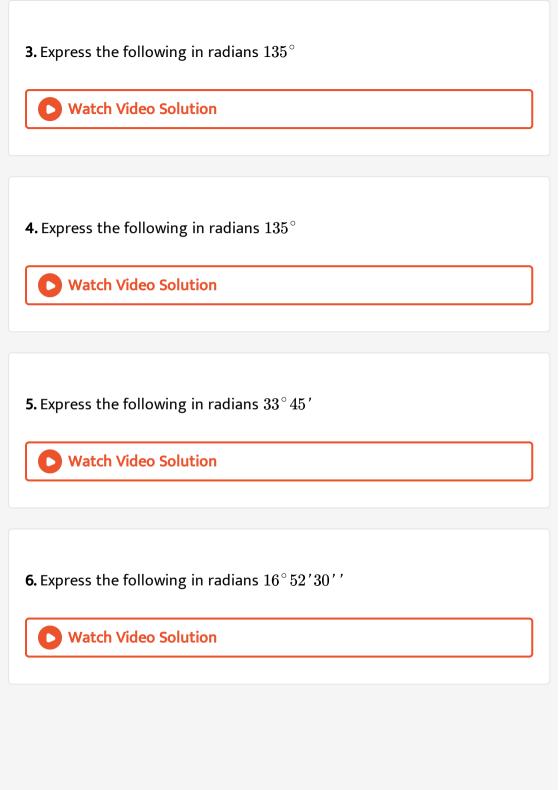# MATHS

BOOKS - A N EXCEL PUBLICATION

TRIGONOMETRIC FUNCTIONS

Question Bank

1. Express the following in degrees $\dfrac{\pi^c}{4}$

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2. Express the following in degrees $\dfrac{(2\pi)^c}{3}$

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3. Express the following in radians $135°$

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4. Express the following in radians $135°$

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5. Express the following in radians $33°\,45'$

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6. Express the following in radians $16°\,52'30''$

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7. A wheel makes 180 revolutions per minute.Through how many radians does it turn in one second?

8. Find the angle between the minute hand of a clock and hour hand when the time is 7.20.

9. If the arcs of the same length in two circles subtend angles $60°$ and $90°$ at their centres . Find the ratio of radii.

10. Find the radian measure corresponding to the following degree measures: $25°$

11. Convert the following degree measure into radian measure.

$-47° \ 30'$

12. Find the radian measure corresponding to the following degree measures: $240°$

13. Find the radian measure corresponding to the following degree measures: $520°$

14. Find the degree measures corresponding to the following radian measures $\left(use\, \pi = \dfrac{22}{7} \right) \dfrac{11}{16}$

15. Find the degree measures corresponding to the following radian measures $\left(use\, \pi = \dfrac{22}{7} \right) - 4$

16. Find the degree measures corresponding to the following radian measures $\left(use\, \pi = \dfrac{22}{7} \right) \dfrac{5\pi}{3}$

17. Find the degree measures corresponding to the following radian measures $\left(use\, \pi = \dfrac{22}{7} \right) \dfrac{7\pi}{6}$

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

19. Find the degree measures of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm $\left(use\pi = \dfrac{22}{7} \right)$

20. In a circle of diameter 40 cm, the length of a cord is 20 cm. Find the length of minor arc of the cord.

21. If two circles arc of the same length subtend angles $60°$ and $75°$ at the centre , Find the ratio of their radii.

22. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc of length 10 cm.

23. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc of length 15cm

24. Find the angle in radian through which a pendulum swings if its length is 75cm and the tip describes an arc of length 21cm

25. Express $105°$ in radian.

26. A horse is tied to a stake by a rope 30 m long. If the horse move along the circumference of a circle by keeping the rope tight find how far it will have gone when the rope has traced an angle of $105°$

27. Fill in the blanks

Degree	Radian
25°	....
....	$5\dfrac{\pi}{3}$
− 47° 30′	....
....	$7\dfrac{\pi}{6}$

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28. The angles of a triangle are in the ratio 2:3:4 .Express the angles in radian measures as well as in degree.

