MATHS

BOOKS - NAGEEN PRAKASHAN ENGLISH

TRIGNOMETRIC FUNCTIONS

SOLVED EXAMPLES

1. Convert 60° angle into radian.

Watch Video Solution

2. Convert $40^\circ, 20'$ into radians.

Watch Video Solution

3. Convert 11 radian into degree.

Watch Video Solution

4. Convert 6 radian into degree.

Watch Video Solution

5. The radius of a circle is 50 cm. Find the angle subtends by an arc of 22 cm length at the centerof the circle.

Watch Video Solution

6. A chord of a circle of diameter 30 cm is of length 15 cm. Find the length of mirror arc corresponding to this chord.

Watch Video Solution

7. Find the angle between the large hand and small hand of a clock at the time $4:30$.

Watch Video Solution

8. If $\tan A = \frac{a}{b}$, then find the value of $\frac{a \sin A - b \cos A}{a \sin A + b \cos A}$.

Watch Video Solution

9. If $s \in x + \cos ec\, x = 2$, then write the value of $\sin^n x + \cos ec^n x$.

Watch Video Solution

10. Prove the following identities:

$\sin^8 \theta + \cos^8 \theta = \left(\sin^2 \theta - \cos^2 \theta\right)\left(1 - 2\sin^2 \theta \cos^2 \theta\right)$

Watch Video Solution

11. Prove that : $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\text{cosec}\theta$

Watch Video Solution

12. Prove that:

$$\frac{\tan A+\sec A-1}{\tan A-\sec A+1}=\frac{\cos A}{1-\sin A}$$

Watch Video Solution

13. If $p=\frac{\sin A}{\sin B}$ and $q=\frac{\cos A}{\cos B}$

Watch Video Solution

14. If $\frac{\sin^4\theta}{a}+\frac{\cos^4\theta}{b}=\frac{1}{a+b}$, prove that $\frac{\sin^8\theta}{a^3}+\frac{\cos^4\theta}{b^3}=\frac{1}{(a+b)^3}$ $\frac{\sin^{4n}\theta}{a^{2n-1}}+\frac{\cos^{4n}\theta}{b^{2n-1}}=\frac{1}{(a+b)^{2n-1}}, n\in N$

Watch Video Solution

15. If $\frac{\cos^4 A}{\cos^2 B} + \frac{\sin^4 A}{\sin^2 B} = 1$ then prove that $\frac{\cos^4 B}{\cos^2 A} + \frac{\sin^4 B}{\sin^2 A} = 1$

Watch Video Solution

16. If $\cot A = \frac{5}{12}$ and A lies in 3rd quadrant, then find the values of five other trignometric ratios.

Watch Video Solution

17. If $\sin A = -\frac{4}{5}$ and $\pi < A < \frac{3\pi}{2}$, find the value of $\frac{\cos ecA + \cot A}{\sec A - \tan A}$

Watch Video Solution

18. If $\sin A + \cos A = 0$ and A lies in 4th quadrant, find the values of $\sin A$ and $\cos A$.

Watch Video Solution

19. Prove that: $\sqrt{\frac{1-\sin A}{1+\sin A}} = \begin{cases} \sec A - \tan A & \text{if } -\frac{\pi}{2} < A < \frac{\pi}{2} \\ \tan A - \sec A & \text{if } \frac{\pi}{2} < A < \frac{3\pi}{2} \end{cases}$

Watch Video Solution

20. Find the values of of the following:

i) $\cos 135^\circ$

ii) $\sin(-780^\circ)$

iii) $\text{cosec} 1920^\circ$

Watch Video Solution

21. Find the values of the following :

i) $\frac{\tan(19\pi)}{3}$

ii) $\frac{\sec(-22\pi)}{3}$

Watch Video Solution

22. Evaluate: $\text{cosec}(-1410)^\circ$

Watch Video Solution

23. Find the value of $\tan \frac{13\pi}{12}$.

Watch Video Solution

24. Prove that:

i) $\sin 40^\circ \cos 50^\circ + \cos 40^\circ \sin 50^\circ = 1$

ii) $\cot(270^\circ - \theta)\cot(270^\circ + \theta)(\cot(540^\circ - \theta)\cot(540^\circ + \theta) = 1$

iii) $\frac{\cos \pi}{8} + \frac{\cos(3\pi)}{8} + \frac{\cos(5\pi)}{8} + \frac{\cos(7\pi)}{8} = 0$

Watch Video Solution

25. If A,B,C and D are the angles of cyclic quadrilateral, prove that:

i) $\cos A + \cos B + \cos C + \cos D$= 0

ii) $\cos(180^\circ - A) + \cos(180^\circ + B) + \cos(180^\circ + C) - \sin(90^\circ + D)$=

0

Watch Video Solution

26. Prove that:

$\sin(-420^0)(\cos 390^0) + \cos(-660^0)(\sin 330^0) = -1.$

Watch Video Solution

27. Find the values of $\sin 75^\circ$.

Watch Video Solution

28. Prove that:

$\cos(30^\circ - x) - \cos(30^\circ + x) = \sin x$

Watch Video Solution

29. If $\sin A = \frac{3}{5}, \cos B = -\frac{12}{13}$, where $A \in \left(0, \frac{\pi}{2}\right) B \in \left(\pi, \frac{3\pi}{2}\right)$,then evaluate the following:

$i) \sin(A - B)$

$ii) \cos(A - B)$

$iii) \tan(A + B)$

Watch Video Solution

30. Prove that:

$s \in (n+1)xs \in (n+2)x + \cos(n+1)x \cos(n+2)x = \cos x$

Watch Video Solution

31. If $\alpha and \beta$ are acute angles such that $tan\alpha = \frac{m}{m+1} and tan\beta = \frac{1}{2m+1}$, prove that $\alpha + \beta = \frac{\pi}{4}$.

Watch Video Solution

32. $0 < A, B < \frac{\pi}{4}, \cos(A+B) = \frac{4}{5}, \sin(A-B) = \frac{5}{13} \Rightarrow \tan 2A =$

Watch Video Solution

33. Prove that:

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

Watch Video Solution

34. $\cos A + \cos(120^\circ + A) + \cos(120^\circ - A) =$

Watch Video Solution

35. Prove that $\cos^2\left(\frac{\pi}{8} - \frac{A}{2}\right) - \cos^2\left(\frac{\pi}{8} + \frac{A}{2}\right) = \sin\left(\frac{\pi}{4}\right).\sin A = \frac{1}{\sqrt{2}}\sin A$

Watch Video Solution

36. Prove that:

$\tan 7A - \tan 5A - \tan 2A = \tan 7A \tan 5A \tan 2A$

Watch Video Solution

37. Prove that: $tan70^0 = tan20^0 + 2tan50^0$.

Watch Video Solution

38. Prove that $\tan 56^\circ = \dfrac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$

Watch Video Solution

39. If $\dfrac{\sin(x+y)}{\sin(x-y)} = \dfrac{a+b}{a-b}$, then show that $\dfrac{\tan x}{\tan y} = \dfrac{a}{b}$.

Watch Video Solution

40. If $A + B = \frac{\pi}{4}$, prove that:

$(1 + \tan A)(1 + \tan B) = 2$

Watch Video Solution

41. If $\tan\theta + \tan(60^\circ + \theta) + \tan(120^\circ + \theta) = 3$, Prove that:

$\frac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta} = 1$

Watch Video Solution

42. Prove that: $\frac{\sin(A - B)}{\sin A \sin B}$, = cotB - cotA`

Watch Video Solution

43. Prove that:

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

Watch Video Solution

44. Prove that:

$\cot A \cot 2A - \cot 2A \cot 3A - \cot 3A \cot A = 1$

Watch Video Solution

45. Prove that:

$\cot 2A + \tan A = \cot A - \cot 2A$

Watch Video Solution

46. Prove the following that:

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

Watch Video Solution

47. If $\tan A = x \tan B$, prove that:

$(x+1)\sin(A-B) = (x-1)\sin(A+B)$

Watch Video Solution

48. If $\alpha and \beta$ are the solutions of the equation $a\tan\theta + b\sec\theta = c,$ then show that $\tan(\alpha+\beta) = \dfrac{2ac}{a^2-c^2}$

Watch Video Solution

49. If $\sin A + \sin B = a$ and $\cos A + \cos B = b$ then prove that $\sin(A+B) = \dfrac{2ab}{a^2+b^2}$ and $\cos(A+B) = \dfrac{b^2-a^2}{a^2+b^2}$

Watch Video Solution

50. Express each of the following as a sum of difference of sine and cosine.

i) $2\sin 2A\cos A$

ii) $2\cos 5A\sin 2A$

iii) $2\cos 4A\cos A$

iv) $2\sin 3A\sin A$

Watch Video Solution

51. Find the value of

$$\sin 37\left(\frac{1}{2}\right)^{\circ}.\sin 7\left(\frac{1}{2}\right)^{\circ}$$

Watch Video Solution

52. Prove that:

$$\sin(45^{\circ}-A)\sin(45+A)=\frac{1}{2}\cos 2A$$

Watch Video Solution

53. Prove that:

$\sec(45^\circ + A)\sec(45^\circ - A) = 2\sec 2A$

Watch Video Solution

54. Prove that:

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

Watch Video Solution

55. Prove that $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$

Watch Video Solution

56. Prove that:

$\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$

Watch Video Solution

57. Prove that:

$$\sin(A+2B)\sin A-\sin B\sin(2A+B)\sin B=\sin(A+B)\sin(A-B)$$

Watch Video Solution

58. Prove that:

$$\cos 175^\circ+\cos 65^\circ+\cos 55^\circ=0$$

Watch Video Solution

59. Prove that:

$$\cos\left(\frac{\pi}{10}\right)-\sin\left(\frac{\pi}{10}\right)=\sqrt{2}\sin\left(\frac{3\pi}{20}\right)$$

Watch Video Solution

60. Prove that:

$$\frac{\cos(60^\circ - A) + \sin(30^\circ - A)}{\cos(30^\circ - A) - \sin(60^\circ - A)} = \cot A$$

Watch Video Solution

61. Prove that:

$$\frac{\cos 7A + \cos 5A}{\sin 7A - \sin 5A} = \cot A$$

Watch Video Solution

62. Prove that:

$$\frac{\cos 5A + \cos 3A + \cos A}{\sin 5A - \sin 3A + \sin A} = \cot A$$

Watch Video Solution

63. Prove that:

$$\frac{\sin(A - C) + 2\sin A + \sin(A + C)}{\sin(B - C) + 2\sin B + \sin(B + C)} = \frac{\sin A}{\sin B}$$

Watch Video Solution

64. Prove that:

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

Watch Video Solution

65. Prove that:

$$\frac{\sin 3A \cos 4A - \sin A \cos 2A}{\sin 4A \sin A + \cos 6A \cos A} = \tan 2A$$

Watch Video Solution

66. Prove that:

$$\frac{\sin 7A + \sin 5A + \sin 9A + \sin 3A}{\cos 3A + \cos 5A + \cos 7A + \cos 9A} = \tan 6A$$

Watch Video Solution

67. If n. $\sin(A+2B)=\sin A$, then prove that: $\tan(A+B)=\frac{1+n}{1-n}.\tan B$

Watch Video Solution

68. If $\cos A=\frac{24}{25}$, evaluate the following, given that $0<A<\frac{\pi}{2}$.

i) sin2A

ii) cos 2A

iii) tan 2A

Watch Video Solution

69. If $\sin A=-\frac{4}{5}$ and A lies in 3rd quadrant, find the values of (i) $\sin 2A$ ii) $\cos 2A$.

Watch Video Solution

70. Find the value of $\cos 15^\circ$ with the help of $\cos 2A = 2\cos^2 A - 1$

Watch Video Solution

71. Prove that: $\frac{\sin 2A}{1+\cos 2A} = \tan A$

Watch Video Solution

72. Prove that :

$\cos^2 A + \cos^2\left(A + \frac{\pi}{3}\right) + \cos^2\left(A - \frac{\pi}{3}\right) = 3/2$

`

Watch Video Solution

73. Prove that:

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

Watch Video Solution

74. Prove that:

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

Watch Video Solution

75. Prove that $\frac{\sin 5x-2\sin 3x+\sin x}{\cos 5x-\cos x}=\tan x$

Watch Video Solution

76. Prove that:

$$\frac{\cot A}{2}-\frac{\tan A}{2}=\frac{\frac{\cos A}{2}}{\frac{\sin A}{2}}-\frac{\frac{\sin A}{2}}{\frac{\cos A}{2}}$$

$$=\frac{\frac{\cos^2 A}{2}-\frac{\sin^2 A}{2}}{\frac{\sin A}{2}\frac{\cos A}{2}}$$

$$=\frac{\cos A}{\frac{1}{2}\cdot\left(2\frac{\sin A}{2}\frac{\cos A}{2}\right)}$$

$$=\frac{2\cos A}{\sin A}=2\cot A=\text{RHS. Hence Proved.}$$

Watch Video Solution

77. Prove that:

$$\frac{1+\sin 2A}{1-\sin 2A} = \tan^2\left(\frac{\pi}{4}+A\right)$$

Watch Video Solution

78. Prove that: $\frac{\cos^4 \pi}{8} + \frac{\cos^4(3\pi)}{8} + \frac{\cos^4(5\pi)}{8} + \frac{\cos^4(7\pi)}{8} = \frac{3}{2}$

