

# TRIGONOMETRY

1.  $(1 + \tan^2 \theta)(1 + \sin \theta)(1 - \sin \theta)$

2.  $(1 + \cot^2 \theta)(1 - \cos \theta)(1 + \cos \theta)$

3. If  $x = a \cos^3 \theta$ ;  $y = b \sin^3 \theta$

Find  $\left(\frac{x}{a}\right)^{\frac{2}{3}} + \left(\frac{y}{b}\right)^{\frac{2}{3}} = ?$

4.  $\cos A + \cos^2 A = 1$

Find  $\sin^2 A + \sin^4 A = ?$

5.  $\cos A + \cos^2 A = 1$

Find  $\sin^{12} A + 3\sin^{10} A + 3\sin^8 A + \sin^6 A - 1$

6.  $\cos^2 A + \cos^4 A = 1$

Find  $\tan^2 A + \tan^4 A = ?$

7.  $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x) = ?$

8.  $x^n = \cos^n \theta + \sin^n \theta$

Find  $2x_6 - 3x_4 + 1 = ?$

9.  $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta \neq 0$

and  $x \sin \theta - y \cos \theta = 0$

Find  $x^2 + y^2 = ?$

10.  $r \sin \theta = 1$ ;  $r \cos \theta = \sqrt{3}$

Find  $\sqrt{3} \tan \theta + 1 = ?$

11. If  $\alpha + \beta = 30^\circ$

Find  $(\sqrt{3} + \tan \alpha)(\sqrt{3} + \tan \beta) = ?$

12.  $A + B = 45^\circ$

$\tan A + \tan B + \tan A + \tan B - 1 = ?$

13. Solve it

$\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8\theta}}}$

(a)  $\sin \theta$

(b)  $\cos \theta$

(c)  $\tan \theta$

(d)  $2 \cos \theta$

14.  $\operatorname{cosec} \theta - \sin \theta = l$

$\sec \theta - \cos \theta = m$

Find  $l^2 m^2 (l^2 + m^2 + 3) = ?$

15. If  $\cos^4 \theta - \sin^4 \theta = \frac{2}{13}$

Find  $\cos^2 \theta - \sin^2 \theta + 1$

16.  $5 \sin^2 \theta + 3 \cos^2 \theta = 4$

Find  $\sin \theta = ?$

17.  $\sin^4 \theta + \sin^2 \theta \cos^2 \theta + 4 + \cos^2 \theta = ?$

18.  $p \sin x = q$

Find  $\sqrt{p^2 - q^2} \tan x = ?$

(a)  $p$

(b)  $pq$

(c)  $q$

(d)  $p/q$

19.  $\sin 17^\circ = \frac{x}{y}$

Find  $\sec 17^\circ - \sin 73^\circ$

20.  $\sec \theta - \tan \theta = 2$

Find  $\sec \theta = ?$

21.  $\sec^2 \theta + \tan^2 \theta = 7$

Find  $\theta = ?$

22.  $\sec^2 \theta + \tan^2 \theta = \frac{7}{12}$

Find  $\sec^4 \theta - \tan^4 \theta$

23.  $\operatorname{cosec} \theta + \cos \theta = 3$

Find  $\operatorname{cosec} \theta = ?$

24.  $\operatorname{cosec}^2 \theta + 2 \cot^2 \theta = 10$

Find  $\sin \theta + \cos \theta = ?$

25. If  $\sin(x + y) = \cos[3(x + y)]$

Find  $\tan[2(x + y)] = ?$

26. If  $\sin 5\theta = \cos 20^\circ$

Find  $\theta = ?$

27.  $\sin 3A = \cos(A - 26^\circ)$

Find  $\angle A = ?$

28.  $\sin \alpha \sec (30 + \alpha) = 1$

Find  $\sin \alpha + \cos^2 \alpha$

29.  $\frac{\cos 80}{\sin 10^\circ} \cos 59 \operatorname{cosec} 31^\circ + 1$

30. If  $\tan 2\theta \tan 3\theta = 0$

Find  $(2 \cos^2 \frac{5\theta}{2} - 1) = ?$

31.  $\tan (x + y) \tan (x - y) = 1$

Find  $\tan \frac{2x}{3} = ?$

32.  $\sin 10 + \sin 20 + \dots + \sin 350$

33.  $\cot 18^\circ [\cos^2 68 \cot 72 + \frac{1}{\sec^2 22 \tan 72^\circ}]$

34.  $\sin^2 1 + \sin^2 5 + \dots + \sin^2 90$

35.  $\sin^2 10 + \sin^2 20 + \dots + \sin^2 80$

36.  $\cos^2 1 + \cos^2 3 + \dots + \cos^2 89$

37.  $\sin (x + y) \sec (x - y) = 1$

Find  $\tan^2 x + \sin^2 x + \sec^2 x = ?$

38.  $\tan 15^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 75^\circ$

39.  $K = (1 - \sin \alpha)(1 - \sin \beta)(1 - \sin \gamma)$   
 $= (1 + \sin \alpha)(1 + \sin \beta)(1 + \sin \gamma)$

