

EDUCATION DEPARTMENT, VILLUPURAM DISTRICT.

Class : X

UNIT TEST

Marks: 50

Subject: Mathematics

UNIT 6 - Trigonometry

Time: 1½ hrs.

I Choose the correct answer.

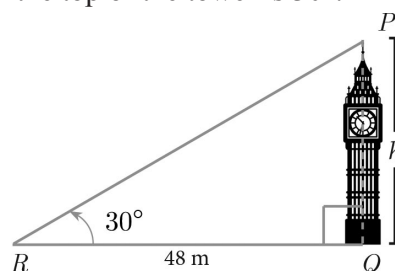
7×1=7

1. $\tan \theta \operatorname{cosec}^2 \theta - \tan \theta$ is equal to
 a) $\sec \theta$ b) $\cot 2\theta$ c) $\sin \theta$ d) $\cot \theta$
2. If $\sin \theta + \cos \theta = a$ and $\sec \theta + \operatorname{cosec} \theta = b$, then the value of $b(a^2 - 1)$ is equal to
 a) $2a$ b) $3a$ c) 0 d) $2ab$
3. If $\sin \theta = \cos \theta$, then $2 \tan^2 \theta + \sin^2 \theta - 1$ is equal to
 a) $\frac{-3}{2}$ b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $\frac{-2}{3}$
4. $(1 + \tan \theta + \sec \theta)(1 + \cot \theta - \operatorname{cosec} \theta)$ is equal to
 a) 0 b) 1 c) 2 d) -1
5. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure
 a) 45° b) 30° c) 90° d) 60°
6. A tower is 60 m high. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30° , then x is equal to
 a) 41.92 m b) 43.92 m c) 43 m d) 45.6 m
7. Two persons are standing ' x ' metres apart from each other and the height of the first person is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shorter person (in metres) is
 a) $\sqrt{2}x$ b) $\frac{x}{2\sqrt{2}}$ c) $\frac{x}{\sqrt{2}}$ d) $2x$

II Answer the following questions. (any 5)

5×2=10

1. Prove that $\frac{\sin A}{1 + \cos A} = \frac{1 - \cos A}{\sin A}$
2. $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sec \theta + \tan \theta$
3. Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.
4. A tower stands vertically on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower.



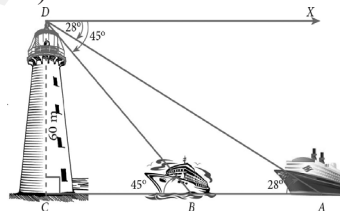
- From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
- From the top of a tree of height 13 m the angle of elevation and depression of the top and bottom of another tree are 45° and 30° respectively. Find the height of the second tree. ($\sqrt{3} = 1.732$)
- 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 as 60° . Find the distance between the foot of the tower and the ball. ($\sqrt{3} = 1.732$)

III Answer the following questions. (any 5)

5×5=25

- If $\operatorname{cosec}\theta + \cot\theta = P$, then prove that $\cos\theta = \frac{P^2 - 1}{P^2 + 1}$
- Prove the following identity.

$$\frac{\sin^3 A + \cos^3 A}{\sin A + \cos A} + \frac{\sin^3 A - \cos^3 A}{\sin A - \cos A} = 2$$
- Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships. ($\sqrt{3} = 1.732$)
- An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats. ($\sqrt{3} = 1.732$)
- A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45° . What is the approximate speed of the boat (in km / hr), assuming that it is sailing in still water? ($\sqrt{3} = 1.732$)
- The angle of elevation of the top of a cell phone tower from the foot of a high apartment is 60° and the angle of depression of the foot of the tower from the top of the apartment is 30° . If the height of the apartment is 50 m, find the height of the cell phone tower. According to radiations control norms, the minimum height of a cell phone tower should be 120 m. State if the height of the above mentioned cell phone tower meets the radiation norms.
- As observed from the top of a 60 m high lighthouse from the sea level, the angles of depression of two ships are 28° and 45° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. ($\tan 28^\circ = 0.5317$)



IV Answer the following question.

1×8=8

- a) Construct a ΔPQR in which $PQ = 8$ cm, $R = 60^\circ$ and the median RG from R to PQ is 5.8 cm. Find the length of the altitude from R to PQ .

(OR)

- b) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3} > 1$).
