MATHS

BOOKS - CHETANA MATHS (MARATHI ENGLISH)

TRIGONOMETRY

Example

1. Find value $8\sin 30° + 4\cos 60°$.

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2. If $\tan\theta = 1, then \tan(90 - \theta) = ?$

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3. Fill in the blank : $\sin 30° \times \cos\ldots\ldots\ldots = \dfrac{1}{2}$.

4. $\sin A = \dfrac{1}{2}$, $\cos A = ?$

5. If θ is in 1st quadrant, $\sin\theta = \dfrac{3}{5}$, then $\cos\theta = ?$.

6. If $\sin P = \dfrac{1}{2}$ and $\angle P$ and $\angle R$ are complementary, then $\cos R = ?$

7. If $\sin\theta = \dfrac{\sqrt{3}}{2}$, $then \cos\theta = ?$

8. $\sin^2 50° + \cos^2 50° = ?$

9. If $\tan\theta = \dfrac{1}{\sqrt{3}}$, then $\tan(90 - \theta) = ?$

10. If $\sin 30° \times \cos ec\theta = 1$, then $\theta = ?$

11. If $\sin\theta = \dfrac{5}{13}$, then find $\cos\theta$ if θ is in 1st quadrant.

12. Find the value of $\sin^2 30 + \cos^2 60 + \tan^2 45$.

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13. In $\triangle ABC$, $\angle A = \alpha$, $\angle B = 90°$ and $\angle C = \theta$. What are $\tan \alpha$ and $\cos \theta$ in terms of sides of $\triangle ABC$?

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14. $\tan 30° \times \tan \theta = 1$, Find θ.

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15. Fill in the blank: $\cos 45° = \sin....$

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16. Find the value of $\cos 60° \times \cos 30° + \sin 60° \times \sin 30°$.

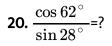**17.** In $\triangle ABC$, $\angle A = 50°$, $\angle B = 90°$ and $\angle C = 40°$. Then write the ratio of $\tan 50°$ in terms of sides of $\triangle ABC$.

18. In $\triangle ABC$, $\angle A = 50°$, $\angle B = 90°$ and $\angle C = 40°$. Then write the ratio of $\cos 40°$ in terms of sides of $\triangle ABC$.

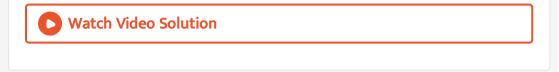**19.** If $\sin \theta = \dfrac{15}{17}$ and θ lies in 1st quadrant, then $\cos \theta = \, ?$

20. $\dfrac{\cos 62^\circ}{\sin 28^\circ} = ?$

21. If $\tan\theta = \dfrac{12}{5}$ and θ lies in 1st quadrant, then find

$5\sin\theta - 12\cos\theta = \ ?$

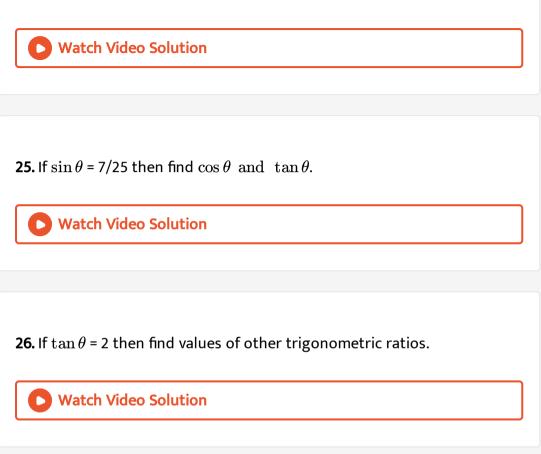**22.** If θ lies in 1st quadrant and $\cos\theta = \dfrac{24}{25}$, then find $\sin\theta$ and $\tan\theta$.

