ASSIGNMENT CLASS XI

TRIGONOMETRY

Q1. Find the degree measure corresponding to the following radian measures:

(a) $\left(\frac{2\pi}{15}\right)^c$ (b) $\left(\frac{\pi}{8}\right)^c$ (c) $\left(\frac{9\pi}{5}\right)^c$ (d) $-\left(\frac{5\pi}{6}\right)^c$

Q2. Find the radian measures corresponding to the following degree measures:

(a) 340^0 (b) 75^0 (c) $-37^0 30'$ (d) 520^0

Q3. Find the magnitude, in radians and degrees, of the interior angle of a regular:

(a) pentagon (b) octagon (c) heptagon (d) duodecagon

Q4. In a right angled triangle , the difference between two acute angles is $\frac{\pi}{18}$. Express the angles in degrees.

Q5. The angles of a triangle are in A.P. such that the greatest is 5 times the least. Find the angles in radians.

Q6. The angles of a triangle are in A.P. and the number of degrees in the least to the number of radians in the greatest is $60:\pi$. Find the angles in radians.

Q7. The number of sides of two regular polygons are as 5:4 and the difference between their angles is 9^0. Find the number of sides of the polygons.

Q8. The perimeter of a certain sector of a circle is equal to half that of the circle of which it is a sector. Find the circular measure of the angle of the sector.

Q9. The larger hand of a big clock is 35 cm long. How many cm does its tip move in 9 minutes?

Q10. (a) Find the angle between the minute and hour hands of a clock at 8:30 .

(b) Find the angle between the minute and hour hands of a clock at 3:40.

Q11. If $\cot\theta = -\frac{12}{5}$ and θ lies in the second quadrant, find the values of other five trigonometric functions.

Q12. Find the values of the following trigonometric ratios:

(a) $\sin\left(\frac{5\pi}{3}\right)$ (b) $\sin 3060^0$ (c) $\tan\frac{11\pi}{6}$ (d) $\cos\left(-1125^0\right)$ (e) $\tan 315^0$

(f) $\cot\left(-\frac{15\pi}{4}\right)$ (g) $\cos 570^0$ (h) $\sin\left(-330^0\right)$ (i) $\cos ec\left(-1200^0\right)$ (j) $\tan\left(-585^0\right)$

Q13. Prove that: $3\sin\frac{\pi}{6}\sec\frac{\pi}{3}-4\sin\frac{5\pi}{6}\cot\frac{\pi}{4}=1$

Q14. Evaluate the following:

(a) $\sin\frac{7\pi}{12}\cos\frac{\pi}{4}-\cos\frac{7\pi}{12}\sin\frac{\pi}{4}$ (b) $\cos\frac{2\pi}{3}\cos\frac{\pi}{4}-\sin\frac{2\pi}{3}\sin\frac{\pi}{4}$

Q15. If $\cot\alpha=\frac{1}{2},\alpha\in\left(\pi,\frac{3\pi}{2}\right)$ and $\sec\beta=\frac{-5}{3},\beta\in\left(\frac{\pi}{2},\pi\right)$, find the value of $\tan(\alpha+\beta)$.

Q16. If $\cos x=\frac{4}{5},\cos y=\frac{12}{13}$; $\frac{3\pi}{2}<x<2\pi$ and $\frac{3\pi}{2}<y<2\pi$, find $\cos(x+y)$ and $\sin(x-y)$.

Q17. Prove that

(i) $\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}+\cos^2\frac{5\pi}{8}+\cos^2\frac{7\pi}{8}=2$

(ii) $\sin^2\frac{\pi}{4}+\sin^2\frac{3\pi}{4}+\sin^2\frac{5\pi}{4}+\sin^2\frac{7\pi}{4}=2$

Q18. (a) Prove that the equation $\frac{(a+b)^2}{4ab}=\sin^2\theta$ is possible only when $a=b$.

(b) Is the equation $2\sin^2\theta-\cos\theta+4=0$ possible?

