

## 9.3 Graph Equations of Circles

**QUESTION** How can you use a graphing calculator to graph a circle?

To graph a circle on most graphing calculators, you must first rewrite the circle's equation as two functions that taken together represent the circle.

**EXAMPLE** Graph a circle

Use a graphing calculator to graph  $x^2 + y^2 = 25$ .

**STEP 1** Solve for  $y$

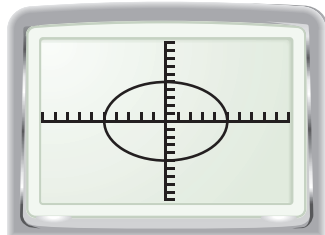
Begin by solving the equation for  $y$ .

$$\begin{aligned} x^2 + y^2 &= 25 \\ y^2 &= 25 - x^2 \\ y &= \pm\sqrt{25 - x^2} \end{aligned}$$

Together, the functions  $y = \sqrt{25 - x^2}$  and  $y = -\sqrt{25 - x^2}$  represent the circle.

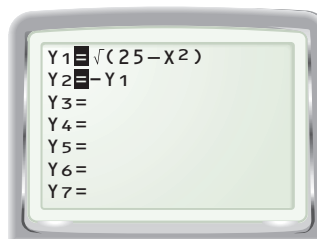
**STEP 3** Graph functions

The graphs are shown in the standard window ( $-10 \leq x \leq 10$  and  $-10 \leq y \leq 10$ ). Because the calculator screen is not square, a horizontal distance of 1 unit is longer than a vertical distance of 1 unit, and the circle is stretched into an oval.



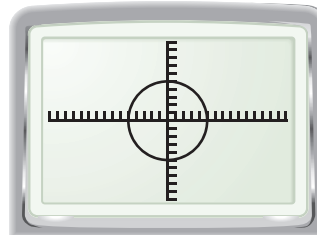
**STEP 2** Enter functions

Enter the two functions as  $y_1$  and  $y_2$ . You can enter  $y_2$  as  $-y_1$ .



**STEP 4** Adjust graph

To show the circle in true proportion, set a window so that the ratio of  $(X_{\max} - X_{\min})$  to  $(Y_{\max} - Y_{\min})$  is 3:2. Such a "square window" can also be obtained by pressing **ZOOM** and selecting ZSquare.



**PRACTICE**

Use a graphing calculator to graph the equation. Give the viewing window that you used and verify that it is a "square window."

- $x^2 + y^2 = 144$
- $x^2 + y^2 = 80$
- $x^2 + y^2 = 576$
- $0.5x^2 + 0.5y^2 = 12$
- $7x^2 + 7y^2 = 105$
- $16x^2 + 16y^2 = 9$