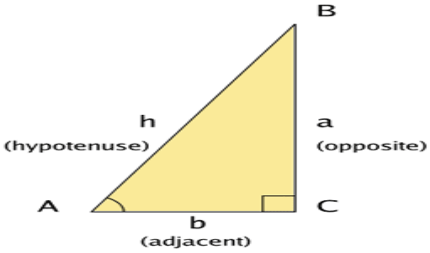
TRIGONOMETRIC RATIOS OF SOME SPECIFIC ANGLES

Created: Monday, 19 September 2011 05:42 | Published: Monday, 19 September 2011 05:42 | Written by Super User | Print

Introduction to Trig Ratios

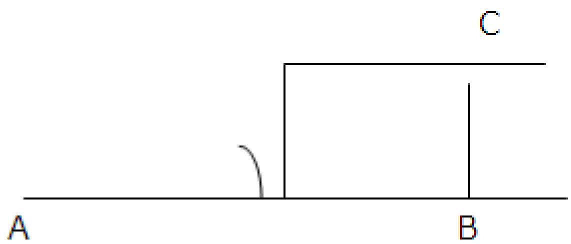
The major functions of trigonometric ratios are sine, cosine, tangent, cosecant, secant and cotangent.



These functions are used to find the relationship between the angle and side of a right angled triangle.

Some specific angles are:
• 0° and 90°
• 45°
• 30° and 60°

Trigonometric Ratios of 0° and 90°



In ?ABC, right – angled at B, and ?BAC = ?

So, from ?ABC, we have
Sin ? = BC / AC
Cos ? = AB / AC
Tan ? = BC / AB

Case I: ?A is becoming small

If ?A is made smaller and smaller in the ?ABC, till it becomes zero. As ?A gets smaller and smaller, the length of the BC decreases. The point C gets closer to point B, and finally when A becomes very close to 0°, AC becomes almost the same as AB.

When ?A is very close to 0°, BC gets very close to 0 and so the value of
Sin A = BC / AC is very close to 0.

Also, when A is very close to 0°, AC is same as AB and so the value of
Cos A = AB/AC is very close to 1.

From the above discussion, we have
Sin 0° = 0
Cosec 0° = 1 / Sin 0° = 1/0 = not defined
Cosec 0° = ?
Cos 0° = 1
Sec 0° = 1 / Cos 0° = 1/1 = 1
Sec 0° = 1

Using Sin and Cos values, we can find Tan 0°
Tan 0° = Sin 0° / Cos 0° = 0
Tan 0° = 0

Also, Cot 0° = 1 / Tan 0° = 1/0 = not defined
Cot 0° = ?

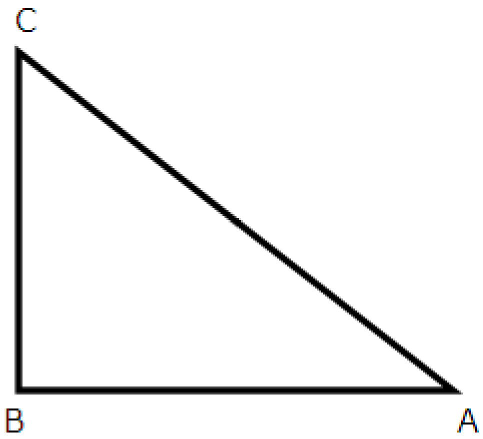
Case II: ?A is becoming large

Now, let's see when ?A is made larger and larger in ?ABC till it becomes 90°. As ?A gets larger and larger, ?C gets smaller and smaller. So, the length of the side AB goes on decreasing. The point A gets closer to point B. Finally when ?A is very close to 90°, ?C becomes very close to 0° and the side AC almost coincides with side BC.

When ?C is very close to 0°, A is very close to 90°, side AC is nearly the same as side BC.

So, Sin A is very close to 1.