(c) Prove that $\sec^2\theta+\cos ec^2\theta\geq 4$

(d) Show that $\cos\theta=x+\frac{1}{x}$ is impossible, if x is real.

(e) Find the value of $\cos\theta$ for which $2\cos\theta=a+\frac{1}{a}$ is possible, where $a\in R$

Q19. (a) Find the sign of the expression: $\sin 100^0+\cos 100^0$.

(b) Reduce $\sqrt{3}\sin\theta+\cos\theta$ as a single term consisting: (i) Sine only (ii) Cosine only

Q20. Prove that:

(a) $\frac{\cos(90^0+\theta)\sec(270^0+\theta)\sin(180^0+\theta)}{\cos ec(-\theta)\cos(270^0-\theta)\tan(180^0+\theta)}=\cos\theta$

(b) $\frac{\sin(180^0+\theta)\cos(90^0+\theta)\tan(270^0-\theta)\cot(360^0-\theta)}{\sin(360^0-\theta)\cos(360^0+\theta)\cos ec(-\theta)\sin(270^0+\theta)}=1$

Q21. If $\cos x+\cos y=\frac{1}{3}$ and $\sin x+\sin y=\frac{1}{4}$, prove that $\tan\left(\frac{x+y}{2}\right)=\frac{3}{4}$.

Q22. If $\tan x=\frac{1}{7}$ and $\tan y=\frac{1}{3}$, show that $\cos 2x=\sin 4y$.

Q23. (a) If $\tan A=\frac{m}{m-1}$ and $\tan B=\frac{1}{2m-1}$, then prove that $A-B=\frac{\pi}{4}$.

(b) If $\tan\alpha=\frac{m}{m+1}$ and $\tan\beta=\frac{1}{2m+1}$, show that $\alpha+\beta=\frac{\pi}{4}$.

Q24. Prove the following:

(a) $\frac{\sin 2\theta}{1-\cos 2\theta}=\cot\theta$

(b) $\frac{1+\sin 2\theta+\cos 2\theta}{1+\sin 2\theta-\cos 2\theta}=\cot\theta$

(c) $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}=\tan\left(\frac{\theta}{2}\right)$

(d) $\frac{\cos\theta}{1+\sin\theta}=\tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$

(e) $\sqrt{\frac{1+\sin x}{1-\sin x}}=\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)$

(f) $\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)+\tan\left(\frac{\pi}{4}-\frac{x}{2}\right)=2\sec x$

Q25. If $\sec\theta+\tan\theta=4$, find the values of $\sin\theta$, $\cos\theta$, $\sec\theta$ and $\tan\theta$.

Q26. Find the quadrant in which θ lies if $\sin\theta=-\frac{1}{\sqrt{2}}$ and $\tan\theta=1$

Q27. Find a pair of values of R and θ from $R\cos\theta=\sqrt{3}$ and $R\sin\theta=1$

Q28. Find all angles between 0^0 and 360^0 satisfying $3\tan^2 x=1$

Q29. If $\sin\theta+\cos\theta=0$ and θ lies in IV quadrant, find $\sin\theta$ and $\cos\theta$.

Q30. If $\tan x+\cot x=2$, prove that $\tan^n x+\cot^n x=2$; $n\in N$

Q31. (a) Prove that: $\cos\theta-\sin\theta=\sqrt{2}\cos\left(\theta+\frac{\pi}{4}\right)$.

(b) Prove that: $\sqrt{3}\,\text{cosec}\,20^0-\sec 20^0=4$

Q32. If $\sin A=\frac{1}{\sqrt{5}}$ and $\cos B=\frac{3}{\sqrt{10}}$, prove that $A+B=\frac{\pi}{4}$.

Q33. Prove that $\sqrt{2+\sqrt{2+2\cos 4\theta}}=2\cos\theta$

Q34. Find maximum and minimum values of $\sin\theta+\cos\theta$.

Q35. If $\tan x+\tan y=a$ and $\cot x+\cot y=b$, prove that $\frac{1}{a}-\frac{1}{b}=\cot(x+y)$.

