

Subject: Mathematics

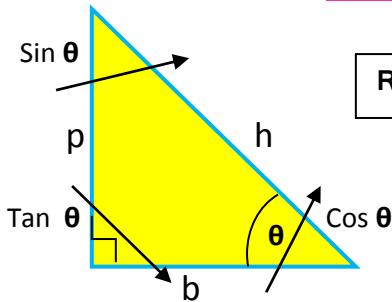
Worksheet-31

Date : 14, September 2020

Class: X

Student name _____ Class Teacher name _____

Introduction to trigonometry - Relationship between the ratios



Recall and answer-

$\sin \theta = \frac{p}{h}$	$\operatorname{Cosec} \theta =$
$\cos \theta =$	$\sec \theta =$
$\tan \theta =$	$\cot \theta =$

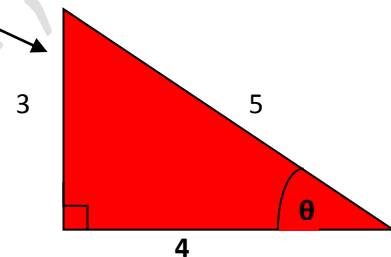
Relationship between trigonometric ratios

$\sin \theta = \frac{1}{\operatorname{Cosec} \theta}$	$\operatorname{Cosec} \theta = \frac{1}{\sin \theta}$
$\cos \theta = \frac{1}{\sec \theta}$	$\sec \theta = \frac{1}{\cos \theta}$
$\tan \theta = \frac{1}{\cot \theta} = \frac{\sin \theta}{\cos \theta}$	$\cot \theta = \frac{1}{\tan \theta} = \frac{\cos \theta}{\sin \theta}$

In a right angled triangle If one of the trigonometric ratios is known for an acute angle, the other remaining trigonometric ratios of the angle can be easily determined .

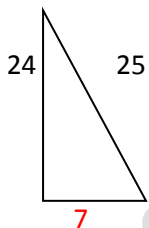
Complete the table for the given triangle-

$\sin \theta =$	$\operatorname{Cosec} \theta =$	$\sin \theta = \frac{1}{\operatorname{Cosec} \theta} =$	$\operatorname{Cosec} \theta = \frac{1}{\sin \theta} =$
$\cos \theta =$	$\sec \theta =$	$\cos \theta = \frac{1}{\sec \theta} =$	$\sec \theta = \frac{1}{\cos \theta} =$
$\tan \theta =$	$\cot \theta =$	$\tan \theta = \frac{1}{\cot \theta} =$	$\cot \theta = \frac{1}{\tan \theta} =$
		$\tan \theta = \frac{\sin \theta}{\cos \theta} =$	$\cot \theta = \frac{\cos \theta}{\sin \theta} =$



Example : In a right angled triangle $\sin \theta = \frac{p}{h} = \frac{24}{25}$. Find all the trigonometric ratios for the triangle.

Solution: $H^2 = P^2 + B^2$; $B^2 = H^2 - P^2$ (by pythagorous theorem)



$$B^2 = 25^2 - 24^2 = 625 - 576 = 49$$

$$B = \sqrt{49} = 7$$

$\operatorname{Cosec} \theta, \sec \theta, \cot \theta$ are reciprocals of $\sin \theta, \cos \theta$ and $\tan \theta$ respectively.

$\sin \theta = \frac{p}{h} = \frac{24}{25}$	$\operatorname{Cosec} \theta = \frac{1}{\sin \theta} = \frac{25}{24}$
$\cos \theta = \frac{b}{h} = \frac{7}{25}$	$\sec \theta = \frac{1}{\cos \theta} = \frac{25}{7}$
$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{24}{7}$	$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{7}{24}$
$\tan \theta = \frac{24}{7}$	$\cot \theta = \frac{7}{24}$ Or
	$\cot \theta = \frac{1}{\tan \theta} = \frac{7}{24}$

Try yourself

Q1. In a right angled triangle $\sin \theta = \frac{5}{13}$. Find all the trigonometric ratios for the triangle.

Q2. Find : i) $\cot \theta$, when $\tan \theta = \frac{15}{8}$ ii) $\operatorname{cosec} \theta$, when $\sin \theta = \frac{\sqrt{3}}{2}$

iii) $\sec \theta$, when $\cos \theta = \frac{1}{\sqrt{2}}$

Q3. If $\sin \theta = \frac{3}{5}$ and $\cos \theta = \frac{4}{5}$, then find $\tan \theta$ and $\cot \theta$.

Match the following :

Column A

- 1) $\operatorname{Cosec} \theta$
- 2) $\tan$
- 3) $\sec \theta$
- 4) $\frac{1}{\sec \theta}$
- 5) $\cot \theta$

Column B

- 1) $\frac{1}{\cos \theta}$
- 2) $\cos \theta$
- 3) $\frac{1}{\sin \theta}$
- 4) $\frac{\sin \theta}{\cos \theta}$
- 5) $\frac{1}{\tan \theta}$