Watch Video Solution

79. Determine the smallest positive value of x (in degrees) for which

$\tan(x+100^\circ) = \tan(x+50^\circ)\tan x \tan(x-50^\circ)$

Watch Video Solution

80. Prove that:

$\sin 5A = 5\sin A - 20\sin^3 A + 16\sin^5 A$

Watch Video Solution

81. Prove that:

$$\frac{\cos^3 A - \cos 3A}{\cos A} + \frac{\sin^3 A + \sin 3A}{\sin A} = 3$$

Watch Video Solution

82. The value of $\cos^2 48^0 - \sin^2 12^0$ is $\frac{\sqrt{5}+1}{8}$ (b) $\frac{\sqrt{5}-1}{8}$ (c) $\frac{\sqrt{5}+1}{5}$ (d) $\frac{\sqrt{5}+1}{2\sqrt{2}}$

Watch Video Solution

83. Without using tables, prove that $\left(\sin 12^0\right)\left(\sin 48^0\right)\left(\sin 54^0\right) = \frac{1}{8}$

Watch Video Solution

84. Prove that $\sin 6^0 \sin 42^0 \sin 66^0 \sin 78^0 - \frac{1}{16}$

Watch Video Solution

Watch Video Solution

85. In ΔABC, prove that:

$$\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$$

Watch Video Solution

86. In ΔABC, prove that:

$$\cos 2A + \cos 2B - \cos 2C = 1 - 4 \sin A \sin B \cos C$$

Watch Video Solution

87. In ΔABC, prove that:

$$\sin A + \sin B - \sin C = 4 \frac{\sin A}{2} \frac{\sin B}{2} \frac{\cos C}{2}$$

Watch Video Solution

88. If A+B+C = π, prove that :

$$\cos A + \cos B + \cos C = 1 + 4\frac{\sin A}{2}\frac{\sin B}{2}\frac{\sin C}{2}.$$

Watch Video Solution

89. In ΔABC, prove that:

a) $$\sin\left(\frac{A}{2}\right) + \sin\left(\frac{B}{2}\right) + \sin\left(\frac{C}{2}\right) = 1 + 4\sin\left(\frac{\pi - A}{4}\right)\sin\left(\frac{\pi - B}{4}\right).\sin\left(\frac{\pi - C}{4}\right)$$

Watch Video Solution

90. If A+B+C=$\frac{\pi}{2}$,prove that:

$$\sin 2A - \sin 2B + \sin 2C = 4\sin A\cos B\sin C$$

Watch Video Solution

91. In ΔABC, prove that:

$$\sin^2 A + \sin^2 B + \sin^2 C = 2 + 2\cos A \cos B \cos C.$$

Watch Video Solution

92. If $A + B + C = 180^0$, prove that :

$$\cos^2\left(\frac{A}{2}\right) + \cos^2\left(\frac{B}{2}\right) - \cos^2\left(\frac{C}{2}\right) = 2\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$$

Watch Video Solution

93. In ΔABC,

$$\tan A + \tan B + \tan C = \tan A \tan B \tan C$$

Watch Video Solution

94. If $x + y + z = xyz$, prove by trignometry that:

$$\frac{2x}{1-x^2} + \frac{2y}{1-y^2} + \frac{2z}{1-z^2} = \frac{2x}{1-x^2} \cdot \frac{2y}{1-y^2} \cdot \frac{2z}{1-z^2}$$

Watch Video Solution

95. Find the general values of θ which satisfy the following equations:

i) $\sin\theta = \frac{1}{\sqrt{2}}$, ii) $\cos\theta = \frac{1}{2}$, (iii) $\tan\theta = \sqrt{3}$, iv) $\cot\theta = 1$, v) $\sec\theta = \frac{2}{\sqrt{3}}$, vi) $\text{cosec}\theta = \sqrt{2}$

Watch Video Solution

96. Find the general solutions from the following equations:

i) $\sin\theta = -\frac{1}{2}$

ii) $\cos = -\frac{\sqrt{3}}{2}$

iii) $\tan\theta = -\sqrt{3}$

Watch Video Solution

97. Find the general values of θ from the following equations:

i) $\sin^2\theta = \frac{3}{4}$

ii) $\cos^2\theta = \frac{1}{2}$

iii) $\tan^2\theta = \frac{1}{3}$

Watch Video Solution

98. Solve: $\sec 2\theta = \frac{2}{\sqrt{3}}$

Watch Video Solution

99. Solve: $\cos 2\theta = \cos^2\theta$

Watch Video Solution

100. Solve: $\tan^3\theta - 3\tan\theta = 0$

Watch Video Solution

101. Solve: $\cos 3\theta + 2\cos\theta = 0$

Watch Video Solution

102. Solve the equation $4\cos^2\theta + \sqrt{3} = 2\left(\sqrt{3}+1\right)\cos\theta.$

Watch Video Solution

103. Solve the equation

$\tan\theta - \cot\theta = \text{cosec}\theta$

Watch Video Solution

104. Solve:

$\cos^2\theta - \sin\theta\cos\theta - \frac{1}{2} = 0$

Watch Video Solution

105. Solve:

$\sin^2\theta + 2\cos\theta + \frac{1}{4} = 0$

Watch Video Solution

106. Solve:

$3\tan(\theta - 15^\circ) = \tan(\theta + 15^\circ)$

Watch Video Solution

107. Solve: $\sin 3\alpha = 4\sin\alpha.\sin(\theta+\alpha).\sin(\theta-\alpha)$ where $\alpha \neq n\pi, n \in I$

Watch Video Solution

108. Solve $\sec\theta - 1 = \left(\sqrt{2}-1\right)\tan\theta.$

Watch Video Solution

109. Solve: $\tan 5\theta = \tan 3\theta$

Watch Video Solution

110. Solve: $\tan 3\theta + \tan \theta = 0$

Watch Video Solution

111. Solve: $\cos 3\theta + \cos \theta = 0$

Watch Video Solution

112. Solve: $\sin 3\theta = \sin 2\theta$

Watch Video Solution

113. Find the general value of θ from the equation $\sin p\theta = \cos q\theta$.

Watch Video Solution

114. Find the general value of θ from the equation $\tan 4\theta = \cot 3\theta$.

Watch Video Solution

115. Solve: $\sin 3\theta + \cos 2\theta = 0$

Watch Video Solution

116. Solve $\tan 2x = -\cot\left(x + \frac{\pi}{3}\right)$

Watch Video Solution

117. Find the general value of θ from the equation $\cos\theta + \cos 2\theta + \cos 3\theta = 0.$

Watch Video Solution

118. Find the general value of θ from the equation $\sin\alpha + \sin(\alpha+\theta) + \sin(\alpha+2\theta) = 0.$

Watch Video Solution

119. Solve $\sin^2 n\theta - \sin^2(n-1)\theta = \sin^2\theta.$

Watch Video Solution

120. Solve:

$\sin 2\theta + \sin 4\theta = \cos\theta + \cos 3\theta$

Watch Video Solution

121. Find the general value of θ from the equation $\tan\theta + \tan 2\theta + \tan 3\theta = \tan\theta \cdot \tan 2\theta \cdot \tan 3\theta$.

Watch Video Solution

122. Find the general value of θ from the equation $\tan\theta + \tan 3\theta = 2\tan 2\theta$.

Watch Video Solution

123. Solve: $\cot\frac{\theta}{2} - \cot\theta = \cos ec\frac{\theta}{2}$

Watch Video Solution

124. Solve: $\cos 3x + \cos x - \cos 2x = 0$

Watch Video Solution

125. Find the general value of θ from the equaion $\sqrt{3}\sin\theta + \cos\theta = 1$

Watch Video Solution

126. Solve the equation $4\cos\theta + 5\sin\theta = 5$ if $\tan 51^\circ 21' = \frac{5}{4}$

Watch Video Solution

127. if $(1+\tan\theta)(1+\tan\phi) = 2$, find the general value of $(\theta+\phi)$

Watch Video Solution

128. Find the general value of θ from the equation $\sin\theta + \cos\theta = \sqrt{2}\cos A$.

Watch Video Solution

129. Find the general value of θ from the equation $\tan\theta - \sqrt{2}\sec\theta = 1$.

Watch Video Solution

130. In ΔABC, a=16, b=12 and $\angle B = 30^\circ$, find sinA.

Watch Video Solution

131. The angles of ΔABC are in A.P. If $a : b = \sqrt{2} : \sqrt{3}$, find the value of $\angle A$.

Watch Video Solution

132. The sides of a triangle ABC are in the ratio $3 : 4 : 5$. If the perimeter of triangle ABC is 60, then its lengths of sides are:

Watch Video Solution

133. In ΔABC, prove that: $b\sin B - c\sin C = a\sin(B - C)$

Watch Video Solution

134. In a ΔABC, if $\tan.\frac{A}{2} = \frac{5}{6}, \tan.\frac{B}{2} = \frac{20}{37}$, then which of the following is/are correct ?

Watch Video Solution

135. In ΔABC, prove that: $\frac{a-b}{c} = \frac{\frac{\sin(A-B)}{2}}{\frac{\cos C}{2}}$

Watch Video Solution

136. For any triangle ABC, prove that $\frac{a+b}{c} = \frac{\cos\left(\frac{A-B}{2}\right)}{\frac{\sin C}{2}}$

Watch Video Solution

137. In ΔABC, a=9,b=8 and c=4, prove that:

$$\cos B - 2\cos C = -\frac{4}{3}$$

Watch Video Solution

138. In ΔABC, a=7, b=5 and c=8, then find the value of cos2B.

Watch Video Solution

139. In ΔABC, prove that:

$$a(\cos C - \cos B) = 2(b-c)\frac{\cos^2 A}{2}$$

Watch Video Solution

140. In ΔABC, prove that:

$$(b+c)\frac{\cos(B+C)}{2} = a\frac{\cos(B-C)}{2}$$

Watch Video Solution

141. If the sides of ΔABC in the ratio $4:5:6$, prove that one angle is twice that of the other.

Watch Video Solution

142. If in triangle $ABC, \angle C = 60^\circ$, then prove that $\frac{1}{a+c} + \frac{1}{b+c} = \frac{3}{a+b+c}$

Watch Video Solution

143. In ΔABC, prove that:

$$\sin\left(A + \frac{B}{2}\right) \cdot \frac{\cos B}{2} = \frac{c+a}{a+b} \frac{\cos C}{2} \cdot \frac{\cos(A-B)}{2}$$

Watch Video Solution

144. In ΔABC, prove that:

$$\frac{b-c}{a} = \frac{\frac{\tan B}{2} - \frac{\tan C}{2}}{\frac{\tan B}{2} + \frac{\tan C}{2}}$$

Watch Video Solution

145. In any ABC, prove that: $a(b\cos C - \cos B) = b^2 - c^2$

Watch Video Solution

146. In any ΔABC, prove that

$a\sin(B-C) + b\sin(C-A) + c\sin(A-B) = 0$

Watch Video Solution

147. In a ΔABC, prove that :

$\tan A + \tan B + \tan C = \tan A \tan B \tan C$

Watch Video Solution

148. IN any ΔABC prove that if a^2, b^2 and c^2 are in AP, the cotA, cotB and cotC are also is AP.

Watch Video Solution

149. In ΔABC, $a = 2, b = \sqrt{6}$ and $c = \sqrt{3} + 1$, find $\angle A$.

Watch Video Solution

150. In ΔABC, prove that:

$$(b-c)^2 \frac{\cos^2 A}{2} + (b+c)^2 \frac{\sin^2 A}{2} = a^2$$

Watch Video Solution

151. Prove that:

$$\left(b^2 + c^2 - a^2\right)\tan A = \left(c^2 + a^2 - b^2\right)\tan B$$

Watch Video Solution

152. In any ΔABC, prove that

$$a^3\cos(B-C)+b^3\cos(C-A)+c^3\cos(A-B)=3abc$$

Watch Video Solution

153. In ΔABC, $a\frac{\cos^2 C}{2}+\text{os}^2\frac{A}{2}=\frac{3b}{2}$, then prove that the sides of ΔABC, are in A.P.

Watch Video Solution

154. In ΔABC, prove that:

$$\frac{c-b\cos A}{b-c(\cos A)}=\frac{\cos B}{\cos C}$$

Watch Video Solution

155. The angle of elevation of the highest point P of a vertical tower at point A on the horizontal ground is 45°. The height of tower is 'h'/ The angle of a elevation of the tower becomes 60° from B on moving a distance 'd' at 30° angle from the horizontal. Prove that: $d = h\left(\sqrt{3} - 1\right)$

Watch Video Solution

156. A lamp post is situated at the middle point M of the side AC of a triangular plot of ABC with $BC = 7m,\ CA = 8\,and\,AB = 9m.$ Lamp post subtends an angle of 15^0 at the point B. determine the height of the lamp post.

Watch Video Solution

157. Two ships move from a point at the same time. First ship moves at the speed of 24 km/hr at 45° angle from north to east and second ship moves at the speed of 32 km/hr at 75° angle from south to east. Find the distance between them after 3 hours.

