

VAISHALI EDUCATION POINT

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TRIGONOMETRIC FUNCTIONS

Class :- XI

SUBJECT: MATHS

General Instructions
ALL QUESTIONS ARE COMPULSORY

QNo.

Questions

1

Find the degree measures corresponding to the following radian measures $\left(\text{Use } \pi = \frac{22}{7}\right)$

(i) $\frac{11}{16}$ (ii) -4 (iii) $\frac{5\pi}{3}$ (iv) $\frac{7\pi}{6}$

2

Find the value of the trigonometric function $\sin\left(-\frac{11\pi}{3}\right)$

3

Find the value of the trigonometric function $\cot\left(-\frac{15\pi}{4}\right)$

4

Prove that : $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$

5

Prove that $2 \sin^2 \frac{\pi}{6} + \operatorname{cosec}^2 \frac{7\pi}{6} \cos^2 \frac{\pi}{3} = \frac{3}{2}$

6

Prove that $\cot^2 \frac{\pi}{6} + \operatorname{cosec} \frac{5\pi}{6} + 3 \tan^2 \frac{\pi}{6} = 6$

7

Prove that $2 \sin^2 \frac{3\pi}{4} + 2 \cos^2 \frac{\pi}{4} + 2 \sec^2 \frac{\pi}{3} = 10$

8

Prove that: $\cos\left(\frac{\pi}{4} - x\right) \cos\left(\frac{\pi}{4} - y\right) - \sin\left(\frac{\pi}{4} - x\right) \sin\left(\frac{\pi}{4} - y\right) = \sin(x + y)$

9

Prove that $\frac{\cos(\pi + x) \cos(-x)}{\sin(\pi - x) \cos\left(\frac{\pi}{2} + x\right)} = \cot^2 x$

10

Prove that : $\cos\left(\frac{3\pi}{2} + x\right) \cos(2\pi + x) \left[\cot\left(\frac{3\pi}{2} - x\right) + \cot(2\pi + x) \right] = 1$

11 Prove that $\sin (n+1)x \sin (n+2)x + \cos (n+1)x \cos (n+2)x = \cos x$

12 Prove that

$$\cos \left(\frac{3\pi}{4} + x \right) - \cos \left(\frac{3\pi}{4} - x \right) = -\sqrt{2} \sin x$$

13 Prove that

$$\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$$

14 Prove the following statements .

$$\sin (45^\circ + A) \cos (45^\circ - B) + \cos (45^\circ + A) \sin (45^\circ - B) = \cos (A - B)$$

15 Prove the following statements.

$$\frac{\sin 75^\circ - \sin 15^\circ}{\cos 75^\circ + \cos 15^\circ} = \frac{1}{\sqrt{3}}$$

16 Prove the following statements.

$$\frac{\sec 8A - 1}{\sec 4A - 1} = \frac{\tan 8A}{\tan 2A}$$

17 Prove that the following statements.

$$\sin 22\frac{1}{2}^\circ = \frac{\sqrt{2}-1}{2\sqrt{2}}$$

18 Prove the following statements.

$$\cos (A + B) + \sin (A - B) = 2 \sin (45^\circ + A) \cos (45^\circ + B)$$

19 Prove that

$$\tan (A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

20 Prove the following statements.

$$\sin (n+1)A \sin \{(n+2)A\} + \cos \{(n+1)A\} \cos \{(n+2)A\} = \cos A$$

21

$$\frac{\sin 7A - \sin A}{\sin 8A - \sin 2A} = \cos 4A \sec 5A$$

Prove the following statements.

22

$$\text{Prove the following statements. } \sec^2 A (1 + \sec 2A) = 2 \sec 2A$$

23

$$\text{Prove that the following statements. } \sin 7\frac{1}{2}^\circ = \frac{\sqrt{4-\sqrt{6}-\sqrt{2}}}{2\sqrt{2}}$$

24

$$\text{Prove that the following statements. } \sin^2 72^\circ - \sin^2 60^\circ = \frac{\sqrt{5}-1}{8}$$

25

$$\text{Prove the following statements. } \tan \left(\frac{\pi}{4} - A \right) = \frac{1 - \tan A}{1 + \tan A}$$

26

Prove the following statements.

$$\tan 56^\circ = \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$$

27

$$\text{Prove the following statements. } \tan 4A = \frac{4 \tan A - 4 \tan^3 A}{1 - 6 \tan^2 A + \tan^4 A}$$

28

$$\text{Prove the following statements. } \cos 6A = 32 \cos^6 A - 48 \cos^4 A + 18 \cos^2 A - 1$$

29

$$\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$$

Prove the following statements.

