MATHS

BOOKS - MODERN PUBLICATION

TRIGNOMETRY

Example

1. Find the radian measure corresponding to the following measure : (I) 25° (II) $-47^{\circ}30'$.

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2. Find the radian measure corresponding to the following measure : (I) 150^{o} (II) $70^{o}50'$.

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3. Find the degree measure corresponding to the following radian measure : 6.

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4. Find the degree measure corresponding to the following radian measure : $\frac{5\pi}{6}$.

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5. If G, D and θ be the number of grades, degrees and radians in any angle, prove that : $\frac{D}{90} = \frac{G}{100} = \frac{2\theta}{\pi}$.

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6. If G, D and θ be the number of grades, degrees and radians in any angle, prove that : $G - D = \frac{20\theta}{\pi}$.

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7. Express the angular measurement of the angle of a regular decagon in degrees, grades and radians.

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8. A wheel rotates making 20 revolutions per second. If the radius of the wheel is 35 cm., what linear distance does a point of its rim traverse in three minutes ?

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9. The perimeter of a certain sector of a circle is equal to the length of the arc of a semi-circle having the same radius. Express the angle of the sector in degrees, minutes and seconds.

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

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11. Find the angle in radian through which a pendulum swings if itslength is 75 cm and the tip describes an arc of length:- 15 cm

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12. Find the angle in radian through which a pendulum swings if itslength is 75 cm and the tip describes an arc of length:- 21 cm

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13. Find in degrees the angle through which a pendulum swings if its length is 50 cm and tip describes an arc of length 10 cm.

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14. 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 $\pi = \frac{22}{7}$).

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15. If in two circles, arcs of the same length subtend angles 60° and 75° at the centre, find the ratio of their radii.

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

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17. Kartarpur is 64 kilometres from Amritsar. Find to the nearest second the angle subtended at the centre of the earth by the arc joining these two towns, earth being regarded as a sphere of 6400 kilometre radius.

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18. The distance of the moon from the centre of the earth is 385,000 kilometres and moon's diameter subtends an angle of 31' at the eye of the observer. Find the diameter of the moon.

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19. Prove that $\sec^4\theta - \sec^2\theta = \tan^4\theta + \tan^2\theta$.

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20. Prove that : $\tan^2\theta - \sin^2\theta = \tan^2\theta\sin^2\theta$.

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21. Prove that : $\sin^8\theta - \cos^8\theta = \left(\sin^2\theta - \cos^2\theta\right)\left(1 - 2\sin^2\theta\cos^2\theta\right)$.

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

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23. Prove that : $\dfrac{\sin\theta}{1 + \cos\theta} + \dfrac{1 + \cos\theta}{\sin\theta} = 2\cos ec\theta.$

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24. Prove that : $\dfrac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = 1 - 2\sec\theta\tan\theta + 2\tan^2\theta.$

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25. Prove that : $\frac{\cos ec\theta}{\cos ec\theta - 1} + \frac{\cos ec\theta}{\cos ec\theta + 1} = 2\sec^2\theta.$

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26. Prove that :

$(\sec A - \cos ecA)(1 + \tan A + \cot A) = \tan A\sec A - \cot A\cos ecA.$

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

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28. If $\frac{\cos^4\alpha}{\cos^2\beta} + \frac{\sin^4\alpha}{\sin^2\beta} = 1$, prove that : $\frac{\cos^4\beta}{\cos^2\alpha} + \frac{\sin^4\beta}{\sin^2\alpha} = 1.$

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29. If $\frac{\cos^4\alpha}{\cos^2\beta} + \frac{\sin^4\alpha}{\sin^2\beta} = 1$, prove that : $\sin^4\alpha + \sin^4\beta = 2\sin^2\alpha\sin^2\beta$.

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30. If $2\tan^2\alpha\tan^2\beta\tan^2\gamma + \tan^2\alpha\tan^2\beta + \tan^2\beta\tan^2\gamma + \tan^2\gamma\tan^2\alpha = 1$, prove that $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 1$.

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31. Given that : $(1 + \cos\alpha)(1 + \cos\beta)(1 + \cos\gamma) = (1 - \cos\alpha)(1 - \cos\beta)(1 - \cos\gamma)$, show that one of the values of each member of this equality is $\sin\alpha\sin\beta\sin\gamma$.

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32. If $\tan^2\theta = 1 - e^2$, prove that $\sec\theta + \tan^3\text{cosec}\theta = \left(2 - e^2\right)^{\frac{3}{2}}$

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33. If $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$, then show that $m^2 - n^2 = 4\sqrt{mn}$

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34. If $m^2 + m'^2 + 2mm' \cos\theta = 1, n^2 + n'^2 + 2nn' \cos\theta = 1$ and $mn + m' n' + (mn' + m'n)\cos\theta = 0$, prove that $m^2 + n^2 = \text{cosec}^2\theta$.

