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MATHS

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TRIGONOMETRIC RATIOS

Question Bank

1. Convert $\frac{2\pi}{3}$ radian and $\frac{11\pi}{12}$ radian into degrees.

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2. Convert $60^o 10' 20''$ into radian.

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3. Express $1 + \sin\theta$ as a prefect square.

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4. Show that $\sin^2 52^\circ + \sin^2 38^\circ = 1$

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5. Show that tan A+cot A=2 cosec 2A

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6. If $x = a\sec\theta$ and $y = b\tan\theta$, eliminateθ.

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7. If $\tan x = \frac{b}{a}$, prove that $a\cos 2x + b\sin 2x = a$

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8. Prove the following Identities

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

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9. If $A+B=45^\circ$, then $(1+\tan A)(1+\tan B)$=_____

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10. If $\sin(\theta+\alpha)=n\sin(\theta-\alpha)$, prove that $\cot\theta=\frac{n-1}{n+1}\cot\alpha$.

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11. Find the other five trigonometric ratio if $\cos\theta=-\frac{4}{5}, 90^\circ<\theta<180^\circ$.

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12. Prove that $\frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} + \frac{\sin(A-B)}{\cos A \cos B} = 0.$

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13. Prove that: $\frac{\tan(A+B)}{\cot(A-B)} = \frac{\tan^2 A - \tan^2 B}{1 - \tan^2 A \tan^2 B}$

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14. If $\sin(A-B) = \frac{1}{2}$ and $\cos(A+B) = \frac{1}{2}$, find A and B.

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15. If A+B+C=90°, Prove that cot A+cot B+cot C=cot A cot B cot C

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16. If A,B,C are angles of a triangle, prove that $\sin\left(\frac{B+C}{2}\right) = \cos\frac{A}{2}$

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17. Prove that $\frac{\cos 100 \sin 10^0}{\cos 10^0 - s \in 10^0} = \tan 55^0$

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18. $\frac{\cos 8^\circ + \sin 8^\circ}{\cos 8^\circ - \sin 8^\circ} = \tan 53^\circ;$

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19. Show that

$\cos(60^\circ - A)\cos(30^\circ - B) - \sin(60^\circ - A)\sin(30^\circ - B) = \sin(A + B)$

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20. Find tha value of $\tan 4620^\circ$

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21. Find tha value of $\cos(-1575^\circ)$

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22. Find the value of $\cos\left(\frac{19\pi}{3}\right)$

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23. Prove that $\frac{\sin A + \sin B}{\cos A + \cos B} = \tan\left(\frac{A+B}{2}\right)$

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24. Prove that $\frac{\sin 5A - \sin 3A}{\cos 5A + \cos 3A} = \tan A$

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25. Prove that $\frac{\sin 2A + \sin 5A - \sin A}{\cos 2A + \cos 5A + \cos A} = \tan 2A$

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26. If $A + B + C = 180^\circ$ prove that $\sin A + \sin B + \sin C = 4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

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27. If $A + B + C = \pi$ and $\cos A = \cos B.\cos C$ prove that $\tan A = \tan B + \tan C$

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28. Prove that sin A + cos A= $\sqrt{2}\cos(45^\circ - A)$

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29. Prove that $\tan 27^\circ + \tan 18^\circ + \tan 27^\circ . \tan 18^\circ = 1.$

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30. Prove that $\cos 130^\circ + \cos 110^\circ + \cos 10^\circ = 0.$

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31. $\sec x = \dfrac{2}{\sqrt{2 + \left(\sqrt{2 + 2\cos 4x}\right)}}$

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32. Prove that $2\cos\frac{\pi}{16} = \sqrt{2+\sqrt{2+\sqrt{2}}}$

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33. Express $\sin 80^\circ - \cos 70^\circ$ as product.