30

$$\tan\left(\frac{\pi}{4} + A\right) \tan\left(\frac{3\pi}{4} + A\right) = -1$$

Prove the following statements.

31

Prove that $\tan(45^\circ + A) = \frac{1 + \tan A}{1 - \tan A}$

32

Prove that $\sin A \sin(60^\circ - A) \sin(60^\circ + A) = \frac{1}{4} \sin 3A$

33

Prove that $\sin 3A + \sin 2A - \sin A = 4 \sin \frac{A}{2} \cos \frac{3A}{2}$

34

Prove that $(\cos A - \cos B)^2 + (\sin A - \sin B)^2 = 4 \sin^2 \frac{A-B}{2}$.

35

Prove that $\cos^2 A + \cos^2(A + 120^\circ) + \cos^2(A - 120^\circ) = \frac{3}{2}$

36

In a ΔABC , prove that $\sin 2A + \sin 2B - \sin 2C = 4 \cos A \cos B \sin C$

37

In a ΔABC , prove that $\sin A + \sin B - \sin C = 4 \sin \frac{A}{2} \sin \frac{B}{2} \cos \frac{C}{2}$

38

In a ΔABC , prove that $\cos A + \cos B + \cos C = 1 + 4 \sin \frac{A}{2} \sin \frac{B}{2} \sin \frac{C}{2}$

39

In a ΔABC , prove that $\cos A + \cos B - \cos C = -1 + 4 \cos \frac{A}{2} \cos \frac{B}{2} \sin \frac{C}{2}$

40

In a ΔABC , prove that $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2 \sin A \sin B \cos C$

41

Prove the following statements.

(i) $\cos(A + B) + \sin(A - B) = 2 \sin(45^\circ + A) \cos(45^\circ + B)$ (ii) $\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$ (iii) $\tan\left(\frac{\pi}{4} + A\right) \tan\left(\frac{3\pi}{4} + A\right) = -1$

42

Prove the following statements.

(i) $\sin A \sin(60^\circ - A) \sin(60^\circ + A) = \frac{1}{4} \sin 3A$ (ii) $\sin 3A + \sin 2A - \sin A = 4 \sin \frac{A}{2} \cos \frac{3A}{2}$ (iii) $(\cos A - \cos B)^2 + (\sin A - \sin B)^2 = 4 \sin^2 \frac{A-B}{2}$.(iv) $\cos^2 A + \cos^2(A + 120^\circ) + \cos^2(A - 120^\circ) = \frac{3}{2}$

43

Prove that,

(i) $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$ (ii) $\cos 12^\circ \cos 24^\circ \cos 48^\circ \cos 84^\circ = \frac{1}{16}$ (iii) $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$

44

Prove that

(i) $\cos 2A + \cos 2\left(A + \frac{\pi}{3}\right) + \cos 2\left(A - \frac{\pi}{3}\right) = \frac{3}{2}$.(ii) $\sin \theta + \sin 3\theta + \sin 5\theta + \sin 7\theta = 4 \cos \theta \cos 2\theta \cos 4\theta$.

45

Find the general solution of the following equations

(i) $\sin \theta - \cos \theta = -\sqrt{2}$

(ii) $\sec x - \tan x = \sqrt{3}$

(iii) $\sin 2x + \sin 4x + \sin 6x = 0$

(iv) $\tan^2 x + (1 - \sqrt{3}) \tan x - \sqrt{3} = 0$

(v) $\cot x + \tan x = 2 \operatorname{cosec} x$

(vi) $4 \cos^2 x + \sqrt{3} = 2(\sqrt{3} + 1) \cos x.$