Watch Video Solution

158. Two trees, A and B are on the same side of a river. From a point C in the river the distance of trees A and B are 25 m and 300 m respectively. If the angle C is 45^0 , find the distance between the trees $(use\ \sqrt{2} = 1.\ 44)$

Watch Video Solution

159. In ΔABC, a =125, b=62 and c=123, find the value of sinB.

Watch Video Solution

160. In ΔABC, a=3,b=4,c=2, then prove that: $\frac{\cos A}{2} = \frac{3\sqrt{6}}{8}$

Watch Video Solution

161. In ΔABC, prove that:

$$\frac{a+b+c}{a-b+c}=\frac{\cot\frac{A}{2}}{2}\frac{\cot\frac{C}{2}}{2}$$

Watch Video Solution

162. In any ABC , prove that: $2\left\{a\frac{\sin^2\frac{C}{2}}{2}+c\frac{\sin^2\frac{A}{2}}{2}\right\}=a+c-b$

Watch Video Solution

163. In ΔABC, prove that:

$$a\left(\frac{\cos^2\frac{C}{2}}{2}-\frac{\cos^2\frac{B}{2}}{2}\right)=(b-c).\frac{\cos^2\frac{A}{2}}{2}$$

Watch Video Solution

164. In ΔABC, prove that:

$$(a+b+c)\left(\frac{\tan\frac{A}{2}}{2}+\frac{\tan\frac{C}{2}}{2}\right)=2b\frac{\cot\frac{B}{2}}{2}$$

Watch Video Solution

165. If the sides a, b and $cofABC$ are in $A\dot{P};$ prove that $2\frac{\sin A}{2}\frac{\sin C}{2} = \frac{\sin B}{2}$

Watch Video Solution

166. In ΔABC, a =125, b=62 and c=123, find the value of sinB.

Watch Video Solution

167. Find the area of ΔABC, if a=10, $b = 7\sqrt{2}$m and $c = 45^\circ$

Watch Video Solution

168. Find the area of ΔABC, if a=6m and $\angle B$and $\angle C$ are respectively 30° and 90°.

Watch Video Solution

169. In any ABC, prove that: $= \frac{a^2 - b}{2} \frac{\sin A \sin B}{\sin(A - B)}$

Watch Video Solution

170. In ΔABC, prove that: $\cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2} = \frac{(a + b + c)^2}{4\Delta}$

Watch Video Solution

EXERCISES 3A

1. Convert the following angles into radians: a) 30° b) 135° c) 90°

Watch Video Solution

2. Convert the following angles into degrees: a) 2 radian b) 22 radian

Watch Video Solution

Watch Video Solution

3. i) The radius of a circle is 40cm. Find the angle subtend by an arc of 22 cm at the center of circle in degrees.

Watch Video Solution

4. Find the anlge between the large hand and small hand of a clock at time $8:20$.

Watch Video Solution

5. Find the radius of a circle in which an arc of 37.4 cm subtends an angle of 60° at the center.

Watch Video Solution

6. If the arcs of same length in two circles subtend angles of 30° and 45° at their centers, then find the ratio of their radii.

Watch Video Solution

7. The angles of a triangle are in A.P. The ratio of the smallest angle in an grades and largest angle in radian is $40:\pi$. Find all angles of the triangle in degrees.

Watch Video Solution

8. A wheel makes 180 resolutions in one minute. Through how many radians does it turn in 1 sec?

A. 4π

B. 5π

C. 6π

D. 7π

Answer: C

Watch Video Solution

9. The angles in a triangle are in A.P. and the ratio of the smallest angle in degrees to the greatest angle in radians is $60:\phi$ Find the angle of the triangle in degrees and radians.

Watch Video Solution

10. The moons distance from the earth is $360,000kms$ and its diameter subtends an angle of 31 at the eye of the observer. Find the diameter of the moon.

Watch Video Solution

11. A driver moves at a speed of 36 km/hr in a circle of radius 200 m. Find the angle in degree moved by the driver in 6 sec.

A. 16

B. 17

C. 18

D. 19

Answer: B

Watch Video Solution

12. The interior angles of a polygon are in A.P. The smallest anlge is $\left(\frac{2\pi}{3}\right)^c$ and common difference is 5°. Find the number of sides in the polygon.

Watch Video Solution

EXERCISES 3B

1. Prove that:

i) $\sqrt{\frac{1-\cos A}{1+\cos A}} = \text{cosec}A - \cot A$

ii) $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A - \tan A$

Watch Video Solution

2. Prove that:

i) $\cot^2 A + \cot^4 A = \text{cosec}^4 A - \text{cosec}^2 A$

ii) $\tan^2 A + \tan^4 A = \sec^4 A - \sec^2 A$

Watch Video Solution

3. Prove that:

$(1-\tan A)^2 + (1-\cot A)^2 = (\sec A - \text{cosec}A)^2$

Watch Video Solution

4. i) Prove that: $\frac{1+\tan^2 A}{1-\tan^2 A} \times \left(2\cos^2 A - 1\right) = 1$

ii) Prove that:

$$\frac{\tan\theta}{1+\cot\theta} + \frac{\cot\theta}{1+\tan\theta} = \text{cosec}\theta.\sec\theta - 1$$

Watch Video Solution

5. Prove that: $\sin A(1+\tan A) + \cos A(1+\cot A) = \sec A + \text{cosec}A$

Watch Video Solution

6. Prove that: $\frac{1+\cos A+\sin A}{1+\cos A-\sin A} = \frac{1+\sin A}{\cos A}$

Watch Video Solution

7. Prove that:

$$2\sec^2 A - \sec^4 A - 2\text{cosec}^2 A + \text{cosec}^4 A = \cot^4 A - \tan^4 A$$

Watch Video Solution

8. Prove that:

$$1-\frac{\sin^2 A}{1+\cot A}-\frac{\cos^2 A}{1+\tan A}=\sin A.\cos A$$

Watch Video Solution

9. i) Prove that: $\frac{\cot^2 A}{(1-\operatorname{cosec} A)^2}=\frac{1+\sin A}{1-\sin A}$

ii) Prove that: $\frac{\cos\theta}{1-\tan\theta}+\frac{\sin\theta}{1-\cot\theta}=\sin\theta+\cos\theta$

Watch Video Solution

10. Prove that:

$$(\sec A\sec B+\tan A\tan B)^2-(\sec A\tan B+\tan A\sec B)^2=1$$

Watch Video Solution

11. about to only mathematics

Watch Video Solution

12. Prove that:

$$\left[\frac{1}{\sec^2 A-\cos^2 A}+\frac{1}{\operatorname{cosec}^2 A-\sin^2 A}\right].\sin^2 A.\cos^2 A=\frac{1-\sin^2 A\cos^2 A}{2+\sin^2 A\cos^2 A}$$

Watch Video Solution

13. i) Prove that: $\left[\frac{1-\sin A}{1-\sec A}-\frac{1+\sin A}{1+\sec A}\right]=2\cot A(\cos A-\operatorname{cosec} A)$

Watch Video Solution

14. If $\cos\theta-\sin\theta=\sqrt{2}\sin\theta$, then prove that:

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

Watch Video Solution

15. If $a\sin^2\theta + b\cos^2\theta = c$, then prove that $\tan^2\theta = \frac{c-b}{a-c}$

Watch Video Solution

16. i) If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then prove that: $a^2 + b^2 = m^2 + n^2$

Watch Video Solution

17. If $a\cos\theta - b\sin\theta = c$, prove that $a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$

Watch Video Solution

18. If $\cot\theta\left(1 + s\int h\eta\right) = 4m and \cot\theta\left(1 - s\int h\eta\right) = 4n$, prove that $\left(m^2 - n^2\right)^2 = mm$.

Watch Video Solution

19. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then prove that: $m^2 - n^2 = 4\sqrt{mn}$

Watch Video Solution

20. If $a\cos\theta - b\sin\theta = c$, prove that $a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$

Watch Video Solution

21. If $(1 - \sin A)(1 - \sin B)(1 - \sin C) = (1 + \sin A)(1 + \sin B)(1 + \sin C)$, then show that each side is equal to $\pm\cos A\cos B\cos C$.

Watch Video Solution

22. If $\tan^2\theta = 1 - m^2$, then show that:

$\sec\theta + \tan^3\theta.\ \text{cosec}\theta = \left(2 - m^2\right)^{3/2}$

Watch Video Solution

23. If $\sin\theta + \cos\theta = x$, then show that:

$\sin^6\theta + \cos^6\theta = 1 - \frac{3}{4}\left(x^2 - 1\right)^2$

Watch Video Solution

24. Prove that:

$\sec^2 x + \text{cosec}^2 x \geq 4$

Watch Video Solution

EXERCISES 3C

1. If $\sin A = -\frac{3}{5}$ and A lies in third quadrant, find the remaining trignometric ratios.

Watch Video Solution

2. If $\cos A = \frac{5}{13}$ and A lies in fourth quadrant, find the remaining trignometric ratios.

Watch Video Solution

3. If $\tan A = -\frac{12}{5}$ and A lies in second quadrant, find the remaining trignometric ratios.

Watch Video Solution

4. If $\cot A = \frac{4}{3}$ and A lies in third quadrant, find the remaining trignometric ratios.

Watch Video Solution

5. If $\sec A = -\frac{17}{8}$ and A lies in second quadrant, find the remaining trignometric ratios.

Watch Video Solution

6. If $\text{cosec}A = \frac{5}{4}$ and A lies in first quadrant, find the remaining trignometric ratios.

Watch Video Solution

7. If $\text{cosec}A = -\sqrt{2}$ and $\frac{3\pi}{2} < A < 2\pi$, find the value of $\frac{\tan A + \text{cosec}A + 1}{\cot A - \text{cosecA} + 1}$.

Watch Video Solution

8. If $\sec A = -2$ and A lies in third quadrant, find the value of $\left(4\cot^2 A - 3\sin^2 A\right)$.

A. $\frac{11}{12}$

B. $-\frac{11}{12}$

C. 1

D. None of these

Answer: B

Watch Video Solution

9. Prove that:

$$\sqrt{\frac{1+\cos A}{1-\cos A}} = \begin{cases} \operatorname{cosec} A + \cot A & \text{if } 0 < A < \pi \\ -\operatorname{cosec} A - \cot A & \text{if } \pi < A < 2\pi \end{cases}$$

Watch Video Solution

10. Evaluate the following:

i) $\tan 135^\circ$

ii) $\sec 150^\circ$

iii) $\cot 240^\circ$

iv) $\text{cosec} 1950^\circ$

v) $\cos(-1125^\circ)$

vi) $\tan(-1470^\circ)$

vii) $\tan 1710^\circ$ viii) $\cot(-1770^\circ)$

Watch Video Solution

11. Prove that: $\tan 10^\circ \tan 20^\circ \tan 70^\circ \tan 80^\circ = 1$

Watch Video Solution

12. Prove that:

$$\frac{\cos 40^\circ + \cos 50^\circ}{\sin 40^\circ + \sin 50^\circ} = 1$$

Watch Video Solution

Watch Video Solution

13. Prove that:

$$\operatorname{cosec}(270^\circ - A)\operatorname{cosec}(270^\circ + A) + \cot(270^\circ - A)\cot(270^\circ + A) = 1$$

Watch Video Solution

14. Prove that:

$$\sin\left(\frac{\pi}{7}\right) + \sin\left(\frac{2\pi}{7}\right) + \sin\left(\frac{8\pi}{7}\right) + \sin\left(\frac{9\pi}{7}\right) = 0$$

Watch Video Solution

15. Evaluate the following:

i) $\cos 120^\circ \sin 390^\circ + \cos 330^\circ \cos 150^\circ$

ii) $\frac{\sin^2(3\pi)}{4} + \frac{\cos^2 \pi}{4} + \frac{\sec^2 \pi}{3}$

Watch Video Solution

16. Prove that:

$$\frac{\cos(\pi + A)\cos(-A)}{\sin(\pi - A).\cos\left(\frac{\pi}{2} + A\right)} = \cot^2 A$$

Watch Video Solution

17. In any quadrilateral ABCD, prove that:

i) $\sin(A + B) + \sin(C + D) = 0$

ii) $\cos(A + D) - \cos(B + C) = 0$

Watch Video Solution

18. Find the value of x:

$$\text{cosec}(90^\circ + \theta) + x\cos\theta\cot(90^\circ + \theta) = \sin(90^\circ + \theta)$$

Watch Video Solution

EXERCISES 3D

1. Evaluate:

i) $\sin 48^\circ \cos 42^\circ + \cos 48^\circ \sin 42^\circ$

ii) $\cos 72^\circ \cos 12^\circ + \sin 72^\circ \sin 12^\circ$

ii) $\cos 72^\circ \cos 12^\circ + \sin 72^\circ \sin 12^\circ$

iii) $\dfrac{\tan 100^\circ + \tan 35^\circ}{1 - \tan 100^\circ \tan 35^\circ}$

iv) $\sin A \cos(A - B) - \cos A \sin(A - B)$

Watch Video Solution

2. The value of $\sin 75^\circ$ is equal to

Watch Video Solution

3. Prove that:

i) $\sin(A + B)\cos(A - B) - \cos(A + B)\sin(A - B) = \sin 2B$

ii)

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

Watch Video Solution

Watch Video Solution

4. If $\cos A = \frac{4}{5}$ and $\cos B = \frac{12}{13}$, then find the values of $\cos(A+B)$ and $\sin(A-B)$, where A , B $\left(\frac{3\pi}{2}\right.$ to $2\pi)$.

