14.3 Verify Trigonometric Identities

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

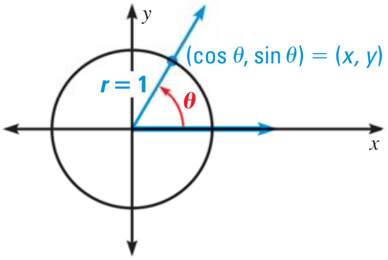
Before You graphed trigonometric functions.

Now You will verify trigonometric identities.

Why? So you can model the path of Halley's comet, as in Ex. 41.

Key Vocabulary
- trigonometric identity

Recall from Lesson 13.3 that if an angle θ is in standard position with its terminal side intersecting the unit circle at (x, y), then $x = \cos\theta$ and $y = \sin\theta$. Because (x, y) is on a circle centered at the origin with radius 1, it follows that:



$$x^2 + y^2 = 1$$

$$\cos^2\theta + \sin^2\theta = 1$$

The equation $\cos^2\theta + \sin^2\theta = 1$ is true for any value of θ. A trigonometric equation that is true for all values of θ (in its domain) is called a **trigonometric identity**. Several fundamental trigonometric identities are listed below, some of which you have already learned.

KEY CONCEPT *For Your Notebook*

Fundamental Trigonometric Identities

Reciprocal Identities

$\csc\theta = \dfrac{1}{\sin\theta}$ $\quad$ $\sec\theta = \dfrac{1}{\cos\theta}$ $\quad$ $\cot\theta = \dfrac{1}{\tan\theta}$

Tangent and Cotangent Identities

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ $\quad$ $\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

Pythagorean Identities

$\sin^2\theta + \cos^2\theta = 1$ $\quad$ $1 + \tan^2\theta = \sec^2\theta$ $\quad$ $1 + \cot^2\theta = \csc^2\theta$

Cofunction Identities

$\sin\left(\dfrac{\pi}{2} - \theta\right) = \cos\theta$ $\quad$ $\cos\left(\dfrac{\pi}{2} - \theta\right) = \sin\theta$ $\quad$ $\tan\left(\dfrac{\pi}{2} - \theta\right) = \cot\theta$

Negative Angle Identities

$\sin(-\theta) = -\sin\theta$ $\quad$ $\cos(-\theta) = \cos\theta$ $\quad$ $\tan(-\theta) = -\tan\theta$

You can use trigonometric identities to evaluate trigonometric functions, simplify trigonometric expressions, and verify other identities.