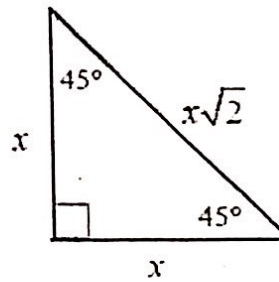
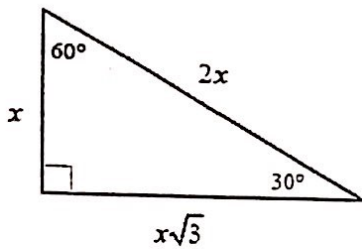


Review of Trigonometry Concepts

- Knowing your 30-60-90 and 45-45-90 triangles will make you proficient in determining the value of some trigonometric expression.



- Given an acute angle α in a right triangle:

$$\sin(\alpha) = \frac{\text{side opposite } \alpha}{\text{hypotenuse}}$$

$$\cos(\alpha) = \frac{\text{side adjacent } \alpha}{\text{hypotenuse}}$$

$$\tan(\alpha) = \frac{\text{side opposite } \alpha}{\text{side adjacent } \alpha}$$

$$\csc(\alpha) = \frac{1}{\sin(\alpha)} = \frac{\text{hypotenuse}}{\text{side opposite } \alpha}$$

$$\sec(\alpha) = \frac{1}{\cos(\alpha)} = \frac{\text{hypotenuse}}{\text{side adjacent } \alpha}$$

$$\cot(\alpha) = \frac{1}{\tan(\alpha)} = \frac{\text{side adjacent } \alpha}{\text{side opposite } \alpha}$$

The tangent and cotangent functions in terms of the sine and cosine functions, as follows:

$$\tan(\alpha) = \frac{\sin(\alpha)}{\cos(\alpha)}$$

$$\cot(\alpha) = \frac{\cos(\alpha)}{\sin(\alpha)}$$

In a unit circle, any point on the circle has coordinates $(\cos \theta, \sin \theta)$, where θ is the angle in standard position. Thus, the "circular definition" for the six trigonometric functions are given as follows, where (x, y) is any point on a circle with radius r .

$$\sin \theta = \frac{y}{r}$$

$$\cos \theta = \frac{x}{r}$$

$$\tan \theta = \frac{y}{x}$$

$$\csc \theta = \frac{r}{y}$$

$$\sec \theta = \frac{r}{x}$$

$$\cot \theta = \frac{y}{x}$$

- cofunction relationships

$$\sin(\alpha) = \cos(90 - \alpha)$$

$$\tan(\alpha) = \cot(90 - \alpha)$$

$$\sec(\alpha) = \csc(90 - \alpha)$$

$$\cos(\alpha) = \sin(90 - \alpha)$$

$$\cot(\alpha) = \tan(90 - \alpha)$$

$$\csc(\alpha) = \sec(90 - \alpha)$$

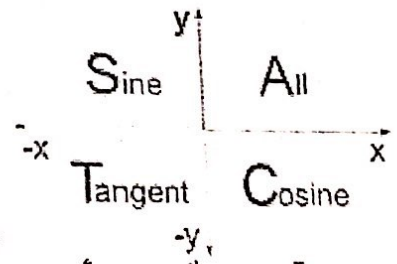
- A **reference angle** is important for determining the value of a trigonometric expression. You can always find the reference angle by calculating the acute angle formed by the terminal side of the given angle and the x-axis. Any trigonometric expression which leaves a reference angle of 30, 45, or 60 degrees can be calculated in its exact form without the use of a calculator.
- The quadrant that the given angle lies in will determine the sign of the value of the trigonometric expression. Using the mnemonic "ASTC" (all students take calculus):

Quadrant I: all functions are positive

Quadrant II: only sine (and cosecant) expressions are positive

Quadrant III: only tangent (and cotangent) expressions are positive

Quadrant IV: only cosine (and secant) expressions are positive



- Radians are another way to measure angles. For reference: $2\pi = 360^\circ$. Therefore, $\pi = \frac{\pi}{6} = 60^\circ$. If you just remember that $\pi = 180^\circ$, you won't have to memorize these. You just have to perform the division to get the value in degrees.