From above discussion we get,
Sin 90° = 1
Cosec 90° = 1
Cos 90°= 0
Sec 90° = ?
Tan 90°= ?
Cot 90° = 0



Trigonometric Ratios of 45°

In ?ABC, right angled at B, if one angle is 45, then the other angle by angle sum property of triangle will also be 45.
?A = ?C = 45°

So, BC = AB (Isosceles triangle property)

Let, AB = BC = ‘a’

Then by [Pythagoras theorem](), AC2 = AB2 + BC2

AC2 = a2 + a2 = 2a2

AC = a?2.

Using formulas for [trigonometric ratios]():

$$\text{Sin } 45° = \frac{\text{Side opposite to angle } 45°}{\text{Hypotenuse}} = \text{a/a?2 = 1/?2}$$

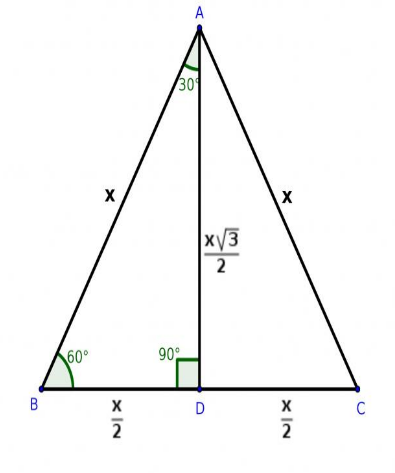
$$\text{Cos } 45° = \frac{\text{Side adjacent to angle } 45°}{\text{Hypotenuse}} = \text{a/a?2 = 1/?2}$$

$$\text{Tan } 45° = \frac{\text{Side opposite to angle } 45°}{\text{Side adjacent to angle } 45°} = \text{a/a = 1}$$

Also, Cosec 45° = ?2, Sec 45° = ?2, Cot 45° = 1

Trigonometric Ratios of 30° and 60°

Let ?ABC, be an [equilateral triangle](). So, ?A = ?B = ?C = 60°



Draw[perpendicular] AD from A to the side BC.

Now, ?ABD ? ?ACD (by ASA)

Therefore, BD = DC

?BAD = ?CAD (by CPCT)

Consider, ?ABD

A = 30, B = 60, D = 90

Let AB = x

So, BD = x/2

And we will find the length of AD by Pythagoras theorem.

AB2 = AD2 + BD2

AB2 – BD2 = AD2

x2 – x2/4 = AD2

AD2 = 3x2/4

AD = x?3/2

Using formulas for trigonometric ratios:

Sin 30° = Side opposite to angle 30° =x/2 / x = 1/2
Hypotenuse

Cos 30° = Side adjacent to angle 30° = x?3/2 / x = ?3/2
Hypotenuse

Tan 30° = Side opposite to angle 30° = x/2 / x?3/2 = 1/?3
Side adjacent to angle 30°

Also, Cosec 30° = 2, Sec 30° = 2/?3, Cot 30° = ?3

Similarly,

Sin 60° = ?3/2

Cosec 60° = 2/?3

Cos 60° = ½

Sec 60° 2

Tan 60° = ?3

Cot 60° = 1/?3

Now try it yourself! Should you still need any help,click here to schedule live online session with e Tutor!

About eAge Tutoring:

eAgeTutor.com is the premium online tutoring provider. Using materials developed by highly qualified educators and leading content developers, a team of top-notch software experts, and a group of passionate educators, eAgeTutor works to ensure the success and satisfaction of all of its students.

Contact us today to learn more about our tutoring programs and discuss how we can help make the dreams of the student in your life come true!

Reference Links:

http://www.purplemath.com/modules/basirati.htm

- http://en.wikipedia.org/wiki/Right_triangle
- http://en.wikipedia.org/wiki/Triangle#Trigonometric_ratios_in_right_triangles
- http://en.wikipedia.org/wiki/Pythagorean_theorem
- http://en.wikipedia.org/wiki/Equilateral_triangle
- http://en.wikipedia.org/wiki/Equilateral_triangle

Category:ROOT