CBSE Class 10 Maths Notes Chapter 8: Here are the notes for Class 10 Math's trigonometry unit. One of the areas of mathematics where we study the relationships between a triangle's angles and sides is trigonometry. The Greek terms "tri" (meaning three), "gon" (meaning sides), and "metron" (meaning measure) are the root of the word trigonometry. We shall study the fundamentals of trigonometry in this chapter.

Learn the entire trigonometry topic that is taught in maths class 10. Get the different trigonometric ratios for different angles as well as the trigonometric function relationships, trigonometry tables, and other identities provided here.

CBSE Class 10 Maths Notes Chapter 8

The hypotenuse is AC, the side next to ∠A is AB, and the side opposite ∠A is BC in the ΔABC right-angled at B.

Trigonometric Ratios

For the right ΔABC, right-angled at ∠B, the trigonometric ratios of the ∠A are as follows:

- sin A=opposite side/hypotenuse=BC/AC
- cos A=adjacent side/hypotenuse=AB/AC
- tan A=opposite side/adjacent side=BC/AB
- cosec A=hypotenuse/opposite side=AC/BC
- sec A=hypotenuse/adjacent side=AC/AB
- cot A=adjacent side/opposite side=AB/BC

Relation between Trigonometric Ratios

- cosec θ =1/sin θ
- sec θ = 1/cos θ
- tan θ = sin θ/cos θ
- cot θ = cos θ/sin θ=1/tan θ

Consider the following example: A right-angled triangle ABC with a hypotenuse of 5 cm, a base of 3 cm, and a perpendicular of 4 cm. It is also right-angled at B. Furthermore, ∠ACB = θ. Calculate the trigonometric ratios cos, sin, and tan.

Solution: Given, in ∆ABC,

Hypotenuse, AC = 5cm

Base, BC = 3cm

Perpendicular, AB = 4cm

Then, by the trigonometric ratios, we have;

tan θ = Perpendicular/Base = 4/3

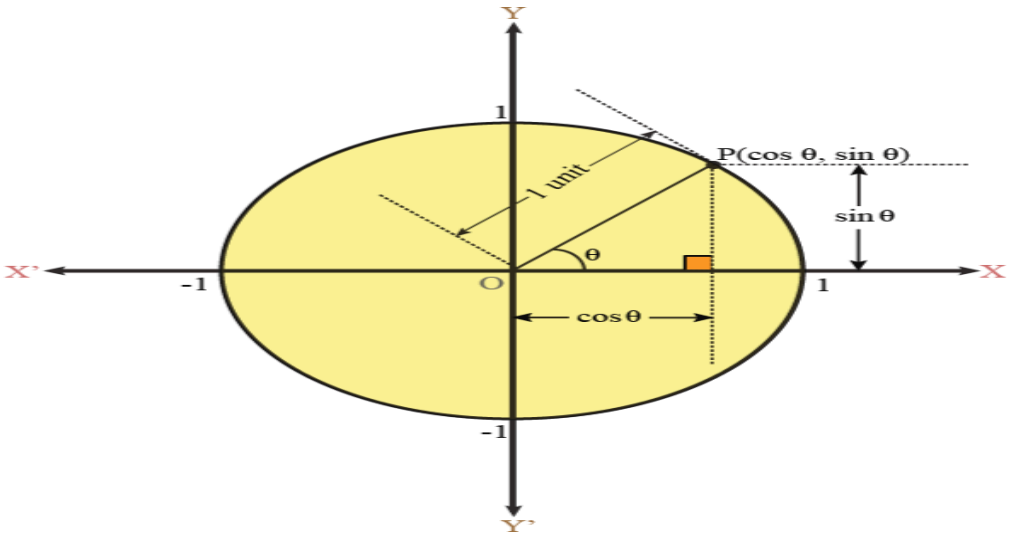
Sin θ = Perpendicular/Hypotenuse = AB/AC = ⅘

Cos θ = Base/Hypotenuse = BC/AC = ⅗

Visualization of Trigonometric Ratios Using a Unit Circle

Draw a circle with the origin in its centre and a radius of one unit. Examine a line segment OP that forms an angle with the x-axis by connecting a point P on the circle to the centre. To cut it at Q, draw a perpendicular from P to the x-axis.

- sin θ=PQ/OP=PQ/1=PQ
- cos θ=OQ/OP=OQ/1=OQ
- tan θ=PQ/OQ=sin θ/cos θ
- cosec θ=OP/PQ=1/PQ
- sec θ=OP/OQ=1/OQ
- cot θ=OQ/PQ=cos θ/sin θ



Trigonometric Ratios of Specific Angles

The specific angles that are defined for trigonometric ratios are 0°, 30°, 45°, 60° and 90°.

