

14.3 Investigating Trigonometric Identities

TEKS a.3, a.5, 2A.2.A; P.2.C

MATERIALS • graphing calculator

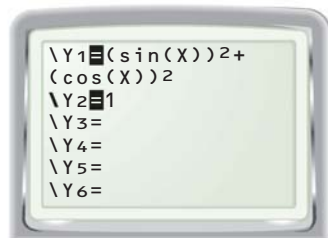
QUESTION How can you use a graphing calculator to verify trigonometric identities?

EXPLORE Investigate a trigonometric identity

Determine whether the equation $\sin^2 x + \cos^2 x = 1$ is true for *no* x -values, *some* x -values, or *all* x -values.

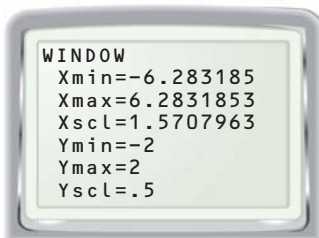
STEP 1 Enter equations

Enter the left side of the equation as y_1 and the right side as y_2 . Use the “thick” graph style for y_2 to distinguish the graphs.



STEP 2 Set viewing window

Set your calculator in radian mode. Adjust the viewing window so that the x -axis shows $-2\pi \leq x \leq 2\pi$ and the y -axis shows $-2 \leq y \leq 2$.



STEP 3 Graph equations

Graph the equations. The calculator first graphs $y_1 = \sin^2 x + \cos^2 x$ and then $y_2 = 1$ as a thicker line over the graph of y_1 .



► The graphs of each side of the equation $\sin^2 x + \cos^2 x = 1$ are the same. So, the equation is true for all x -values.

DRAW CONCLUSIONS Use your observations to complete these exercises

Use a graphing calculator to determine whether the equation is true for *no* x -values, *some* x -values, or *all* x -values. (Set your calculator in radian mode and use $-2\pi \leq x \leq 2\pi$ and $-2 \leq y \leq 2$ for the viewing window.)

1. $\tan x = \frac{\sin x}{\cos x}$
2. $\sin x = -\cos x$
3. $\tan x = \frac{1}{x}$
4. $\cos(-3x) = \cos 3x$
5. $\cos x = 1.5$
6. $\sin(x - \pi) = \cos x$
7. $\sin(-x) = -\sin x$
8. $\cos \frac{x}{2} = \frac{1}{2} \cos x$
9. $\cos\left(x - \frac{\pi}{2}\right) = \sin x$
10. **REASONING** Trigonometric equations that are true for *all* values of x (in their domain) are called trigonometric identities. Which trigonometric equations in Exercises 1–9 are trigonometric identities?