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35. If $10\sin^4\alpha + 15\cos^4\alpha = 6$, find the value of $27\text{cosec}^6\alpha + 8\sec^6\alpha$.

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36. Show that $\sec^2\theta \text{cosec}^2\theta \geq 4$ for all those θ for which $\sin\theta\cos\theta \neq 0$.

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37. If $\cot\theta = -\frac{12}{5}$ and θ lies in the second quadrant, find the values of the other five functions.

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38. If θ lies in the fourth quadrant and $\cos\theta = \frac{5}{13}$,

find the value of : $\sin\theta$ and $\tan\theta$.

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39. If θ lies in the fourth quadrant and $\cos\theta = \frac{5}{13}$,

find the value of : $\frac{13\sin\theta + 5\sec\theta}{5\tan\theta + 6\mathrm{cos}ec\theta}$.

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40. If sec A + tan A = 4, find sin A, cos A.

Also find the quadrant in which A lies.

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41. Prove that $\sec^2\theta + \cos^2\theta$ can never be less than 2.

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42. Show that no value of $\sec\theta$ can satisfy the equation:

$6\sec^2\theta - 5\sec\theta + 1 = 0$.

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43. Show that the euqation $\sin\theta = x + \frac{1}{x}$ is impossible if x is real.

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44. If x and y be real, show that the equation : $\sin^2\theta = \frac{x^2 + y^2}{2xy}$ is possible only when $x = y \neq 0$.

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45. If $\tan\theta + \cot\theta = 2$, then find the value of $\tan^{100}\theta + \cot^{100}\theta$.

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46. Prove that : $\dfrac{\left(\sin 0^\circ + \cos 30^\circ\right)\left(\sin 30^\circ + \tan 45^\circ\right)}{\left(\tan 30^\circ + \cot 60^\circ\right)\left(\sec 60^\circ - \mathrm{cos}ec 90^\circ\right)} = \dfrac{9}{8}$.

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47. Prove that : $\sin^2\dfrac{\pi}{6} + \cos^2\dfrac{\pi}{3} - \tan^2\dfrac{\pi}{4} = -\dfrac{1}{2}$.

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48. Prove that $\sin^2 30^\circ, \sin^2 45^\circ, \sin^2 60^\circ$ are in A.P.

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49. Find the values of the following trigonometric function :

$\sin\dfrac{31\pi}{3}$.

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50. Find the values of the following trigonometric function :

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

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51. Find the values of the following trigonometric function :

$\cos\left(-1710^{\circ}\right)$.

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52. Find the values of the following trigonometric function :

$\tan\frac{19\pi}{3}$.

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53. Prove that

$$\frac{\cos\left(90^\circ+\theta\right)\sec(-\theta)\tan\left(180^\circ-\theta\right)}{\sec\left(360^\circ-\theta\right)\sin\left(180^\circ+\theta\right)\cot\left(90^\circ-\theta\right)}=-1$$

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54. Prove that : $3\cos^2\frac{\pi}{4}+\sec\frac{2\pi}{3}+5\tan^2\frac{\pi}{3}=\frac{29}{2}.$

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55. Find 'x' from the equation :

$$\operatorname{cosec}\left(90^\circ-\theta\right)-x\sin\left(90^\circ-\theta\right)\tan\left(180^\circ+\theta\right)=\sin\left(90^\circ+\theta\right).$$

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56. Prove that : $\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}+\cos^2\frac{5\pi}{8}+\cos^2\frac{7\pi}{8}=2.$

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57. Prove that :

$\cos 24^\circ+\cos 55^\circ+\cos 125^\circ+\cos 204^\circ+\cos 300^\circ=\frac{1}{2}.$

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58. If A, B, C, D be the angles of a cyclic quadrilateral, taken in order, prove that : $\cos A+\cos B+\cos C+\cos D=0.$

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59. Show that the function : $f(x) = \tan\left(3x + \frac{\pi}{4}\right)$ is periodic and find its period.

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60. Prove that : $\cos(A + B) = \cos A \cos B - \sin A \sin B$.

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61. Prove that : $\cos(A - B) = \cos A \cos B + \sin A \sin B$.

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62. Prove that :

$\sin(A + B) = \sin A \cos B + \cos A \sin B$.

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63. Prove that : $\sin(A - B) = \sin A\cos B - \cos A\sin B.$

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64. Prove that : $\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A\tan B}.$

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65. Prove that : $\tan(A - B) = \dfrac{\tan A - \tan B}{1 + \tan A\tan B}.$

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66. Prove that : $\cot(A + B) = \dfrac{\cot A\cot B - 1}{\cot B + \cot A}.$

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67. Prove that : $\cot(A - B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$.

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68. Prove that : $\tan\left(45^\circ + A\right) = \frac{1 + \tan A}{1 - \tan A}$.

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69. Prove that : $\tan\left(45^\circ - A\right) = \frac{1 - \tan A}{1 + \tan A}$.

