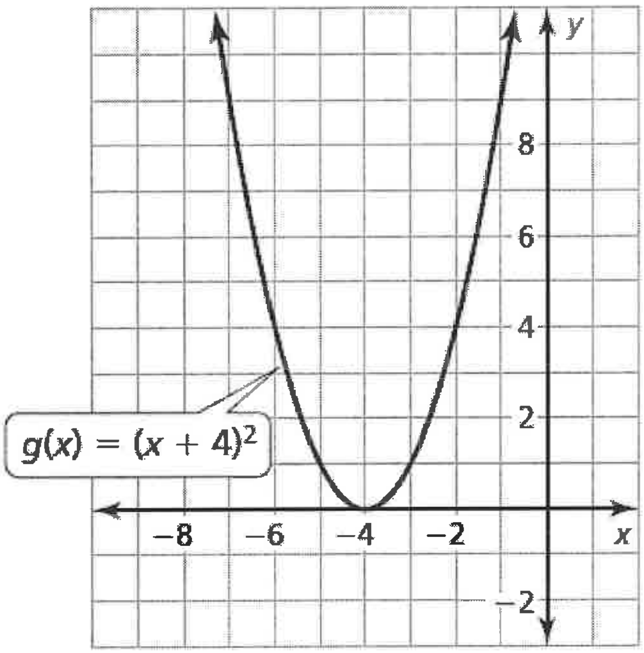
ANSWER PRESENTATION TOOL

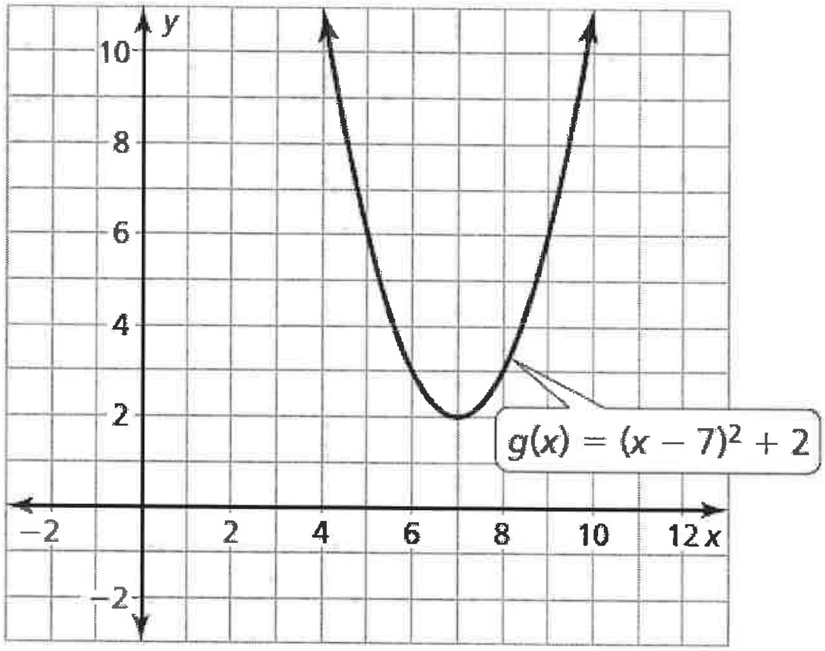
Algebra 2 - Student Edit 2 Chapter Rev 1-27 ALL EVEN Show Solu

ODD

1. The graph of g is a translation 4 units left of the parent graph f.



3. The graph of g is a translation 7 units right and 2 units up of the parent graph f.



5. First write a function h that represents the horizontal shrink of f.

$$h(x) = f\left(\tfrac{3}{2}x\right)$$
$$= \left(\tfrac{3}{2}x\right)^2$$
$$= \tfrac{9}{4}x^2$$

Then write a function g that represents the translations.

$$g(x) = h(x + 5) - 2$$
$$= \tfrac{9}{4}(x + 5)^2 - 2$$

The transformed function is $g(x) = \frac{9}{4}(x + 5)^2 - 2$.

7. **a.** The graph is a horizontal translation left of the parent quadratic function, so h is negative. The graph is not a vertical translation of the parent quadratic function, so k is zero.

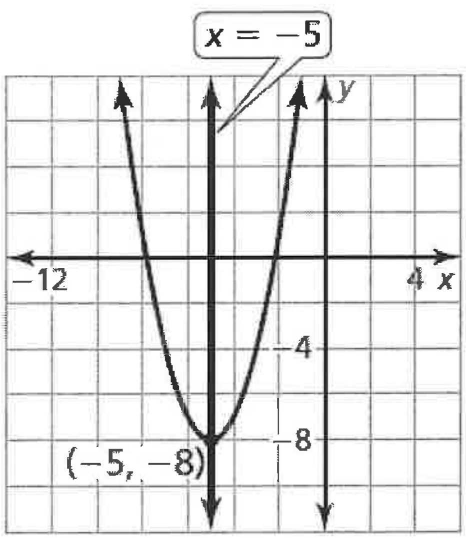
b. The graph is a horizontal translation right and a vertical translation down of the parent quadratic function. So, h is positive and k is negative.

