

Reciprocal Trigonometric Identities

In addition to $\sin \theta$, $\cos \theta$ and $\tan \theta$, there are three other trigonometric ratios you need to be aware of.

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

Put in terms of *opposite*, *adjacent* and *hypotenuse*, they are:

$$\csc \theta = \frac{\text{hyp}}{\text{opp}}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}}$$

Most often, whenever you see $\csc \theta$, $\sec \theta$ and $\cot \theta$, you can just replace it with its reciprocal identity.

Rewrite each of the following using $\sin \theta$, $\cos \theta$ and $\tan \theta$

a) $\cot 60^\circ =$

b) $\sec 150^\circ =$

c) $\csc 225^\circ =$

d) $\sec 300^\circ =$

Now, find the exact value of each using special triangles.

a) $\cot 60^\circ =$

b) $\sec 150^\circ =$

c) $\csc 225^\circ =$

d) $\sec 300^\circ =$

WARNING: $\sec \theta \neq \cos^{-1} \theta$, $\csc \theta \neq \sin^{-1} \theta$ **and** $\cot \theta \neq \tan^{-1} \theta$!

Evaluate each of the following.

a) $\csc 45^\circ =$

b) $\sin^{-1}(45^\circ)$

Homework:

1. Find the exact value for each of the following ratios.

a) $\cot 120^\circ =$

b) $\sec 330^\circ =$

c) $\csc 315^\circ =$

d) $\sec 210^\circ =$

e) $\cot 45^\circ =$

f) $\sec 135^\circ =$

g) $\csc 150^\circ =$

h) $\sec 240^\circ =$

2. Find $\sin \theta$, $\cos \theta$, $\tan \theta$, $\csc \theta$, $\sec \theta$ **and** $\cot \theta$ for an angle (θ) whose terminal arm passes through the point $(-5,4)$.

$\sin \theta =$

$\csc \theta =$

$\cos \theta =$

$\sec \theta =$

$\tan \theta =$

$\cot \theta =$

