

Maxprap. Chapter wise Series Class 11th - Trigonometry

Class : 11th

Subject: Mathematics

Max. Marks : 60

Duration : 2½ Hrs

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

- All questions are compulsory.
- This question paper contains 25 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 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 4 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- There is no overall choice.
- Use of Calculators is not permitted.

Section A

Questions 1 to 10 carry 1 mark each

- The radius of a circle is 30 cm. The length of the arc of this circle whose chord is 30 cm long, is
a) 13.6π cm b) 9π cm c) 10π cm d) 2π cm
- $2\sin\frac{5\pi}{12}\sin\frac{\pi}{12} = ?$
a) $\frac{1}{\sqrt{2}}$ b) $\sqrt{2}$ c) $\frac{\sqrt{3}}{2}$ d) $\frac{1}{2}$
- A wheel makes 180 revolutions in 1 minute. How many radians does it turn in 1 second?
a) $(4\pi)^c$ b) $(12\pi)^c$ c) $(3\pi)^c$ d) $(6\pi)^c$
- $\cos(75^\circ) =$
a) $(-\sqrt{3} - 1)/2\sqrt{2}$ b) $(\sqrt{3} + 1)/2\sqrt{2}$ c) $(\sqrt{3} - 1)/2\sqrt{2}$ d) $(1 - \sqrt{3})/2\sqrt{2}$
- If $\sin\theta = \frac{15}{17}$ and $\cos\phi = \frac{12}{13}$, where θ and ϕ both lie in quadrant I, then $\sin(\theta + \phi) = ?$
a) $\frac{180}{221}$ b) $\frac{171}{221}$ c) $\frac{220}{221}$ d) $\frac{181}{221}$
- $\frac{\sin 3x - \sin x}{\cos x - \cos 3x}$ is equal to
a) $\tan 2x$ b) $-\tan 2x$ c) $-\cot 2x$ d) $\cot 2x$
- If $\cos x = \frac{-1}{3}$ and x lies in quadrant III, then $\tan \frac{x}{2} = ?$
a) $\sqrt{3}$ b) $-\sqrt{2}$ c) $-\sqrt{3}$ d) $\sqrt{2}$
- A circular wire of radius 7 cm is cut and bent again into an arc of a circle of radius 12 cm. The angle subtended by the arc at the centre is

a) 50°

b) 210°

c) 100°

d) 60°

Assertion(A)/Reason(R) Based (9-10): In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

9. Assertion (A): The value of $\sin(690^\circ) \cos(-300^\circ) + \cos(-750^\circ) \sin(-240^\circ) = 1$.

Reason (R): The values of sin and cos is negative in third and fourth quadrant respectively.

10. Assertion (A): If $\sin x = -\frac{1}{3}$, then $\cos x = \frac{2\sqrt{2}}{3}$

Reason (R): If the value of $\cos x$ is - ve and $\sin x$ is - ve then $x \in \left[\frac{3\pi}{2}, 2\pi\right]$

