9.3 Graph Equations of Circles

TEKS a.5, a.6, 2A.3.B

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*

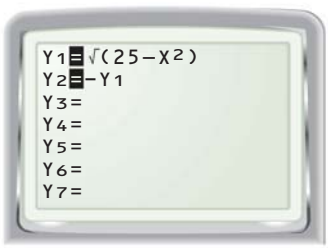
Begin by solving the equation for y.

$$x^2 + y^2 = 25$$
$$y^2 = 25 - x^2$$
$$y = \pm\sqrt{25 - x^2}$$

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

STEP 2 *Enter functions*

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



STEP 3 *Graph functions*

The graphs are shown in the standard window ($-10 \le x \le 10$ and $-10 \le y \le 10$). 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 4 *Adjust graph*

To show the circle in true proportion, set a window so that the ratio of (Xmax − Xmin) to (Ymax − Ymin) 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."

1. $x^2 + y^2 = 144$
2. $x^2 + y^2 = 80$
3. $x^2 + y^2 = 576$
4. $0.5x^2 + 0.5y^2 = 12$
5. $7x^2 + 7y^2 = 105$
6. $16x^2 + 16y^2 = 9$