23. If $\sin\theta$ = 11/61 find the values of $\cos\theta$ using trigonometric identity.

24. If $\tan\theta = 3/4$ then find the value of $\sec\theta$ and $\cos\theta$.

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25. If $\sin\theta = 7/25$ then find $\cos\theta$ and $\tan\theta$.

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26. If $\tan\theta = 2$ then find values of other trigonometric ratios.
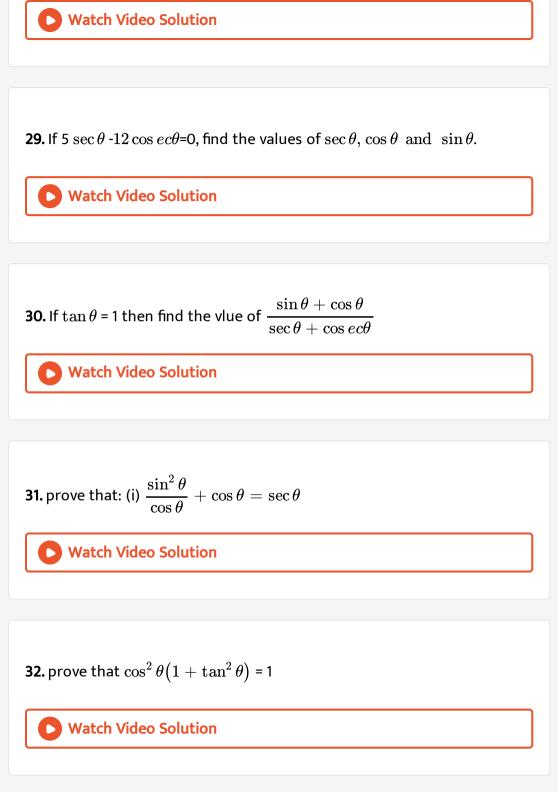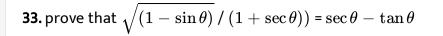
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27. If $\cot\theta = 40/9$, find the value of $\cos es\theta$ and sin theta`.

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28. If $\sec\theta = 13/12$, find values of other trigonometric ratios.

29. If $5 \sec \theta - 12 \cos ec\theta = 0$, find the values of $\sec \theta$, $\cos \theta$ and $\sin \theta$.

30. If $\tan \theta = 1$ then find the vlue of $\dfrac{\sin \theta + \cos \theta}{\sec \theta + \cos ec\theta}$

31. prove that: (i) $\dfrac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta$

32. prove that $\cos^2 \theta \left(1 + \tan^2 \theta\right) = 1$

33. prove that $\sqrt{(1 - \sin\theta) / (1 + \sec\theta))} = \sec\theta - \tan\theta$