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70. Prove that :

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

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71. Prove that :

$\cos(A+B)\cos(A-B)=\cos^2 A-1+\cos^2 B.$

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72. Expand : $\sin(A+B+C)$.

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73. Expand : $\cos(A+B+C)$.

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74. Expand : $\tan(A+B+C)$.

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75. Prove that :

$$\sin 70^\circ \cos 10^\circ - \cos 70^\circ \sin 10^\circ = \frac{\sqrt{3}}{2}.$$

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76. Prove that :

$$\cos\left(\frac{\pi}{4} - \theta\right)\cos\left(\frac{\pi}{4} - \phi\right) - \sin\left(\frac{\pi}{4} - \theta\right)\sin\left(\frac{\pi}{4} - \phi\right) = \sin(\theta + \phi).$$

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77. Prove the following: $\dfrac{\tan\left(\frac{\pi}{4} + x\right)}{\tan\left(\frac{\pi}{4} - x\right)} = \left(\dfrac{1 + \tan x}{1 - \tan x}\right)^2$

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78. Prove that :

$$\frac{\sin(x+\theta)}{\sin(x+\phi)} = \cos(\theta - \phi) + \cot(x+\phi)\sin(\theta - \phi).$$

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79. Prove that : If $\theta + \phi = 45^\circ$, prove that

$(1 + \tan\theta)(1 + \tan\phi) = 2.$

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80. Prove that : $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ.$

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81. Prove that :

$\tan 3\theta \tan 2\theta \tan \theta = \tan 3\theta - \tan 2\theta - \tan \theta$.

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82. Prove the following: $\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$

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83. Prove that : $\dfrac{\cos^2 33^\circ - \cos^2 57^\circ}{\sin^2 \frac{21^\circ}{2} - \sin^2 \frac{69^\circ}{2}} = -\sqrt{2}$.

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84. Prove that $\tan 70^\circ = \tan 20^\circ + 2\tan 50^\circ$.

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85. Prove that : $\cos(A+B) = \cos A \cos B - \sin A \sin B$.

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86. Prove that : $\sin^2 A = \cos^2(A-B) + \cos^2 B - 2\cos(A-B)\cos A \cos B$.

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87. If $\cos(\alpha-\beta)+\cos(\beta-\gamma)+\cos(\gamma-\alpha) = -\frac{3}{2}$, prove that $\cos\alpha+\cos\beta+\cos\gamma = \sin\alpha+\sin\beta+\sin\gamma = 0$

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88. If $2\tan\beta+\cot\beta = \tan\alpha$, prove that $\cot\beta = 2\tan(\alpha-\beta)$.

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89. If $\tan A = \frac{1}{\sqrt{x(x^2 + x + 1)}}$, $\tan B = \frac{\sqrt{x}}{\sqrt{x^2 + x + 1}}$ and $\tan C = \sqrt{x^{-3} + x^{-2} + x^{-1}}$, prove that A+B=C.

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90. If $a\tan\alpha + b\tan\beta = (a + b)\tan\left(\frac{\alpha + \beta}{2}\right)$, where $\alpha \neq \beta$, prove that : $a\cos\beta = b\cos\alpha$.

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91. If $\tan(\alpha + \theta) = n\tan(\alpha - \theta)$, show that:$(n + 1)\sin 2\theta = (n - 1)\sin 2\alpha$.

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92. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, prove that $\cos\left(\theta - \frac{\pi}{4}\right) = \pm\frac{1}{2\sqrt{2}}$.

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93. If $\sin x = \frac{3}{5}$, $\cos y = -\frac{12}{13}$, where x and y both lie in second quadrant, find the value of sin(x+y).

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94. If $\cos A = \frac{1}{7}$ and $\cos B = \frac{13}{14}$ (A, B being positive acute), prove that $A - B = 60^\circ$.

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95. Find the maximum and minimum values of $7\cos\theta + 24\sin\theta$.

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96. Prove that

$5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3$ lies between -4 and 10.

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97. Prove that :

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

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98. Prove that : $2\cos A\sin B = \sin(A + B) - \sin(A - B)$.

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99. Prove that :

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

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100. Prove that : $2\sin A\sin B = \cos(A - B) - \cos(A + B)$.

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101. Prove that : $\sin C + \sin D = 2\sin\frac{C + D}{2}\cos\frac{C - D}{2}$.

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102. Prove that :

$\sin C - \sin D = 2\cos\frac{C + D}{2}\sin\frac{C - D}{2}$.