Watch Video Solution

5. If $\tan A = 2, \sec B = -\frac{5}{3}$, where $\pi < A < \frac{3\pi}{2}, \frac{\pi}{2} < B < \pi$, then

i) Find the value of $\tan(A+B)$,

ii) find the quadrant in which (A+B) terminates.

Watch Video Solution

6. If $\cos A = -\frac{\sqrt{3}}{2}, \sin B = -\frac{5}{13}$, where $\frac{\pi}{2} < A < \pi, \frac{3\pi}{2} < B < 2\pi$, find the value of $\tan(A-B)$.

Watch Video Solution

7. If $\tan A = \frac{m}{m-1}$ and $\tan B = \frac{1}{2m-1}$, find the value of $\tan(A-B)$.

Watch Video Solution

8. If $\tan A = \frac{m}{m-1}$ and $\tan(B) = n$, find the values of $\tan 2A$ and $\tan 2B$.

Watch Video Solution

9. If $\tan A = m+1$ and $\tan B = m-1$, prove that $\tan(A-B) = \frac{2}{m^2}$.

Watch Video Solution

10. Prove that: $\frac{\tan\left(\frac{\pi}{4}+A\right)}{\tan\left(\frac{\pi}{4}-A\right)} = \left(\frac{1+\tan A}{1-\tan A}\right)^2$

Watch Video Solution

11. Prove that: $\cos\left(\frac{\pi}{4}+A\right)+\cos\left(\frac{\pi}{4}-A\right)=\sqrt{2}\cos A$

Watch Video Solution

12. Prove that:

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

Watch Video Solution

13. Prove that: $\sin^2\left(\frac{\pi}{8}+\frac{A}{2}\right)-\sin^2\left(\frac{\pi}{8}-\frac{A}{2}\right)=\frac{1}{\sqrt{2}}\sin A$

Watch Video Solution

14. Prove that: $\frac{\cos^2\pi}{8}+\frac{\sin^2(3\pi)}{8}+\frac{\sin^2(5\pi)}{8^2_{\sin}}\frac{7\pi}{8}=2$

Watch Video Solution

15. Prove that:

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

Watch Video Solution

16. Prove that: i) $\tan 36^\circ+\tan 9^\circ+\tan 36^\circ\tan 9^\circ=1$

Watch Video Solution

17. Prove that:

$$\frac{\cos 8^\circ-\sin 8^\circ}{\cos 8^\circ+\sin 8^\circ}=\cot 53^\circ$$

Watch Video Solution

18. If $A-B=\frac{\pi}{4}$, then prove that:

$$(1+\tan A)(1-\tan B)=2$$

Watch Video Solution

19. Prove that: $\frac{\cos(60^\circ - A) + \sin(30^\circ - A)}{\cos(30^\circ - A) - \sin(60^\circ - A)} = \cot A$

Watch Video Solution

20. i) If $A + B = \frac{\pi}{4}$ prove that: $(\cot A - 1)(\cot B - 1) = 2$

Watch Video Solution

21. Prove that:

$$\frac{\tan\left(\frac{\pi}{4} + A\right) + \tan\left(\frac{\pi}{4} - A\right)}{\tan\left(\frac{\pi}{4} + A\right) - \tan\left(\frac{\pi}{4} - A\right)} = \text{cosec}2A$$

Watch Video Solution

22. Prove that:

$$\frac{\sin(A - B)}{\cos A \cos B} + \frac{\sin(B - C)}{\cos B \cos c} + \frac{\sin(C - A)}{\cos C \cos A} = 0$$

Watch Video Solution

23. Prove that:

$\sin A \sin(B-C) + \sin B \sin(C-A) + \sin C \sin(A-B) = 0$

Watch Video Solution

24. Prove that:

$\cot 2A \cot 3A - \cot 3A \cot 5A - \cot 5A \cot 2A = 1$

Watch Video Solution

25. Prove that:

$\cot A - \cot 2A = \text{cosec} 2A$

Watch Video Solution

26. Prove that:

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

Watch Video Solution

27. If $\tan B = \frac{n \sin A \cos A}{1 - n\cos^2 A}$, then $\tan(A + B)$ equals to

Watch Video Solution

28. If $\tan B = \frac{n \sin A \cos A}{1 - n\cos^2 A}$, then $\tan(A + B)$ equals to

Watch Video Solution

29. If $2\tan B + \cot B = \tan A$, prove that:

$2\tan(A - B) = \cot B$

Watch Video Solution

30. i) If tan (A+B) = n tan (A-B), prove that: $\frac{n+1}{n-1} = \frac{\sin 2A}{\sin 2B}$

Watch Video Solution

31. If $A + B = 225^\circ$, then find the value of $\frac{\cot A}{1+\cot A} \times \frac{\cot B}{1+\cot B}$

Watch Video Solution

32. If $\cos(A+B)\sin(C-D) = \cos(A-B)\sin(C+D)$, then write the value of $tanAtanBtanC$.

Watch Video Solution

33. If $\alpha and \beta$ are the solutions of $a\cos\theta + bs\int h\eta = c,$ then show that $\cos(\alpha+\beta) = \frac{a^2-b^2}{a^2+b^2}$ (ii) $\cos(\alpha-\beta) = \frac{2c^2-(a^2+b^2)}{a^2+b^2}$

Watch Video Solution

34. If $\sin A + \sin B = a$ and $\cos A + \cos B = b$, prove that:

i) $\sin(A + B) = \dfrac{2ab}{a^2 + b^2}$

ii) $\tan(A + B) = \dfrac{2ab}{b^2 - a^2}$

Watch Video Solution

35. Prove that the value of $5\cos\theta + 3\cos\left(\theta + \dfrac{\pi}{3}\right)$ lies between -7 and 7.

Watch Video Solution

36. Prove that:

$\tan 10^\circ \tan 50^\circ + \tan 50^\circ \tan 70^\circ + \tan 70^\circ \tan 170^\circ = 3$

Watch Video Solution

37. prove that $\sin 2x + 2\sin 4x + \sin 6x = 4\cos^2 x . \sin x$

Watch Video Solution

38. Prove that:

$$\frac{\sin 7A + \sin 5A + \sin 9A + \sin 3A}{\cos 3A + \cos 5A + \cos 7A + \cos 9A} = \tan 6A$$

Watch Video Solution

39. Prove that

$$\sin A + \sin 2A + \sin 4A + \sin 5A = 4\cos\left(\frac{A}{2}\right)\cos\left(\frac{3A}{2}\right)\sin 3A$$

Watch Video Solution

40. Prove that: $\frac{\cos 8A \cos 5A - \cos 12A \cos 9A}{\sin 8A \cos 5A + \cos 12A \sin 9A} = \tan 4A$

Watch Video Solution

41. If $\cos A = k\cos(A - 2B)$, prove that:

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

Watch Video Solution

42. If $\cos ecA + \sec A = \cos ecB + secB$, prove that:

$$\text{tanAtanB} = \frac{\cot(A + B)}{2}$$

Watch Video Solution

43. i) If $\sin A + \sin B = \sqrt{3}(\cos B - \cos A)$, prove that:

$$\sin 3A + \sin 3B = 0$$

ii) If A,B and C are in arithmetic progression, then prove that:

$$\cot B = \frac{\sin A - \sin c}{\cos C - \cos A}$$

Watch Video Solution

44. Show that :

$\cos A + \cos B + \cos C + \cos(A + B + C) = 4 \cos \frac{B + C}{2} \cos \frac{C + A}{2} \cos A$

.

Watch Video Solution

45. If $\frac{\sin(\theta + \alpha)}{\cos(\theta - \alpha)} = \frac{1 - m}{1 + m}$, prove that

$\tan\left(\frac{\pi}{4} - \theta\right) \tan\left(\frac{\pi}{4} - \alpha\right) = m$

Watch Video Solution

EXERCISES 3E

1. Express each of the following as a sum or difference of sine and cosine.

i) $2 \sin 7A \cos 3A$, ii) $2 \cos 5A \sin 3A$, iii) $2 \cos 8A \cos 5A$, iv) $2 \sin 6A \sin 4A$

Watch Video Solution

2. Evaluate: $\sin\left(\frac{521}{2}\right)^{\circ}\cos\left(7\left(\frac{1}{2}\right)\right)^{\circ}$

Watch Video Solution

3. Prove that: $\cos(45^{\circ}+A)\cos(45^{\circ}-A)=\frac{1}{2}\cos 2A$

Watch Video Solution

4. Prove that: $\cos A\cos\left(60^{0}-A\right)\cos\left(60^{0}+A\right)=\frac{1}{4}\cos 3A$

Watch Video Solution

5. If $A=30^{\circ}$, show that :

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

Watch Video Solution

6. Prove that:

$$\tan\left(\frac{\pi}{3}-A\right).\tan\left(\frac{\pi}{3}+A\right)=\frac{2\cos 2A+1}{2\cos 2A-1}$$

Watch Video Solution

7. Prove that:

i) $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$

ii) $\sin 10^\circ \sin 50^\circ \sin 60^\circ \sin 70^\circ = \frac{\sqrt{3}}{16}$

iii) $\sin 20^\circ \sin 40^\circ \sin 80^\circ = \frac{\sqrt{3}}{8}$

Watch Video Solution

8. Prove that:

i) $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$

ii) $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

iii) $4\cos 12^\circ \cos 48^\circ \cos 72^\circ = \cos 36^\circ$

iv) $\cos 40^\circ \cos 80^\circ \cos 160^\circ = -\frac{1}{8}$

Watch Video Solution

9. Prove that: $\tan 20^0 \tan 40^0 \tan 80^0 = \tan 60^0$

Watch Video Solution

10. Prove that:

$$\frac{\tan(A+B)}{2} + \frac{\tan(A-B)}{2} = \frac{2\sin A}{\cos A + \cos B}$$

Watch Video Solution

11. Prove that:

i) $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$

ii) $\sin(60^\circ + A) + \sin(60^\circ - A) = \sqrt{3}\cos A$

Watch Video Solution

12. Prove that:

i) $\frac{\sin(5\pi)}{18} - \frac{\cos(4\pi)}{9} = \sqrt{3}\frac{\sin\pi}{9}$

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

Watch Video Solution

13. Prove that:

$$\frac{\sin A + \sin B}{\sin A - \sin B} = \tan\left(\frac{A+B}{2}\right).\cot\left(\frac{A-B}{2}\right)$$

Watch Video Solution

14. Prove that:

$$\frac{\sin 9A - \sin 7A}{\cos 7A - \cos 9A} = \cot 8A$$

Watch Video Solution

15. Prove that:

$$\frac{\cos 2A + \cos 3A + \cos 4A}{\sin 2A + \sin 3A + \sin 4A} = \cot 3A$$

Watch Video Solution

16. Prove that:

$$\frac{\sin 7A - 2\sin 4A + \sin A}{\cos 7A - 2\cos 4A + \cos A} = \tan 4A$$

Watch Video Solution

17. Prove that:

$$\frac{\sin(A+B) - 2\sin A + \sin(A-B)}{\cos(A+B) - 2\cos A + \cos(A-B)} = \tan A$$

Watch Video Solution

18. Prove that

$$(\cos A - \cos B)^2 + (s \in A - s \in B)^2 = 4\sin^2(A-B)/2\Big]$$

Watch Video Solution

19. show that $\cos 2\theta \cos\left(\frac{\theta}{2}\right) - \cos 3\theta \cos\left(\frac{9\theta}{2}\right) = \sin 5\theta \sin\left(\frac{5\theta}{2}\right)$

Watch Video Solution

EXERCISES 3F

1. Evaluate $\sin 2A$, $\cos 2A$ and $\tan 2A$ if:

i) $\sin A = \frac{5}{13}$, ii) $\cos A = \frac{8}{17}$, iii) $\tan A = \frac{4}{3}$

Watch Video Solution

2. If $\cos A = -\frac{3}{5}$ and $\frac{\pi}{2} < A < \pi$, find the values of the following:

i) $\sin 2A$, ii) $\cos 2A$, iii) $\tan 2A$

Watch Video Solution

3. If $\tan A = \frac{12}{5}$ and $\pi < A < \frac{3\pi}{2}$, find the values of the following:

i) $\sin 2A$

ii) $\cos 2A$

iii) $\tan 2A$

Watch Video Solution

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

Watch Video Solution

5. prove that $\frac{\sin 2A}{1 - \cos 2A} = \cot A$

Watch Video Solution

6. Prove that:

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

Watch Video Solution

Watch Video Solution

7. Prove that:

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

Watch Video Solution

8. Statement I : $\frac{\sin^2\pi}{8}+\frac{\sin^2(3\pi)}{8}+\frac{\sin^2(5\pi)}{8}+\frac{\sin^2(7\pi)}{8}=2$

Statement II $\frac{\sin^4\pi}{8}+\frac{\sin^4(3\pi)}{8}+\frac{\sin^4(5\pi)}{8}\frac{\sin^4(7\pi)}{8}=\frac{3}{2}$

Watch Video Solution

9. Prove that:

$$\sin^2 A+\sin^2(60^\circ+A)+\sin^2(A-60^\circ)=\frac{3}{2}$$

Watch Video Solution

10. i) Prove that: $\frac{1-\sin 2A}{1+\sin 2A} = \tan^2\left(\frac{\pi}{4} - A\right)$

ii) If $\cos\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$, then prove that:

$\cos 2\theta = \frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ and $\cos 3\theta = \frac{1}{2}\left(x^3 + \frac{1}{x^3}\right)$