9. Identify the constants $a = 1$, $h = -5$, and $k = -8$. Plot the vertex $(-5, -8)$ and draw the axis of symmetry $x = -5$. Evaluate the function for two values of x.

$x = -6$: $g(-6) = (-6 + 5)^2 - 8 = -7$

$x = -2$: $g(-2) = (-2 + 5)^2 - 8 = 1$

Plot the points $(-6, -7)$, $(-2, 1)$, and their reflections in the axis of symmetry. Draw the parabola through the plotted points.



The minimum value is -8. The function is decreasing to the left of $x = -5$ and increasing to the right of $x = -5$.

11. Identify the constants $a = -2$, $b = 16$, and $c = 3$. Because $a < 0$, the parabola opens down. Find the vertex. First calculate the x-coordinate.

$$x = -\frac{b}{2a} = -\frac{16}{2(-2)} = 4$$

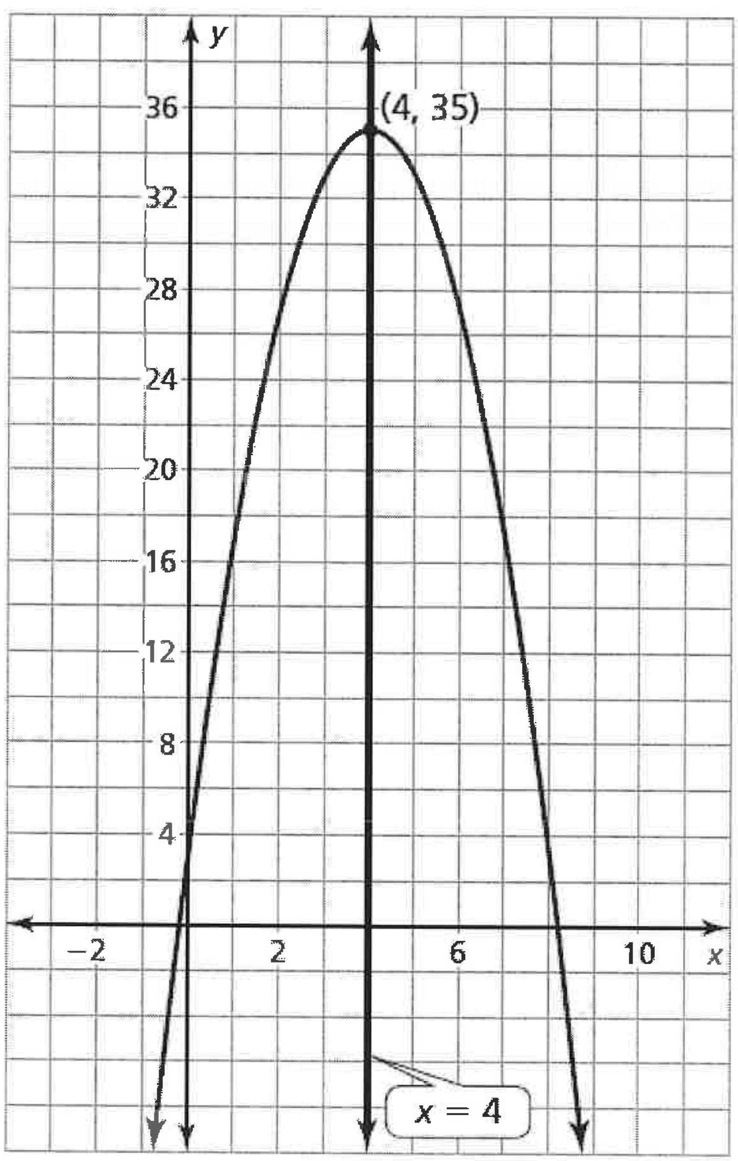
Then find the y-coordinate of the vertex.

$$g(4) = -2(4)^2 + 16(4) + 3 = 35$$

So, the vertex is $(4, 35)$. Plot the point. Draw the axis of symmetry $x = 4$. Identify the y-intercept c, which is 3. Plot the point $(0, 3)$ and its reflection in the axis of symmetry, $(8, 3)$. Evaluate the function for another value of x, such as $x = 1$.

$$g(1) = -2(1)^2 + 16(1) + 3 = 17$$

Plot the point $(1, 17)$ and its reflection in the axis of symmetry, $(7, 17)$. Draw a parabola through the plotted points.



The maximum value is 35. The function is increasing to the left of $x = 4$ and decreasing to the right of $x = 4$.

13. The points (1, 4) and (7, 4) have the same $g(x)$ value, so the vertex is on the line $x = \frac{(7 + 1)}{2} = 4$. The table shows that the value of $g(x)$ when $x = 4$ is 13, so the vertex is the point (4, 13).

15. $y = x(0.6 - 0.02x)$

$y = 0.6x - 0.02x^2$

$y = -0.02x^2 + 0.6x$

The axis of symmetry is $x = -\frac{0.6}{-0.04} = 15$ and $y = 15[0.6 - 0.02(15)] = 4.5$. Your first kick reaches a maximum height of 4.5 feet, 15 feet away from you. The point (0, 0) is on the graph, so the reflected point (30, 0) is also on the graph, and the kick travels 30 feet before hitting the ground.