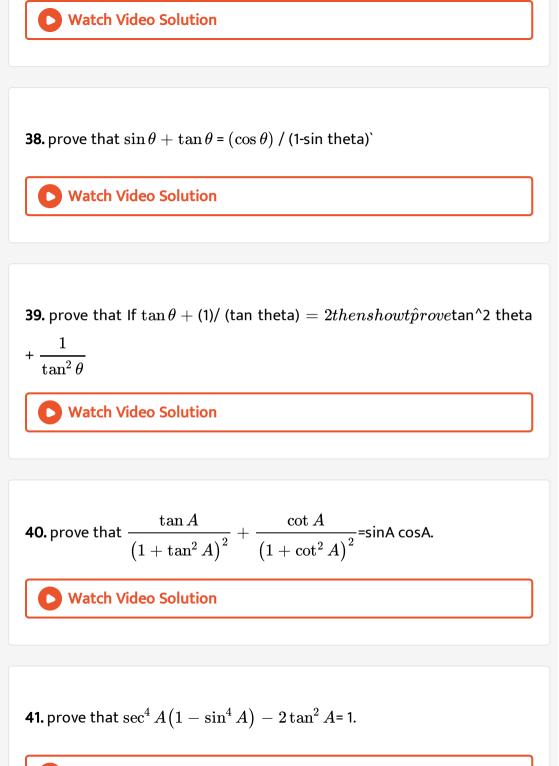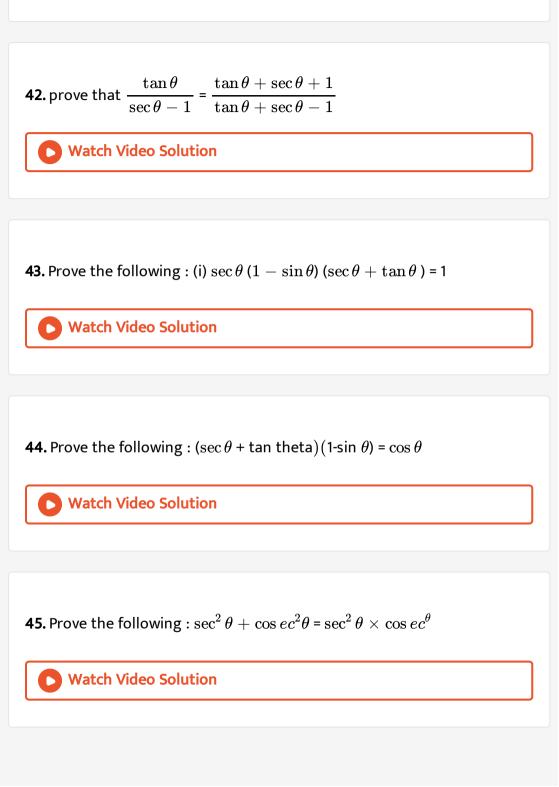**34.** prove that $(\sec\theta - \cos\theta)(\cot\theta + \tan\theta) = \tan\theta.\sec\theta$

35. prove that $\cot\theta + \tan\theta = \cos ec\theta.\sec\theta$

36. prove that $\dfrac{1}{\sec\theta - \tan\theta} = \sec\theta + \tan\theta$

37. Prove that $\sin^4\theta - \cos^4\theta = 1 - 2\cos^2\theta$

38. prove that $\sin\theta + \tan\theta$ = $(\cos\theta)$ / (1-sin theta)`

39. prove that If $\tan\theta + (1)/$ (tan theta) $= 2 then show t \hat{p} rove$ tan^2 theta $+ \dfrac{1}{\tan^2\theta}$

40. prove that $\dfrac{\tan A}{\left(1 + \tan^2 A\right)^2} + \dfrac{\cot A}{\left(1 + \cot^2 A\right)^2}$ =sinA cosA.

41. prove that $\sec^4 A\left(1 - \sin^4 A\right) - 2\tan^2 A$= 1.

42. prove that $\dfrac{\tan\theta}{\sec\theta - 1} = \dfrac{\tan\theta + \sec\theta + 1}{\tan\theta + \sec\theta - 1}$

43. Prove the following : (i) $\sec\theta\,(1 - \sin\theta)\,(\sec\theta + \tan\theta) = 1$

44. Prove the following : $(\sec\theta + \tan\text{ theta})(1\text{-}\sin\theta) = \cos\theta$

45. Prove the following : $\sec^2\theta + \cos ec^2\theta = \sec^2\theta \times \cos ec^\theta$

46. Prove the following : $\cot^2 \theta - \tan^2 \theta = \cos ec^2\theta - \sec^2 \theta$

47. Prove the following :$\tan^4 \theta + \tan^2 \theta = \sec^4 \theta - \sec^2 \theta$

48. (ii) $\dfrac{1}{1 + \sin \theta}$ +(1)/ (1-sin theta) $= $ 2sec^2 theta`

49. Prove the following : $\sec^6 x - \tan^6 x = 1 + 3 \sec^2 x \times \tan^2 x$

50. Prove the following : $\dfrac{\tan \theta}{\sec \theta + 1} = \dfrac{\sec \theta - 1}{\tan \theta}$

51. Prove the following : $\dfrac{\tan^3 \theta - 1}{\tan \theta - 1} = \sec^2 \theta + \tan \theta$

52. Prove the following : $\dfrac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = $ (1)/ (sec theta - tan theta)`

53. A person is standing at a distance of 80 m from a church looking at its top. The angle of elevation is of $45°$. Find the height of the church.