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34. Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

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35. $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$

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36. Prove that $\cos^6\theta - \sin^6\theta = \cos 2\theta\left(1 - \frac{1}{4}\sin^2 2\theta\right)$

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37. Evaluate $\tan 15^\circ$

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38. Find the value of $\sin 18^\circ$

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39. Find the principal solution of the equation $\tan x = \sqrt{3}$

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40. Find the principal solution of the equation $\cos x = -\frac{1}{2}$

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41. Solve sin 2x+cos x=0

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

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43. Solve for θ, $2\cos^2\theta + \sin\theta - 1 = 0, 0 \leq \theta \leq \frac{\pi}{2}$

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44. Convert the following radian into degree measure $\frac{4\pi}{5}$

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45. Convert the following radian into degree measure $\frac{7\pi}{6}$

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46. Convert the following radian into degree measure $\frac{5\pi}{3}$

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47. If $\sin\theta = \frac{5}{7}$ what is $\cos\theta$ and $\tan\theta$?

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48. If $\cos\theta = \frac{3}{5}$ what is $\tan\theta$ and $\cos ec\theta$?

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49. If $\tan\theta = \frac{5}{4}$ what is $\sin\theta$ and $\cos\theta$?

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50. If $\cos\theta = -\frac{4}{5}$, find the value of $\cot\theta$?

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51. Given $\tan\theta = -\frac{3}{4}$ and $\frac{3\pi}{2} < \theta < 2\pi$, find the other trigonometric ratios.

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52. If tan (A+B)=p, tan(A-B)=q find tan 2A.

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53. If $\tan\theta = \frac{a}{b}$, show that $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \frac{a^2 - b^2}{a^2 + b^2}$

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54. Evaluate the following: $\sin 78^\circ \cos 18^\circ - \cos 78^\circ \sin 18^\circ$

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55. Evaluate the following: $\cos 47^\circ \cos 13^\circ - \sin 47^\circ \sin 13^\circ$

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56. Find the value of the following trigonometric functions: $\sin 765^\circ$

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57. Find the value of the following trigonometric functions: $\cos(-1410^\circ)$

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58. Find the value of the following trigonometric functions: $\sin\left(-\frac{11\pi}{3}\right)$

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59. Find the value of the following trigonometric functions: $\cot\left(-\frac{15\pi}{4}\right)$

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60. Find the value of the following trigonometric functions: $\cos\left(-\frac{31\pi}{3}\right)$

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61. Find the value of the following trigonometric functions:$\sin 570^\circ$

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62. Find the value of the following trigonometric functions: $\tan(-1125^\circ)$

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63. Find the value of the following trigonometric functions:$\sin 1110^\circ$

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64. Find the value of the following trigonometric functions:$\sin 660^\circ$

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65. Find the value of the following trigonometric functions: $\cos(-225^\circ)$

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66. Show that $\sin^2 20^\circ + \sin^2 70^\circ = 1$

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67. Show that $\sin^2 49^\circ + \sin^2 41^\circ = 1$

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68. Show that $\sin^2 36^\circ + \sin^2 54^\circ = 1$

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69. Show that $\sin^2 46^\circ + \sin^2 44^\circ = 1.$

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70. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$

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71. Prove that $\sqrt{\frac{\cos ec\theta + \cot\theta}{\cos ec\theta - \cot\theta}} = \frac{\sin\theta}{1-\cos\theta}$

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72. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}+\sqrt{\frac{1-\sin\theta}{1+\sin\theta}}=2\sec\theta$

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73. Prove that $\operatorname{cosec}^2\theta+\sec^2\theta=\frac{\sec^2\theta}{\sin^2\theta}$

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74. $\frac{1+\sin 2\theta+\cos 2\theta}{1+\sin 2\theta-\cos 2\theta}=$

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75. Prove that $\cos(120^\circ-A)+\cos A+\cos(120^\circ+A)=0.$

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76. Prove that $\tan(45^\circ - \theta) = \dfrac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta}$

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77. Prove that $\tan\left(\dfrac{\pi}{4} + \dfrac{\theta}{2}\right) = \sec\theta + \tan\theta$

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78. $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \dfrac{3}{16}$

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79. If $A + B + C = \pi$, prove that

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

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80. If A+B+C=π, prove that tan A+tan B+tan C= tanA tan B tan C

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

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82. If$A + B + C = \pi$, prove that:

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

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83. If A+B+C=π and cos A=cos B. cosC,prove that cot B cot C=$\frac{1}{2}$

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84. Express $\sin 6\theta + \sin 3\theta$ as a product.