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29. Complete the following tables:

Degree	15°	------	420°	------	18°	------
Radians	------	$\dfrac{\pi}{4}$	------	$8\dfrac{\pi}{3}$	-----	-2

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30. If an arc of length l of a circle of radius r subtends an angle θ radians at the centre what is the relation connecting l , r , θ

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31. Find the length of an arc of a circle of radius 5 cms subtending a central angle measuring $15°$

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32. If the length of a chord of a circle of diameter 40 cm is 20 cm , what is the angle subtended by the chord at the centre of the circle ?

33. In a circle of diameter 40 cm, the length of a cord is 20 cm. Find the length of minor arc of the cord.

34. If the angle subtended at the centre of a circle of diameter 50 cm by an arc of length 11 cm is θ radians find θ

35. If the angle subtended at the centre of a circle of diameter 50 cm by an arc of length 11 cm is θ radians.Find the angle subtended above in

degree $\left(use \pi = \dfrac{22}{7} \right)$

36. Consider a pendulum of length 50 cms If the tip of the pendulum describes an arc of length 10 cms find the angle (in radian) through which the pendulum swings.

37. Consider a pendulum of length 50 cms If the tip of the pendulum describes an arc of length 10 cms find the angle through which the pendulum swings. Find this angle in degrees.

38. Consider a pendulum of length 50 cms. If the tip describes an arc of length 20 cms find the angle in degree $\left(\pi = \dfrac{22}{7} \right)$ through which

pendulum swings.

39. The minute hand of a big clock in 36cms long what is the angle (in radians) described by the minute hand in 20 minutes.

40. The minute hand of a big clock in 36 cms long how many cms does the extremity of the minute hand move in 20 minutes time. $\left(use\pi = \dfrac{22}{7}\right)$

41. Find the value of the other five trignometric functions if cosx= $\left(-\dfrac{1}{2}\right)$, x lies in 3rd quadrant.

42. If $\sin x = \dfrac{3}{5}$ and x lies in the 2nd quadrant find the values of the other five trignometric functions.

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43. If $\cot x = \dfrac{3}{4}$ and x lies in the 3rd quadrant find the values of the other five trignometric functions.

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44. If $\sec x = \dfrac{13}{5}$ and x lies in fourth quadrant then find the values of the other five trignometric functions.

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45. If $\tan x = -\dfrac{5}{12}$ and x lies in second quadrant then find the values of the other trignometric functions.

46. Find the value of $\sin 765°$

47. Find the value of $\cos ec(- 1410°)$

48. Find the value of $\tan\left(\dfrac{19\pi}{3}\right)$

49. Find the value of $\sin\left(\dfrac{-11\pi}{3}\right)$

50. Find the value of $\cot\left(\dfrac{-15\pi}{4}\right)$

51. If $\sin\alpha = \dfrac{15}{17}$, $\cos\beta = \dfrac{12}{13}$ and α and β are in the first quadrant , find the values of $\sin(\alpha+\beta)$, $\cos(\alpha+\beta)$, and $\tan(\alpha+\beta)$

52. If $\tan A = \dfrac{a}{a+1}$ and $\tan B = \dfrac{1}{2a+1}$ .prove that $A+B=45°$; $a \neq \left(-\dfrac{1}{2}\right)$ and a $\neq$ -1

53.   Show   that

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

54. If $A + B = \dfrac{\pi}{4}$ show that (1+tanA)(1+tanB)=2

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55. Prove that $\tan 70° = \tan 20° + 2\tan 50°$

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56. Prove that $\tan 225° \cot 405° + \tan 675° \cot 315° = 2$

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57. Prove that $\dfrac{\sin A + \sin 3A + \sin 5A}{\cos A + \cos 3A + \cos 5A} = \tan 3A$