54. A boy standing at a distance of 48 meters from a building observes the top of the building and makes an angle of elevation of $30°$. Find the

height of the building.

55. From the top of a lighthouse, an observer looking at a ship makes an angle of depression of $60°$. If the height of the lighthouse is 90 metre, then find how far the ship is from the lighthouse. ($\sqrt{3} = 1, 73$)

56. From the top of a lighthouse, an observer looks at a ship and finds the angle of depression to be $30°$. If the height of the lighthouse is 100 m, then find how far is that ship from the lighthouse.

57. Two buildings are facing each other on either side of a road of width 12m. From the top of the first building, which is 10 m high, the angle of

elevation of the top of the second is $60°$. What is the height of the second building?

58. Two buildings are in front of each other on a road of width 15 meters. From the top of the first building, having a height of 12 meters, the angle of elevation of the top of the second building is $30°$. What is the height of the second building?

59. Two poles of heights 18 metre and 7 metere are erected on a ground. The length of the wire fastened at their tops in 22 meters. Find the angle made by the wire with the horizontal.

60. A storm broke a tree and the treetop rested 20 m from the base of the tree, making an angle of $60°$ with the horizontal. Find the height of the tree.

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61. A kite is flying at a height of 60 m above the ground. The string attached to the kite is tied at the ground. It makes an angle of $60° with the ground. As \sum \in gt\hat{s}tr \in gisstra \in ght, f \in dthe \leq n > hof$ sqrt3`= 1.73)

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62. Chose the correct alternative answer for the following question. (1)

$\sin\theta . \cos es\theta$=.......

    A. (A) 1

    B. (B) 0

C. (c) 1/2

D. (D) $\sqrt{2}$

Answer:

63. (2) $\cos ec45° = ?$

A. (A) $\dfrac{1}{\sqrt{2}}$

B. (B) $\sqrt{2}$

C. (c) $\sqrt{3}/2$

D. (d) $\dfrac{2}{\sqrt{3}}$

Answer:

64. (3) $1 + \tan^2 \theta$ =?

A. (A)$\cot^2 \theta$

B. (B) $\cos esc^2\theta$

C. (C) $\sec^2 \theta$

D. (D) $\tan^2 \theta$

Answer:

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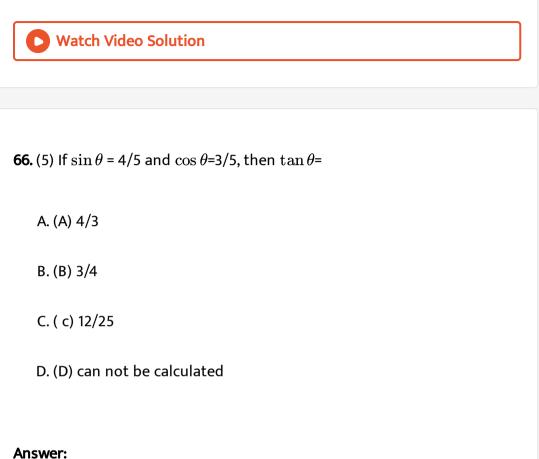**65.** What we see at a higher level from the horizontal line, angle formed is

..............,

A. (A) Angle of Elevation

B. (B) Angle of Depression

C. (C) 0

D. (D) Straight angle

Answer:

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66. (5) If $\sin\theta$ = 4/5 and $\cos\theta$=3/5, then $\tan\theta$=

A. (A) 4/3

B. (B) 3/4

C. (c) 12/25

D. (D) can not be calculated

Answer:

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67. (6) If $\cos ec\theta$ = 61/60, $\sec\theta$ = 61/11, then $\cot\theta$ =........

