



Octahedral classes, kharadi

2nd floor, yashwant plaza, near bank of India,

Class 10 - Mathematics

Trigonometry

Maximum Marks: 50

Time Allowed: 2 hours

Section A

1. Answer any 8 questions

8

- If $\tan A = \cot B$, prove that $A + B = 90^\circ$.
- Prove the trigonometric identity: $\frac{\cos \theta}{(1 - \tan \theta)} - \frac{\sin^2 \theta}{(\cos \theta - \sin \theta)} = (\cos \theta + \sin \theta)$
- Prove the trigonometric identity:
 $\tan^2 A \sec^2 B - \sec^2 A \tan^2 B = \tan^2 A - \tan^2 B$
- Prove that: $\tan^2 A - \tan^2 B = \frac{\sin^2 A - \sin^2 B}{\cos^2 A \cos^2 B}$
- Prove that: $\frac{(\sin^4 \theta + \cos^4 \theta)}{1 - 2 \sin^2 \theta \cos^2 \theta} = 1$.
- A 7 m long flagstaff is fixed on the top of a tower standing on the horizontal plane. From point on the ground, the angles of elevation of the top and bottom of the flagstaff are 60° and 45° respectively. Find the height of the tower correct to one place of decimal.
- An observer, 1.5 m tall, is 20.5 m away from tower 22 m high. Determine the angle of elevation of the top of the tower from the eye of the observer.
- A window in a building is at height of 10 m from the ground. The angle of depression of a point P on the ground from the window is 30° . The angle of elevation of the top of the building from the point P is 60° . Find the height of the building.
- Two ships are approaching a light house from opposite directions. The angle of depression of two ships from top of the light house are 30° and 45° . If the distance between two ships is 100 m. Find the height of light-house.
- A player sitting on the top of a tower of height 20 m observes the angle of depression of a ball lying on the ground is 60° . Find the distance between the foot of the tower and the ball. Take $\sqrt{3} = 1.732$

Section B

2. Answer any 6 questions

18

- Without using trigonometric tables, evaluate $\frac{\cos 58^\circ}{\sin 32^\circ} + \frac{\sin 22^\circ}{\cos 68^\circ} - \frac{\cos 38^\circ \operatorname{cosec} 52^\circ}{\tan 18^\circ \cdot \tan 35^\circ \tan 72^\circ \cdot \tan 55^\circ}$
- Prove the trigonometric identity:
If $\sin \theta + 2 \cos \theta = 1$ prove that $2 \sin \theta - \cos \theta = 2$.
- In a right triangle ABC, right angled at C, if $\tan A = 1$, then verify that $2 \sin A \cos A = 1$
- $\angle A$ and $\angle B$ are acute angles such that $\cos A = \cos B$, then show that $\angle A = \angle B$.
- If $\sec \alpha = \frac{5}{4}$ evaluate $\frac{1 - \tan \alpha}{1 + \tan \alpha}$,
- A man on the deck of a ship, 12 m above water level, observes that the angle of elevation of the top of a cliff is 60° and the angle of depression of the base of the cliff is 30° . Find the distance of the cliff from the ship and the height of the cliff. [Use $\sqrt{3} = 1.732$]
- From a point on a ground, the angle of elevation of bottom and top of a transmission tower fixed on the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.
- If at some time of the day the ratio of the height of a vertically standing pole to the length of its shadow on the ground is $\sqrt{3} : 1$, then find the angle of elevation of the sun at that time.

Section C

3. Answer any 6 questions

24

a)

If $\operatorname{cosec}(A - B) = 2$, $\cot(A + B) = \frac{1}{\sqrt{3}}$, $0^\circ < (A + B) \leq 90^\circ$, $A > B$. Find A and B.

- b) Prove that : $\sqrt{\frac{1+\sin \theta}{1-\sin \theta}} + \sqrt{\frac{1-\sin \theta}{1+\sin \theta}} = 2 \sec \theta$.
- c) Prove that: $\frac{1+\tan^2 A}{1+\cot^2 A} = \left(\frac{1-\tan A}{1-\cot A} \right)^2 = \tan^2 A$
- d) Evaluate : $\tan^2 30^\circ \sin 30^\circ + \cos 60^\circ \sin^2 90^\circ \tan^2 60^\circ - 2 \tan 45^\circ \cos^2 0^\circ \sin 90^\circ$.
- e) On the same side of a tower, two objects are located. When observed from the top of the tower, their angles of depression are 45° and 60° . If the height of the tower is 150 m, find the distance between the objects.
- f) The angle of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are 30° and 45° respectively. Find the height of the tower and also the horizontal distance between the building and the tower.
- g) The angle of elevation of a stationery cloud from a point 2500 m above a lake is 15° and the angle of depression of its reflection in the lake is 45° . What is the height of the cloud above the lake level?
- h) A vertical pedestal stands on the ground and is surmounted by a vertical flagstaff of height 5 m. At a point on the ground the angles of elevation of the bottom and the top of the flagstaff are 30° and 60° respectively. Find the height of the pedestal.