Exercise 1: Match the quadratic functions with their graph.

\[
\begin{align*}
f(x) &= \frac{1}{3} (x + 1)^2 \\
g(x) &= 4x^2 - 24x + 34 \\
s(x) &= -3(x + 4)^2 + 1 \\
t(x) &= -\frac{1}{4} x + \frac{1}{2} x + \frac{11}{4}
\end{align*}
\]
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.

\[ f(x) = \frac{1}{3} (x + 1)^2 \quad g(x) = 4x^2 - 24x + 34 \]
\[ s(x) = -3(x + 4)^2 + 1 \quad t(x) = -\frac{1}{4} x + \frac{1}{2} x + \frac{11}{4} \]

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):

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

\[ f(x) = 3x^2 - 12x + 7 \]
\[ f(x) = (3x^2 - 12x) + 7 \]
\[ f(x) = 3(x^2 - 4x) + 7 \]
\[ f(x) = 3(x^2 - 4x + (-2)^2) + 7 - 3(-2)^2 \]
\[ f(x) = 3(x - 2)^2 + 7 - 12 \]
\[ f(x) = 3(x - 2)^2 - 5 \]
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

\[ a = -\frac{1}{4}; \quad b = \frac{5}{6} \]

\[ x = -\frac{b}{2a} \]
\[ = -\frac{\frac{5}{6}}{2 \left(-\frac{1}{4}\right)} \]
\[ = -\frac{5}{6} \cdot \frac{2}{-\frac{1}{2}} \]
\[ = -\frac{5}{6} \cdot \frac{2}{1} \]
\[ = -\frac{5}{3} \]

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

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

Vertex = \(\left(\frac{5}{3}, -7\frac{11}{36}\right)\)
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.

\[ f(x) = a(x - h)^2 + k \]
\[ f(x) = 2(x - 1)^2 + (-3) \]
\[ f(x) = 2(x - 1)^2 - 3 \text{ standard form} \]

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

\[ f(x) = 2(x - 1)^2 - 3 \]
\[ f(x) = 2(x^2 - 2x + 1) - 3 \]
\[ f(x) = 2x^2 - 4x + 2 - 3 \]
\[ f(x) = 2x^2 - 4x - 1 \text{ general form} \]