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103. Prove that :

$$\cos C + \cos D = 2\cos\frac{C + D}{2}\cos\frac{C - D}{2}.$$

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104. Prove that :

$$\cos C - \cos D = 2\sin\frac{C + D}{2}\sin\frac{D - C}{2}.$$

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105. Prove that :

$$\cos 2\theta\cos\frac{\theta}{2} - \cos 3\theta\cos\frac{9\theta}{2} = \sin 5\theta\sin\frac{5\theta}{2}.$$

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106. Prove that :

$$\sin 105^\circ + \cos 105^\circ = \cos 45^\circ.$$

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107. Prove that :

$$\tan\left(60^\circ + A\right)\tan\left(60^\circ - A\right) = \frac{2\cos 2A + 1}{2\cos 2A - 1}.$$

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108. Prove that :

$$\sin\left(150^\circ + x\right) + \sin\left(150^\circ - x\right) = \cos x.$$

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109. Prove that : $\dfrac{\sin A + \sin B}{\cos A + \cos B} = \tan\dfrac{A + B}{2}.$

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110. Prove that :

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

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111. If the angles A, B, C are in A.P., prove that

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

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112. Prove that $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = 4\cos^2\left(\frac{\alpha - \beta}{2}\right)$.

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113. If $\sin\theta + \sin\phi = \sqrt{3}(\cos\phi - \cos\theta)$,

prove that : $\sin3\theta + \sin3\phi = 0$.

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114. Find the value of $\left(\frac{\cos A + \cos B}{\sin A - \sin B}\right)^n + \left(\frac{\sin A + \sin B}{\cos A - \cos B}\right)^n$ (where, n is an even)

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115. If $\sin x + \sin y = a$ and $\cos x + \cos y = b$, find the values of : $\tan\frac{x+y}{2}$.

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116. If $\sin x + \sin y = a$ and $\cos x + \cos y = b$, find the values of : $\tan\frac{x-y}{2}$.

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117. Prove that :

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

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118. Prove that

$$\cos\alpha + \cos\beta + \cos\gamma + \cos(\alpha + \beta + \gamma) = 4\frac{\cos(\alpha + \beta)}{2}\frac{\cos(\beta + \gamma)}{2}\frac{\cos(\gamma + \alpha)}{2}$$

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119. If $\sin\theta = n\sin(\theta + 2\alpha)$, show that : $\tan(\theta + \alpha) = \frac{1 + n}{1 - n}\tan\alpha.$

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120. If $\alpha + \beta = 90\,^{\circ}$, then find the maximum and minimum values of $\sin\alpha\sin\beta$.

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121. Prove that : $\sin 2\theta = 2\sin\theta\cos\theta$.

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122. Prove that :

$\cos 2\theta = \cos^2\theta - \sin^2\theta = 1 - 2\sin^2\theta = 2\cos^2\theta - 1$.

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123. Prove that : $\tan 2\theta = \dfrac{2\tan\theta}{1 - \tan^2\theta}$.

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124. Prove that :

$$\sin 2\theta = \frac{2\tan\theta}{1 + \tan^2\theta}.$$

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125. Prove that :

$$\cos 2\theta = \frac{1 - \tan^2\theta}{1 + \tan^2\theta}.$$

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126. Prove that :

$$\sin 3\theta = 3\sin\theta - 4\sin^3\theta.$$

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127. Prove that :

$\cos 3\theta = 4\cos^3\theta - 3\cos\theta.$

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128. Prove that :

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

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129. Prove that :

$$\frac{\tan 5\theta + \tan 3\theta}{\tan 5\theta - \tan 3\theta} = 4\cos 2\theta \cos 4\theta.$$

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130. Find $\sin 2\theta$ when $\sin\theta + \cos\theta = 1$.

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131. Prove that $\tan A + \cot A = 2\text{cosec } 2\text{A}.$

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132. Prove the following: $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

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133. Prove that :

$$\tan 4\theta = \frac{4\tan\theta\left(1 - \tan^2\theta\right)}{1 - 6\tan^2\theta + \tan^4\theta}.$$

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134. Prove that $\frac{\sec 8A - 1}{\sec 4A - 1} = \frac{\tan 8A}{\tan 2A}$.

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135. If $2\tan\alpha = 3\tan\beta$, show that $\tan(\alpha - \beta) = \frac{\sin 2\beta}{5 - \cos 2\beta}$

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136. Prove that :

$$\cos A \cos 2A \cos 2^2 A \cos 2^3 A \ldots\ldots . \cos 2^{n-1} A = \frac{\sin 2^n A}{2^n \sin A}.$$

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137. If $2\cos\theta = x + \frac{1}{x}$, prove that $2\cos 3\theta = x^3 + \frac{1}{x^3}$

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138. Prove that : $\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}+\cos^2\frac{5\pi}{8}+\cos^2\frac{7\pi}{8}=2.$

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139. Prove that :

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

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140. Find the value of $\tan 22^{\circ}30'$.

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141. If $\sin\theta+\sin\phi=a$ and $\cos\theta+\cos\phi=b$,

find : $\sin(\theta+\phi)$.

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142. If $\sin\theta + \sin\phi = a$ and $\cos\theta + \cos\phi = b$,

find : $\cos(\theta + \phi)$.