SECTION – B

Questions 11 to 15 carry 2 marks each

11. Prove that: $\sin \frac{13\pi}{3} \sin \frac{8\pi}{3} + \cos \frac{2\pi}{3} \sin \frac{5\pi}{6} = \frac{1}{2}$.

12. Prove that: $\sin 38^\circ + \sin 22^\circ = \sin 82^\circ$.

13. Prove that $2 \cos 45^\circ \cos 15^\circ = \frac{(\sqrt{3}+1)}{2}$.

14. Prove that: $\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$

15. Prove that: $\cos 55^\circ + \cos 65^\circ + \cos 175^\circ = 0$.

SECTION – C

Questions 16 to 19 carry 3 marks each

16. Prove that: $\cot \frac{\pi}{8} = \sqrt{2} + 1$.

17. Prove the following identity: $\cos 4x = 1 - 8 \cos^2 x + 8 \cos^4 x$.

18. Prove that: $\frac{\sin A + 2 \sin 3A + \sin 5A}{\sin 3A + 2 \sin 5A + \sin 7A} = \frac{\sin 3A}{\sin 5A}$.

19. Prove that $\tan 4\theta = \frac{4 \tan \theta (1 - \tan^2 \theta)}{1 - 6 \tan^2 \theta + \tan^4 \theta}$

SECTION – D

Questions 20 to 23 carry 5 marks each

20. Prove that: $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$.

21. Prove that $\cos^3 A + \cos^3 (120^\circ + A) + \cos^3 (240^\circ + A) = \frac{3}{4} \cos 3A$.

22. Prove that: $\tan 20^\circ \tan 30^\circ \tan 40^\circ \tan 80^\circ = 1$

23. Prove that: $4 \sin A \sin (60^\circ - A) \sin (60^\circ + A) = \sin 3A$.

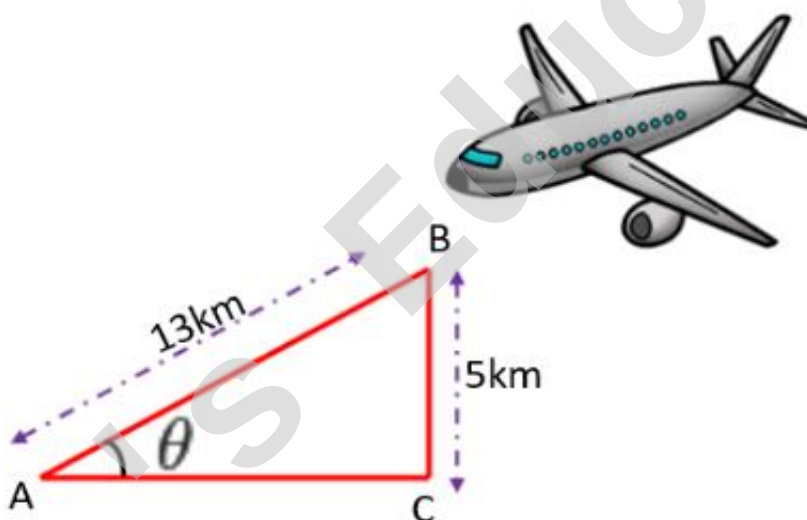
Hence deduce that: $\sin 20^\circ \times \sin 40^\circ \times \sin 60^\circ \times \sin 80^\circ = \frac{3}{16}$

SECTION – E (Case Study Based Questions)

Questions 24 & 25 carry 4 marks each

24. Read the following text carefully and answer the questions that follow:

An airplane is observed to be approaching a point that is at a distance of 13 km from the point of observation and makes an angle of elevation of θ and the height of the airplane above the ground is 5km. Based on the above information answer the following questions.



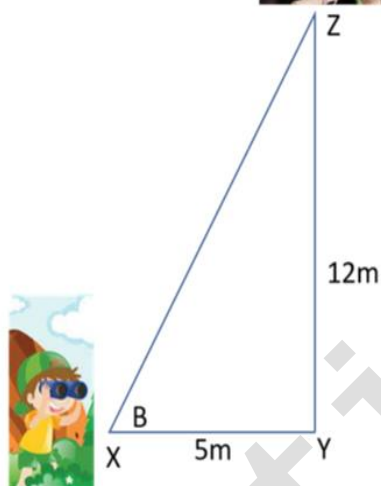
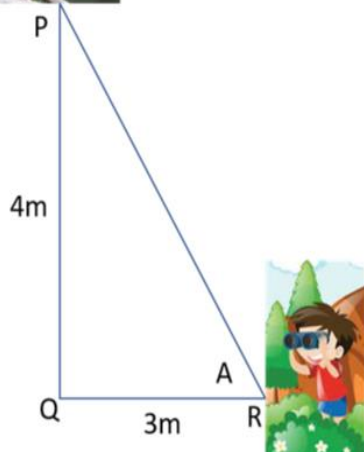
- Find the value of $\sin 2\theta$. (1)
- Find the value of $\cos 2\theta$. (1)
- Find the value of $\sin \left(\frac{\theta}{2}\right)$. (2)

OR

- Find the value of $\cos \left(\frac{\theta}{2}\right)$. (2)

25. Read the following text carefully and answer the questions that follow:

Anand and Sri went for walking. Anand observes a bird on a top tree with an angle of elevation A. The distance between Anand and the tree on the ground is 3 m and height of the tree on which bird is sitting is 4m. At the same time Sri observes another bird on the top of house with angle of elevation B. The distance between Sri and house on the ground is 5m and height of the house where bird is sitting is 12m.



- d) Find the value of $\cos A + \sin B$. (1)
- e) Find the value of $\sin(A + B)$. (1)
- f) Find the value of $\cos(A + B)$. (2)

OR

Find the value of $\sin(A - B)$. (2)

Trigonometry Paper Details – Analysis

Objective Questions

MCQ 1 marks x 8 question = 8

Assertion Reason 1 marks x 2 question = 2

Subjective

Short type I 2 marks x 5 question = 10

Short type II 3 marks x 4 question = 12

Long Type 5 marks x 4 question = 20

Case Studies Based

Case 1 4 marks

Case 2 4 marks

Total = 60 marks Your Score =