CHAPTER 08 & 09
TRIGONOMETRY

ASSIGNMENT-08

SUBJECT: MATHEMATICS **MAX. MARKS : 40**
CLASS : X **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. If $3\cot\theta = 2$, then the value of $\tan\theta$

(a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{3}{\sqrt{13}}$ (d) $\frac{2}{\sqrt{13}}$

2. If $\sin\theta - \cos\theta = 0$, then the value of $(\sin^4\theta + \cos^4\theta)$ is

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{4}$

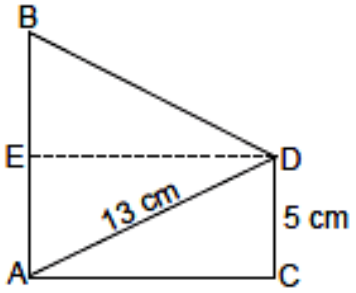
3. If ΔABC is right angled at C, then the value of $\sin(A + B)$ is

(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}$

4. If $\text{cosec}A - \cot A = \frac{4}{5}$, then $\text{cosec}\ A =$

(a) $\frac{47}{40}$ (b) $\frac{59}{40}$ (c) $\frac{51}{40}$ (d) $\frac{41}{40}$

5. In the given figure, if AB = 14 cm, then the value of tan B is:



(a) $\frac{4}{3}$ (b) $\frac{14}{3}$ (c) $\frac{5}{3}$ (d) $\frac{13}{3}$

6. The angle of depression of a car, standing on the ground, from the top of a 75 m high tower, is 30°. The distance of the car from the base of the tower (in m) is:

(a) $25\sqrt{3}$ (b) $50\sqrt{3}$ (c) $75\sqrt{3}$ (d) 150

7. If $\sqrt{3}\ \sin\theta - \cos\theta = 0$ and $0° < \theta < 90°$, find the value of θ.

(a) 30° (b) 45° (c) 60° (d) 90°

8. A ladder 15 m long just reaches the top of a vertical wall. If the ladder makes an angle of 60° with the wall, then the height of the wall is

(a) $15\sqrt{3}$ m (b) $15\sqrt{3}/2$ m (c) 15/2 m (d) 15 m

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. Assertion (A): If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$ then the value of $x + y = 3$.
Reason (R): For any value of θ, $\sin^2\theta + \cos^2\theta = 1$

10. Assertion (A): Sin A is the product of Sin and A.
Reason (R): The value of $\sin\theta$ increases as θ increases.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. ABC is a right triangle, right angled at C. If A = 30° and AB = 40 units, find the remaining two sides of ΔABC.

12. Find the value of x if $\tan 3x = \sin 45°.\cos 45° + \sin 30°$.

13. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \text{cosec}\,\theta = q$, show that $q(p^2 - 1) = 2p$.

14. Evaluate: $\dfrac{5\sin^2 30^0 + \cos^2 45^0 + 4\tan^2 60^0}{2\sin 30^0 \cos 60^0 + \tan 45^0}$

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. If $\sec\theta + \tan\theta = p$, prove that $\sin\theta = \dfrac{p^2 - 1}{p^2 + 1}$.

16. Prove that: $\dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \dfrac{2\sec^2\theta}{\tan^2\theta - 1}$

17. Prove that: $\dfrac{1}{\text{cosec}\,\theta - \cot\theta} - \dfrac{1}{\sin\theta} = \dfrac{1}{\sin\theta} - \dfrac{1}{\text{cosec}\,\theta + \cot\theta}$

SECTION – D

Questions 18 carry 5 marks.