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85. Evaluate using multiple angle formula: $\sin 15^\circ$

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86. Evaluate using multiple angle formula: $\cos 15^\circ$

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87. Evaluate using multiple angle formula: $\tan 15^\circ$

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88. Prove that : $\frac{\tan 69^0 + tan66^0}{1 - tan69^0 tan\ 66^0} = -1$

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89. Prove that: $\frac{\cos 11^0 + \sin 11^0}{\cos 11^0 - \sin 11^0} = tan56^0$

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90. Prove that

$\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$

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91. Prove that: $\cos 80^0 + \cos 40^0 - \cos 20^0 = 0$

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92. Prove that:$\cos 420^\circ \sin 390^\circ + \sin(-300^\circ)\cos(-330^\circ) = 1$

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93. Prove that: $\frac{\sin(A-B)}{s \in As \in B} + \frac{\sin(B-C)}{s \in Bs \in C} + \frac{\sin(C-A)}{s \in Cs \in A} = 0$

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94. Prove that: $\frac{\sin(A+B)+\sin(A-B)}{\cos(A+B)+\cos(A-B)} = tanA$

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95. $\frac{\sin A + \sin 3A}{\cos A + \cos 3A} = \tan 2A$

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96. Prove that:

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

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

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98. Solve for θ, $(0^\circ \leq \theta \leq 360^\circ) 2\sin^2\theta + 3\cos\theta = 0$

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99. Solve for θ, $(0^\circ \leq \theta \leq 360^\circ) \cos\theta + \sqrt{3}\sin\theta = 0$

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100. Find the principal and general solutions of the equation $\sin x = \frac{\sqrt{3}}{2}$

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101. Find the principal and general solutions of the equation $\tan x = -\frac{1}{\sqrt{3}}$

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102. Find the principal and general solution of $secx = 2$

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103. Find the principal and general solutions of the equation $\sec x = -\sqrt{2}$

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104. Find the principal and general solutions of the equation $\sqrt{2}\cos x = 1$

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105. Find the principal and general solutions of the equation $\sqrt{2}\sin x + 1 = 0$

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106. Find the principal and general solutions of the equation $2\cos^2 x - 3\cos x + 1 = 0$

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107. Find the principal and general solutions of the equation cot x-tan x=2

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108. Find the principal and general solutions of the equation sec 4x- sec 2x=2

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109. Find the principal and general solutions of the equation sin x+ cos x=1

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110. Solve $2\cos^2 x - 3\sin x = 0$

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111. Solve $\tan^2 x = 3\cos ec^2 x - 1$

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112. Solve $2\cos^2 x + 3\cos x - 2 = 0$

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113. General solution of $\tan\left(\frac{\pi}{4} + x\right) + \tan\left(\frac{\pi}{4} - x\right) = 4$ is

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114. Solve $\cos^3 x \sin 3x + \sin 3x \cos x = \frac{3}{4}$

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115. Solve the equation $\sin x + \sqrt{3}\cos x = \sqrt{2}$

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116. Solve $\cos x - \sqrt{3}\sin x = 1$

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117. Solve $\tan^2 x - \left(1 + \sqrt{3}\right)\tan x + \sqrt{3} = 0$

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118. Solve $\tan x + \sec x = \sqrt{3}$

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119. $\tan^2 x + \cot^2 x = 2$

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