A. (A) $\dfrac{61^2}{660}$

B. (B) 60/11

C. (C) 11/60

D. (D) can not be calculated

Answer:

68. (7) If $\sin\theta$= 24/25, then $\cos\theta$=.....

A. (A) $\sqrt{24}/5$

B. (B) 25/24

C. (C) 25/7

D. (D) 7/25

Answer:

69. (8) If $\tan\theta=1$, then $\sec\theta=$.......

A. (A) 1

B. (B) $\sqrt{2}$

C. (C) 2

D. (D) 0

Answer:

70. (9) If $\cot\theta=3/4$, then $\tan^2\theta=$.......

A. (A) 4/3

B. (B) 9/16

C. (C) 16/9

D. (D) 5/4

Answer:

71. (10) If $\cos ec\theta = \dfrac{2}{\sqrt{3}}$, then$\theta$=......
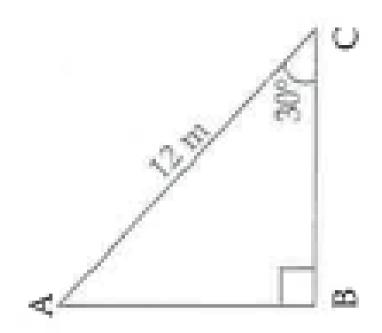
A. (A) $0°$

B. (B) $45°$

C. (C) $30°$

D. (D) $60°$

Answer:

72. In the adjoining figure, If $\angle B = 90°$, $\angle C = 30°$, AC=12 m, then AB =.......a)

$12\sqrt{3}m$ b) 6 $\sqrt{3}$ m c) 12m d) 6m

A. (A) $12\sqrt{3}m$

B. (B) $6\sqrt{3}$ m

C. (C) 12m

D. (D) 6m

Answer:

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73. (12) If $(\sec \theta - 1)(\sec \theta + 1) = 1/3$, then $\cos \theta = ...$

A. (A) 1/2

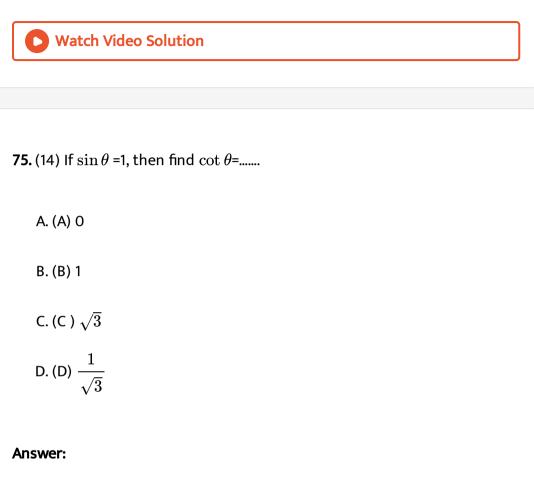B. (B) $1//\sqrt{2}$

C. (c) $\sqrt{3}//2$

D. (D) $sqet2//3$

Answer:

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74. If $\sin \theta + \cos \theta = a$, and $\sin \theta - \cos \theta = b$, then ..... (A) $a^2 + b^2 = 1$ (B) $a^2 - b^2 = 1$ (C) $a^2 + b^2 = 2$ (D) $a^2 - b^2 = 2$

A. (A) $a^2 + b^2 = 1$

B. (B) $a^2 - b^2 = 1$

C. (C) $a^2 + b\text{^}2 = 2$

D. (D) $a^2 - b^2 = 2$

Answer:

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75. (14) If $\sin\theta$ =1, then find $\cot\theta$=.......

A. (A) 0

B. (B) 1

C. (C) $\sqrt{3}$

D. (D) $\dfrac{1}{\sqrt{3}}$

Answer:

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76. (1) If $\tan\theta$=2, find the values of other trigonometric ratios using the identities.