Trigonometric Ratios of 45°

If one of the angles of a right-angled triangle is 45°, then another angle will also be equal to 45°.

Let us say ABC is a right-angled triangle at B, such that;

$\angle A = \angle C = 45°$

Thus, BC = AB = a (say)

Using Pythagoras theorem, we have;

$AC^2 = AB^2 + BC^2$

$= a^2 + a^2$

$= 2a^2$

$AC = a\sqrt{2}$

Now, from the trigonometric ratios, we have;

- sin 45° = (Opp. side to angle 45°)/Hypotenuse = BC/AC = $a/a\sqrt{2} = 1/\sqrt{2}$
- cos 45° = (Adj. side to angle 45°)/Hypotenuse = AB/AC = $a/a\sqrt{2} = 1/\sqrt{2}$
- tan 45° = BC/AB = a/a = 1

Similarly,

- cosec 45° = 1/sin 45° = $\sqrt{2}$
- sec 45° = 1/cos 45° = $\sqrt{2}$
- cot 45° = 1/tan 45° = 1

Trigonometric Ratios of 30° and 60°

Here, we will consider an equilateral triangle ABC, such that;

AB = BC = AC = 2a

$\angle A = \angle B = \angle C = 60°$

Now, draw a perpendicular AD from vertex A that meets BC at D

According to the congruency of the triangle, we can say;

$\Delta ABD \cong \Delta ACD$

Hence,

BD = DC

$\angle$ BAD = $\angle$ CAD (By CPCT)

Now, in triangle ABD, $\angle$ BAD = 30° and $\angle$ ABD = 60°

Using Pythagoras theorem,

$AD^2 = AB^2 – BD^2$

$= (2a)^2 – (a)^2$

$= 3a^2$

$AD = a\sqrt{3}$

So, the trigonometric ratios for a 30-degree angle will be;

sin 30° = BD/AB = a/2a = 1/2

cos 30° = AD/AB = $a\sqrt{3}/2a = \sqrt{3}/2$

tan 30° = BD/AD = $a/a\sqrt{3} = 1/\sqrt{3}$

Also,

cosec 30° = 1/sin 30 = 2

sec 30° = $1/\cos 30 = 2/\sqrt{3}$

cot 30° = $1/\tan 30 = \sqrt{3}$

Similarly, we can derive the values of trigonometric ratios for 60°.

- sin 60° = $\sqrt{3}/2$
- cos 60° = 1/2
- tan 60° = $\sqrt{3}$
- cosec 60° = $2/\sqrt{3}$
- sec 60° = 2
- cot 60° = $1/\sqrt{3}$

Trigonometric Ratios of 0° and 90°

In the event that $\angle$A is decreased and ABC forms a right-angled triangle at B, side AC will approach side AB. Accordingly, when $\angle$ A approaches zero, AC approaches AB and BC approaches zero.

Hence, Sin A = BC /AC = 0

and cos A = AB/AC = 1

tan A = sin A/cos A = 0/1 = 0

Also,

cosec A = 1/sin A = 1/0 = not defined

sec A = 1/cos A = 1/1 = 1

cot A = 1/tan A = 1/0 = not defined

The values of trigonometric ratios for a 90-degree angle can be found in a similar manner. In this case, angle C becomes zero, and side AB will approach side BC to make angle A nearly 90 degrees and side AB almost zero.

Range of Trigonometric Ratios from 0 to 90 Degrees

For $0^\circ \leq \theta \leq 90^\circ$,

- $0 \leq \sin\theta \leq 1$
- $0 \leq \cos\theta \leq 1$
- $0 \leq \tan\theta < \infty$
  $1 \leq \sec\theta < \infty$
- $0 \leq \cot\theta < \infty$
- $1 \leq \text{cosec}\,\theta < \infty$

tan θ and sec θ are not defined at 90◦.

cot θ and cosec θ are not defined at 0◦.

Standard Values of Trigonometric Ratios

∠A	0o	30o	45o	60o	90o
sin A	0	1/2	1/√2	√3/2	1
cos A	1	√3/2	1/√2	1/2	0
tan A	0	1/√3	1	√3	not defined
cosec A	not defined	2	√2	2/√3	1
sec A	1	2/√3	√2	2	not defined
cot A	not defined	√3	1	1/√3	0

Benefits of CBSE Class 10 Maths Notes Chapter 8

Experts in the field have put together our Class 10 PDF Trigonometry Notes to provide you with the best review materials. They are aware of the challenges students have when

studying trigonometry because they have instructed thousands of students in more than a thousand cities.

For this reason, the Class 10 Maths Chapter 8 Notes include step-by-step compilation and shortcut procedures. It will be easier for you to comprehend the same if you revise from here. This is a synopsis of the main points of the chapter for your knowledge.