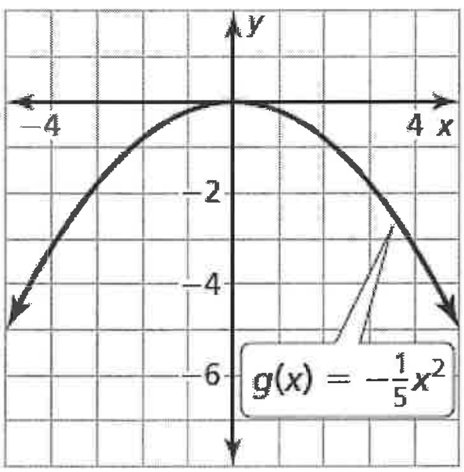
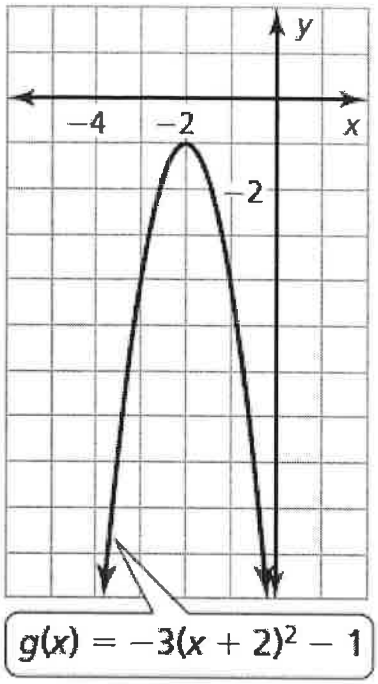
ANSWER PRESENTATION TOOL

Algebra 2 - Student Edit | 2 | Chapter Rev | 2-28 | ALL EVEN ODD | Show Solu

2. The graph of g is a reflection in the x-axis and a vertical shrink by a factor of $\frac{1}{5}$ of the parent graph f.



4. The graph of g is a vertical stretch by a factor of 3 followed by a reflection in the x-axis, then a translation 2 units left and 1 unit down of the parent graph f.



6. First write a function h that represents the translations of f.

$$h(x) = f(x + 2) + 3$$
$$= [(x + 2)^2 - 2(x + 2)] + 3$$
$$= (x^2 + 4x + 4 - 2x - 4) + 3$$
$$= x^2 + 2x + 3$$

Then write a function g that represents the reflection in the y-axis.

$$g(x) = h(-x)$$
$$= (-x)^2 + 2(-x) + 3$$
$$= x^2 - 2x + 3$$

The transformed function is $g(x) = x^2 - 2x + 3$.

8. The vertex of the first kick is (30, 18), so the maximum height is 18 yards. The maximum height of the second kick is $18 + 6 = 24$ and the horizontal distance is the same, so the vertex of the second kick is (30, 24). The equation of the second kick takes the form $y = a(x - 30)^2 + 24$. The point (0, 0) is on both graphs, and due to symmetry, so is the point (60, 0).

$$0 = a(60 - 30)^2 + 24$$

$$0 = 900a + 24$$

$$-24 = 900a$$

$$-\frac{24}{900} = a$$

$$-\frac{2}{75} = a$$

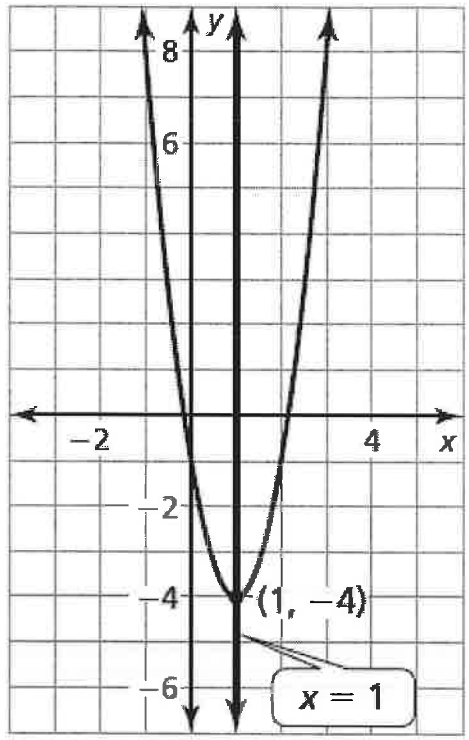
So, a function that represents the second kick is $y = -\frac{2}{75}(x - 30)^2 + 24$.

