

Chapter 8 Trigonometry

UNIT TEST

Duration: 1 hour

Marks: 30

SECTION A

Each carry 1 mark

1. If $\sqrt{3}\tan \theta = 1$, then $\sin^2 \theta - \cos^2 \theta =$

- a) $-\frac{1}{2}$ b) $\frac{1}{2}$ c) $\frac{3}{2}$ d) $\frac{5}{2}$

2. The value of $2(\sin^2 45^\circ + \cot^2 30^\circ) - 6(\cos^2 45^\circ - \tan^2 30^\circ)$ is

- a) 6 b) 3 c) 2 d) 4

3. The value of $4(\sin^4 30^\circ + \cos^4 60^\circ) - 3(\cos^2 45^\circ - \sin^2 90^\circ)$ is

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

4. Assertion: The value of $\sin \theta = \frac{4}{3}$ is not possible.

Reason: Hypotenuse is the largest side in any right-angled triangle.

(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.

SECTION B

Each carry 2 marks

5. ABC is a triangle, right angled at A. If $\angle C = 60^\circ$, $\angle B = 30^\circ$, and $BC = 3$ cm, find the remaining parts of $\triangle ABC$.

6. If $\tan(A - B) = \frac{1}{\sqrt{3}}$ and $\sin(A + B) = \frac{\sqrt{3}}{2}$, $0^\circ < (A + B) \leq 90^\circ$, $A > B$, then find A and B.

7. Prove that: $\sin^6 \theta + \cos^6 \theta + 3\sin^2 \theta \cdot \cos^2 \theta = 1$.

SECTION C

Each carry 3 marks

8. Show that: $(1 + \cot A + \tan A)(\sin A - \cos A) = \sin A \cdot \tan A - \cot A \cdot \cos A$.

9. Prove that: $\frac{(1 + \cot \theta + \tan \theta)(\sin \theta - \cos \theta)}{(\sec^3 \theta - \operatorname{cosec}^3 \theta)} = \sin^2 \theta \cos^2 \theta$.

SECTION D

Each carry 5 marks

10. If $\tan x = n \tan y$ and $\sin x = m \sin y$, prove that $\cos^2 x = \frac{m^2 - 1}{n^2 - 1}$.

11. If $\cot \theta + \tan \theta = x$ and $\sec \theta - \cos \theta = y$, prove that $(x^2 y)^{2/3} - (xy^2)^{2/3} = 1$

SECTION E

12. 'Skysails' is that genre of engineering science that uses extensive utilization of wind energy to move a vessel in the sea water. The 'Skysails' technology allows the towing kite to gain a height of anything between 100 metres – 300 metres. The sailing kite is made in such a way that it can be raised to its proper elevation and then brought back with the help of a 'telescopic mast' that enables the kite to be raised properly and effectively.

Based on the following figure related to sky sailing, answer the questions:

- i) In the given figure, if $\sqrt{3} \tan 2\theta - 3 = 0$, where θ is acute angle, then find the value of θ . [1mark]
- ii) What should be the length of the rope of the kite sail in order to pull the ship at the angle (calculated above) and be at a vertical height of 300 m? [2 marks]

(Or)

What should be the distance BC in order to pull the ship at the angle (calculated above) and be at a vertical height of 300 m? [2 marks]

- iii) If the length of the rope, $AC = 200\text{m}$ and $\theta = 30^\circ$, then find the vertical height AB.

UNIT TEST

1. a) $\frac{-1}{2}$

2. a) 6

3. c) 2

4. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

5. $AC = 1.5\text{cm}, AB = 1.5\sqrt{3}\text{cm}$

6. $45^\circ, 15^\circ$

7. 1

8. Proof

9. Proof

10. Proof

11. 1

12. i) 30° ii) 600 m (Or) $300\sqrt{3}$ m iii) 100 m