The vertex of the second kick is (12, 7) and the point (0, 0) is on the graph, so the reflected point (24, 0) is also on the graph, and the second kick travels 24 feet before hitting the ground. So, your first kick travels farther before hitting the ground. Your second kick travels higher.

17. Because the vertex is not at the origin and the focus is below the vertex, the equation has the form $y = \frac{1}{4p}(x - h)^2 + k$.

The distance from the vertex to the focus is 4 units, so $p = -4$. Because the vertex is (2, 6), $h = 2$ and $k = 6$.

Substitute these values to write an equation of the parabola.

$y = \frac{1}{4(-4)}(x - 2)^2 + 6 = -\frac{1}{16}(x - 2)^2 + 6$

So, an equation of the parabola is $y = -\frac{1}{16}(x - 2)^2 + 6$.

19. Rewrite the equation in standard form.

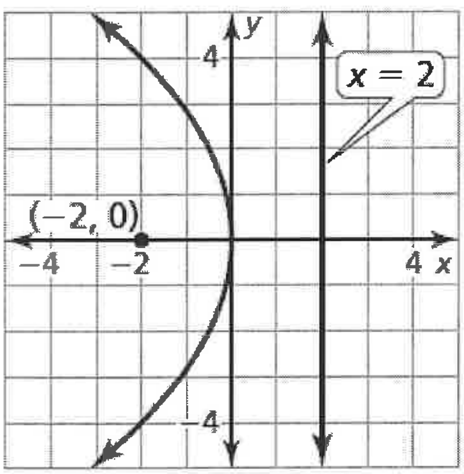
$$64x + 8y^2 = 0$$

$$64x = -8y^2$$

$$x = -\frac{1}{8}y^2$$

Identify the focus, directrix, and axis of symmetry. The equation has the form $x = \frac{1}{4p}y^2$, where $p = -2$. The focus is $(p, 0)$, or $(-2, 0)$. The directrix $x = -p$, or $x = 2$. Because y is squared, the axis of symmetry is the x-axis. Use a table of values to graph the equation.

y	0	±2	±4	±6
x	0	−0.5	−2	−4.5



21. Because the vertex is not at the origin and the axis of symmetry is horizontal, the equation has the form $x = \frac{1}{4p}(y - k)^2 + h$. The vertex (h, k) is $(3, 1)$ and the focus $(h + p, k)$ is $(5, 1)$, so $h = 3$, $k = 1$, and $p = 2$. Substitute these values to write an equation of the parabola.

$$x = \frac{1}{4(2)}(y - 1)^2 + 3 = \frac{1}{8}(y - 1)^2 + 3$$

So, the equation of the parabola is $x = \frac{1}{8}(y - 1)^2 + 3$.

23. The vertex of the parabola is $(10, -4)$ and passes through the point $(1, 12)$. Use the vertex and the point to solve for a in vertex form.

$$y = a(x - h)^2 + k$$

$$12 = a(1 - 10)^2 - 4$$

$$16 = 81a$$

$$a = \frac{16}{81}$$

So, an equation of the parabola is $y = \frac{16}{81}(x - 10)^2 - 4$.

25. Use the form of a quadratic equation $y = ax^2 + bx + c$. Use substitution of the x- and y-values from the points $(-2, 7)$, $(1, 10)$, and $(2, 27)$ to form the following system.

$$4a - 2b + c = 7$$

$$a + b + c = 10$$

$$4a + 2b + c = 27$$

Solve the system of equations.

$$3a - 3b = -3$$

$$3a + b = 17$$

$$-4b = -20$$

$$a = 4$$

$$b = 5$$

$$c = 1$$

So, an equation of the parabola is $y = 4x^2 + 5x + 1$.

27. $y(0)$ $y(0.5)$ $y(1)$ $y(1.5)$ $y(2)$ $y(2.5)$

150 146 134 114 86 50

4 12 20 28 36

-8 -8 -8 -8

The second differences are constant, so the data can be modeled by a quadratic equation. Write a quadratic equation of the form $y = ax^2 + bx + c$ that models the data. Use any three points (x, y) from the table to write a system of equations.

Use (0, 150): $c = 150$

Use (1, 134): $a + b + c = 134$

Use (2, 86): $4a + 2b + c = 86$

Use the elimination method to solve the system.

$$2a + b = -32$$
$$a + b = -16$$
$$a = -16$$
$$b = 0$$
$$c = 150$$

The data can be modeled by the equation $y = -16x^2 + 150$. To determine the time the object is in the air, let $y = 0$ and then solve for x.

$$0 = -16x^2 + 150$$
$$16x^2 = 150$$
$$x^2 = \frac{75}{8}$$
$$x = \pm\sqrt{\frac{75}{8}} \approx 3.06$$

Because you need only the positive solution, the object stays in the air for about 3.06 seconds.