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58. Prove that $(\cos A - \cos B)^2 + (\sin A - \sin B)^2 = 4\sin^2\left(\dfrac{A-B}{2}\right)$

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59. Prove that $\left(\dfrac{\sin(3A)}{\sin A}\right) + \left(\dfrac{\cos(3A)}{\cos A}\right) = 4\cos 2A$

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60. Prove that $\dfrac{\tan 5\theta + \tan 3\theta}{\tan 5\theta - \tan 3\theta} = 4\cos 2\theta \cos 4\theta$

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61. Prove that $1 - 8\sin^2 A \cos^2 A = \cos 4A$

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62. If $2\cos\theta = x + \left(\dfrac{1}{x}\right)$ prove that $2\cos 3\theta = x^3 + \left(\dfrac{1}{x^3}\right)$

63. If $\tan\theta = \dfrac{b}{a}$ Show that $a\cos 2\theta + b\sin 2\theta = a$

64. If $\tan A = \dfrac{1}{3}$ and $\tan B = \dfrac{1}{7}$, show that $2A + B = 45°$

65. Prove that $\sin^2\left(\dfrac{\pi}{8}\right) + \sin^2\left(\dfrac{3\pi}{8}\right) + \sin^2\left(\dfrac{5\pi}{8}\right) + \sin^2\left(\dfrac{7\pi}{8}\right) = 2$

66. Prove that $\dfrac{1 + \cos\theta + \sin\theta}{1 - \cos\theta + \sin\theta} = \cot\left(\dfrac{\theta}{2}\right)$

67. If $\tan\left(\dfrac{A}{2}\right)$=x show that secA+tanA=$\dfrac{1+x}{1-x}$

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

69. Prove that $2\sin^2\left(\dfrac{\pi}{6}\right) + \cos ec^2\left(\dfrac{7\pi}{6}\right)\cos^2\left(\dfrac{\pi}{3}\right) = \dfrac{3}{2}$

70. Prove that $\cot^2\left(\dfrac{\pi}{6}\right) + \cos ec\left(\dfrac{5\pi}{6}\right) + 3\tan^2\left(\dfrac{\pi}{6}\right) = 6$

71. Prove that $2\sin^2\left(\dfrac{3\pi}{4}\right) + 2\cos^2\left(\dfrac{\pi}{4}\right) + 2\sec^2\left(\dfrac{\pi}{3}\right) = 10$

72. Find the value of

$\sin 75^\circ$

73. Show that

$\tan 15^\circ = 2 - \sqrt{3}$

74.   Prove   that

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

75. prove that

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

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

77.   Prove   that

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

78. Prove that

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

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

80. prove the following

$$\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$$

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

82. prove the following

$$\sin 2x + 2\sin 4x + \sin 6x = 4\cos^2 x \sin 4x$$

83. Prove that $\cot 4x(\sin 5x + \sin 3x) = \cot x(\sin 5x - \sin 3x)$

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

85. Prove that $\dfrac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$

86. Prove that $\dfrac{\sin x - \sin y}{\cos x + \cos y} = \dfrac{\tan(x-y)}{2}$

87. Prove that $\dfrac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

88. prove the following

$\dfrac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$

89. prove the following

$\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

90. Prove that $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$

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

92. Prove that $1 - 8\sin^2 A \cos^2 A = \cos 4A$

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

94. Suppose that $\cos \theta = -\dfrac{1}{2}$ and θ is in the 2nd quadrant.Fill in the blanks by choosing the correct answer from the bracket

$\sin \theta = \ldots\ldots\ldots\ldots$, $\tan \theta$=....................

