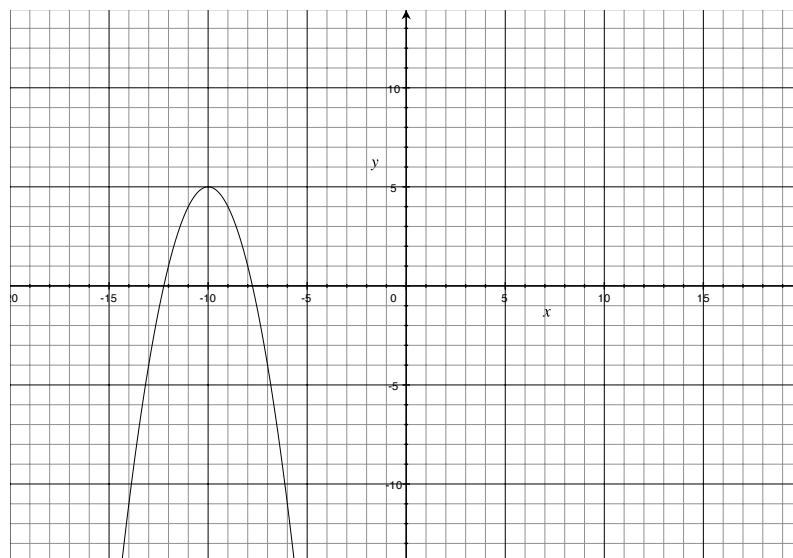


1. (5 points) Consider the function  $g(x) = -(x + 10)^2 + 5$ .
- Identify the parent function  $f$  of  $g$ .
  - Describe the sequence of transformations from  $f$  to  $g$ .
  - Sketch the graph of  $g$ .

**Solution:**

- The parent function is  $f(x) = x^2$ .
- To obtain the graph of  $g$  from the graph of  $f$ , first horizontally shift it 10 units left (because of the  $x + 10 = x - (-10)$ ), then reflect it with respect to the  $x$ -axis (because of the leading coefficient of  $-1$ ), and then vertically shift it 5 units up (because of the  $+5$ ).

c.



2. (5 points) Write an equation for the function  $g(x)$  that has the shape of  $f(x) = \sqrt{x}$  but is moved nine units downward and reflected in both the  $x$ -axis and the  $y$ -axis. State the domain of  $g$  as well.

**Solution:** We first transform to the function  $f_1(x) = \sqrt{x} - 9$  that is shifted downward 9 units. We then reflect in the  $x$ -axis by multiplying the whole function by  $-1$ , which yields the function  $f_2(x) = -\sqrt{x} + 9$ . Our final transformation replaces  $x$  by  $-x$  to reflect with respect to the  $y$ -axis, and we obtain  $g(x) = -\sqrt{-x} + 9$ . This function has domain  $(-\infty, 0]$ , since it is defined for all  $x$  such that  $-x \geq 0$ , which is the same as  $0 \geq x$ .