Watch Video Solution

11. Prove that:

$\sqrt{3}\text{cosec}20^\circ - \sec 20^\circ = 4$

Watch Video Solution

12. Prove that:

$\left(1 + \cos.\frac{\pi}{8}\right)\left(1 + \cos.\frac{3\pi}{8}\right)\left(1 + \cos.\frac{5\pi}{8}\right)\left(1 + \cos.\frac{7\pi}{8}\right) = \frac{1}{8}$

Watch Video Solution

13. Evaluate the following: i) $\sin\frac{\pi}{12}$ ii) $\sin\frac{\pi}{8}$, iii) $\cos\frac{\pi}{8}$, iv) $\cos\frac{\pi}{24}$

Watch Video Solution

14. Prove that: $\cot\frac{\pi}{24} = \sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$

Watch Video Solution

15. If sinA = $-\frac{5}{13}$ and $\pi < A < \frac{3\pi}{2}$, find the values of the following:

i) $\sin\left(\frac{A}{2}\right)$, ii) $\cos\left(\frac{A}{2}\right)$, iii) $\tan\left(\frac{A}{2}\right)$

Watch Video Solution

16. If $\tan A = -\frac{3}{4}$ and $\frac{\pi}{2} < A < \pi$, find the values of the following:

i) $\sin\left(\frac{A}{2}\right)$ ii) $\cos\left(\frac{A}{2}\right)$, iii) $\tan\left(\frac{A}{2}\right)$

Watch Video Solution

17. Prove that:

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

Watch Video Solution

18. Prove that:

$$\tan\left(\frac{A}{2}\right)+\cot\left(\frac{A}{2}\right)=2\text{cosec}A$$

Watch Video Solution

19. Prove that: $s\in^4\frac{\pi}{8}+s\in^4\frac{3\pi}{8}+s\in^4\frac{5\pi}{8}+s\in^4\frac{7\pi}{8}=\frac{3}{2}$

Watch Video Solution

20. Prove that: $1+\cos^2 2\theta=2\left(\cos^4\theta+\sin^4\theta\right)$

Watch Video Solution

21. i) Prove that:

$\cos^3 2A + 3\cos 2A = 4\left(\cos^6 A - \sin^6 A\right)$

ii) Prove that: $4\left(\cos^3 10^\circ + \sin^3 20^\circ\right) = 3(\cos 10^\circ + \sin 20^\circ)$

Watch Video Solution

22. Prove that: $\tan A(1 + \sec 2A) = \tan 2A$

Watch Video Solution

23. Show that: `sqrt(2+sqrt(2+sqrt(2+2cos8theta)))=2costheta,0

Watch Video Solution

24. about to only mathematics

Watch Video Solution

25. Prove that: $\cos 5A = 16\cos^5 A - 20\cos^3 A + 5\cos A$

Watch Video Solution

26. Prove that $\cos^3 x + \cos^3\left(\frac{2\pi}{3} + x\right) + \cos^3\left(\frac{2\pi}{3} - x\right) = \frac{3}{4}\cos 3x$

Watch Video Solution

EXERCISES 3G

1. Prove that:

i) $\tan\left(45^\circ - \frac{A}{2}\right) = \frac{1 - \sin A}{\cos A}$

ii) $\tan\left(45^\circ + \frac{A}{2}\right) = \frac{\cos A}{1 - \sin A}$

Watch Video Solution

2. Prove that: $s \in^2 24^0 - s \in^2 6^0 = \frac{\sqrt{5} - 1}{8}$

Watch Video Solution

3. Prove that: $\sin^2 42^0 - \cos^2 78^0 = \frac{\sqrt{5}+1}{8}$

Watch Video Solution

4. about to only mathematics

Watch Video Solution

5. Prove that: $\cos 78^0 \cos 42^0 \cos 36^0 = \frac{1}{8}$

Watch Video Solution

6. Prove that:

$\sin\left(\frac{\pi}{10}\right).\cos\left(\frac{\pi}{5}\right) = \frac{1}{4}$

Watch Video Solution

7. Prove that: $\sin\left(\frac{\pi}{10}\right)+\sin\left(\frac{13\pi}{10}\right)=-\frac{1}{2}$

Watch Video Solution

8. Prove that:

$$\left(1+\cos.\frac{\pi}{8}\right)\left(1+\cos.\frac{3\pi}{8}\right)\left(1+\cos.\frac{5\pi}{8}\right)\left(1+\cos.\frac{7\pi}{8}\right)=\frac{1}{8}$$

Watch Video Solution

9. about to only mathematics

Watch Video Solution

10. Prove that: $\sin\left(\frac{\pi}{5}\right)\sin 2\frac{\pi}{5}\sin 3\frac{\pi}{5}\sin 4\frac{\pi}{5}=\frac{5}{16}$

Watch Video Solution

11. Prove that:$\tan 6^0 \tan 42^0 \tan 66^0 \tan 78^0 = 1.$

Watch Video Solution

12. Prove that $\frac{\cos(2\pi)}{15}\frac{\cos(4\pi)}{15}\frac{\cos(8\pi)}{15}\frac{\cos(14\pi)}{15} = \frac{1}{16}$

Watch Video Solution

EXERCISES 3H

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

Watch Video Solution

2. If $A + B + C = \pi$, prove that : $\sin A + \sin B + \sin C = 4\cos, \frac{A}{2}\cos, \frac{B}{2}\cos, \frac{C}{2}$

Watch Video Solution

3. In ΔABC, prove that: a)

$$\frac{\sin 2A + \sin 2B + \sin 2C}{\sin A + \sin B + \sin C} = 8 \sin\left(\frac{A}{2}\right) \sin\left(\frac{B}{2}\right) \sin\left(\frac{C}{2}\right)$$

Watch Video Solution

4. In a triangle ABC

$$\sin(B + 2C) + \sin(C + 2A) + \sin(A + 2B) = 4 \sin\left(\frac{B - C}{2}\right) \sin\left(\frac{C - A}{2}\right.$$

Watch Video Solution

5. In ΔABC, prove that:

a) $$\sin\left(\frac{A}{2}\right) + \sin\left(\frac{B}{2}\right) + \sin\left(\frac{C}{2}\right) =$$

$$1 + 4 \sin\left(\frac{\pi - A}{4}\right) \sin\left(\frac{\pi - B}{4}\right) . \sin\left(\frac{\pi - C}{4}\right),$$

Watch Video Solution

6. If $A + B + C = \frac{\pi}{2}$, prove that:

$\sin 2A + \sin 2B + \sin 2C = 4 \cos A \cos B \cos C$

Watch Video Solution

7. Prove that:

a)

$\sin(A + B + C) + \sin(A - B - C) + \sin(A + B - C) + \sin(A - B + C)$

b)

$\cos(A + B + C) + \cos(A + B - C) + \cos(B + C - A) + \cos(C + A - B$

Watch Video Solution

8. If $A + B + C = 180$, prove that:

$\sin A + \sin B + \sin C = 4 \cos\left(\frac{A}{2}\right) \cos\left(\frac{B}{2}\right) \cos\left(\frac{C}{2}\right)$

Watch Video Solution

9. If $A + B + C = 2S$, prove that:

$$\sin(S - A) + \sin(S - B) + \sin(S - C) - \sin S = 4\frac{\sin A}{2}\frac{\sin B}{2}\frac{\sin C}{2}$$

Watch Video Solution

10. If ΔABC, prove that:

a) $\sin^2 A + \sin^2 B - \sin^2 C = 2\sin A \sin B \cos C$

b) $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2\sin A \cos B \sin C$

c) $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2\cos A \cos B \cos C$

Watch Video Solution

11. If $A + B + C = 180^0$, prove that :

$$\cos^2\left(\frac{A}{2}\right) + \cos^2\left(\frac{B}{2}\right) - \cos^2\left(\frac{C}{2}\right) = 2\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$$

Watch Video Solution

12. If $A+B+C=\pi$, then prove that $\frac{\tan A}{2}\cdot\frac{\tan B}{2}+\frac{\tan B}{2}\cdot\frac{\tan C}{2}+\frac{\tan C}{2}\cdot\frac{\tan A}{2}=1$

Watch Video Solution

13. In ΔABC, prove that:

$\cot B\cot C+\cot C\cot A+\cot A\cot B=1$

Watch Video Solution

14. In ΔABC, prove that:

$\tan 2A+\tan 2B+\tan 2C=\tan 2A\tan 2B\tan 2C$

Watch Video Solution

15. Prove that:

$(\tan(\alpha-\beta)+\tan(\beta-\lambda)+\tan(\lambda-\alpha)=\tan(\alpha-\beta)\tan(\beta-\lambda)\tan(\lambda-$

Watch Video Solution

16. In ΔABC, prove that:

$$\tan B \tan C + \tan C \tan A + \tan A \tan B = 1 + \sec A \sec B \sec C$$

Watch Video Solution

17. In ΔABC, prove that:

$$\cot A + \cot B + \cot C = \cot A \cot B \cot C + \text{cosec} A \text{cosec} B \text{cosec} C$$

Watch Video Solution

18. If $x + y + z = xyz$, prove that:

a) $$\frac{3x - x^3}{1 - 3x^2} + \frac{3y - y^3}{1 - 3y^2} + \frac{3z - z^3}{1 - 3z^2} = \frac{3x - x^3}{1 - 3x^2} \cdot \frac{3y - y^3}{1 - 3y^2} \cdot \frac{3z - z^3}{1 - 3z^2}$$

b) $$\frac{x + y}{1 - xy} + \frac{y + z}{1 - yz} + \frac{z + x}{1 - zx} = \frac{x + y}{1 - xy} \cdot \frac{y + z}{1 - yz} \cdot \frac{z + x}{1 - zx}$$

Watch Video Solution

EXERCISES 3I

1. Find the geneal values of θ from the following equations:

i) $\sin\theta = \frac{\sqrt{3}}{2}$, ii) $\cos\theta = \frac{1}{\sqrt{2}}$, iii) $\tan\theta = \sqrt{3}$, iv) $\sec\theta = \frac{2}{\sqrt{3}}$, v) $\cot\theta = \frac{1}{\sqrt{3}}$, vi) $\text{cosec}\theta = \sqrt{2}$

Watch Video Solution

2. Find the general values of θ from the following equations:

i) $\sin\theta = -\frac{\sqrt{3}}{2}$

ii) $\sec\theta = -\sqrt{2}$

iii) $\cot\theta = -\frac{1}{\sqrt{3}}$, iv) $\text{cosec}\theta = -2$

Watch Video Solution

3. Find the general values of θ from the following equations:

i) $\cos^2\theta = \frac{1}{4}$, ii) $\sin^2\theta = 1$, iii) $\cot^2\theta = 3$, iv) $\sec^2\theta = \frac{4}{3}$

Watch Video Solution

4. Find the general values of θ from the following equations:

i) $\sin 3\theta = \frac{\sqrt{3}}{2}$, ii) $\cos 4\theta = \frac{1}{\sqrt{2}}$

iii) $\tan 2\theta = \sqrt{3}$

iv) $\text{cosec} 3\theta = 2$

Watch Video Solution

5. Solve the following equations :

i) $\tan\theta = \cot\theta$, ii) $\cos 2\theta = 2\sin^2\theta$

iii) $\tan 3\theta = -\sqrt{3}$, iv) $\sin 2\theta - \cos\theta = 0$

v) $\sec^2 2\theta = 1 - \tan 2\theta$

Watch Video Solution

6. Solve the following equations:

i) $3\left(\tan^2\theta + \sec^2\theta\right) = 5$

ii) $\tan^2\theta + \cot^2\theta = 2$

iii) $7\cos^2\theta + 3\sin^2\theta = 4$

Watch Video Solution

7. Find the general values of θ from the following equations:

i) $2\cos^2\theta + \sin\theta = 0$

ii) $\sin^2\theta - 2\cos\theta + \frac{1}{4} = 0$

iii) $\tan\theta - \sin\theta = \sin\theta\tan\theta - 1$

iv) $\sin^2\theta - \left(1+\sqrt{3}\right)\sin\theta\cos\theta + \sqrt{3}\cos^2\theta = 0$