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95. Suppose that $\cos \theta = -\dfrac{1}{2}$ and θ is in the 2nd quadrant prove that

$\dfrac{4\tan \theta + 4\sin \theta}{3\cos \theta - 3\sin \theta} = \dfrac{4\sqrt{3}}{3\left(1 + \sqrt{3}\right)}$

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96. Match the following:

Trigonometric function	Range
$\sin \theta$	$(-1, 1)$
$\tan \theta$	$[-1, 1]$
$\sec \theta$	R
$1 + \cos \theta$	$R - (-1, 1)$
	$[0, 2]$

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97. Nikolas is asked to prove that $\cos^2 x + \cos^4 x = 1$ if $\sin x + \sin^2 x = 1$ He proceeded as follows. But he could not complete the solution. Observe the solution and write the complete solution. Given that $\sin x + \sin^2 x = 1$ therefore $\sin x = 1 - \sin^2 x$

$\sin x = \cos^2 x$...............

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98. Given that three numbers a,b,c are in G.P. If $b^2 = ac$ Prove that $\cot^2 30°$, $\cot^2 45°$, $\cot^2 60°$ are in G.P.

99. Match the following:

Column I	Column II
sin 60°	$\dfrac{1}{2}$
cos 60°	$\sqrt{3}/2$
sin 45°	$\dfrac{\sqrt{3}+1}{2\sqrt{2}}$
sin 105°	$\dfrac{1}{\sqrt{2}}$
	$\dfrac{\sqrt{3}-1}{2\sqrt{2}}$

100. Prove that $\sin 105^\circ + \cos 105^\circ = \cos 45^\circ$

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101. Choose the correct answer from the bracket and fill in the blank sin(B-C)=............... (sinBcosC+cosBsinC,sinBcosC-cosBsinC , sinBsinC+cosB cosC, sinBsinC-cosBcosC)

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102. Prove that

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

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103. A wheel is rotated $\dfrac{\pi}{2}$ radians. Convert the angle of rotation into degree measures If it rotates 75° show that $\sin 75^\circ = \dfrac{\sqrt{3} + 1}{2\sqrt{2}}$, using

$$75° = 45° + 30°$$

104. A wheel is rotated $\dfrac{\pi}{2}$ radians. Convert the angle of rotation into degree measures Evaluate the following $\sin 765°$

105. Evaluate the following $\tan\left(\dfrac{13\pi}{3}\right)$

106. Given that $\sin x + \sin y = a$ and $\cos x + \cos y = b$ rajan derived the value of $\tan\left(\dfrac{x+y}{2}\right)$ as follows. Fill in the blanks and write the complete solution. Given that $\sin x + \sin y = a$ and $\cos x + \cos y = b$.

107. Prove that cotA-tanA=2cotA

108. using cotA-tanA=2cot2A deduce that

$$\tan\alpha + \tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha = \cot\alpha$$

109. What is the value of $\tan 30° + 2\tan 60° + 4\tan 120° + 8\cot 240°$?

Also verify the value directly.

110. Match the following:

Column A	Column B
tan 60°	0
cos 45°	$\sqrt{3}$
sec 30°	$\dfrac{1}{\sqrt{2}}$
cos 90°	$\dfrac{2}{\sqrt{3}}$
	1

111. Prove that $\tan^2 60° + 4\cos^2 45° + 3\sec^2 30° + 5\cos^2 90° = 9$

112. Suppose θ is an acute angle and $\tan\theta + \cot\theta = 2$ Derive a quadratic equation in $\tan\theta$

113. Suppose θ is an acute angle and $\tan\theta + \cot\theta = 2$ solve the given equation.

114. Suppose A and B are angles lying in the first quadrant such that $\tan A = \dfrac{15}{8}$ and $\tan B = \dfrac{12}{5}$ evaluate tan(A-B)

115. Suppose A and B are angles lying in the first quadrant such that $\tan A = \dfrac{15}{8}$ and $\tan B = \dfrac{12}{5}$.Find sin A , sin B, cosA and cosB

116. Suppose A and B are angles lying in the first quadrant such that $\tan A = \dfrac{15}{8}$ and $\tan B = \dfrac{12}{5}$.Prove that $\sin(A - B) = -\dfrac{21}{221}$ and $\cos(A - B) = \dfrac{220}{221}$

