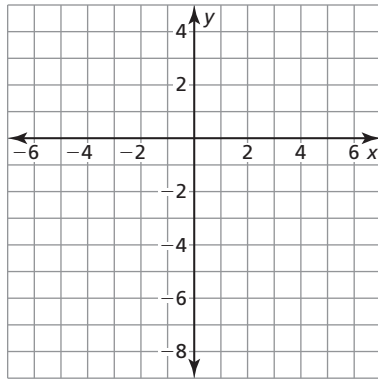
8.2 Graphing $f(x) = ax^2 + c$ (continued)

2 **EXPLORATION:** Finding x -Intercepts of Graphs

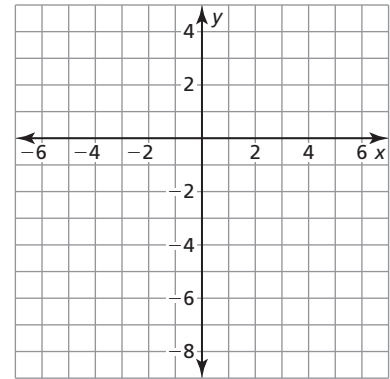
Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Graph each function. Find the x -intercepts of the graph. Explain how you found the x -intercepts.

a. $y = x^2 - 7$



b. $y = -x^2 + 1$

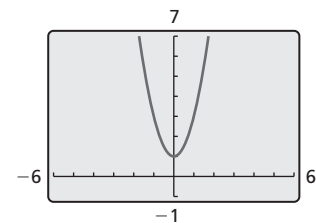


Communicate Your Answer

3. How does the value of c affect the graph of $f(x) = ax^2 + c$?

4. Use a graphing calculator to verify your answers to Question 3.

5. The figure shows the graph of a quadratic function of the form $y = ax^2 + c$. Describe possible values of a and c . Explain your reasoning.



8.2**Notetaking with Vocabulary**

For use after Lesson 8.2

In your own words, write the meaning of each vocabulary term.

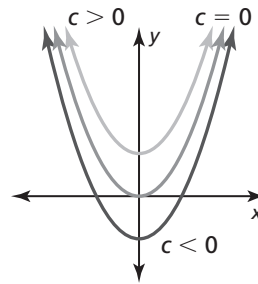
zero of a function

Core Concepts**Graphing $f(x) = ax^2 + c$**

- When $c > 0$, the graph of $f(x) = ax^2 + c$ is a vertical translation c units up of the graph of $f(x) = ax^2$.
- When $c < 0$, the graph of $f(x) = ax^2 + c$ is a vertical translation $|c|$ units down of the graph of $f(x) = ax^2$.

The vertex of the graph of $f(x) = ax^2 + c$ is $(0, c)$, and the axis of symmetry is $x = 0$.

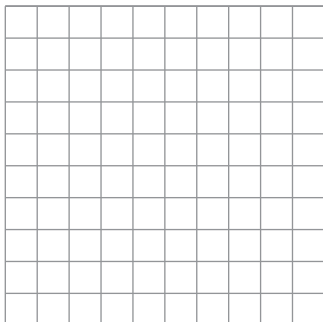
Notes:



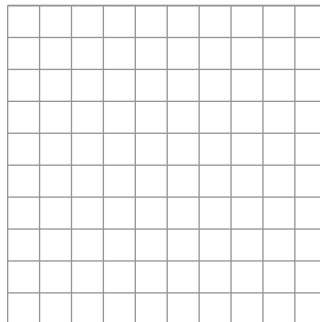
8.2 Notetaking with Vocabulary (continued)**Extra Practice**

In Exercises 1–4, graph the function. Compare the graph to the graph of $f(x) = x^2$.

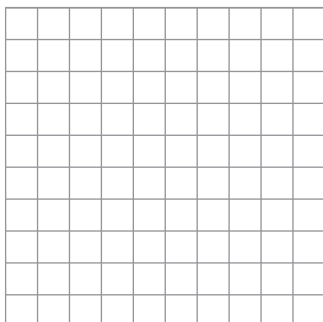
1. $g(x) = x^2 + 5$



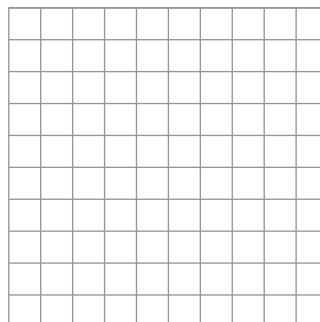
2. $m(x) = x^2 - 3$



3. $n(x) = -3x^2 - 2$



4. $q(x) = \frac{1}{2}x^2 - 4$



8.2 Notetaking with Vocabulary (continued)

In Exercises 5–8, find the zeros of the function.

5. $y = -x^2 + 1$

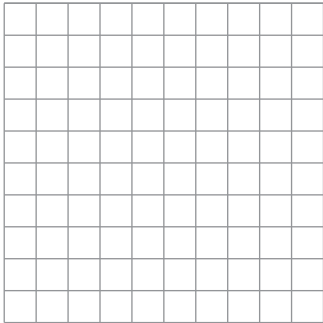
6. $y = -4x^2 + 16$

7. $n(x) = -x^2 + 64$

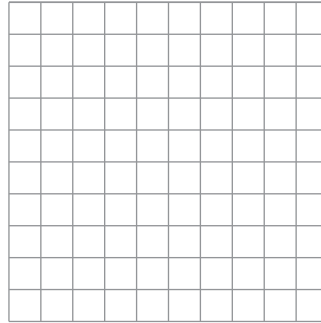
8. $p(x) = -9x^2 + 1$

In Exercises 9 and 10, sketch a parabola with the given characteristics.

9. The parabola opens down, and the vertex is
- $(0, 5)$
- .



10. The lowest point on the parabola is
- $(0, 4)$
- .



11. The function
- $f(t) = -16t^2 + s_0$
- represents the approximate height (in feet) of a falling object
- t
- seconds after it is dropped from an initial height
- s_0
- (in feet). A tennis ball falls from a height of 400 feet.

- a. After how many seconds does the tennis ball hit the ground?
- b. Suppose the initial height is decreased by 384 feet. After how many seconds does the ball hit the ground?