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143. If $\sin\theta + \sin\phi = a$ and $\cos\theta + \cos\phi = b$,

find : $\cos(\theta - \phi)$.

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144. If $\tan x = \frac{3}{4}, \pi < x < \frac{3\pi}{2}$,

find the values of $\sin\frac{x}{2}$, $\cos\frac{x}{2}$ and $\tan\frac{x}{2}$.

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145. If α and β are the solution of $a\cos\theta + b\sin\theta = c$, then

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146. Prove that :

$$\sin^2 72^\circ - \sin^2 60^\circ = \frac{\sqrt{5}-1}{8}.$$

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147. Prove that :

$$\sin\frac{\pi}{5}\sin\frac{2\pi}{5}\sin\frac{3\pi}{5}\sin\frac{4\pi}{5} = \frac{5}{16}.$$

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148. If $A+B+C=\pi$, then, find

$\sin 2A+\sin 2B+\sin 2C.$

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

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

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150. 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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151. If $A + B + C = 180^\circ$, prove that :

$\sin^2 A + \sin^2 B + \sin^2 C = 2(1 + \cos A \cos B \cos C)$.

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

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

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153. If $A + B + C = 180^\circ$, prove that :

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

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154. If $A + B + C = 180^\circ$, prove that : $\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2} = \cot\frac{A}{2}\cot\frac{B}{2}\cot\frac{C}{2}$.

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155. Prove that :

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

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156. Find the values of the following :

$\sin 34^\circ 22'$.

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157. Find the values of the following :

$\cos 64^\circ 34'$.

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158. Find the values of the following :

$\cot 33^\circ 40'$.

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159. Find the angle $\theta, 0 < \theta \le 90^\circ$, if :

$\sin\theta = 0.5373$.

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160. Find the angle $\theta, 0 < \theta \leq 90^{\circ}$, if :

$\cos\theta = 0.0087.$

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161. Find the angle $\theta, 0 < \theta \leq 90^{\circ}$, if :

$\cot\theta = 0.5750.$

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162. Find the angle $\theta, 0 < \theta \leq 90^{\circ}$, if :

$\log\sin\theta = -0.5.$

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163. Draw the graph of $y = 3\sin 2x$.

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164. Draw the graph of : $y = f(x) = 3\sin(2x - 1)$.

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165. Sketch the graph of : y =sin x and y = sin 2x on the same axes.

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166. Find the principal and general solutions of the following equation:- $\tan x = \sqrt{3}$

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167. Find the principal and general solutions of the following equation:- $\sec x = 2$

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168. Find the Principal solution of the following :

$\operatorname{cosec} x = -2.$

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169. Find the solution of $\sin x = -\frac{\sqrt{3}}{2}$.

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170. Find the general solution of the following equations: $\cos 4x = \cos 2x$

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171. Solve the following equation :

$\cos 3x = \sin 2x.$

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

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173. Solve the following equation : $2\cos^2 t + 3\sin t = 0.$

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174. Solve the following equation :

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

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175. Solve the equation :

$\sin\theta + \sin 3\theta + \sin 5\theta = 0.$

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176. Solve the equation :

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

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177. Solve : $\tan x + \tan 2x + \tan 3x = \tan x \tan 2x \tan 3x.$

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178. In any triangle ABC, prove that :

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

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179. If A, B, C are angles of triangle ABC and a, b, c are lengths of the sides opposite to A, B, C respectively, then show that : $a(\sin B-\sin C)+b(\sin C-\sin A)+c(\sin A-\sin B)=0.$

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180. In any triangle ABC, prove that : $a\sin(B-C)+b\sin(C-A)+c\sin(A-B)=0.$

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

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182. In any triangle ABC, prove that : $\frac{\sin(B - C)}{\sin(B + C)} = \frac{b^2 - c^2}{a^2}$.

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183. For any triangle ABC, prove that : $\frac{a + b}{c} = \frac{\cos\frac{A - B}{2}}{\sin\frac{C}{2}}$.

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184. Using sine formula, determine cosine formula.

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185. In any triangle ABC, prove that :

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

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186. If cos A = m cos B, then prove that

$$\cot\frac{A+B}{2} = \frac{m+1}{m-1}\tan\left(\frac{B-A}{2}\right).$$

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187. Prove that :

$$\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ = 4.$$

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188. For all θ in $[0, \pi/2]$, show that $\cos(\sin\theta) > \sin(\cos\theta)$.

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189. It is given that : $\tan(\pi\cos\theta) = \cot\left(\sqrt{3}\pi\sin\theta\right)$, $0 < \theta < \frac{\pi}{2}$. Find the value of $\sin\left(\theta + \frac{\pi}{6}\right)$.

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190. ABC is a triangle such that : $\sin(2A + B) = \sin(C - A) = -\sin(B + 2C) = \frac{1}{2}$. If A, B and C are in arithmetical progression, determine the values of A, B and C.

