Directorate of Education, GNCT of Delhi

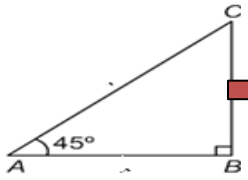
Subject: Mathematics **Worksheet 33** Dated: 18th September 2020

Class: X Student's Name: _____ Class Teacher's Name:_____

Trigonometric Ratios of 30^0, 45^0, 60^0

Let's Recall:

a) Sin A = 1/__ d) Cos A = 1/__
b) Tan A = 1/__ e) Cot A = 1/__
c) Sec A = 1/__ f) Cosec A = 1/__

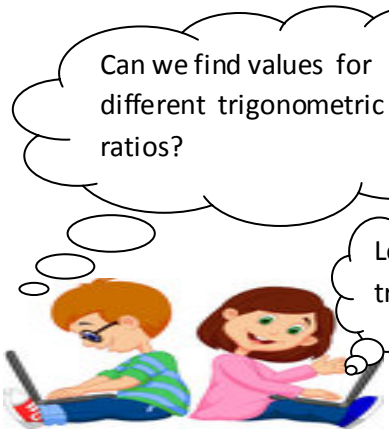


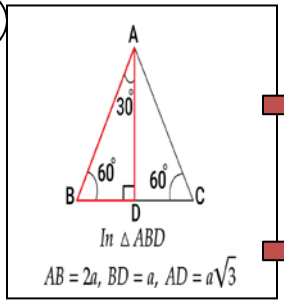
AB= 1a, BC=1a, AC= $\sqrt{2}$ a

$\sin 45^\circ = \frac{BC}{AC} = \frac{a}{a\sqrt{2}} = \frac{1}{\sqrt{2}}$ $\quad$ $\text{cosec}\, 45^\circ = \frac{1}{\sin 45^\circ} = \sqrt{2}$

$\cos 45^\circ = \frac{AB}{AC} = \frac{a}{a\sqrt{2}} = \frac{1}{\sqrt{2}}$ $\quad$ $\sec 45^\circ = \frac{1}{\cos 45^\circ} = \sqrt{2}$

$\tan 45^\circ = \frac{BC}{AB} = \frac{a}{a} = 1$ $\quad$ $\cot 45^\circ = \frac{1}{\tan 45^\circ} = 1$





$\sin 60^\circ = \frac{AD}{AB} = \frac{\frac{\sqrt{3}}{2}a}{a} = \frac{\sqrt{3}}{2}$ $\quad$ $\text{cosec}\, 60^\circ = \frac{1}{\sin 60^\circ} = \frac{2}{\sqrt{3}}$

$\cos 60^\circ = \frac{BD}{AB} = \frac{\frac{a}{2}}{a} = \frac{1}{2}$ $\quad$ $\sec 60^\circ = \frac{1}{\cos 60^\circ} = 2$

$\tan 60^\circ = \frac{AD}{BD} = \frac{\frac{\sqrt{3}}{2}a}{\frac{a}{2}} = \sqrt{3}$ $\quad$ $\cot 60^\circ = \frac{1}{\tan 60^\circ} = \frac{1}{\sqrt{3}}$

$\sin 30^\circ = \frac{BD}{AB} = \frac{\frac{a}{2}}{a} = \frac{1}{2}$ $\quad$ $\text{cosec}\, 30^\circ = \frac{1}{\sin 30^\circ} = 2$

$\cos 30^\circ = \frac{AD}{AB} = \frac{\frac{\sqrt{3}}{2}a}{a} = \frac{\sqrt{3}}{2}$ $\quad$ $\sec 30^\circ = \frac{1}{\cos 30^\circ} = \frac{2}{\sqrt{3}}$

$\tan 30^\circ = \frac{BD}{AD} = \frac{\frac{a}{2}}{\frac{\sqrt{3}}{2}a} = \frac{1}{\sqrt{3}}$ $\quad$ $\cot 30^\circ = \frac{1}{\tan 30^\circ} = \sqrt{3}$

Example 1: Find values of given trigonometric ratios with the help of given table and write True or False:

Solution: $\sin 90^0 = \cos 60^0$

$\sin 90^0 = 1$, $\cos 60^0 = 1/2$

as $1 \neq 1/2$, Therefore $\sin 90^0 \neq \cos 60^0$

Hence It's False.

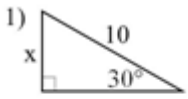
Let's put values of all trigonometric ratios in table:

angle θ / ratio	0°	30°	45°	60°	90°
sin θ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos θ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan θ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	not defined
cosec θ	not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec θ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	not defined
cot θ	not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

Example 2: Find the value of x.

Solution:

1)



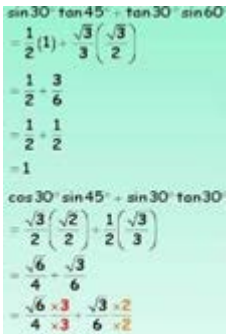
$\sin 30^\circ = \frac{x}{10}$

$\frac{1}{2} = \frac{x}{10}$

$x = 5$

Example 3: Solve:

Solution:



Let's learn a trick to remember values of trigonometric ratios:

θ	0°	30°	45°	60°	90°
	√0/4	√1/4	√2/4	√3/4	√4/4
Sinθ	0	1/2	1/√2	√3/2	1
Cosθ	1	√3/2	1/√2	1/2	0
Tanθ	0	1/√3	1	√3	∞
Cotθ	∞	√3	1	1/√3	0
Secθ	1	2/√3	√2	2	∞
Cosecθ	∞	2	√2	2/√3	1

Now try these:

Q1. Write True or False: a) $\sin 60^0 = \cos 30^0$ b) $\sin 45^0 = \cos 45^0$
c) $\tan 60^0 = \cot 60^0$ d) $\text{cosec}\, 30^0 = \cot 30^0$

Q2. In rt. Δ ABC, right angled at B, AB=5cm and ∠ACB =30^0. Determine the length of the sides BC and AC.

Q3. Find all the trigonometric ratios for the following triangle: