

### Exercise 43

In Exercises 41–58, find any intercepts and test for symmetry. Then sketch the graph of the equation.

$$y = 9 - x^2$$

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#### Solution

To find the  $y$ -intercept, plug  $x = 0$  into the function.

$$y = 9 - (0)^2 = 9$$

Therefore, the  $y$ -intercept is  $(0, 9)$ . To find the  $x$ -intercept(s), set  $y = 0$  and solve the equation for  $x$ .

$$9 - x^2 = 0$$

$$x^2 = 9$$

$$x = \{-3, 3\}$$

Therefore, the  $x$ -intercepts are  $(-3, 0)$  and  $(3, 0)$ . Replacing  $x$  with  $-x$  does not change the equation, so there is symmetry with respect to the  $y$ -axis.

$$y = 9 - (-x)^2 = 9 - x^2$$

Replacing  $y$  with  $-y$  changes the equation, so there's no symmetry with respect to the  $x$ -axis.

$$-y = 9 - x^2 \quad \rightarrow \quad y = -9 + x^2$$

Replacing  $x$  with  $-x$  and  $y$  with  $-y$  changes the equation, so there's no symmetry with respect to the origin.

$$-y = 9 - (-x)^2 = 9 - x^2 \quad \rightarrow \quad y = -9 + x^2$$

A graph of the function versus  $x$  is shown below.

