8 Chapter Review

Dynamic Solutions available at *BigIdeasMath.com*

8.1 Graphing $f(x) = ax^2$ (pp. 419–424)

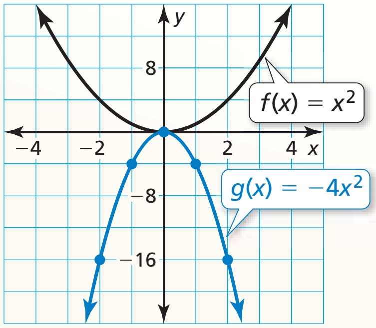
Graph $g(x) = -4x^2$. Compare the graph to the graph of $f(x) = x^2$.

Step 1 Make a table of values.

x	-2	-1	0	1	2
$g(x)$	-16	-4	0	-4	-16

Step 2 Plot the ordered pairs.

Step 3 Draw a smooth curve through the points.

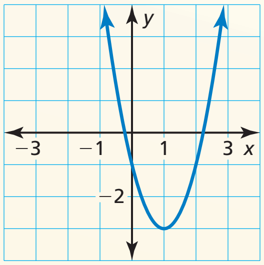


▶ The graphs have the same vertex, (0, 0), and the same axis of symmetry, $x = 0$, but the graph of g opens down and is narrower than the graph of f. So, the graph of g is a vertical stretch by a factor of 4 and a reflection in the x-axis of the graph of f.

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

1. $p(x) = 7x^2$ **2.** $q(x) = \frac{1}{2}x^2$ **3.** $g(x) = -\frac{3}{4}x^2$ **4.** $h(x) = -6x^2$

5. Identify characteristics of the quadratic function and its graph.



8.2 Graphing $f(x) = ax^2 + c$ (pp. 425–430)

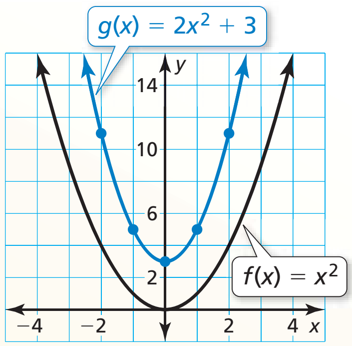
Graph $g(x) = 2x^2 + 3$. Compare the graph to the graph of $f(x) = x^2$.

Step 1 Make a table of values.

x	-2	-1	0	1	2
$g(x)$	11	5	3	5	11

Step 2 Plot the ordered pairs.

Step 3 Draw a smooth curve through the points.



▶ Both graphs open up and have the same axis of symmetry, $x = 0$. The graph of g is narrower, and its vertex, (0, 3), is above the vertex of the graph of f, (0, 0). So, the graph of g is a vertical stretch by a factor of 2 and a vertical translation 3 units up of the graph of f.

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

6. $g(x) = x^2 + 5$ **7.** $h(x) = -x^2 - 4$ **8.** $m(x) = -2x^2 + 6$ **9.** $n(x) = \frac{1}{3}x^2 - 5$

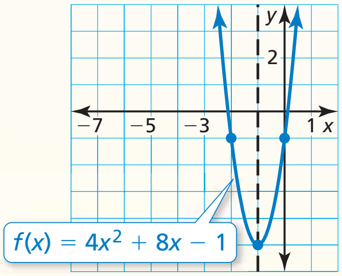
8.3 Graphing $f(x) = ax^2 + bx + c$ (pp. 431–438)

Graph $f(x) = 4x^2 + 8x - 1$. Describe the domain and range.

Step 1 Find and graph the axis of symmetry: $x = -\frac{b}{2a} = -\frac{8}{2(4)} = -1$.

Step 2 Find and plot the vertex. The axis of symmetry is $x = -1$. So, the x-coordinate of the vertex is -1. The y-coordinate of the vertex is $f(-1) = 4(-1)^2 + 8(-1) - 1 = -5$. So, the vertex is $(-1, -5)$.

Step 3 Use the y-intercept to find two more points on the graph. Because $c = -1$, the y-intercept is -1. So, $(0, -1)$ lies on the graph. Because the axis of symmetry is $x = -1$, the point $(-2, -1)$ also lies on the graph.



Step 4 Draw a smooth curve through the points.

▶ The domain is all real numbers. The range is $y \geq -5$.

Graph the function. Describe the domain and range.