View Text Solution

8. Find the general values of θ from the following equations:

i) $\sin 3\theta = \cos 3\theta$

ii) $2\cos^2\theta = 1 - 2\sin\theta\cos\theta$

iii) $\text{cosec}^2\theta + 2\text{cosec}\theta - 3 = 0$

Watch Video Solution

9. Solve the equation: $\sin 2\theta + \cos 3\theta = 0$

Watch Video Solution

10. $4\sin^4\theta + \cos^4\theta = 1$.Then find its general solution

Watch Video Solution

11. Solve the equation $(1 - \tan\theta)(1 + \sin 2\theta) = 1 + \tan\theta$

Watch Video Solution

12. Solve the following equation: $\cos\theta + \sin\theta = \cos 2\theta + \sin 2\theta$

Watch Video Solution

13. If $\tan(\cot\theta) = \cot(\tan\theta)$, then prove that:

$\pi(2n+1)\sin 2\theta = 4$

Watch Video Solution

14. Solve:

$4\left(\sin^3\theta\cos\theta - \cos^3\theta\sin\theta\right) = 1$

Watch Video Solution

15. Solve: $\tan\theta + \sec\theta = 2\cos\theta$

Watch Video Solution

16. Solve: $2\sin^2\theta + \sin^2 2\theta = 2$

Watch Video Solution

EXERCISES 3J

1. Solve: $\tan 4\theta = \tan 2\theta$

Watch Video Solution

2. Solve : $\tan 6\theta = \tan 3\theta$

Watch Video Solution

3. Solve: $\cos 5\theta = \cos 2\theta$

Watch Video Solution

4. Solve: $\sin 4\theta = \sin \theta$

Watch Video Solution

5. Solve: $\tan 2\theta \cot \theta = 1$

Watch Video Solution

6. Solve: $\cot 2\theta = \tan \theta$

Watch Video Solution

7. Solve: $\sin 2\theta = \sin\left(\frac{2\pi}{3} - \theta\right)$

Watch Video Solution

8. Solve that equation : $\sin m\theta + \sin n\theta = 0.$

Watch Video Solution

9. Solve: $\tan p\theta + \cot q\theta = 0$

Watch Video Solution

10. Solve: $\cos p\theta + \cos q\theta = 0$

Watch Video Solution

11. Solve: $\cot 5\theta = \cot 2\theta$

Watch Video Solution

12. Solve: $\tan 4\theta = -\cot\left(\frac{\pi}{6} + \theta\right)$

Watch Video Solution

13. Solve: $\tan^2 3\theta = \cot^2 \theta$

Watch Video Solution

EXERCISES 3K

1. Find the general values of θ from the following equations:

$\sin 4\theta - \sin 2\theta = \cos 3\theta$

Watch Video Solution

2. Solve that equation : $\sin\theta + \sin 3\theta + \sin 5\theta = 0$.

Watch Video Solution

3. Solve the following equation: $\sin 2\theta - \sin 4\theta + \sin 6\theta = 0$

Watch Video Solution

4. $\cos\theta - \cos 2\theta = \sin 3\theta$.Then find its general solution

Watch Video Solution

5. Solve it

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

Watch Video Solution

6. Find the general values of θ from the following equations:

$$\sin 2\theta + \sin 4\theta = \sin 6\theta$$

Watch Video Solution

7. $\sin\theta + \sin 7\theta = \sin 4\theta$. Then find its general solution

Watch Video Solution

8. Find the general values of θ from the following equations:

$$\sin\theta + \sin 2\theta + \sin 4\theta + \sin 5\theta = 0$$

Watch Video Solution

Watch Video Solution

9. find the general values of 'θ' from the following equations

$\cos 3\theta \cos 5\theta - \cos 7\theta \cos 9\theta = 0$

Watch Video Solution

10. find the general values of 'θ' from the following equations

$\cos\theta . \cos 2\theta . \cos 3\theta = \frac{1}{4}$

Watch Video Solution

11. Solve the equation: $\tan\theta + \tan 2\theta + \tan\theta \tan 2\theta = 1$

Watch Video Solution

12. find the general values of 'θ' from the following equations

$\tan\theta + \tan 2\theta = \tan 3\theta$

Watch Video Solution

13. Solve $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$

Watch Video Solution

14. Find the general values of θ from the following equations:

$\tan\left(\frac{\pi}{4} + \theta\right) + \tan\left(\frac{\pi}{4} - \theta\right) = 4$

Watch Video Solution

15. $\tan\theta + \tan\left(\frac{\pi}{3} + \theta\right) + \tan\left(\frac{2\pi}{3} + \theta\right) = 3$

Watch Video Solution

16. $\cos\theta - \sin\theta = \cos\alpha - \sin\alpha$.Then find its general solution

Watch Video Solution

17. find the general values of 'θ' from the following equations

$\sqrt{3}\tan 2\theta + \sqrt{3}\tan 3\theta + \tan 2\theta \tan 3\theta = 1$

Watch Video Solution

18. $\tan\theta - \tan\left(\frac{\theta}{2}\right) = \sec\left(\frac{\theta}{2}\right)$.Then find its general solution

Watch Video Solution

EXERCISES 3L

1. Find the general values of θ from the following equations:

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

Watch Video Solution

2. Find the general values of θ from the following equations:

$\sqrt{3}\sin\theta - \cos\theta = \sqrt{2}$

Watch Video Solution

3. If $\sqrt{3}\cos\theta + \sin\theta = 2$, then general value of θ is:

Watch Video Solution

4. Solve $\cot\theta + \text{cosec}\theta = \sqrt{3}$

Watch Video Solution

5. Find the general values of θ from the following equations:

$1 + \cot\theta = \text{cosec}\theta$

Watch Video Solution

6. Find the general values of θ from the following equations:

$\tan\theta + \sec\theta = \sqrt{3}$

Watch Video Solution

7. solve the following equations $3\cos\theta - \sqrt{7}\sin\theta = 2$, When $\sin 48^2 35' = \frac{3}{4}$.

Watch Video Solution

8. $6\cos\theta + 8\sin\theta = 9$, when $\tan 53^\circ 8' = \frac{4}{3}$ and $\cos 25^\circ 50' = \frac{9}{10}$

Watch Video Solution

9. Find the general values of θ from the following equations:

$\sqrt{2}\sec\theta + \tan\theta = 1$

Watch Video Solution

10. Find the general values of θ from the following equations:

$$\sin\theta + \cos\theta = \frac{\sqrt{3}+1}{2}$$

Watch Video Solution

EXERCISES 3M

1. Find the general values of θ satisying the following two equations:

$$\sin\theta = \frac{1}{\sqrt{2}} \text{ and } \sec\theta = -\sqrt{2}$$

Watch Video Solution

2. find general value of θ : $\sin\theta = -\frac{1}{2}$ and $\cos\theta = -\frac{\sqrt{3}}{2}$

Watch Video Solution

3. Find the general values of θ from the following equations:

$\cot\theta = -\sqrt{3}$ and $\operatorname{cosec}\theta = 2$

Watch Video Solution

4. $\cos\theta = \frac{1}{\sqrt{2}}$ and $\tan\theta = -1$.Then find its general solution

Watch Video Solution

5. $\sin\theta = \frac{\sqrt{3}}{2}$ and $\tan\theta = -\sqrt{3}$.Then find its general solution

Watch Video Solution

6. $\sec\theta = \frac{2}{\sqrt{3}}$ and $\cot\theta = -\sqrt{3}$.Then find its general solution

Watch Video Solution

7. $\sin\theta = -\frac{1}{2}$ and $\tan\theta = -\frac{1}{\sqrt{3}}$.Then find its general solution

Watch Video Solution

8. $\tan\theta = \sqrt{3}$ and $\text{cosec}\theta = \frac{2}{\sqrt{3}}$

Watch Video Solution

EXERCISES 3N

1. In ΔABC, a=4, b=6 and $\angle B = 30^\circ$, evaluate sinA.

Watch Video Solution

2. In ΔABC, $b = 2\sqrt{3}$, $c = 3\sqrt{2}$, $\angle C = 60^\circ$, evaluate $\angle A$.

Watch Video Solution

3. In ΔABC, $\angle A = 60^0$, $\angle B = 45^\circ$, find $a : b$.

Watch Video Solution

4. In ΔABC, $\angle B = 90^\circ$, $\angle A = 30^\circ$, $b = 20cm$, find a and c.

Watch Video Solution

5. If the ratio of angles of ΔABC is $1 : 2 : 3$, find the ratio of its sides.

Watch Video Solution

6. The angle of a triangle are in the ratio 1 : 2 : 7, prove that the ratio of the greatest side to the least side is $\left(\sqrt{5}+1\right) : \left(\sqrt{5}-1\right)$.

Watch Video Solution

7. In ΔABC, a=3, b=4 and c=5, evaluate sin2C.

Watch Video Solution

8. In ΔABC, prove that: $\sin B + \sin C > \sin A$

Watch Video Solution

9. In any ΔABC, prove that

$$\frac{\sin A}{\sin(A+B)} = \frac{a}{c}$$

Watch Video Solution

10. In ΔABC, prove that: $a\cos A + b\cos B = (c)\cos(A-B)$

Watch Video Solution

11. In ΔABC, prove that: $a \sin A - b \sin B = c \sin(A - B$

Watch Video Solution

12. In ΔABC, $C = 90^\circ$, $A = 30^\circ$, $b = 6$, find the remaining elements of the triangle.

Watch Video Solution

13. In any triangle ABC prove that: $\sin\left(\frac{B-C}{2}\right) = \left(\frac{b-c}{a}\right)\frac{\cos A}{2}$

Watch Video Solution

14. In ΔABC,

if a = 2, b = 3, c = 4, prove that $\cos A = \frac{7}{8}$.

Watch Video Solution

15. If in ΔABC, $a = 4$, $b = 6$, $c = 8$ then $2\cos A + 4\cos B + \cos C =$

Watch Video Solution

16. In ΔABC, if a=6, b=8, c=10, evaluate cos2A.

Watch Video Solution

17. In ΔABC, if b=7, c=24, a=25, find $\angle A$.

Watch Video Solution

18. In ΔABC, $a : b : c = 15 : 7 : 13$, find cosA.

Watch Video Solution

19. In ΔABC,

if the sides are 7, $4\sqrt{3}$ and $\sqrt{13}$ cm, prove that the smallest angle is 30°.

Watch Video Solution

20. In ΔABC, $a = x^2 - 1$, $b = 2x + 1$, $\angle C = 120^\circ$, find c.

Watch Video Solution

21. With usual notations, if in a triangle $ABC \dfrac{b+c}{11} = \dfrac{c+a}{12} = \dfrac{a+b}{13}$,

then prove that: $\dfrac{\cos A}{7} = \dfrac{\cos B}{19} = \dfrac{\cos C}{25}$

Watch Video Solution

22. In ΔABC, prove that: $a(\cos B + \cos C) = 2(b+c)\dfrac{\sin^2 A}{2}$.

Watch Video Solution

23. In ΔABC, prove that:

$$b(\cos A - \cos C) = 2(c-a)\frac{\cos^2 B}{2}$$

Watch Video Solution

24. i) In ΔABC, prove that: $\frac{b-a}{b+a} = \frac{\tan C}{2} \cdot \frac{\tan(B-A)}{2}$

ii) In ΔABC, prove that:

$$a\sin\left(\frac{A}{2}+B\right) = (b+c)\frac{\sin A}{2}$$

Watch Video Solution

25. In ΔABC, prove that: $\frac{a}{b+c} = \frac{1-\frac{\tan B}{2}\frac{\tan C}{2}}{1+\frac{\tan B}{2}\frac{\tan C}{2}}$

Watch Video Solution

26. In ΔABC, prove that: $a^2 \sin 2B + b^2 \sin 2A$=2 ab sinC

Watch Video Solution

Watch Video Solution

27. Prove that,

$$\frac{a\sin(B-C)}{b^2-c^2}=\frac{b\sin(C-A)}{c^2-a^2}=\frac{c\sin(A-B)}{a^2-b^2}$$

Watch Video Solution

28. In any ΔABC, prove that

$$ac\cos B-bc\cos A=a^2-b^2$$

Watch Video Solution

29. In any triangle ABC, prove that following:

$$\frac{a^2\sin(B-C)}{\sin A}+\frac{b^2\sin(C-A)}{\sin B}+\frac{c^2\sin(A-B)}{\sin C}=0$$

Watch Video Solution

30. In ΔABC, prove that: $\frac{1+\cos A.\cos(B-C)}{1+\cos C.\cos(A-B)}=\frac{b^2+c^2}{a^2+b^2}$

Watch Video Solution

31. In ΔABC, $\left(b^2+c^2\right)\sin(B-C)=\left(b^2-c^2\right)\sin(B+C)$, then prove that the triangle in either isosceles or right angled.

Watch Video Solution

32. In a ABC, if $\cos C=\dfrac{\sin A}{2\sin B}$, prove that the triangle is isosceles.

Watch Video Solution

33. In $\triangle ABC$, $\cos A=\sin B-\cos C$,prove that ΔABC, is right angled.

Watch Video Solution

34. If $\dfrac{\sin A}{\sin C}=\dfrac{\sin(A-B)}{\sin(B-C)}$, prove that a^2, b^2, c^2 are in A.P.

Watch Video Solution

35. In a triangle ABC, prove that for any angle θ, $b\cos(A-\theta)+a\cos(B+\theta)=C\cos\theta$.

Watch Video Solution

36. In ΔABC, $\frac{1}{a},\frac{1}{b},\frac{1}{c}$ are in A.P. prove that $\text{cosec}^2\frac{A}{2},\text{cosec}^2\frac{B}{2},\text{cosec}\frac{C}{2}$ are also in A.P.

Watch Video Solution

37. If a=5, b=12 and c=13, find tanA.

Watch Video Solution

38. The sides of a triangle are $x^2 + x + 1, 2x + 1,$ and $x^2 - 1$. Prove that the greatest angle is 120°

Watch Video Solution

39. i) In ΔABC, if b=17, c=11 and $\angle A = 60^\circ$, find $\frac{\tan(B - C)}{2}$

Watch Video Solution

40. In any ΔABC, prove that $(a - b)^2 \cos^2\left(\frac{C}{2}\right) + (a + b)^2 \sin^2\left(\frac{C}{2}\right) = c^2.$

Watch Video Solution

41. In ΔABC, prove that:

$(b^2 - c^2 + a^2)\tan C = (b^2 + c^2 - a^2)\tan A$

Watch Video Solution

42. In a ΔABC, if $\frac{2\cos A}{a}+\frac{\cos B}{b}+\frac{2\cos C}{c}=\frac{a}{bc}+\frac{b}{ca}$, prove that $\angle A=90^\circ$.