40.  $p \sin \theta + 2 \cos \theta = 3$

and  $q \sin \theta - p \cos \theta = 2$

Find  $p^2 + q^2 = ?$

41.  $3 \sin \theta + 5 \cos \theta = 3$

then  $5 \sin \theta - 3 \cos \theta = ?$

42.  $\sin \theta + \cos \theta = \sqrt{2} \sin \theta$

$\sin \theta - \cos \theta = ?$

43.  $\sin \theta + \cos \theta = \frac{17}{13}$

$\sin \theta - \cos \theta = ?$

44.  $\frac{\sin \theta}{x} = \frac{\cos \theta}{y}$

then find  $\sin \theta - \cos \theta$

(a)  $x - y$

(b)  $x + y$

(c)  $\frac{x - y}{\sqrt{x^2 + y^2}}$

(d)  $\frac{x - y}{\sqrt{x^2 - y^2}}$

45.  $A + B + C = 180^\circ$

Find  $\tan A + \tan B + \tan C$

(a)  $\sin A \sin B \sin C$

(b)  $\cos A \cos B \cos C$

(c)  $\tan A \tan B \tan C$

(d) None

46.  $\tan 20^\circ + \tan 72^\circ + \tan 88^\circ$

47.  $\sin 20 \sin 40 \sin 60 \sin 80$

48.  $1 - \sin 10 \sin 50 \sin 70$

49.  $\cos 12 \cos 24 \cos 36 \cos 48 \cos 60 \cos 72 \cos 84$

If  $\cos 36 = \frac{\sqrt{5} + 1}{4}$  ;  $\frac{\sqrt{5} - 1}{4}$

50.  $\frac{x}{a} \sin + \frac{y}{b} \cos = \frac{1}{2}$

Find  $\frac{y}{b} \sin \theta - \frac{x}{a} \cos \theta = ?$

51.  $3 \sin \theta + 4 \cos \theta = 5$

Find  $\tan \theta = ?$

52.  $(a^2 - b^2) \sin \theta + 2ab \cos \theta = a^2 + b^2$

Find  $\tan \theta = ?$

53.  $x \sin \theta - y \cos \theta = \sqrt{x^2 + y^2}$

$\frac{\cos^2 \theta}{a^2} + \frac{\sin^2 \theta}{b^2} - \frac{1}{x^2 + y^2}$

(a)  $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

(b)  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

(c)  $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$

(d)  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

54. In  $\triangle XYZ$ ;  $\angle Y = 90^\circ$  and  $XZ - TZ = 2$

$XY = 2\sqrt{6}$  Find  $\sec R = \tan R = ?$

55. In  $\triangle PQR$ ;  $\angle Q = 90^\circ$

$PQ - QR = 2$ ;  $AC = 2\sqrt{5}$

$\cos^2 A - \cos^2 C = ?$

56. Find maximum & minimum

$15 \sin^2 \theta + 10 \cos^2 \theta$

57.  $(1 + \operatorname{cosec} \theta + \tan \theta) \times (1 - \sec \theta + \tan \theta)$
58. Find maximum & minimum  
 $\sin^6 \theta + \cos^6 \theta$
59. Find maximum & minimum  
 $\sin^4 \theta + \cos^4 \theta$
60. Find maximum & minimum  
 $\sin^2 \theta + \cos^4 \theta$
61. Find maximum & minimum  
 $5 \sin \theta + 4 \cos \theta$
62. Find maximum & minimum  
 $12 \sin^2 \theta + 17 \cos^2 \theta$
63.  $8 \sin \theta + 15 \cos \theta$   
 maximum & minimum
64.  $27^{\sin x} \times 81^{\cos x}$   
 maximum & minimum
65. Find max. value of  
 (a)  $\sin^8 \theta + \cos^{14} \theta$   
 (b)  $\sin^{88} \theta + \cos^{114} \theta$
66. Find maximum & minimum  
 (a)  $\sin \theta + \cos \theta$   
 (b)  $\sin\left(\frac{\theta + \pi}{6}\right) + \cos\left(\frac{\theta + \pi}{6}\right)$
67. Find min. value  
 $9 \tan^2 \theta + 25 \cos^2 \theta$
68. Find min. value  
 $4 \sin^2 \theta + 10 \operatorname{cosec}^2 \theta$
69. Find min. value  
 $\sin^2 \theta + \operatorname{cosec}^2 \theta + \cos^2 \theta + \sec^2 \theta + \tan^2 \theta + \cot^2 \theta$
70. Find maximum & minimum  
