

## Exercise 83

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  $(4, 3)$  and has the shape of  $f(x) = 5x^2$ . 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  $5x^2$ , so  $a = 5$ .

$$y = 5(x - h)^2 + k$$

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

$$y = 5x^2 + k$$

Now use the fact that  $y = 3$  when  $x = 4$  to determine  $k$ .

$$3 = 5(4)^2 + k$$

$$3 = 5(16) + k$$

$$3 = 80 + k$$

$$k = -77$$

Therefore, the quadratic function is

$$y = 5x^2 - 77.$$