Watch Video Solution

EXERCISES 3O

1. In ΔABC, a=5, b=7, c=8, find $\frac{\cos B}{2}$

Watch Video Solution

2. In ΔABC, $a=17, b=8, c=15$, find $\frac{\sin B}{2}$.

Watch Video Solution

3. In ΔABC, a=25,b=52, c=63, find $\cot\left(\frac{A}{2}\right)$.

Watch Video Solution

4. In ΔABC, prove that: $\frac{b\cos^2 C}{2} + \frac{c\cos^2 B}{2} = s$

Watch Video Solution

5. In ΔABC, prove that:

$$2\left[a\frac{\sin^2 B}{2} + b\frac{\sin^2 A}{2}\right] = a + b - c$$

Watch Video Solution

6. In ΔABC, prove that:

$$(b + c - a)\left(\frac{\cot B}{2} + \frac{\cot C}{2}\right) = 2a\frac{\cot A}{2}$$

Watch Video Solution

7. In ΔABC, prove that:

$$\frac{b-c}{a}\frac{\cos^2 A}{2}+\frac{c-a}{b}\frac{\cos^2 B}{2}+\frac{a-b}{c}.\frac{\cos^2 C}{2}=0$$

Watch Video Solution

8. In any triangle ABC, prove that:

$$(b-c)\cot\left(\frac{A}{2}\right)+(c-a)\cot\left(\frac{B}{2}\right)+(a-b)\cot\left(\frac{C}{2}\right)=0$$

Watch Video Solution

9. In a ΔABC the sides a, b and c are in AP. Evaluate $\left(\tan\frac{A}{2}+\tan\frac{C}{2}\right):\cot\frac{B}{2}$.

Watch Video Solution

10. In a ΔABC the sides a, b and c are in AP. Evaluate $\left(\tan\frac{A}{2}+\tan\frac{C}{2}\right):\cot\frac{B}{2}$.

Watch Video Solution

11. If $b + c = 3a$, then find the value of $\cot.\frac{B}{2}\cot.\frac{C}{2}$

Watch Video Solution

12. In ΔABC, if a,b,c are in A.P. prove that:

$\cot\left(\frac{A}{2}\right), \cot\left(\frac{B}{2}\right), \cot\left(\frac{C}{2}\right)$ are also in A.P.

Watch Video Solution

13. In ΔABC, prove that:

$(a+b+c).\left(\tan\left(\frac{A}{2}\right)+\tan\left(\frac{B}{2}\right)\right) = 2c\cot\left(\frac{C}{2}\right)$

Watch Video Solution

14. In ΔABC, prove that:

$$\frac{\cot A}{2}+\frac{\cot B}{2}+\frac{\cot C}{2}=\frac{a+b+c}{a+b-c}\frac{\cot C}{2}$$

Watch Video Solution

15. In ΔABC, a,b,c are in A.P., prove that: $\frac{\cot A}{2}.\frac{\cot C}{2}=3$

Watch Video Solution

16. Find the area of ΔABC, if $a=2, b=3$ and c=5 cm

Watch Video Solution

17. Find the area of ΔABC, if a=10cm, $\angle B=45^\circ$ and $\angle C=45^\circ$

Watch Video Solution

18. Find the area of ΔABC, if a=10cm, $\angle B = 45^\circ$ and $\angle C = 45^\circ$

Watch Video Solution

19. In any ABC, prove that: $= \frac{a^2 - b}{2} \frac{\sin A \sin B}{\sin(A - B)}$

Watch Video Solution

20. In a ΔABC prove that $\cot A + \cot B + \cot C = \frac{a^2 + b^2 + c^2}{4\Delta}$

Watch Video Solution

21. Prove that in ΔABC,

$$\frac{(a+b+c)^2}{a^2+b^2+c^2} \Rightarrow \frac{\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2}}{\cos A + \cot B + \cot C}$$

Watch Video Solution

22. In ΔABC, prove that:

$$s^2.\tan\left(\frac{A}{2}\right)\tan\left(\frac{B}{2}\right)\tan\left(\frac{C}{2}\right) = \Delta$$

Watch Video Solution

23. In ΔABC, prove that: $abc.\ \frac{\cos A}{2}.\ \frac{\cos B}{2}.\ \frac{\cos C}{2} = \Delta s$

Watch Video Solution

24. In ΔABC, prove that:

$$\frac{\tan A}{2}.\ \frac{\tan B}{2}.\ \frac{\tan C}{2} = \sqrt{\left(1-\frac{a}{s}\right)\left(1-\frac{b}{s}\right)\left(1-\frac{c}{s}\right)}$$

Watch Video Solution

EXERCISES 3P

1. If $x = r\sin\theta\cos\phi, y = r\sin\theta\sin\phi$ and $z = r\cos\theta, then x^2 + y^2 + z^2$ is independent of $(a)\theta, \phi$ (b) r, θ (c) r, ϕ (d) r

A. 1

B. r

C. r^2

D. None of these

Answer: C

Watch Video Solution

2. Prove that: $\sin\left(\frac{\pi}{10}\right) + \sin\left(\frac{13\pi}{10}\right) = -\frac{1}{2}$

A. 1

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. None of these

Answer: C

Watch Video Solution

3. Prove that: $\sin 20^0 \sin 40^0 \sin 60^0 \sin 80^0 = \frac{3}{16}$

A. $\frac{1}{16}$

B. $\frac{3}{16}$

C. $-\frac{3}{16}$

D. None of these

Answer: B

Watch Video Solution

4. $\sin^2 24^\circ - \cos^2 84^\circ = ?$

A. $\frac{\sqrt{5}-1}{8}$

B. $\frac{\sqrt{5}+1}{8}$

C. $\frac{\sqrt{5}-1}{4}$

D. None of these

Answer: A

Watch Video Solution

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

A. 2

B. 0

C. 1

D. None of these

Answer: B

Watch Video Solution

6. Maximum value of $(3\sin\theta + 4\cos\theta)$ is:

A. 5

B. -5

C. 1

D. None of these

Answer: A

Watch Video Solution

7. If $\sin x + \sin y = \sqrt{3}(\cos y - \cos x)$, then $\sin 3x + \sin 3y =$ _____

(a) $2\sin 3x$ (b) 0 (c) 1 (d) none of these

A. 1

B. -1

C. 0

D. None of these

Answer: C

Watch Video Solution

8. Prove that: $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2\frac{x-y}{2}$

A. $4\sin^2\left(\frac{x-y}{2}\right)$

B. $4\cos^2\left(\frac{x-y}{2}\right)$

C. $4\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$

D. $4\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$

Answer: A

Watch Video Solution

9. If $2\cos\theta = x + \frac{1}{x}$, then $2\cos 2\theta = ?$

Watch Video Solution

10. If $A + B = 45^\circ$, show that $(1 + \tan A)(1 + \tan B) = 2.$

A. 2

B. -2

C. 1

D. 0

Answer: A

Watch Video Solution

11. Prove that: $\frac{\cos^2 \pi}{8} + \frac{\sin^2(3\pi)}{8} + \frac{\sin^2(5\pi)}{8^2_{\sin}} \frac{7\pi}{8} = 2$

A. -1

B. 1

C. -2

D. 2

Answer: D

Watch Video Solution

12. If $\sin x + \sin^2 x = 1$,then $\cos^4 x + \cos^2 x = ?$

A. 2

B. -2

C. 1

D. -1

Answer: C

Watch Video Solution

13. If $4\sin^2\theta = 3,$ then general value of θ is:

A. $n\pi \pm \frac{\pi}{4}$

B. $n\pi \pm \frac{\pi}{3}$

C. $n\pi \pm \frac{\pi}{6}$

D. None of these

Answer: B

Watch Video Solution

14. If $\sin 7\theta = \cos 5\theta$, then general value of θ is:

Watch Video Solution

15. If $\tan 3\theta = \cot \theta$, then general value of θ is :

Watch Video Solution

16. Find the general value of θ from the equation $\tan\theta + \tan 2\theta + \tan 3\theta = \tan\theta.\tan 2\theta.\tan 3\theta.$

A. $\frac{n\pi}{3}$

B. $\frac{n\pi}{4}$

C. $\frac{n\pi}{6}$

D. $\frac{n\pi}{2}$

Answer: c

Watch Video Solution

17. Solve the following equation : $\cot\theta + tan\theta = 2$

A. $n\pi + (-1)^n \frac{\pi}{2}$

B. $\frac{1}{2}\left[n\pi + (-1)^n \frac{\pi}{2}\right]$

C. $\frac{1}{3}\left[n\pi + (-1)^n \frac{\pi}{2}\right]$

D. None of these

Answer: B

Watch Video Solution

18. The solution of $\cos 2\theta = \cos^2 \theta$ is:

Watch Video Solution

19. $\cot \theta = -\sqrt{3}$ and $\cos ec\theta = 2$

A. $n\pi + \frac{\pi}{6}$

B. $n\pi + \frac{7\pi}{6}$

C. $n\pi - \frac{7\pi}{6}$

D. None of these

Answer: B

Watch Video Solution

20. Solve: $2\sin^2\theta + \sin^2 2\theta = 2$

A. $\left(n\pi - \frac{\pi}{3}\right)$

B. $n\pi - \frac{\pi}{6}$

C. $n\pi - \frac{\pi}{4}$

D. $n\pi - \frac{\pi}{12}$

Answer: C

Watch Video Solution

21. If $\sqrt{3}\sin\theta - \cos\theta = 0$, then one general value of θ is:

A. $\frac{n\pi}{2}$

B. $\frac{n\pi}{4}$

C. $\frac{n\pi}{6}$

D. $\frac{n\pi}{3}$

Answer: D

Watch Video Solution

22. In ΔABC, a=12 m, $\angle B = 30^\circ$ and $\angle C = 90^\circ$, then area of $\Delta ABC = ?$

A. $2n\pi + \frac{5\pi}{12}$

B. $2n\pi - \frac{5\pi}{12}$

C. $n\pi + \frac{5\pi}{12}$

D. $n\pi - \frac{5\pi}{12}$

Answer: A

Watch Video Solution

23. In ΔABC, a=12 cm, $\angle B = 30^\circ$ and $\angle C = 90^\circ$, then area of $\Delta ABC = ?$

A. $6\sqrt{3}m^2$

B. $24\sqrt{3}m^2$

C. $36\sqrt{3}m^2$

D. None of these

Answer: B

Watch Video Solution

24. In ΔABC, $\frac{\cot A}{2}, \frac{\cot B}{2}, \frac{\cot C}{2}$ are in A.P., then the true statement is:

A. $b^2 = ac$

B. $c^2 = ab$

C. $2b = a + c$

D. $2a = b + c$

Answer: C

Watch Video Solution

25. In ΔABC, if a,b,c are in A.P. prove that:

$\cot\left(\frac{A}{2}\right), \cot\left(\frac{B}{2}\right), \cot\left(\frac{C}{2}\right)$ are also in A.P.

A. 3

B. 6

C. 0

D. -3

Answer: A

Watch Video Solution

26. In ΔABC, $a = 9, b = 8$ and c=4, then $3\cos B - 6\cos C = ?$

Watch Video Solution

27. In ΔABC, If $\frac{1}{a+b}+\frac{1}{b+c}=\frac{3}{a+b+c}$, then $\angle B=?$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

Watch Video Solution

28. In any ΔABC, prove that

$a^3\cos(B-C)+b^3\cos(C-A)+c^3\cos(A-B)=3abc$

A. abc

B. 2abc

C. 3abc

D. 4abc

Answer: C

Watch Video Solution

29. With usual notations, if in a triangle ABC,

$\frac{b+c}{11} = \frac{c+a}{12} = \frac{a+b}{13}$, then cosA : cosB : cosC is equal to

A. $25:19:17$

B. $9:7:25$

C. $7:9:25$

D. $7:19:25$

Answer: D

Watch Video Solution

30. In ΔABC,

$(b-c)\frac{\cot A}{2} + (c-a)\frac{\cot B}{2} + (a-b)\frac{\cot C}{2} = ?$

A. 0

B. 1

C. -1

D. abc

Answer: A

Watch Video Solution

31. In a ΔABC, if $\frac{2\cos A}{a} + \frac{\cos B}{b} + \frac{2\cos C}{c} = \frac{a}{bc} + \frac{b}{ca}$, prove that $\angle A = 90^\circ$.