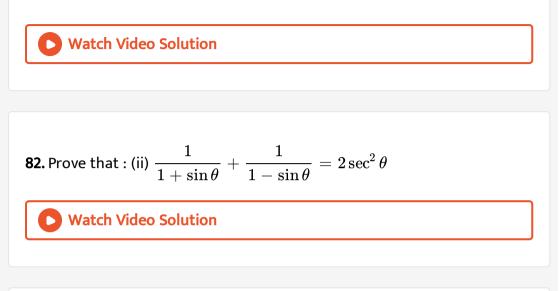**77.** (2) If $\cot \theta = 7/24$, find the values of other trigonometric ratios using the identity.

78. (3) $3 \sin \theta$ -4 $\cos \theta = 0$, then find the values of all trigonometric ratios.

79. If $\sqrt{3} \tan \theta = 3 \sin \theta$, find the value of $\sin \theta^2 \theta - \cos^2 \theta$, where $\theta \neq 0$.

80. (5) Simplify : $\sin \theta \, (\cos ec\theta - \sin \theta)$.

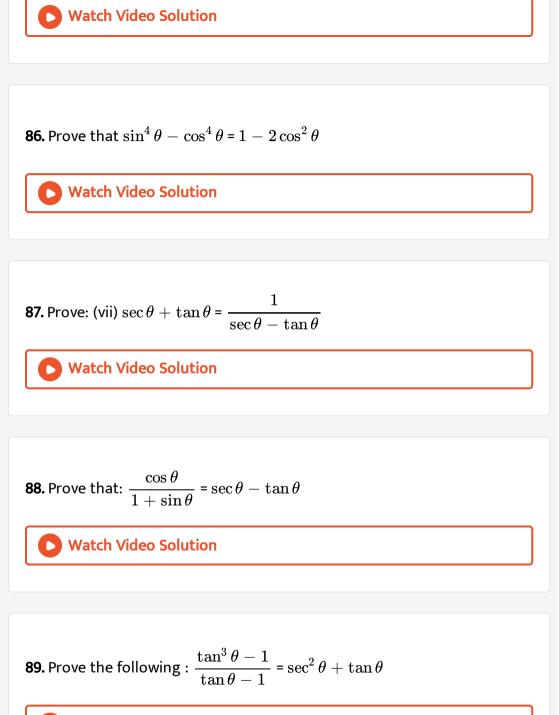**81.** (6) prove : (i) $\cos^2 \theta + (1)/ (1 + \cot^2 \text{theta})` = 1$

82. Prove that : (ii) $\dfrac{1}{1 + \sin \theta} + \dfrac{1}{1 - \sin \theta} = 2 \sec^2 \theta$

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

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

85. Prove: (v) $\cot^2 \theta - \dfrac{1}{\sin^2 \theta} = -1$

86. Prove that $\sin^4 \theta - \cos^4 \theta = 1 - 2\cos^2 \theta$

87. Prove: (vii) $\sec \theta + \tan \theta = \dfrac{1}{\sec \theta - \tan \theta}$

88. Prove that: $\dfrac{\cos \theta}{1 + \sin \theta} = \sec \theta - \tan \theta$

89. Prove the following : $\dfrac{\tan^3 \theta - 1}{\tan \theta - 1} = \sec^2 \theta + \tan \theta$

90. Prove that: (x) $\dfrac{\sin\theta + \tan\theta}{\cos\theta} = \tan\theta\,(1 + \sec\theta)$

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91. Prove that: (xi) $\cos ec^2\,A - \cos^2 A = \dfrac{\sec^2 A - \sin^2 A}{\tan^2 A}$

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92. (xii) $\left(\dfrac{1}{\cos\theta}\right.$ + (1)/(cot theta))times(sec theta - tan theta)` = 1

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93. Prove that: (xiii) $\dfrac{\cos^2 A + \tan^2 A - 1}{\sin^2 A} = \tan^2 A$

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94. Prove that: (xiv) $\dfrac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \dfrac{1 + \sin A}{\cos A}$

95. (xv) $\left(\cos^2 \theta\right)/ \left(1 - \tan \theta\right) + \dfrac{\sin^3 \theta}{}$ (sin theta - cos theta) $= 1 + \sin$

theta cos theta`

96. A person is standing at a distance of 80 m from a church looking at its

top. The angle of elevation is of $45°$. Find the height of the church.

