Exercise 65

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	5	2	1	2	5

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 1, so the vertex is $(0, 1)$, which means $h = 0$ and $k = 1$.

$$y = a(x - 0)^2 + 1$$
$$= ax^2 + 1$$

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

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

Therefore, the quadratic function is

$$y = (1)x^2 + 1$$
$$= x^2 + 1.$$