

Exercise 81

For the following exercises, write the equation of the quadratic function that contains the given point and has the same shape as the given function.

Contains $(2, 3)$ and has the shape of $f(x) = 3x^2$. Vertex is on the y -axis.

Solution

Start with the general vertex form of a quadratic function.

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

The function has the shape of $3x^2$, so $a = 3$.

$$y = 3(x - h)^2 + k$$

The vertex is on the y -axis, so $h = 0$.

$$y = 3x^2 + k$$

Now use the fact that $y = 3$ when $x = 2$ to determine k .

$$3 = 3(2)^2 + k$$

$$3 = 3(4) + k$$

$$3 = 12 + k$$

$$k = -9$$

Therefore, the quadratic function is

$$y = 3x^2 - 9.$$