10. Identify the constants $a = 3$, $h = 1$, and $k = -4$. Plot the vertex $(1, -4)$ and draw the axis of symmetry $x = 1$. Evaluate the function for two values of x.

$x = 0: f(0) = 3(0 - 1)^2 - 4 = -1$

$x = 3: f(2) = 3(3 - 1)^2 - 4 = 8$

Plot the points $(0, -1)$, $(3, 8)$, and their reflections in the axis of symmetry. Draw the parabola through the plotted points.



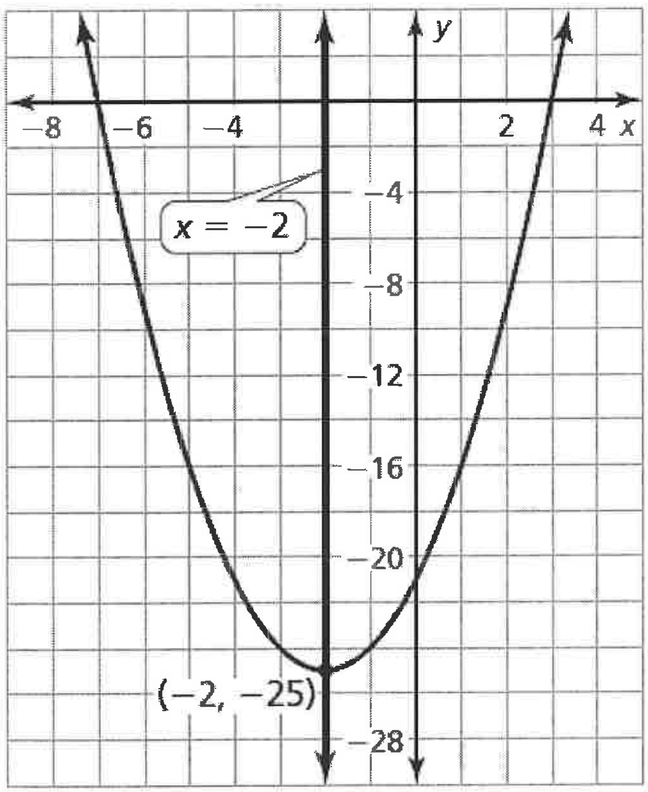
The minimum value is -4. The function is decreasing to the left of $x = 1$ and increasing to the right of $x = 1$.

12. Identify the x-intercepts. The x-intercepts are $p = 3$ and $q = -7$, so the parabola passes through the points $(3, 0)$ and $(-7, 0)$. Find the coordinates of the vertex.

$$x = \frac{p + q}{2} = \frac{3 + (-7)}{2} = -2$$

$$h(-2) = (-2 - 3)(-2 + 7) = -25$$

So, the axis of symmetry is $x = -2$ and the vertex is $(-2, -25)$. Draw a parabola through the vertex and the points where the x-intercepts occur.



The minimum value is -25. The function is decreasing to the left of $x = -2$ and increasing to the right of $x = -2$.

14. The vertex is $(-5, k)$ and the graph goes through the point $(0, 3)$.

$$3 = a(0 + 5)^2 + k$$

$$3 = 25a + k$$

$$3 - 25a = k$$

Sample answer: Let $a = 1$.

$$3 - 25 = k$$

$$-22 = k$$

So, a quadratic function is

$$y = (x + 5)^2 - 22$$

$$y = x^2 + 10x + 25 - 22$$

$$y = x^2 + 10x + 3.$$

So, a quadratic function in standard form is $y = x^2 + 10x + 3$.

16. Because the vertex is at the origin and the axis of axis of symmetry is horizontal, the equation has the form $x = \frac{1}{4p}y^2$. The directrix is $x = 2$, so $p = -2$. Substitute -2 for p to write the equation of the parabola.

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

So, an equation of the parabola is $x = \frac{1}{4(-2)}y^2 = -\frac{1}{8}y^2$.