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

Watch Video Solution

32. In ΔABC, $a = 3, b = 4, c = 2$, then $\frac{\cos A}{2} = ?$

A. $\frac{3\sqrt{6}}{8}$

B. $\frac{\sqrt{10}}{8}$

C. $\frac{2\sqrt{6}}{9}$

D. $\frac{\sqrt{10}}{9}$

Answer: A

Watch Video Solution

EXERCISES 3Q

1. If for $\theta \varepsilon R$, maximum value of $5\sin + 3\sin(\theta - \alpha) + 3$ is equal to 10 then

A. 5

B. 11

C. 10

D. None of these

Answer: c

Watch Video Solution

2. If $A = \sin^2\theta + \cos^4\theta$, then find all real values of θ.

A. $\frac{3}{4} \leq A \leq \frac{13}{16}$

B. $\frac{3}{4} \leq A \leq 1$

C. $1 \leq A \leq 2$

D. $\frac{13}{16} \leq A \leq 1$

Answer: b

Watch Video Solution

3. Find the value of $\sqrt{3}\cos ec20^\circ - \sec 20^\circ$

A. 1

B. 2

C. 4

D. None of these

Answer: c

Watch Video Solution

4. If $\cos x = \tan y$, $\cos y = \tan z$ and $\cos z = \tan x$, then $\sin^2 x = ?$

A. $2\sin 18^\circ$

B. $\sin 18^\circ$

C. $2\cos 18^\circ$

D. None of these

Answer: a

Watch Video Solution

5. $3(\sin\theta - \cos\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4\left(\sin^6\theta + \cos^6\theta\right)$ is equal to

A. 0

B. 1

C. -13

D. 13

Answer: d

Watch Video Solution

6. If $\sin x + \cos x = a$, then

(i) $\sin^6 x + \cos^6 x = \ldots .$

(ii) $|\sin x - \cos x| = \ldots .$

A. $\frac{4 - 3\left(m^2 - 1\right)^2}{4}$

B. $\frac{3 + \left(m^2 - 1\right)^2}{4}$

C. $\frac{4 + 3\left(m^2 - 1\right)^2}{4}$

D. None of these

Answer: a

Watch Video Solution

7. If $\cos A + \cos B = m$ and $\sin A + \sin B = n$ wherem, $n \neq 0$, then $\sin(A + B)$ is equal to

A. $\frac{mn}{m + n}$

B. $\frac{m^2 + n^2}{2mn}$

C. $\frac{2mn}{m^2+n^2}$

D. $\frac{mn}{m^2+n^2}$

Answer: c

Watch Video Solution

8. The solution set of the equation $4\sin\theta.\cos\theta - 2\cos\theta - 2\sqrt{3}\sin\theta + \sqrt{3} = 0$ in the interval $(0, 2\pi)$ is :

A. $\frac{3\pi}{4}, \frac{7\pi}{4}$

B. $\left(\frac{\pi}{3}\right), \frac{5\pi}{3}$

C. $\frac{3\pi}{4}, \frac{7\pi}{4}, \frac{\pi}{3}, \frac{5\pi}{3}$

D. None of these

Answer: d

Watch Video Solution

9. Solutions of the equations $(2\cos x - 1)(3\cos x + 4) = 0$ is $[0, 2\pi]$ is:

A. $\frac{\pi}{3}$

B. $\frac{\pi}{3}, \frac{5\pi}{3}$

C. $\frac{\pi}{3}, \frac{5\pi}{3}, \cos^{-1}\left(-\frac{4}{3}\right)$

D. None of these

Answer: B

Watch Video Solution

10. If $\frac{\sin(\theta+\alpha)}{\cos(\theta-\alpha)} = \frac{1-m}{1+m}$, prove that $\tan\left(\frac{\pi}{4}-\theta\right)\tan\left(\frac{\pi}{4}-\alpha\right) = m$

A. m

B. 2m

C. 3m

D. 4m

Answer: a

Watch Video Solution

11. If $4\sin^4 x + \cos^4 x = 1$, then one general value is:

A. $\frac{n\pi}{12}$

B. $\frac{n\pi}{6}$

C. $\frac{n\pi}{2}$

D. $n\pi$

Answer: d

Watch Video Solution

12. If $\left(2+\sqrt{3}\right)\cos\theta = 1 - \sin\theta$, then one general value is:

A. $2n\pi + \frac{\pi}{2}$

B. $n\pi + \frac{\pi}{2}$

C. $n\pi + \frac{\pi}{3}$

D. None of these

Answer: a

Watch Video Solution

13. The general solution of equation $3\tan(\theta - 15^o) = \tan(\theta + 15^o)$ is:

A. $n\pi + (-1)^n \frac{\pi}{4}$

B. $\frac{n\pi}{2} + (-1)^n \frac{\pi}{4}$

C. $\frac{n\pi}{3} + (-1)^n \frac{\pi}{6}$

D. None of these

Answer: b

Watch Video Solution

14. The solution of $\cos\theta.\ \cos 2\theta.\ \cos 3\theta = \frac{1}{4}, 0 < \theta < \frac{\pi}{4}$ is:

A. $\frac{\pi}{8}$

B. $\frac{\pi}{6}$

C. $\frac{\pi}{9}$

D. $\frac{\pi}{12}$

Answer: a

Watch Video Solution

15. If $\sec\theta - 1 = \left(\sqrt{2} - 1\right)\tan\theta$, then general value of θ is:

A. $\frac{n\pi}{2}$

B. $n\pi$

C. $2n\pi$

D. $3n\pi$

Answer: c

Watch Video Solution

16. If $\sin 3\alpha = 4\sin\alpha\sin(x+\alpha)\sin(x-\alpha)$, then

A. $n\pi \pm \frac{\pi}{4}$

B. $n\pi \pm \frac{\pi}{3}$

C. $2n\pi$

D. $n\pi$

Answer: b

Watch Video Solution

17. The number of solutions of the equation $\sin\theta + \cos\theta = 2$ are:

A. 1

B. 2

C. 0

D. infinite

Answer: c

Watch Video Solution

18. If $\sin\theta - 3\sin 2\theta + \sin 3\theta = \cos\theta - 3\cos 2\theta + \cos 3\theta$, then one of the general value is:

A. $\frac{n\pi}{2} + \frac{\pi}{8}$

B. $n\pi + \frac{\pi}{8}$

C. $n\pi - \frac{\pi}{8}$

D. $\frac{n\pi}{2} - \frac{\pi}{8}$

Answer: a

Watch Video Solution

19. If $3\tan^2\theta - 2\sin\theta = 0$, then general value of θ is:

A. $n\pi$

B. $\frac{n\pi}{2}$

C. $\frac{n\pi}{3}$

D. $\frac{n\pi}{4}$

Answer: a

Watch Video Solution

20. If $\cos\theta + \cos 3\theta + \cos 5\theta + \cos 7\theta = 0$, then general value of θ is:

A. $(2n+1)\frac{\pi}{2}$

B. $(2n+1)\frac{\pi}{3}$

C. $(2n+1)\frac{\pi}{4}$

D. $(2n+1)\frac{\pi}{6}$

Answer: c

Watch Video Solution

21. Maximum value of $(3\sin\theta + 4\cos\theta)$ is:

Watch Video Solution

EXERCISES 3.1

1. Find the radian measures corresponding to the following degree measures:(i) $25o$ (ii) $-47o30'$ (iii) $240o$ (iv) $520o$

A. 25°

B. $-47^\circ 30'$

C. 240°

D. 520°

Watch Video Solution

2. Find the degree measures corresponding to the following radian measures (use $\pi = \frac{22}{7}$). (i) $\frac{11}{16}$ (ii) 4 (iii) $\frac{5\pi}{3}$ (iv) $\frac{7\pi}{6}$

A. $\frac{11}{16}$

B. -4

C. $\frac{5\pi}{3}$

D. $\frac{7\pi}{6}$

Watch Video Solution

3. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?

Watch Video Solution

4. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm (use $\pi = \frac{22}{7}$).

Watch Video Solution

5. In a circle of diameter 40 cm. the length of a chord is 20 cm. Find the length of minor arc of the chord.

Watch Video Solution

6. If arcs of same length in two circles subtend angles of 60° and 75° at their centers, find the ratios of their radii.

Watch Video Solution

7. Find the angle in radian through which a pendulum swings if its length is 75 cm and the tip describes an arc of length (i) 10 cm (ii) 15 cm (iii) 21 cm

Watch Video Solution

EXERCISES 3.2

1. Find the values of trignometric functions in Questions 6 to 10.

$\sin 765^\circ$

Watch Video Solution

2. Find the value of other five trigonometric function $\sin x = \frac{3}{5}$, x lies in second quadrant.

Watch Video Solution

3. Find the value of other five trigonometric function $\cot x = \frac{3}{4}$, x lies in third quadrant.

Watch Video Solution

4. Find the value of other five trigonometric function $\sec x = \frac{13}{5}$, x lies in fourth quadrant.

Watch Video Solution

5. Find the value of other five trigonometric function $\tan x = -\frac{5}{12}$, x lies in second quadrant.

Watch Video Solution

6. Find the values of other five trignometric functions in Questions 1 to 5.

$\cos x = -\frac{1}{2}$, x lies in third quadrant.

Watch Video Solution

7. Find the values of the trigonometric function $\mathrm{cosec}(-1410o)$.

Watch Video Solution

8. Find the values of the following :

i) $\tan\left(\frac{19\pi}{3}\right)$

ii) $\sec\left(\frac{-22\pi}{3}\right)$

Watch Video Solution

9. $\sin\left(\frac{-11\pi}{3}\right)$

Watch Video Solution

10. $\cot\left(\frac{-15\pi}{4}\right)$

Watch Video Solution

EXERCISES 3.3

1. $\sin^2\left(\frac{\pi}{6}\right)+\cos^2\left(\frac{\pi}{3}\right)-\tan^2\left(\frac{\pi}{4}\right)=-\frac{1}{2}$

Watch Video Solution

2. $2\sin^2\frac{\pi}{6}+\cos ec^2\frac{7\pi}{6}\cos^2\frac{\pi}{3}=\frac{3}{2}$

Watch Video Solution

3. $\cot^2\frac{\pi}{6}+\cos ec\frac{5\pi}{6}+3\tan^2\frac{\pi}{6}=6$

Watch Video Solution

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

Watch Video Solution

5. Find the value of: $\sin 75^0$

A. 0

B. $\frac{\sqrt{1}}{2\sqrt{2}}$

C. $\sqrt{2}$

D. $\frac{\sqrt{3}+1}{2\sqrt{2}}$

Answer: D

Watch Video Solution

6. Find the value of $\tan 15^0$

Watch Video Solution

7. Prove that:

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

Watch Video Solution

8. $\frac{\tan\left(\frac{\pi}{4}+x\right)}{\tan\left(\frac{\pi}{4}-x\right)}=\left(\frac{1+\tan x}{1-\tan x}\right)^2$

Watch Video Solution

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

Watch Video Solution

10. Prove that:

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

13. Prove that:$\cos^2 2x-\cos^2 6x=\sin 4x\sin 8x$

Watch Video Solution

14. Prove that:$\sin 2x+2\sin 4x+\sin 6x=4\cos^2 x\sin 4$

Watch Video Solution

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

Watch Video Solution

16. Prove that $\cot 4x(s\in 5x+s\in 3x)=\cot x(s\in 5x-s\in 3x)$

Watch Video Solution

17. Prove that: $\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = -\frac{\sin 2x}{\cos 10x}$

Watch Video Solution

18. Prove that: $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$

Watch Video Solution

19. Show that $\frac{\sin x - \sin y}{\cos x + \cos y} = \tan\left(\frac{x - y}{2}\right)$

Watch Video Solution

20. Prove that: $\frac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

Watch Video Solution

21. Prove that : $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$

Watch Video Solution

22. $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

Watch Video Solution

23. $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$

Watch Video Solution

24. Prove that:$\tan 4x = \frac{4\tan x\left(1 - \tan^2 x\right)}{1 - 6\tan^2 x + \tan^4 x}$

Watch Video Solution

25. Prove that:$\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

Watch Video Solution

EXERCISES 3.4

1. Find the principal and general solution of $\tan x = \sqrt{3}$

A. $x = n\pi + \frac{\pi}{6}$

B. $x = n\pi + \frac{\pi}{3}$

C. $x = n\pi \pm \frac{\pi}{6}$

D. $x = n\pi \pm \frac{\pi}{3}$

Answer: B

Watch Video Solution

2. $\sec x = 2$

Watch Video Solution

3. Find the principal and general solution of $\cot x = -\sqrt{3}$

Watch Video Solution

4. Solve: $\cos 4x = \cos 2x$

Watch Video Solution

5. Solve

$\cos 3x + \cos x - \cos 2x = 0$

Watch Video Solution

6. $\sin 2x + \cos x = 0$

Watch Video Solution

7. Find the general solution : $\sec^2 2x = 1 - \tan 2x$

Watch Video Solution

8. $\sin x + \sin 3x + \sin 5x = 0$

Watch Video Solution

MISCELLANEOUS EXERCISE

1. about to only mathematics

Watch Video Solution

2. Prove that: (sin 3 x +sin x) sin x + (cos 3x - cos x) cos x = 0

Watch Video Solution

3. Prove that: $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2 \frac{x+y}{2}$

Watch Video Solution

4. Prove that: $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2 \frac{x-y}{2}$

Watch Video Solution

5. Show that $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\sin 4x \cos 2x \cos x$.

Watch Video Solution

6. Prove that: $\frac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$

Watch Video Solution

7. Prove that: $\sin 3x + \sin 2x - \sin x = 4\sin x \cos\left(\frac{x}{2}\right)\cos\left(\frac{3x}{2}\right)$

Watch Video Solution

8. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ of the following : $\tan x = -\frac{4}{3}, x$ in quadrant II

Watch Video Solution

9. $\cos x = -\frac{1}{3}$, x in quadrant III. Find the values of other five trignometric functions

Watch Video Solution

10. $\sin x = \frac{1}{4}$, x in quadrant II. Find the values of other five trignometric functions

Watch Video Solution