97. (8) From the top of a lighthouse, an observer looks at a ship and finds

the angle of depression to be $60°$. If the lighthouse is 90 m, then find

how far is that ship from the lighthouse? $\left(\sqrt{3} = 1.73\right)$

98. (9) A building is 200 $\sqrt{3}$ metres high. Find the angle of elevation if its top is 200 m away from its foot.

99. (10) A straight road leads to the foot of a tower of height 50m. From the top of the tower, the angle of depression of two cars standing on the road are $30°$ and $60°$. What is the distance between the two cars?

100. (11) A ship of height 24m is sighted from a lighthouse. From the top of the lighthouse, the angle of depression to the top of the mast and base of the ship is $30°$ and $45°$ respectively. How far is the ship from the lighthouse? $\left(\sqrt{3} = 1.73\right)$

101. (12) From a point on the roof of a house, 11m high, it is observed that the angles of depression of the top and foot of a lamp ost are $30°$ and $60°$ respectively. What is the height of the lamp post?

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102. (A) Choose the correct alternative answer for the following: (1) $\sin\theta$. $\cos ec\theta$= ....

A. (A) 1

B. (B) 0

C. (C) 1/2

D. (D) $\sqrt{2}$

Answer:

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103. (2) If $\sin theat = \dfrac{4}{5}$ and $\cos theat = \dfrac{3}{5}$ then $\tan\theta$

A. (A) 4/3

B. (B) 3/4

C. (c) 12/25

D. (D) can not be calculated

Answer:

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104. Q.1. (B) solve the following: If $\sin\theta = \dfrac{\sqrt{3}}{2}$ / then find θ,

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105. Find the value of $\tan 40° \times \tan 50°$.

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106. perform any two of the following activities: If $\tan\theta = 1$, then complete the following activity to find $\cos\theta$.

107. A boy is at a distance of 60 m from a tree, makes an angle of elevation of $60°$ with the top of the tree. What is the height of the tree?

108. Prove that $\dfrac{\sin^2 A}{\cos A} + \cos A = \sec A$.

109. Solve the following: If x $=$ r $\cos\theta$ and y $=$ r $\sin\theta$, then prove $x^2 + y^2 = r^2$

110. Using Pythagoras theorem, prove that $1 + \cot^2 theat = \cos es^2 \theta,$
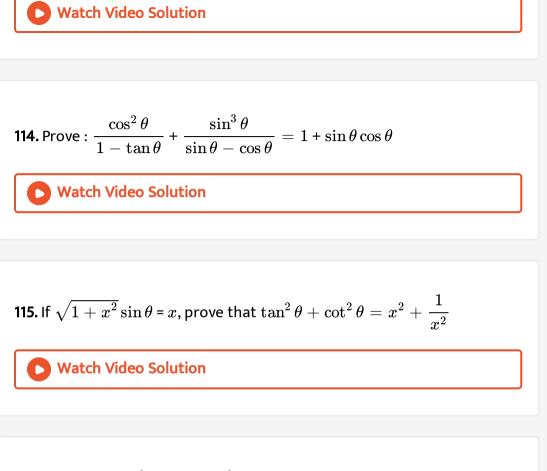
111. Two poles of heights 18 metre and 7 metere are erected on a ground. The length of the wire fastened at their tops in 22 meters. Find the angle made by the wire with the horizontal.