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191. Prove that the values of the function

$\frac{\sin x\cos 3x}{\cos x\sin 3x}$ do not lie between $\frac{1}{3}$ and 3.

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192. If $\tan\alpha = \frac{p}{q}$, where $\alpha = 6\beta$, α being an acute angle, prove that : $\frac{1}{2}\{p\operatorname{cosec}2\beta - q\sec 2\beta\} = \sqrt{p^2 + q^2}$.

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193. Determine the smallest positive value of x (in degrees) for which $\tan\left(x + 100^\circ\right) = \tan\left(x + 50^\circ\right)\tan x\tan\left(x - 50^\circ\right)$

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194. If $\tan(\alpha - \beta) = \frac{\sin 2\beta}{5 - \cos 2\beta}$, find $\tan\alpha : \tan\beta$.

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195. Find the values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying the equation $(1 - \tan\theta)(1 + \tan\theta)\sec^2\theta + 2^{\tan^2\theta} = 0$

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196. If $32\tan^8\theta = 2\cos^2\alpha - 3\cos\alpha$ and $3\cos 2\theta = 1$, then find the general value of α.

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197. If $\frac{\tan(\theta + \alpha)}{a} = \frac{\tan(\theta + \beta)}{b} = \frac{\tan(\theta + \gamma)}{c}$, prove that : $\frac{a + b}{a - b}\sin^2(\alpha - \beta) + \frac{b + c}{b - c}\sin^2(\beta - \gamma) + \frac{c + a}{c - a}\sin^2(\gamma - \alpha) = 0$.

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198. Find all the values of α for which : $\sin^4 x + \cos^4 x + \sin 2x + \alpha = 0$ is valid.

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199. Let A, B, C be three angles such that $A = \pi/4$ and $\tan B \tan C = p$. Find all possible values of p such that A, B, C are the angles of triangles.

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200. IN a ΔABC, let $a = 6, b = 3$ and $\cos(A - B) = \frac{4}{5}$.

All symbols used have usual meaning in a triangle.

Statement I $\angle B = \frac{\pi}{2}$

Statement II $\sin A = \frac{2}{\sqrt{5}}$

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201. If p_1, p_2, p_3 are the altitudes of a triangle from the vertices A, B, C and $\triangle$, the area of the triangle, prove that : $\frac{1}{p_1} + \frac{1}{p_2} - \frac{1}{p_3} = \frac{2ab}{(a + b + c) \triangle} \cos^2 \frac{C}{2}$.

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202. If p_1, p_2, p_3 are the altitudes of a triangle from the vertices A, B, C and $\triangle$, the area of the triangle, prove that :

$$p_1^{-2} + p_2^{-2} + p_3^{-2} = \frac{(\cot A + \cot B + \cot C)}{\Delta}.$$

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Exercise

1. Find the radian measure corresponding to the following degree measure 15°

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2. Find the radian measure corresponding to the following degree measure : $40^{\circ}20'$.

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3. Find the radian measure corresponding to the following degree measure : 245°.

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

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5. Find the radian measure corresponding to the following grade measure : 70°.

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6. Find the radian measure corresponding to the following grade measure : 150^g.

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7. Find the radian measure corresponding to the following grade measure : $310\,^\circ$.

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8. Find thedegree measure corresponding to the following measure. (Use $\pi = \frac{22}{7}$).

$\frac{11}{15}$.

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9. Find thedegree measure corresponding to the following measure.

(Use $\pi = \frac{22}{7}$).

$-8.$

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10. Find thedegree measure corresponding to the following measure. (Use $\pi = \frac{22}{7}$).

$\frac{5\pi}{4}$.

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11. Find thedegree measure corresponding to the following measure. (Use $\pi = \frac{22}{7}$).

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

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12. The angles of a triangle are $3x^{\circ}$, $\left(\frac{4x}{3}\right)^{g}$ and $\frac{2\pi x}{75}$ radians. Find all the angles in degrees .

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13. Express the radians the fourth angle of a quadrilateral which has three angles $46^{\circ}30'10''$, $75^{\circ}44'45''$, $123^{\circ}9'35''$ respectively, taking $\pi = \frac{355}{113}$.

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14. The sum of two angles is 80 grades and their difference is 18°. Find the angles.

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15. The angles of a triangle are in the ratio 1 : 2: 3. Find the angles in radians.

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16. The vertical angle of an isosceles triangle is $\frac{2}{3}$ rd of each of its base angles. Find it in radians.

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17. In a right-angled triangle, the difference between two acute angles is $\frac{\pi}{9}$ in circular measure. Express the angles in degrees.

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18. The wheel of a carriage is 91 cm in diameter and makes 5 revolutions per second. How fast is the carriage running ?

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

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20. Find the length of the arc of a circle of radius 5 cm subtending an angle measure 45°.