Q36. Prove that:

(a) $4\sin A\sin(60^0-A)\sin(60^0+A)=\sin 3A$

(b) $\cos A+\cos(120^0-A)+\cos(120^0+A)=0$

(c) $\sin 10^0\sin 50^0\sin 60^0\sin 70^0=\frac{\sqrt{3}}{16}$

(d) $\cos 20^0\cos 40^0\cos 80^0=\frac{1}{8}$

Q37. Prove that: (a) $\cos\theta\cos\left(\frac{\pi}{3}-\theta\right)\cos\left(\frac{\pi}{3}+\theta\right)=\frac{1}{4}\cos 3\theta$

(b) $\sin\theta\sin\left(\theta+\frac{\pi}{3}\right)\sin\left(\theta+\frac{2\pi}{3}\right)=\frac{1}{4}\sin 3\theta$

Q38. Prove that:

(a) $\cos\alpha+\cos\beta+\cos\gamma+\cos(\alpha+\beta+\gamma)=4\cos\frac{\alpha+\beta}{2}\cos\frac{\beta+\gamma}{2}\cos\frac{\gamma+\alpha}{2}$

(b) $\frac{\cos 8A\cos 5A-\cos 12A\cos 9A}{\sin 8A\cos 5A+\cos 12A\sin 9A}=\tan 4A$ (c) $\frac{\sin 11A\sin A+\sin 7A\sin 3A}{\cos 11A\sin A+\cos 7A\sin 3A}=\tan 8A$

(d) $\frac{\sin 3A+\sin 5A+\sin 7A+\sin 9A}{\cos 3A+\cos 5A+\cos 7A+\cos 9A}=\tan 6A$ (e) $\frac{\sin 5A-\sin 7A+\sin 8A-\sin 4A}{\cos 4A+\cos 7A-\cos 5A-\cos 8A}=\cot 6A$

(f) $\frac{\sin 8\theta\cos\theta-\sin 6\theta\cos 3\theta}{\cos 2\theta\cos\theta-\sin 3\theta\sin 4\theta}=\tan 2\theta$ (g) $\frac{\sin(A+B)-2\sin A+\sin(A-B)}{\cos(A+B)-2\cos A+\cos(A-B)}=\tan A$

Q39. If $\sin A=\frac{3}{5}$, where $0^0<A<90^0$, find the values of $\sin 2A, \cos 2A, \tan 2A$ and $\sin 4A$.

Q40. (a) Find the greatest value of $\sin x\cos x$.

(b) If $x+y=90^0$, find the maximum and minimum values of $\sin x\sin y$.

Q41. Find the value of $\sin\frac{\pi}{8}$ and $\cos\frac{\pi}{8}$.

Q42. Find the most general value of θ satisfying the equations: $\sin\theta=-\frac{1}{2}$ and $\tan\theta=-\frac{1}{\sqrt{3}}$.

Q43. Find general solution of:

(a) $\cos 3\theta=-\frac{1}{2}$ (b) $\tan 3x=-1$ (c) $\tan\theta\tan 2\theta=1$

Q44. Solve the following equations:

(a) $2\tan^2 x+\sec^2 x=2\ ;\ 0\le x\le 2\pi$ (b) $\sin 2\theta+\sin 4\theta+\sin 6\theta=0$

(c) $\cot^2\theta+\frac{3}{\sin\theta}+3=0$ (d) $\tan^2\theta+\left(1-\sqrt{3}\right)\tan\theta-\sqrt{3}=0$

(e) $\tan\theta+\tan 2\theta+\tan\theta\tan 2\theta=1$ (f) $\sqrt{3}\cos\theta+\sin\theta=\sqrt{2}$

(g) $\cot\theta+\operatorname{cosec}\theta=\sqrt{3}$ (h) $\sin^2\theta-\cos\theta=\frac{1}{4}$

(i) $2\sin^2 x+\sqrt{3}\cos x+1=0$ (j) $\cos\theta+\cos 2\theta+\cos 3\theta=0$

Q45. Solve the following trigonometric equations:

(a) $\sin 3x+\cos 2x=0$ (b) $3\tan x+\cot x=5\cos ecx$

(c) $2\tan x-\cot x+1=0$ (d) $\cos 3x+\cos x=\cos 4x+\cos 2x$

Q46. (a)What is the minimum value of $3\cos x+4\sin x+8$.

