

Exercise 69

For the following exercises, use the table of values that represent points on the graph of a quadratic function. By determining the vertex and axis of symmetry, find the general form of the equation of the quadratic function.

| | | | | | |
|-----|----|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 |
| y | 8 | 2 | 0 | 2 | 8 |

Solution

Notice that the y -values are the same for $x = -1, 1$ and $x = -2, 2$. This means the axis of symmetry is $x = 0$. Start with the general formula of a quadratic function in vertex form.

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

The y -value corresponding to $x = 0$ is 0, so the vertex is $(0, 0)$, which means $h = 0$ and $k = 0$.

$$\begin{aligned}y &= a(x - 0)^2 + 0 \\ &= ax^2\end{aligned}$$

Use any of the other points to determine a . For example, $y = 2$ when $x = 1$.

$$2 = a(1)^2$$

$$2 = a(1)$$

$$a = 2$$

Therefore, the quadratic function is

$$y = 2x^2.$$