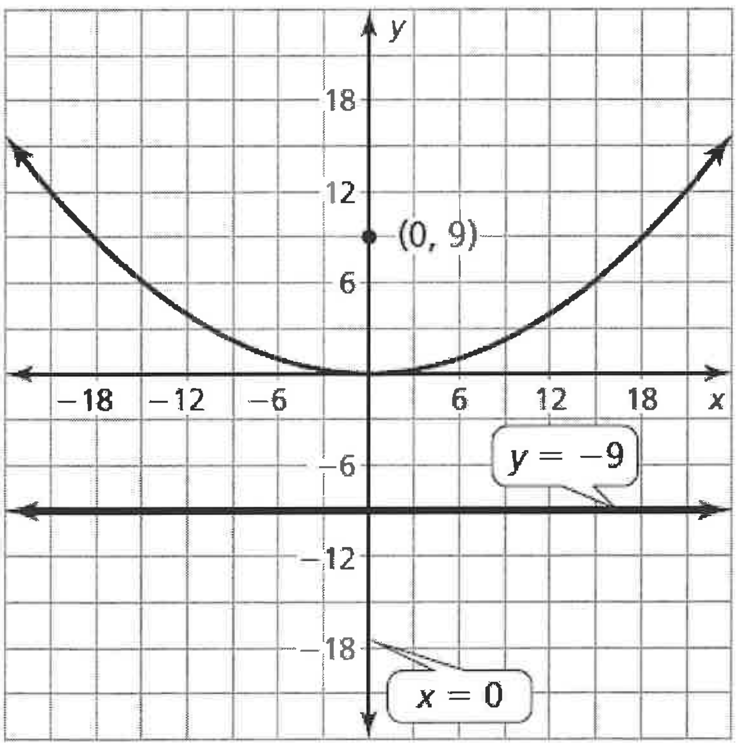
18. Rewrite the equation in standard form.

$36y = x^2$

$y = \frac{1}{36}x^2$

Identify the focus, directrix, and axis of symmetry. The equation has the form $y = \frac{1}{4p}x^2$, where $p = 9$. The focus is $(0, p)$, or $(0, 9)$. The directrix $y = -p$, or $y = -9$. Because x is squared, the axis of symmetry is the y-axis. Use a table of values to graph the equation.

x	0	±2	±4	±6
y	0	0.111	0.444	1



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

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

So, the equation of the parabola is $y = \frac{1}{4}(x - 2)^2 - 4$.

22. To model the situation, use the equation $y = \frac{1}{4p}(x - h)^2 + k$.

Let the vertex be $(0, -6)$, and the graph pass through the points $(-10, 0)$ and $(10, 0)$. Substitute for h and k, and use another point to find p.

$$y = \frac{1}{4p}(x - 0)^2 - 6$$

$$y = \frac{1}{4p}x^2 - 6$$

$$0 = \frac{1}{4p}(10)^2 - 6$$

$$0 = \frac{1}{4p}(100) - 6$$

$$6 = \frac{1}{4p}(100)$$

$$6 = \frac{25}{p}$$

$$p = \frac{25}{6} \approx 4.167$$

The focus is about $(0, -6 + 4.167)$, or $(0, -1.83)$. So, the microphone is about 1.83 inches below the opening of the parabolic dish.

24. The x-intercepts of the parabola are -1 and 5 and passes through the point (4, 3). Use the x-intercepts and the point to solve for a in intercept form.

$y = a(x - p)(x - q)$

$3 = a(4 - (-1))(4 - 5)$

$3 = -5a$

$a = -\frac{3}{5}$

So, an equation of the parabola is $y = -\frac{3}{5}(x + 1)(x - 5)$.

26. The vertex is (80, 30) and the graph goes through the point (0, 20).

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

$20 = a(0 - 80)^2 + 30$

$20 = 6400a + 30$

$-10 = 6400a$

$-\frac{1}{640} = a$

So, an equation of the parabola is $y = -\frac{1}{640}(x - 80)^2 + 30$.

The point (160, 20) is a reflection of the point (0, 20) about the axis of symmetry. Thus, the height of the second ramp is 20 feet.

28. a. Using technology, a quadratic function is a good model for the data.

$f(x) = 0.05x^2 + 2.4x + 1$

b. $f(45) = 0.05(45)^2 + 2.4(45) + 1 = 210.25$

The estimated total stopping distance of a vehicle travelling 45 miles per hour is about 210 feet.