(b) If $\sin x+\cos x=1$, what is the value of $\sin 2x$.

Q47. Draw the graph of: (*i*) $3\sin x$ (*ii*) $\sin 2x$ (*iii*) $-\cos x$ (*iv*) $3\cos 2x$

Q48. The angles of a ΔABC are in A.P. and it is being given that $b:c=\sqrt{3}:\sqrt{2}$, find $\angle A$.

Q49. In ΔABC, if $a=3,b=5,c=7$, find $\cos A,\cos B,\cos C$.

Q50. In ΔABC, if $a=\sqrt{2},b=\sqrt{3},c=\sqrt{5}$, show that its area is $\frac{\sqrt{6}}{2}$ square units.

Answers

1. (a) 24^0 (b) $22^0 30'$ (c) 324^0 (d) -150^0
2. (a) $\left(\frac{17\pi}{9}\right)^c$ (b) $\left(\frac{5\pi}{12}\right)^c$ (c) $-\left(\frac{5\pi}{24}\right)^c$ (d) $\left(\frac{26\pi}{9}\right)^c$
3. (a) $\left(\frac{3\pi}{5}\right)^c$; 108^0 (b) $\left(\frac{3\pi}{4}\right)^c$; 135^0 (c) $\left(\frac{5\pi}{7}\right)^c$; $128^0 34' 17''$ (d) $\left(\frac{5\pi}{6}\right)^c$; 150^0
4. $50^0, 40^0$ 5. $\frac{\pi}{9}, \frac{\pi}{3}, \frac{5\pi}{9}$ 6. $\frac{\pi}{6}, \frac{\pi}{3}, \frac{\pi}{2}$ 7. 10 , 8 8. $(\pi-2)$ radians

9. 33 cm 10. (a) 75^0 (b) $\left(\frac{13\pi}{18}\right)^c$ 11. $\cos ec\theta=\frac{13}{5}, \tan\theta=-\frac{5}{12}, \sin\theta=\frac{5}{13}$

$, \cos\theta=-\frac{12}{13}, \sec\theta=-\frac{13}{12}$ 12. (a) $-\frac{\sqrt{3}}{2}$ (b) 0 (c) $-\frac{1}{\sqrt{3}}$ (d) $\frac{1}{\sqrt{2}}$

(e) -1 (f) 1 (g) $-\frac{\sqrt{3}}{2}$ (h) $\frac{1}{2}$ (i) $-\frac{2}{\sqrt{3}}$ (j) -1

14. (a) $\frac{\sqrt{3}}{2}$ (b) $-\frac{\sqrt{3}+1}{2\sqrt{2}}$ 15. $\frac{2}{11}$ 16. $\frac{33}{65}, -\frac{16}{65}$ 18. (e) $a=\pm 1$

19. (a) positive (b)(i) $2\sin\left(\theta+\frac{\pi}{6}\right)$ (ii) $2\cos\left(\theta-\frac{\pi}{3}\right)$

25. $\sin\theta=\frac{15}{17}$, $\cos\theta=\frac{8}{17}$, $\sec\theta=\frac{17}{8}$, $\tan\theta=\frac{15}{8}$ 26. Third 27. $R=2, \theta=\frac{\pi}{6}$

28. $x=30^0, 150^0, 210^0$ and 330^0 29. $-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$ 34. Maximum : $\sqrt{2}$ and minimum : $-\sqrt{2}$

39. $\frac{24}{25}, \frac{7}{25}, \frac{24}{7}, \frac{336}{625}$ 40. (a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ and $\frac{1}{2}$ 41. $\sqrt{\frac{\sqrt{2}-1}{2\sqrt{2}}}, \sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}$

