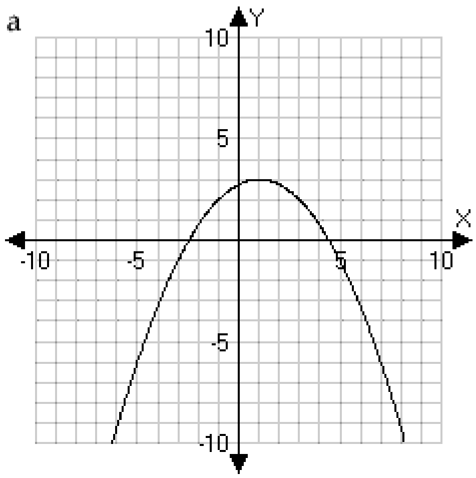
Review Exercise Set 2

Exercise 1: Match the quadratic functions with their graph.

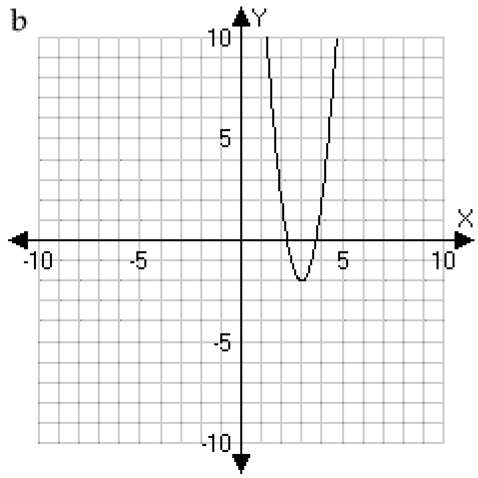
$f(x) = \frac{1}{3}(x + 1)^2$ $g(x) = 4x^2 - 24x + 34$

$s(x) = -3(x + 4)^2 + 1$ $t(x) = -\frac{1}{4}x + \frac{1}{2}x + \frac{11}{4}$

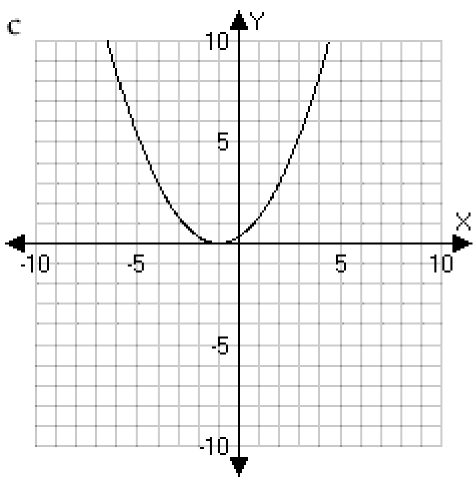
a



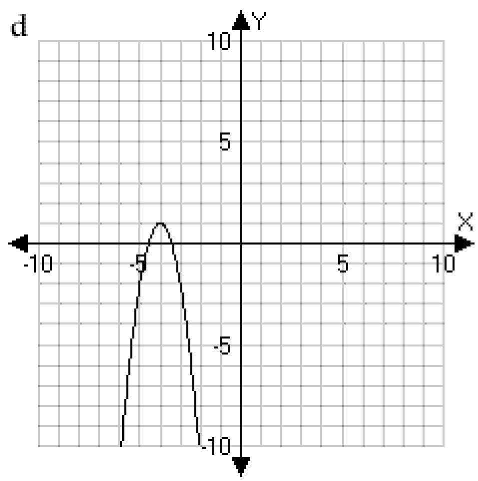
b



c

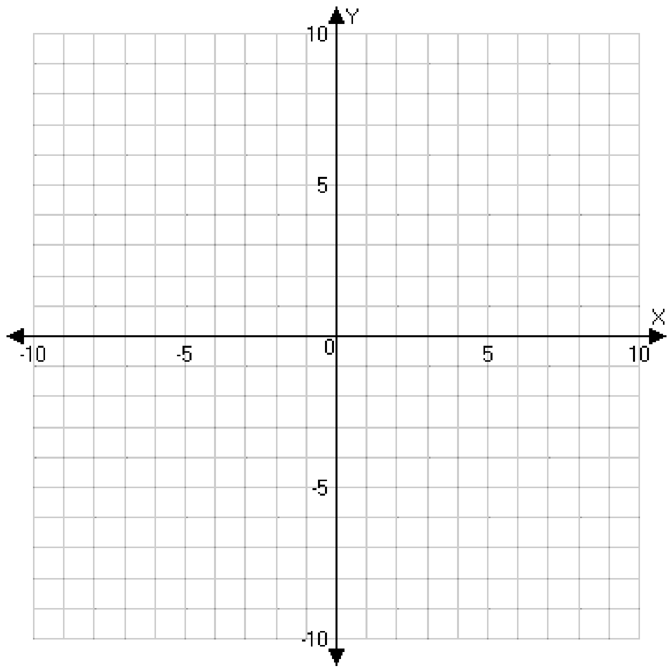


d



Exercise 2: Graph the quadratic function given in standard form.

$$F(x) = \frac{1}{3}(x - 3)^2 + 2$$



Exercise 3: Rewrite the given quadratic function in standard form by using the completing the square method.

$$f(x) = 3x^2 - 12x + 7$$

Exercise 4: Determine the vertex of the parabola defined by the given quadratic function.

$$g(x) = -\frac{1}{4}x^2 + \frac{5}{6}x - 8$$

Exercise 5: Find the quadratic function that passes through the following vertex and point. Express the equation in both standard and general form.

