

## Trigonometric Identities 30

An identity is an equation that is true for all values of the variable which are defined.

An example is;  $3x = 2x + x$ .

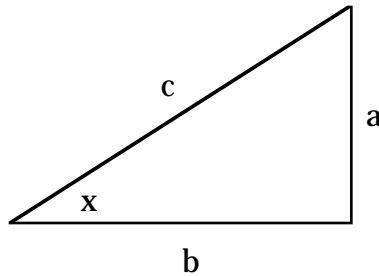
An example of a trigonometric identity is;  $\cos x \tan x = \sin x$ .

The **Basic Identities** are;

$$\csc x = 1/\sin x, \quad \sec x = 1/\cos x, \quad \cot x = 1/\tan x$$

$$\tan x = \sin x/\cos x \quad \cot x = \cos x/\sin x$$

These identities can be proven by using the right triangle shown below; with  $\sin x = a/c$ ,  $\cos x = b/c$ ,  $\tan x = a/b$ ,  $\csc x = c/a$ ,  $\sec x = c/b$ ,  $\cot x = b/a$ .



Questions:

1) Simplify the following. Use the basic identities. Express the answer in terms of the  $\sin x$  or  $\cos x$  functions.

a)  $\cos \theta \cdot \tan \theta =$

b)  $\tan \theta \cdot \cot \theta =$

c)  $\sin \theta \cdot \tan \theta \cdot \cos \theta =$

d)  $1 / \sec \theta =$

e)  $\tan \theta \cdot \csc \theta =$

f)  $\cot \theta \cdot \sin \theta =$

$$g) \sin\theta \cdot \sec\theta \cdot \cot\theta = \quad h) \csc\theta / \sin\theta =$$

$$i) \csc\theta + \cot\theta \cdot \sec\theta =$$

$$j) \cos\theta \cdot (\sec\theta + \tan\theta) =$$

$$k) \cot\theta \cdot \sin\theta + \cos\theta =$$

$$l) (\csc\theta + \sec\theta) \cdot (\sin\theta \cdot \cos\theta) =$$

Answers: 1)a)  $\sin\theta$ , b) 1, c)  $\sin^2\theta$ , d)  $\cos\theta$ , e)  $1/\cos\theta$ , f)  $\cos\theta$ , g) 1, h)  $1/\sin^2\theta$ , i)  $2/\sin\theta$ , j)  $1 + \sin\theta$ , k)  $2\cos\theta$ , l)  $\cos\theta + \sin\theta$ .