Exercise 45

For the following exercises, use the vertex (h, k) and a point on the graph (x, y) to find the general form of the equation of the quadratic function.

$$(h, k) = (2, 0),\ (x, y) = (4, 4)$$

Solution

Start with the vertex form of a general quadratic function.

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

The vertex $(2, 0)$ is given, so h and k are known.

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

$$= a(x - 2)^2$$

Now use the fact that $y = 4$ when $x = 4$ to determine a.

$$4 = a(4 - 2)^2$$

$$4 = a(2)^2$$

$$4 = a(4)$$

$$a = 1$$

Therefore, the quadratic function is

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

$$= (x - 2)^2$$

$$= x^2 - 4x + 4.$$