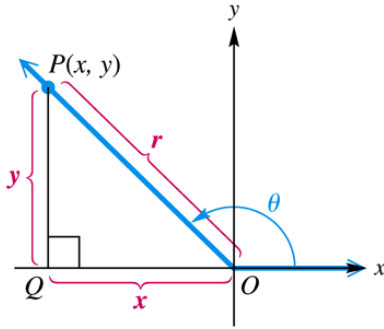


Section 1.3: Trigonometric Functions

Defining Trigonometric Functions

- Let (x, y) be a point other than the origin on the terminal side of an angle θ in standard position. Let's find **the distance from the point to the origin**:

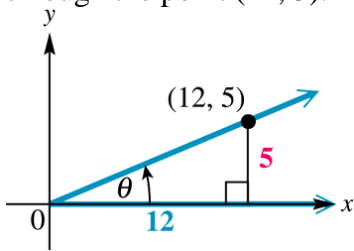


- The six major trigonometric functions of an angle θ are **sine**, **cosine**, **tangent**, **cosecant**, **secant**, and **cotangent**. Their definitions are as follows:

$$\sin \theta = \frac{y}{r} \qquad \cos \theta = \frac{x}{r} \qquad \tan \theta = \frac{y}{x}, \quad x \neq 0$$

$$\csc \theta = \frac{r}{y}, \quad y \neq 0 \qquad \sec \theta = \frac{r}{x}, \quad x \neq 0 \qquad \cot \theta = \frac{x}{y}, \quad y \neq 0$$

Example 1 (Finding Function Values): The terminal side of an angle θ in standard position passes through the point $(12, 5)$. Find the values of the six trigonometric functions of angle θ .

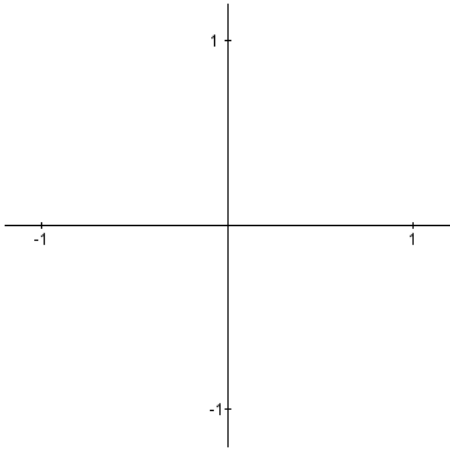


Example 2 (Finding Function Values): The terminal side of an angle θ in standard position passes through the point $(8, -6)$. Find the values of the six trigonometric functions of angle θ .

Example 3 (Finding Function Values): Find the six trigonometric function values of the angle θ in standard position, if the terminal side of θ is defined by $x + 2y = 0, x \geq 0$.

Quadrantal Angles

- Remember that an angle in standard position whose terminal sides lie along the x -axis or y -axis, such as angles with measures 90° , 180° , 270° , and so on, are called **quadrantal angles**.



Example 4 (Function Values of Quadrantal Angles): Find the values of the six trigonometric functions of a 360° angle.

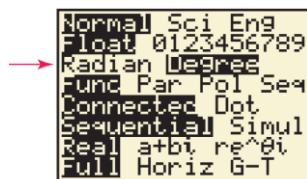
Function Values of Quadrantal Angles

θ	$\sin \theta$	$\cos \theta$	$\tan \theta$	$\cot \theta$	$\sec \theta$	$\csc \theta$
0°	0	1	0	Undefined	1	Undefined
90°	1	0	Undefined	0	Undefined	1
180°	0	-1	0	Undefined	-1	Undefined
270°	-1	0	Undefined	0	Undefined	-1
360°	0	1	0	Undefined	1	Undefined

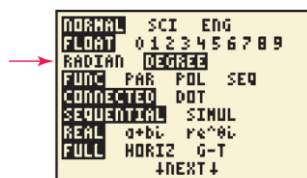
Example 5: Find the values of the six trigonometric functions of an angle θ in standard position with terminal side through $(0, -5)$.

Calculator Advice

- Function values of quadrantal angles can be found with a calculator that has trigonometric function keys. **Make sure the calculator is set in degree mode.**



TI-83 Plus



TI-84 Plus

Caution

One of the most common errors involving calculators in trigonometry occurs when the calculator is set for radian measure, rather than degree measure. Be sure you know how to set your calculator in degree mode.