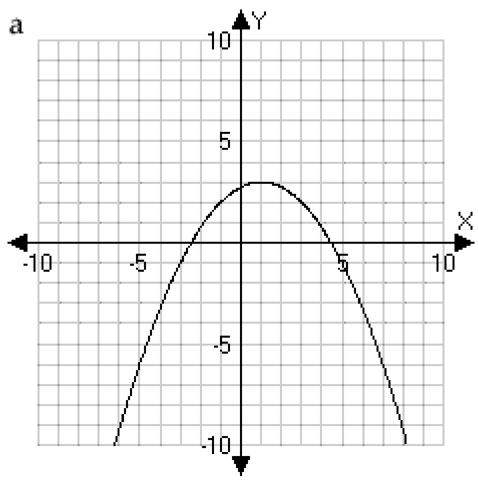
vertex (1, -3) point (3, 5)

Review Exercise Set 2 Answer Key

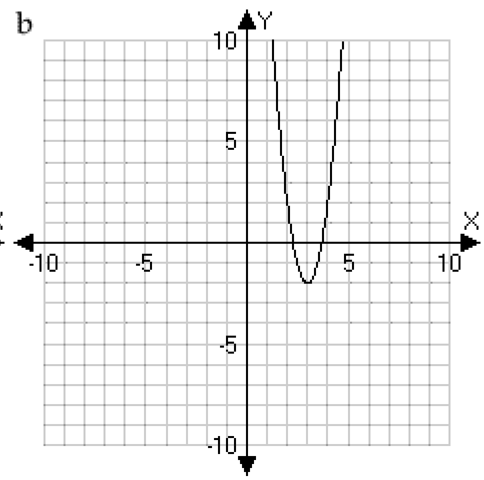
Exercise 1: Match the quadratic functions with their graph.

$f(x) = \frac{1}{3}(x + 1)^2$ $g(x) = 4x^2 - 24x + 34$

$s(x) = -3(x + 4)^2 + 1$ $t(x) = -\frac{1}{4}x + \frac{1}{2}x + \frac{11}{4}$



$t(x) = -\frac{1}{4}x + \frac{1}{2}x + \frac{11}{4}$



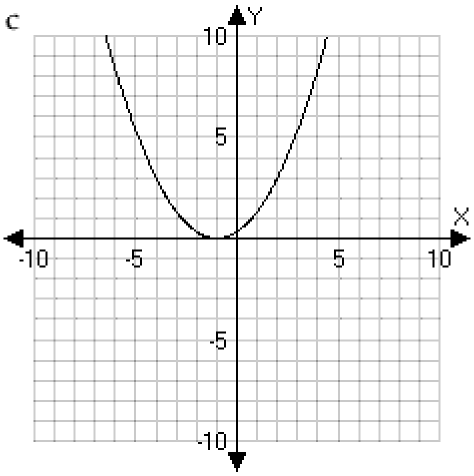
$g(x) = 4x^2 - 24x + 34$

Graph "a" is the function t(x) because it is opening downward and has the y-intercept of 11/4.

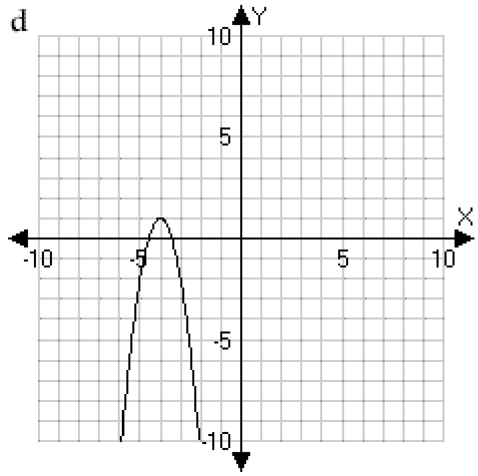
Graph "b" is the function g(x) because it is opening upward and is the only graph that could intersect the y-axis at 34.

Exercise 1 (Continued):

c



d



$f(x) = \frac{1}{3}(x + 1)^2$

$s(x) = -3(x + 4)^2 + 1$

Graph "c" is the function f(x) because it is opening upward and has its vertex at (-1, 0).