10. $y = x^2 - 2x + 7$

11. $f(x) = -3x^2 + 3x - 4$

12. $y = \frac{1}{2}x^2 - 6x + 10$

13. The function $f(t) = -16t^2 + 88t + 12$ represents the height (in feet) of a pumpkin t seconds after it is launched from a catapult. When does the pumpkin reach its maximum height? What is the maximum height of the pumpkin?

8.4 Graphing $f(x) = a(x - h)^2 + k$ (pp. 441–448)

Determine whether $f(x) = 2x^2 + 4$ is *even*, *odd*, or *neither*.

$f(x) = 2x^2 + 4$ — Write the original function.

$f(-x) = 2(-x)^2 + 4$ — Substitute $-x$ for x.

$= 2x^2 + 4$ — Simplify.

$= f(x)$ — Substitute $f(x)$ for $2x^2 + 4$.

▶ Because $f(-x) = f(x)$, the function is even.

Determine whether the function is *even*, *odd*, or *neither*.

14. $w(x) = 5^x$

15. $r(x) = -8x$

16. $h(x) = 3x^2 - 2x$

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

17. $h(x) = 2(x - 4)^2$

18. $g(x) = \frac{1}{2}(x - 1)^2 + 1$

19. $q(x) = -(x + 4)^2 + 7$

20. Consider the function $g(x) = -3(x + 2)^2 - 4$. Graph $h(x) = g(x - 1)$.

21. Write a quadratic function whose graph has a vertex of (3, 2) and passes through the point (4, 7).

8.5 Using Intercept Form *(pp. 449–458)*

Use zeros to graph $h(x) = x^2 - 7x + 6$.

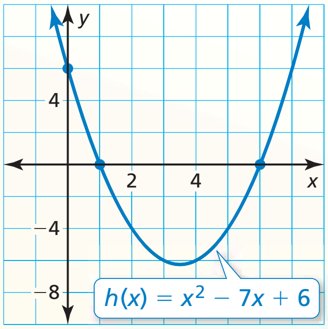
The function is in standard form. The parabola opens up ($a > 0$), and the y-intercept is 6. So, plot (0, 6).

The polynomial that defines the function is factorable. So, write the function in intercept form and identify the zeros.

$h(x) = x^2 - 7x + 6$ — Write the function.

$= (x - 6)(x - 1)$ — Factor the trinomial.

The zeros of the function are 1 and 6. So, plot (1, 0) and (6, 0). Draw a parabola through the points.



Graph the quadratic function. Label the vertex, axis of symmetry, and *x*-intercepts. Describe the domain and range of the function.

22. $y = (x - 4)(x + 2)$ **23.** $f(x) = -3(x + 3)(x + 1)$ **24.** $y = x^2 - 8x + 15$

Use zeros to graph the function.

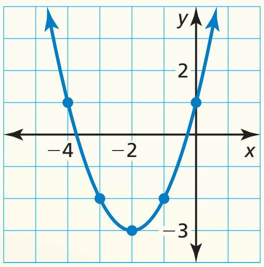
25. $y = -2x^2 + 6x + 8$ **26.** $f(x) = x^2 + x - 2$ **27.** $f(x) = 2x^3 - 18x$

28. Write a quadratic function in standard form whose graph passes through (4, 0) and (6, 0).

8.6 Comparing Linear, Exponential, and Quadratic Functions *(pp. 459–468)*

Tell whether the data represent a *linear*, an *exponential*, or a *quadratic* function.

a. $(-4, 1), (-3, -2), (-2, -3)$
$(-1, -2), (0, 1)$



The points appear to represent a quadratic function.

b.

x	−1	0	1	2	3
y	15	8	1	−6	−13

+1 +1 +1 +1

x	−1	0	1	2	3
y	15	8	1	−6	−13

−7 −7 −7 −7

The first differences are constant. So, the table represents a linear function.

29. Tell whether the table of values represents a *linear*, an *exponential*, or *a quadratic* function. Then write the function.

x	−1	0	1	2	3
y	512	128	32	8	2

30. The balance y (in dollars) of your savings account after t years is represented by $y = 200(1.1)^t$. The beginning balance of your friend's account is \$250, and the balance increases by \$20 each year. (a) Compare the account balances by calculating and interpreting the average rates of change from $t = 2$ to $t = 7$. (b) Predict which account will have a greater balance after 10 years. Explain.