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21. Find the length of an arc of circle of radius 6cm subtending an angle of 15° at the centre.

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22. Find the radius of a circle in which a central angle of 60° intercepts an arc of 37.4 cm. (Use $\pi = \frac{22}{7}$)

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

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24. If in two circles, arcs of the same length subtend angles 60° and 75° at the centre, find the ratio of their radii.

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25. Find the angle in radian through which a pendulum swings if itslength is 75 cm and the tip describes an arc of length:- 10 cm

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26. Find the angle in radian through which a pendulum swings if itslength is 75 cm and the tip describes an arc of length:- 15 cm

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27. Find the angle in radian through which a pendulum swings if itslength is 75 cm and the tip describes an arc of length:- 21 cm

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28. Show that the minute hand of a watch gains $5^{\circ} 30'$ on the hour hand in a minute.

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29. Find the angle between the hour-hand and the minute hand of a clock at half-past three.

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30. If G, D and θ be the number of grades, degrees and radians in any angle, prove that : $\frac{D}{90} = \frac{G}{100} = \frac{2\theta}{\pi}$.

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31. If G, D and θ be the number of grades, degrees and radians in any angle, prove that : $G = D + \frac{D}{9}$.

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32. Find the circular measure of an internal angle of a regular : pentagon .

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33. Find the circular measure of an internal angle of a regular : hexagon .

Watch Video Solution

34. Find the circular measure of an internal angle of a regular : polygon of 40 sides.

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35. The angles of a triangle are in A.P. and the greatest angle of the triangle is double the least angle, find the greatest angle in radians.

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36. The angles of a triangle are in A.P. and the number of degrees in the least to the number of radians in the greatest is as $60 : \pi$, find the angles in degrees and radians.

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37. The angles of a triangle are in A.P. and one of them is 80°. Find all the angles in sexagesimal system.

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38. The angles of a triangle are in A.P. and the greatest is 84°. Find all the three angles in radians.

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39. The angles of a quadrilateral are in A.P. Find all the angles if the greatest angle is double the smallest.

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40. The minute hand of a watch is 1.5 cm long. How many cm does its extremity move in 40 minutes ? (Use $\pi = 3.14$)

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41. A horse is tied to post by a rope. If the horse moves along circular path always keeping the tight and describes 88m, when it has traced out 72° at centre, find the length of rope.

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42. If a train is moving on the circular path of 1500 m radius at the rate of 66km//h, find the angle in radian, if it has in 10 second.

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43. At what distance does a man, whose height is 2 metres, subtend an angle of 10' ?

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44. Assuming that a person of normal sight can read print to such distance that the letters subtend and angle of 5 at his eye, find the height of the letters that he can read at a distance of 12 metres.

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45. Assuming that the earth's radius is 6400 km and that it subtends an angle of 57' at the centre of the moon, find the distance of the centre of the moon from the earth's centre.

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46. Prove the following identity :

$\sin\theta\cot\theta + \sin\theta \cos ec\theta = 1 + \cos\theta.$

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47. Prove that $(\cos ec\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1.$

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48. Prove the following identity :

$\sin\theta(1+\tan\theta)+\cos\theta(1+\cot\theta)=\sec\theta+\cos ec\theta.$

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49. Prove the following identity :

$(\sin\theta+\cos\theta)(\sec\theta+\cos ec\theta)=2+\sec\theta\cos ec\theta.$

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50. (cosec θ -sin θ) (sec θ - cos θ) (tan θ + cot θ) = 1.

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51. Prove the following identity :

$\sin^2A\cos^2B+\cos^2A\sin^2B+\cos^2A\cos^2B+\sin^2A\sin^2B=1.$

Watch Video Solution

52. Prove the following identity :

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

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53. Prove the following identity :

$$\frac{1+\cos\theta}{1-\cos\theta} = \frac{\tan^2\theta}{(\sec\theta-1)^2}.$$

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54. Prove the following identity :

$$\frac{1-\sin\theta}{1+\sin\theta} = (\sec\theta-\tan\theta)^2.$$

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55. Prove the following identity :

$$\sqrt{\frac{1 - \cos\theta}{1 + \cos\theta}} = \cos ec\theta - \cot\theta .$$

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56. Prove the following identity :

$$\sqrt{\frac{1 + \cos\theta}{1 - \cos\theta}} = \cos ec\theta + \cot\theta$$

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57. Prove the following identity :

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

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58. Prove the following identity :

$\cot^2\theta - \cos^2\theta = \cot^2\theta\cos^2\theta.$

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59. Prove the following identity :

$\sin^4\theta + \cos^4\theta = 1 - 2\sin^2\theta\cos^2\theta.$

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60. Prove the following identity :

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

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61. Prove the following identity :

$\sec^4\theta - \tan^4\theta = 1 + 2\tan^2\theta.$

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62. Prove the following identity :

$\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta.$

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63. Prove the following identity :

$2\left(\sin^6\theta + \cos^6\theta\right) - 3\left(\sin^4\theta + \cos^4\theta\right) + 1 = 0.$

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64. Prove the following identity :

$2u_6 - 3u_4 + 1 = 0$, where $u_n = \cos^n\theta + \sin^n\theta$.