Graph "d" is the function s(x) because it is opening downward and has its vertex at (-4, 1).

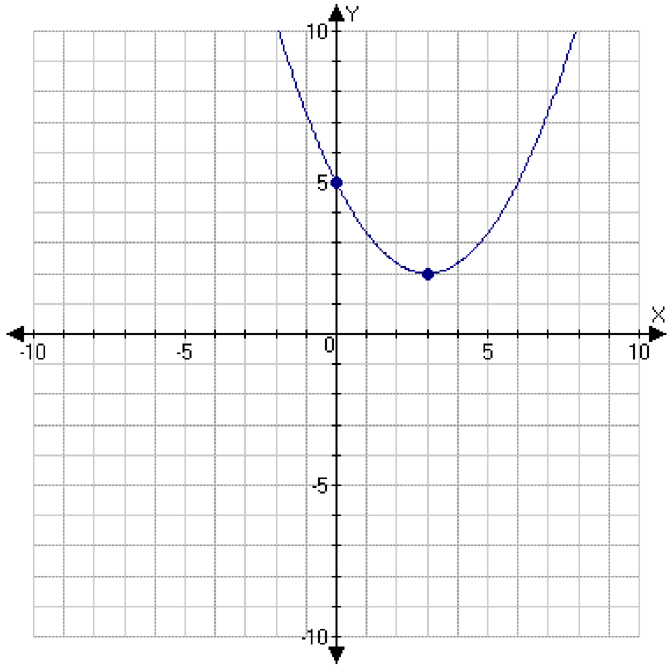
Exercise 2: Graph the quadratic function given in standard form.

$$F(x) = \frac{1}{3}(x - 3)^2 + 2$$

From the function we can obtain the following information about the graph:

Direction of quadratic function: opens upward
Vertex: (3, 2)
y-intercept: (0, 5)

Exercise 2 (Continued):



Exercise 3: Rewrite the given quadratic function in standard form by using the completing the square method.

$f(x) = 3x^2 - 12x + 7$
$f(x) = (3x^2 - 12x) + 7$
$f(x) = 3(x^2 - 4x) + 7$
$f(x) = 3(x^2 - 4x + \left(\frac{-4}{2}\right)^2) + 7 - 3\left(\frac{-4}{2}\right)^2$
$f(x) = 3(x^2 - 4x + (-2)^2) + 7 - 3(-2)^2$
$f(x) = 3(x - 2)^2 + 7 - 3(4)$
$f(x) = 3(x - 2)^2 + 7 - 12$
$f(x) = 3(x - 2)^2 - 5$

Exercise 4: Determine the vertex of the parabola defined by the given quadratic function.

g(x) = $-\frac{1}{4}x^2 + \frac{5}{6}x - 8$

Find the x-coordinate of the vertex

a = $-\frac{1}{4}$; b = $\frac{5}{6}$

$$
\begin{aligned}
x &= -\frac{b}{2a} \\
&= -\frac{5/6}{2\left(-1/4\right)} \\
&= -\frac{5/6}{-1/2} \\
&= -\frac{5}{6} \times -\frac{2}{1} \\
&= -\frac{5}{3}
\end{aligned}
$$

Find the y-coordinate of the vertex – g($\frac{5}{3}$)

$$
\begin{aligned}
g(x) &= -\frac{1}{4}\left(\frac{5}{3}\right)^2 + \frac{5}{6}\left(\frac{5}{3}\right) - 8 \\
&= -\frac{1}{4}\left(\frac{25}{9}\right) + \frac{25}{18} - 8 \\
&= -\frac{25}{36} + \frac{25}{18} - 8 \\
&= -\frac{25}{36} + \frac{50}{36} - \frac{288}{36} \\
&= -\frac{263}{36} \\
&= -7\frac{11}{36}
\end{aligned}
$$

Vertex = ($\frac{5}{3}$, $-7\frac{11}{36}$)

Exercise 5: Find the quadratic function that passes through the following vertex and point. Express the equation in both standard and general form.

vertex (1, -3) point (3, 5)

First, we need to determine the value of "a" in the standard form equation of a quadratic function. The vertex will be the values for (h, k) and the given point will be the values for the point (x, f(x)).

$f(x) = a(x - h)^2 + k$
$5 = a(3 - 1)^2 + (-3)$
$5 = a(2)^2 - 3$
$5 = 4a - 3$
$8 = 4a$
$2 = a$

Now, we can substitute the value for "a" and the vertex into our standard form equation.

$f(x) = a(x - h)^2 + k$
$f(x) = 2(x - 1)^2 + (-3)$
$f(x) = 2(x - 1)^2 - 3$ standard form

To get the general form equation we will multiply out the equation.

$f(x) = 2(x - 1)^2 - 3$
$f(x) = 2(x^2 - 2x + 1) - 3$
$f(x) = 2x^2 - 4x + 2 - 3$
$f(x) = 2x^2 - 4x - 1$ general form