117. Which of the following are true if θ is in first quadrant $\tan \theta = -\dfrac{1}{2}$

118. Which of the following are true If θ is in 3rd quadrant $\sin \theta = \dfrac{1}{4}$

119. Which of the following are true? for some angle θ: $\sin \theta = 4$

120. Which of the following are true ?for some angle θ: $\tan\theta = 5$

121. Which of the following are true in the 1st quadrant all trignometric ratios are positive.

122. If $\tan A = \dfrac{18}{17}$ and $\tan B = \dfrac{1}{35}$ prove that tan(A-B)=1

123. If tan(A-B)=1 what is the value of A-B?

124. If $\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$, then by applying the result

$\tan \theta = \left(\dfrac{1}{\cot \theta} \right)$ prove that $\cot(A + B) = \dfrac{\cot A \cot B - 1}{\cot A + \cot B}$

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125. If tanA+tanB=a and cotA+cotB=b prove that $\cot A \cot B = \dfrac{b}{a}$

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126. If tanA+tanB=a and cotA+cotB=b.Prove that $\cot(A+B)=\left(\dfrac{1}{a}\right) - \left(\dfrac{1}{b}\right)$

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127. Complete the following and find the value of $a_1, a_2 \ldots a_7$ and

(i) Complete the following table by finding $a_1, a_2, a_3, a_4, a_5, a_6, a_7$ and $b_1, b_2, b_3, b_4, b_5, b_6, b_7$

θ	120°	330°	240°	420°	390°	450°	-300°
sine	a_1	a_2	a_3	a_4	$\cdot a_5$	a_6	a_7
cosine	b_1	$\cdot b_2$	b_3	$.b_4$	b_5	b_6	b_7

$b_1, b_2 \ldots b_7$

128. Prove that $\sin 120° \cos 330° + \cos 240° \sin 330° = 1$

129. Prove that $\cos 420° \sin 390° + \cos(-300°)\sin(450°) = \dfrac{3}{4}$

130. Prove that $\sin^2(\theta - \phi) - \sin^2(\theta + \phi) = -\sin 2\theta \sin 2\phi$ hence prove that $\cos 2\theta \cos 2\phi - \sin^2(\theta + \phi) + \sin^2(\theta - \phi) = \cos(2\theta + 2\phi)$

131. Given that $\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$ by writing $A + B + C = (A + B) + C$ prove that

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

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132. Given that $\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$ if $A + B + C = 0°$

prove that $\tan A + \tan B + \tan C = \tan A \tan B \tan C$ hence prove

that

$$\tan(x - y) + \tan(y - z) + \tan(z - x) = \tan(x - y)\tan(y - z)\tan(z - x)$$

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133. Prove that $\sin(A + B)\sin(A - B) = \sin^2 A - \sin^2 B$

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134. Given that $\sin 18° = \dfrac{\sqrt{5} - 1}{4}$ prove that

$\sin^2 24° - \sin^2 6° = \dfrac{\sqrt{5} - 1}{8}$,

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135. Express $\sin A + \sin 3A$ and $\cos A + \cos 3A$ in product form

136. Prove that $\dfrac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

137. If $A = 30°$ deduce the value of $\tan 60°$

138. Express $\sin \theta + \sin 3\theta$ and $\sin 5\theta + \sin 7\theta$ in product form

139. Prove that $\sin\theta + \sin 3\theta + \sin 5\theta + \sin 7\theta = 4\cos\theta\cos 2\theta\sin 4\theta$

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140. Express $\cos 40°\cos 80°$ in sum form

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141. Prove that $\cos 20°\cos 40°\cos 80° = \dfrac{1}{8}$

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142. Express sin3A and cos2A in terms of sine function

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143. Convert sin5A+sinA into product form and show that

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

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144. If $A = 18°$ deduce the value of $\sin 36° = \dfrac{\sqrt{10 - 2\sqrt{5}}}{4}$