 $\sin \theta + \cos \theta$
71. In  $\triangle ABC$ ,  $\angle A = 90^\circ$   
 Find (1)  $\sin^2 A + \sin^2 B + \sin^2 C$   
 (2)  $\cos^2 A + \cos^2 B + \cos^2 C$
72. If  $2(\sin^6 \theta + \cos^6 \theta) - t(\sin^4 \theta + \cos^4 \theta) + 1 = 0$   
 Find  $t = ?$
73.  $\triangle ABC$ ,  $\angle A = 90^\circ$   $AD \perp BC$   $AD = 4$  cm,  $BC = 12$  cm  
 Find  $\cot B + \cot C = ?$
74. In  $\triangle ABC$ ,  $\angle A = 30^\circ$ ,  $\angle B = 60^\circ$   
 Find ratio of  $AB : BC : CA$
75. In  $\triangle ABC$ ,  $\angle B = 60^\circ$ ,  $AB : AC = \sqrt{2} : \sqrt{3}$   
 Find  $\angle A$  &  $\angle C = ?$
76. In  $\triangle ABC$ ,  $BC = 4$  cm,  $CA = 12$  cm,  $\angle ABC = 30^\circ$   
 Find  $\sin A = ?$
77. In  $\triangle ABC$ ,  $D$  is a point on  $BC$  and  $BD : DC = 1 : 3$ .  
 If  $\angle B = 30^\circ$ ,  $\angle C = 45^\circ$   
 Find  $\frac{\sin \angle BAD}{\sin \angle CAD} = ?$
78.  $\frac{\sin(270 + \theta) \cos(360 + \theta) \tan(170 + \theta)}{\cos(180 + \theta) \sin(270 - \theta) \cot(260 + \theta)} = ?$
79.  $\cos 10 - \sin 10$   
 (a) the (b) -ue  
 (c) 0 (d) 1
80. If  $\tan 2\theta \tan 4\theta = 1$   
 Find  $\sin 2\theta + \cos 4\theta = ?$
81.  $\sin(x + y) \sec(x - y) = 1$   
 Find  $\tan^2 x + \sin^2 x + \sec^2 x = ?$
82.  $\cos(2\alpha + 10) \operatorname{cosec}(\alpha - 40) = 1$   
 Find  $\alpha = ?$
83.  $\frac{\cos \alpha}{\cos \beta} = m$  and  $\frac{\cos \alpha}{\sin \beta} = n$   
 Find  $(m^2 + n^2) \cos^2 \beta = ?$
84.  $\frac{\cos \alpha}{\cos \beta} = m$  and  $\frac{\sin \alpha}{\sin \beta} = n$   
 Find  $(m^2 - n^2) \cos^2 \beta = ?$
85. If  $\tan \alpha = n \tan \beta$  and  $\sin \alpha = m \sin \beta$   
 Find  $\cos^2 \alpha = ?$
86.  $a \sin \theta + b \cos \theta = c$   
 Find  $a \cos \theta - b \sin \theta = ?$
87.  $3 \sin \theta + 5 \cos \theta = 3$  then  $5 \sin \theta - 3 \cos \theta = ?$

88.  $\sin \theta - \cos \theta = \frac{7}{17}$

Find  $\sin \theta + \cos \theta = ?$

89.  $10 \sin^4 \alpha + 15 \cos^4 \alpha = 6$

Find  $27 \operatorname{cosec}^6 \alpha + 8 \sec^6 \alpha = ?$

90. If  $\sin^3 \alpha + 20 \cos^3 \alpha = 12$

Find  $10 \sin \alpha + 15 \cos \alpha = ?$

91. If  $\sin + \sin^2 \theta + \sin^3 \theta = 1$

Find  $\cos^6 \theta + 8 \cos^2 \theta - 4 \cos^4 \theta = ?$

92.  $\sec^2 \theta + \tan^2 \theta = 7$

Find  $\sin \theta = ?$

93.  $2 \sec^2 \theta + \tan^2 \theta = 17$

Find  $\cot \theta = ?$

94.  $\tan 2 + \cot 2 = 14$

Find  $\sec \theta \cdot \operatorname{cosec} \theta = ?$

95. Find maximum & minimum value of

$$5 \cos \theta + 3 \cos \left( \theta + \frac{\pi}{3} \right) + 3$$

96.  $\frac{\sin 39}{\cos 51} + 2 \tan 11 \tan 31 \tan 45 \tan 59 \tan 79 - 3(\sin^2 21 + \sin^2 69) = ?$

97.  $\tan(A+B) = \frac{1}{2}, \tan(A-B) = \frac{1}{3}$

Find  $\tan 2A = ?$

98.  $\tan(A+2B) = \frac{1}{2}, \tan 2(A-B) = \frac{1}{3}$

Find  $\angle A = ?$

99.  $\sin(x+y) = 1, \tan(x-y) = \frac{1}{\sqrt{3}}$

Find  $\sin x + \tan y = ?$

100. Find maximum & minimum

$$\sin^2 \theta + \cos^2 \theta$$