42. $2n\pi+\frac{11\pi}{6}$, n is any integer 43. (a) $\theta=\frac{2n\pi}{3}\pm\frac{2\pi}{9}$; $n\in Z$ (b) $x=\frac{n\pi}{3}-\frac{\pi}{12}$; $n\in Z$

(c) $\theta=n\pi-\frac{\pi}{4}$ or $n\pi+\alpha$ where $\tan\alpha=\frac{1}{2}$ 44. (a) $\frac{\pi}{6},\frac{5\pi}{6},\frac{7\pi}{6},\frac{11\pi}{6}$

(b) $\theta=\frac{n\pi}{4}$ or $m\pi\pm\frac{\pi}{3}$ where $m,n\in Z$ (c) $\theta=n\pi+(-1)^{n+1}\frac{\pi}{6}$ or $m\pi+(-1)^{m+1}\frac{\pi}{2}$; $m,n\in Z$

(d) $\theta=n\pi-\frac{\pi}{4}$ or $m\pi+\frac{\pi}{3}$; $m,n\in Z$ (e) $\theta=\frac{n\pi}{3}+\frac{\pi}{12}$; $n\in Z$ (f) $\theta=2n\pi+\frac{5\pi}{12}$ or $2n\pi-\frac{\pi}{12}$; $n\in Z$

(g) $\theta=2n\pi+\frac{\pi}{3}$; $n\in Z$ (h) $\theta=2n\pi\pm\frac{\pi}{3}$; $n\in Z$ (i) $\theta=2n\pi\pm\frac{5\pi}{6}$; $n\in Z$

(j) $\theta=(2n+1)\frac{\pi}{4}$ or $2n\pi\pm\frac{2\pi}{3}$; $n\in Z$

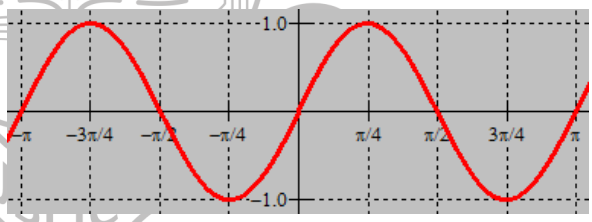
45. (a) $x=2n\pi-\frac{\pi}{2}$ or $x=\frac{2n\pi}{5}-\frac{\pi}{10}$ (b) $\theta=2n\pi\pm\frac{\pi}{3}$

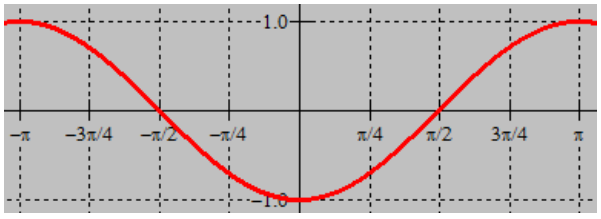
(c) $x=n\pi+\frac{3\pi}{4}$ or $x=m\pi+\alpha$, $\tan\alpha=\frac{1}{2}$ (d) $x=2n\pi$, $\frac{2m\pi}{5}$ or $(2p+1)\frac{\pi}{2}$

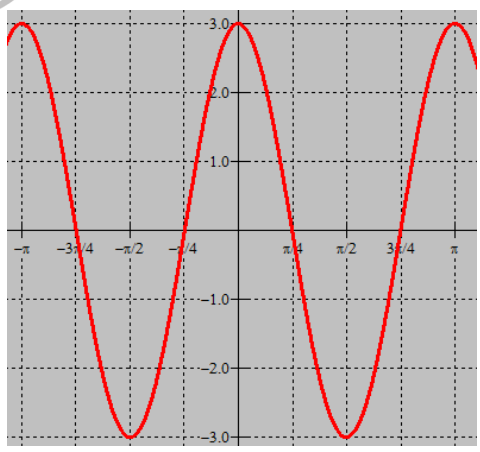
46. (a)3 (b) 0

47.

(i) 

(ii) 

(iii) 

(iv) 

48. 75^0 49. $\frac{13}{14},\frac{11}{14},-\frac{1}{2}$