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145. Prove that $\cos^2 \theta = \dfrac{1 + \cos 2\theta}{2}$

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146. Evaluate $\cos^2\left(\dfrac{\pi}{8}\right) + \cos^2\left(\dfrac{3\pi}{8}\right)$

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147. Evaluate $\cos^2\left(\dfrac{\pi}{8}\right) + \cos^2\left(\dfrac{3\pi}{8}\right) + \cos^2\left(\dfrac{5\pi}{8}\right) + \cos^2\left(\dfrac{7\pi}{8}\right) = 2$

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148. Prove that $\dfrac{\sin A}{1 + \cos A} = \tan\left(\dfrac{A}{2}\right)$

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149. Show that

$\tan 15° = 2 - \sqrt{3}$

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150. Given that $1 - \cos\theta = 2\sin^2\left(\dfrac{\theta}{2}\right)$ and $1 + \cos\theta = 2\cos^2\left(\dfrac{\theta}{2}\right)$

prove that $\dfrac{1 + \sin\theta - \cos\theta}{1 + \sin\theta + \cos\theta} = \tan\left(\dfrac{\theta}{2}\right)$

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151. Given that $1 - \cos\theta = 2\sin^2\left(\dfrac{\theta}{2}\right)$ and $1 + \cos\theta = 2\cos^2\left(\dfrac{\theta}{2}\right)$

deduce the value of $\tan\left(22\dfrac{1}{2}\right)^\circ$

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152. Writing $4A = 2 \times 2A$ prove that

$\sin 4A = 4\sin A \cos^3 A - 4\cos A \sin^3 A$

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153. if $\sin 4A = 4\sin A \cos^3 A - 4\cos A \sin^3 A$ Dividing numerator and

denominator on the R.H.S. by $\cos^4 A$ prove that

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

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154.

$$\cos ecA = \frac{1}{\sin A} \text{ and } \cot A = \frac{\cos A}{\sin A} prove \cos ecA - \cot A = \tan\left(\frac{A}{2}\right)$$

155. Given that $1 - \cos\theta = 2\sin^2\left(\frac{\theta}{2}\right)$ and $1 + \cos\theta = 2\cos^2\left(\frac{\theta}{2}\right)$

deduce the value of $\tan\left(22\frac{1}{2}\right)^\circ$

156. Given that $\tan\theta = \frac{a}{b}$ find $\sin 2\theta$ and $\cos 2\theta$

157. Given that $\tan\theta = \frac{a}{b}$ prove that $b\cos 2\theta + a\sin 2\theta = b$

158. Solve $2 \cos^2 t + 3 \sin t = 0$

159. Solve $\sin 2\theta + \cos \theta = 0$

160. solve $\sqrt{3} \cos \theta + \sin \theta = \sqrt{2}$

161. Find the principle and general solution of the following.

$\tan x = \sqrt{3}$

162. Find the principal and general solutions of the following equations

secx=2

163. Find the principal and general solutions of the following equations

$\cot x = -\sqrt{3}$

164. Find the principle and general solution of the following.

$\cos ecx = -2$

165. Find the general solution of the following equations

$\cos 4x = \cos 2x$

166. Find the general solution of the following equations

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

167. Find the general solution of the following equations

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

168. Find the general solutions for each of the following equations

$$\sec^2 2x = 1 - \tan 2x$$

169. Find the solution of the equation

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

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170. What is the principal value of θ if $\tan \theta = -\sqrt{3}$?