112. Prove that $\left(1 + \dfrac{1}{\tan^2 A}\right)\left(1 + \dfrac{1}{\cot^2 A}\right) = \dfrac{1}{\sin^2 A - \sin^4 A}$

113. In a right angled $\triangle ABC, \ \angle A = 90°$ and $\dfrac{5\sin^2 B + 7\cos^2 C + 4}{3 + 8\tan^2 60°} = \dfrac{7}{27}$ and $AC = 3.$ Find the perimeter of $\triangle ABC.$
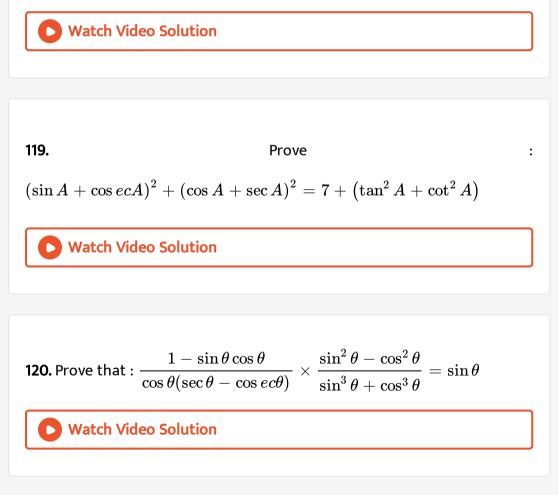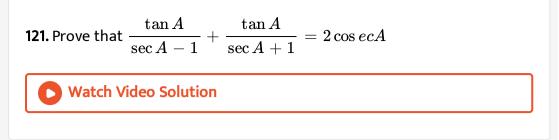
114. Prove : $\dfrac{\cos^2\theta}{1-\tan\theta} + \dfrac{\sin^3\theta}{\sin\theta-\cos\theta} = 1 + \sin\theta\cos\theta$

115. If $\sqrt{1+x^2}\sin\theta = x$, prove that $\tan^2\theta + \cot^2\theta = x^2 + \dfrac{1}{x^2}$

116. Prove : $\dfrac{\tan\theta}{1-\cot\theta} + \dfrac{\cot\theta}{1-\tan\theta} = 1 + \tan\theta + \cot\theta$

117. prove : $\sin^8\theta - \cos^8\theta = \left(\sin^2\theta - \cos^2\theta\right)\left(1 - 2\sin^2\theta\cos^2\theta\right)$

118. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his syes to the top of the building increases from his eyes to the top of the building increases from $30°$ to $60°$ as he walks towards the building. Find the distance he walked towards the building.

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119.   Prove   :

$$(\sin A + \cos ecA)^2 + (\cos A + \sec A)^2 = 7 + (\tan^2 A + \cot^2 A)$$

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120. Prove that : $\dfrac{1 - \sin\theta\cos\theta}{\cos\theta(\sec\theta - \cos ec\theta)} \times \dfrac{\sin^2\theta - \cos^2\theta}{\sin^3\theta + \cos^3\theta} = \sin\theta$

121. Prove that $\dfrac{\tan A}{\sec A - 1} + \dfrac{\tan A}{\sec A + 1} = 2\cos ecA$

122. From the top of a light house, 80 metres high, two ships on the same side of light house are observed. The angles of depression of the ships as seen from the light house are found to be of $45°$ and $30°$. Find the distance between the two ships. (Assume that the two ships and the bottom of the lighthouse are in a line)

123. If a $\cos theat + b\sin\theta$ = m and a $\sin\theta - b\cos\theta$ = n, then prove that $a^2 + b^2 = m^2 + n^2$

124. If $\sqrt{3}\tan\theta = 3\sin\theta$, find the value of $\sin^2\theta - \cos^2\theta$, where $\theta \neq 0$.

125. Prove that : $\left(1 + \dfrac{1}{\tan^2 A}\right)\left(1 + \dfrac{1}{\cot^2 A}\right) = \dfrac{1}{\sin^2 A - \sin^4 A}$