## Exercise 47

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.

$$(h, k) = (0, 1),\ (x, y) = (2, 5)$$

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**Solution**

Start with the vertex form of a general quadratic function.

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

The vertex $(0, 1)$ is given, so $h$ and $k$ are known.

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

$$= ax^2 + 1$$

Now use the fact that $y = 5$ when $x = 2$ to determine $a$.

$$5 = a(2)^2 + 1$$

$$4 = a(4)$$

$$a = 1$$

Therefore, the quadratic function is

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

$$= x^2 + 1.$$