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171. Find the general solution of $\tan \theta = -\sqrt{3}$

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172. complete the following table

Equation	$\sin \theta = \frac{1}{2}$	$\cot \theta = \frac{1}{\sqrt{3}}$	$\sec \theta = 2$	$\operatorname{cosec} \theta = 2$
Principal value of θ				

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173. Consider the trignometric equation $4\cos^2\theta + 6\sin^2\theta = 5$ prove that $\cos^2\theta = \dfrac{1}{2}$

174. Consider the trignometric equation $4\cos^2\theta + 6\sin^2\theta = 5$ prove that the general solution of the given equation is $n\pi \pm \left(\dfrac{\pi}{4}\right) : n \in Z$

175. Consider the equation $\sin\theta + \sin 3\theta + \sin 5\theta = 0$ prove that $\sin 3\theta(1 + 2\cos 2\theta) = 0$

176. Consider the equation $\sin\theta + \sin 3\theta + \sin 5\theta = 0$ prove that the general solution of the given equation is $\theta = \dfrac{m\pi}{3}$ or $n\pi \pm \left(\dfrac{\pi}{3}\right)$:

$m, n \in Z$

177. Consider the equation $\cos\theta + \sin\theta = \sqrt{2}$

prove that $\sin\left(\left(\dfrac{\pi}{4}\right) + \theta\right) = 1$

178. Consider the equation $\cos\theta + \sin\theta = \sqrt{2}$

prove that general solution of the given equation is $\theta = 2n\pi + \dfrac{\pi}{4}$:

$n \in z$

179. Consider the equation $\sqrt{3}\sin x - \cos x = \sqrt{2}$

prove that $\sin\left(x - \left(\dfrac{\pi}{6}\right)\right) = \dfrac{1}{\sqrt{2}}$

180. Consider the equation $\sqrt{3}\sin x - \cos x = \sqrt{2}$

Prove that the general solution of the given equation $x = n\pi + (-1)^n \left(\left(\dfrac{\pi}{4} \right) + \left(\dfrac{\pi}{6} \right) \right) : n \in Z$

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181. Consider the equation $\tan\theta + \sec\theta = \sqrt{3}$

prove that $\tan\left(\left(\dfrac{\pi}{4} \right) + \left(\dfrac{\theta}{2} \right) \right) = \sqrt{3}$

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182. Consider the equation $\tan\theta + \sec\theta = \sqrt{3}$

prove that the general solution of the given equations is $\theta = 2n\pi \pm \left(\dfrac{\pi}{6} \right) : n \in Z$

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183. Prove that $2\cos\left(\dfrac{\pi}{13}\right)\cos\left(\dfrac{9\pi}{13}\right) + \cos\left(\dfrac{3\pi}{13}\right) + \cos\left(\dfrac{5\pi}{13}\right) = 0$

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184. Prove that $(\sin 3x + \sin x)\sin x + (\cos 3x - \cos x)\cos x = 0$

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185. Prove that $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2\left(\dfrac{x+y}{2}\right)$

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186. Prove that $(\cos A - \cos B)^2 + (\sin A - \sin B)^2 = 4\sin^2\left(\dfrac{A-B}{2}\right)$

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187. Prove that $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\cos x \cos 2x \sin 4x$

188. Prove that $\dfrac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$

189. Prove that $\sin 3x + \sin 2x - \sin x = 4 \sin x \cos\left(\dfrac{x}{2}\right) \cos\left(\dfrac{3x}{2}\right)$

190. Find $\sin\left(\dfrac{x}{2}\right)$, $\cos\left(\dfrac{x}{2}\right)$, and $\tan\left(\dfrac{x}{2}\right)$ if $\tan x = -\dfrac{4}{3}$ and x is in the second quadrant.

191. Find $\sin\left(\dfrac{x}{2}\right)$, $\cos\left(\dfrac{x}{2}\right)$ and $\tan\left(\dfrac{x}{2}\right)$ if $\cos x = \left(-\dfrac{1}{3}\right)$ and x lies in the 3rd quadrant .

192. Find $\sin\left(\dfrac{x}{2}\right)$, $\cos\left(\dfrac{x}{2}\right)$ and $\tan\left(\dfrac{x}{2}\right)$ if $\sin x = \dfrac{1}{4}$ and x lies in the second quadrant.