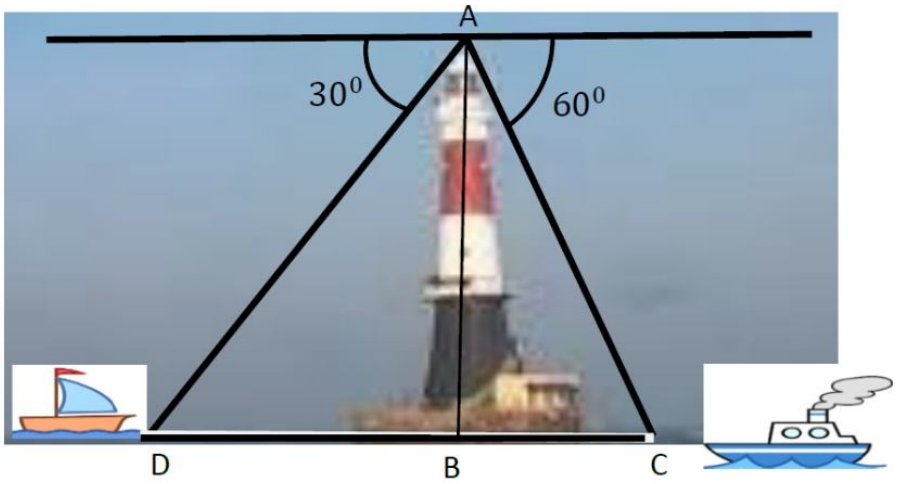
18. If $\text{cosec}\,\theta - \sin\theta = m$ and $\sec\theta - \cos\theta = n$, prove that $(m^2n)^{2/3} + (mn^2)^{2/3} = 1$.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. A lighthouse is a tall tower with light near the top. These are often built on islands, coasts or on cliffs. Lighthouses on water surface act as a navigational aid to the mariners and send warning to

boats and ships for dangers. Initially wood, coal would be used as illuminators. Gradually it was replaced by candles, lanterns, electric lights. Nowadays they are run by machines and remote monitoring. Prongs Reef lighthouse of Mumbai was constructed in 1874-75. It is approximately 40 meters high and its beam can be seen at a distance of 30 kilometres. A ship and a boat are coming towards the lighthouse from opposite directions. Angles of depression of flash light from the lighthouse to the boat and the ship are 30^0 and 60^0 respectively.

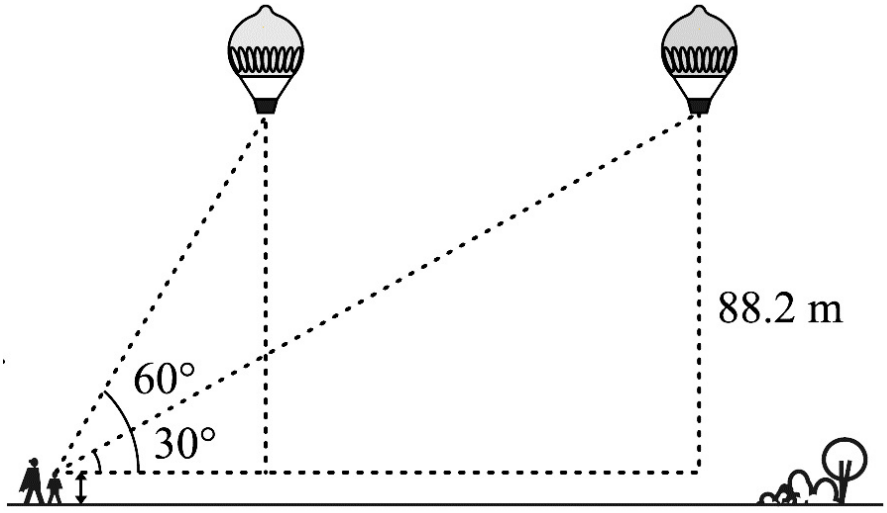


(i) Which of the two, boat or the ship is nearer to the light house. Find its distance from the lighthouse? (2)
(ii) Find the time taken by the boat to reach the light house if it is moving at the rate of 2 km per hour. (2)

OR

(ii) The ratio of the height of a light house and the length of its shadow on the ground is $\sqrt{3} : 1$. What is the angle of elevation of the sun? (2)

20. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60°. After 30 seconds, the angle of elevation reduces to 30° (see the below figure).



Based on the above information, answer the following questions. (Take $\sqrt{3}$ =1.732)
(i) Find the distance travelled by the balloon during the interval. (2)
(ii) Find the speed of the balloon. (2)

OR

(ii) If the elevation of the sun at a given time is 30°, then find the length of the shadow cast by a tower of 150 feet height at that time. (2)