Find the *x*- and *y*-intercepts.

1. $x + y = 4$

2. $y = x - 11$

3. $y = 2x - 13$

4. $2x - 5y = -1$

5. $6x - y = 12$

6. $y = \frac{1}{6}x + 3$

Complete the statement with *always*, *sometimes*, or *never*.

Explain your reasoning.

1. If $x^2 = y^2$, then x is _____ equal to $|y|$.

2. If x and y are real numbers, then $|x + y|$ is _____ equal to $|y + x|$.

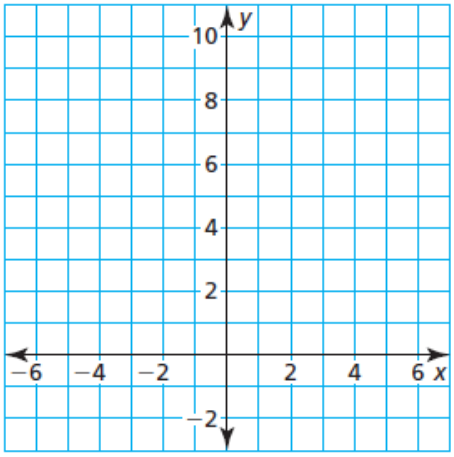
3. For any real number d, the equation $|x + 5| = d$ will _____ have no solution.

Essential Question

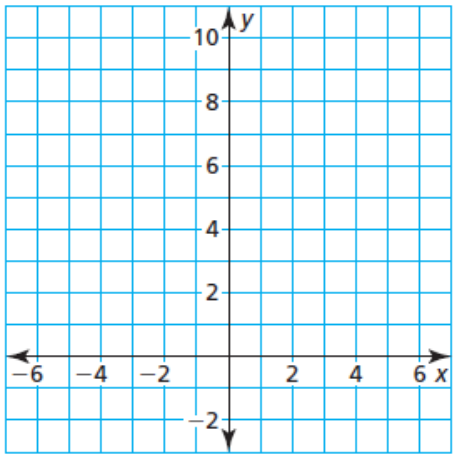
How does the value of c affect the graph of $f(x) = ax^2 + c$?

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 $g(x) = x^2 + 2$

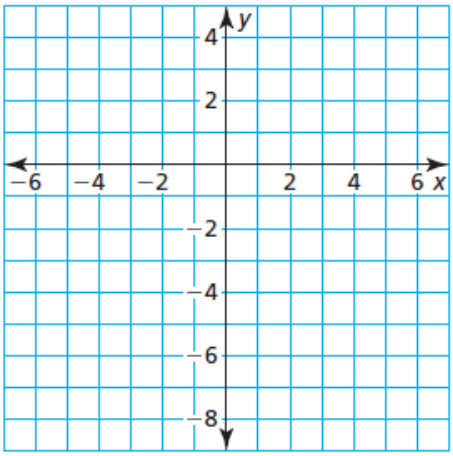


b. $f(x) = 2x^2$ and $g(x) = 2x^2 – 2$

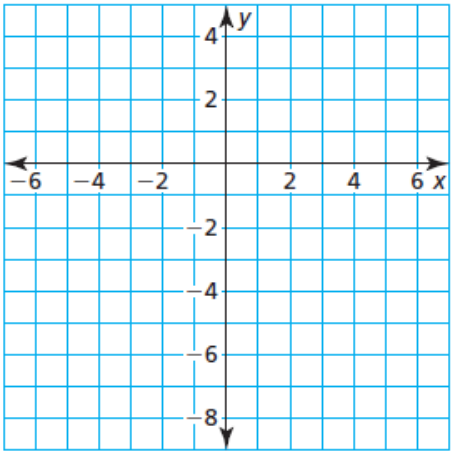


Work with a partner. Graph each function. Find the x-intercepts of the graph. Explain how you found the x-intercepts.

a. $y = x^2 - 7$



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

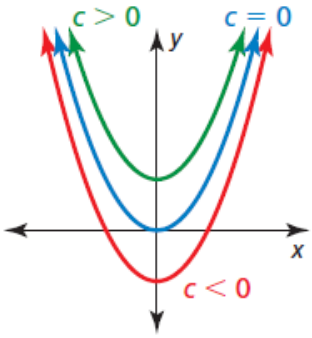


Core Concept

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 $x = 0$.



Graph $g(x) = x^2 - 2$. Compare the graph to the graph of $f(x) = x^2$.

Graph the function. Compare the graph to the graph of $f(x) = x^2$.

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

2. $h(x) = x^2 + 3$

Graph $g(x) = 4x^2 + 1$. Compare the graph to the graph of $f(x) = x^2$.

Let $f(x) = -0.5x^2 + 2$ and $g(x) = f(x) - 7$.

a. Describe the transformation from the graph of f to the graph of g. Then graph f and g in the same coordinate plane.

b. Write an equation that represents g in terms of x.

Graph the function. Compare the graph to the graph of $f(x) = x^2$.

3. $g(x) = 2x^2 - 5$

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

5. Let $f(x) = 3x^2 - 1$ and $g(x) = f(x) + 3$.

a. Describe the transformation from the graph of f to the graph of g. Then graph f and g in the same coordinate plane.

b. Write an equation that represents g in terms of x.

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). An egg is dropped from a height of 64 feet.

a. After how many seconds does the egg hit the ground?

b. Suppose the initial height is adjusted by k feet. How will this affect part (a)?

6. Explain why only nonnegative values of *t* are used in Example 4.

7. WHAT IF? The egg is dropped from a height of 100 feet. After how many seconds does the egg hit the ground?

Writing Prompt: The graph of $y = -4x^2 + 12$ is …