

## Exercise 67

For the following exercises, write a formula for the function  $g$  that results when the graph of a given toolkit function is transformed as described.

The graph of  $f(x) = x^2$  is vertically compressed by a factor of  $\frac{1}{2}$ , then shifted to the right 5 units and up 1 unit.

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### Solution

To vertically compress the graph by a factor of  $\frac{1}{2}$ , multiply the function by  $\frac{1}{2}$ .

$$\frac{1}{2}x^2$$

To then shift it to the right 5 units, replace  $x$  with  $x - 5$ .

$$\frac{1}{2}(x - 5)^2$$

To then shift it up 1 unit, add 1 to the function.

$$g(x) = \frac{1}{2}(x - 5)^2 + 1$$