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65. Prove the following identity :

$\sec^6\theta - \tan^6\theta = 1 + 3\tan^2\theta + 3\tan^4\theta$.

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66. Prove the following identity :

$\cos ec^6\theta - \cot^6\theta = 3\cot^2\theta\cos ec^2\theta + 1$.

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67. Prove the following identity :

$$2\sec^2\theta - \sec^4\theta - 2\mathrm{cos}ec^2\theta + \mathrm{cos}ec^4\theta = \cot^4\theta - \tan^4\theta.$$

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68. Prove the following identity :

$$\frac{\sin\theta}{1 + \cos\theta} + \frac{\tan\theta}{1 + \cos\theta} = \sec\theta \mathrm{cos}ec\theta - \cot\theta.$$

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69. Prove the following identity :

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

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70. Prove the following identity :

$$\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \operatorname{cosec}^2\theta.$$

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71. Prove the following identity :

$$\frac{\operatorname{cosec}\theta}{\cot\theta + \tan\theta} = \cos\theta.$$

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72. Prove the following identity :

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

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73. Prove the following identity :

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

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74. Prove the following identity :

$$\frac{\cot^2\theta}{(1 - \cos ec\theta)^2} = \frac{1 + \sin\theta}{1 - \sin\theta}.$$

Watch Video Solution

75. Prove the following identity :

$$\cot^2\theta\left(\frac{\sec\theta - 1}{1 + \sin\theta}\right) + \sec^2\theta\left(\frac{\sin\theta - 1}{1 + \sec\theta}\right) = 0.$$

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76. Prove the following identity :

$$\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + \sec\theta \cos ec\theta.$$

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77. (1 + cot A — cosec A) (1 + tan A + sec A) = 2 .

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78. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. : $(\sin A + \cos ec A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.

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79. Prove the following identity :

$(1 - \tan x)^2 + (1 - \cot x)^2 = (\sec x - \operatorname{cosec} x)^2.$

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80. Prove the following identity :

$(\sec\theta - \cos\theta)(\operatorname{cosec}\theta - \sin\theta) = \dfrac{1}{\tan\theta + \cot\theta}.$

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81. Prove the following identity :

$(\sin\theta + \sec\theta)^2 + (\cos\theta + \operatorname{cosec}\theta)^2 = (1 + \sec\theta\operatorname{cosec}\theta)^2 .$

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82. Prove the following identity :

$$\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cot\theta = \sec\theta\operatorname{cosec}\theta \ .$$

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83. Prove the following identity :

$$\frac{1}{\operatorname{cosec}\theta - \cot\theta} - \frac{1}{\sin\theta} = \frac{1}{\sin\theta} - \frac{1}{\operatorname{cosec}\theta + \cot\theta}.$$

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84. Prove the following identity :

$$\frac{1}{\sec\theta + \tan\theta} - \frac{1}{\cos\theta} = \frac{1}{\cos\theta} - \frac{1}{\sec\theta - \tan\theta} \ .$$

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85. Prove the following identity :

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

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86. Prove the following identity :

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

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87. Prove the following identity :

$$\frac{\cot\theta + \operatorname{cos}ec\theta - 1}{\cot\theta - \operatorname{cos}ec\theta + 1} = \frac{1 + \cos\theta}{\sin\theta}.$$

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88. Prove the following identity :

$$\frac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} = 2 + \frac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta}.$$

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89. Prove the following identity :

$$\frac{\sin A - \sin B}{\cos A + \cos B} + \frac{\cos A - \cos B}{\sin A + \sin B} = 0.$$

Watch Video Solution

90. Prove the following identity :

$$(1 + \cot A + \tan A)(\sin A - \cos A) = \frac{\sec A}{\operatorname{cosec}^2 A} - \frac{\operatorname{cosec} A}{\sec^2 A}.$$

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91. Eliminate θ between the equation :

$x = h + a\cos\theta, y = k + b\sin\theta.$

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92. Eliminate θ between the equation :

$x = \sin\theta + \cos\theta, y = \sin\theta - \cos\theta.$

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93. Eliminate θ between the equation :

$x = a\cos\theta + b\sin\theta, y = a\sin\theta - b\cos\theta.$

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94. Eliminate θ between the equation :

$x = a\sec\theta, y = b\tan\theta.$

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95. Eliminate θ between the equation :

$x = a\sec^3\theta, y = b\tan^3\theta.$

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96. Eliminate A between the equation :

$\sec A + \tan A = m, \sec A - \tan A = n.$

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97. Eliminate A between the equation :

$a\cos ecA + b\cot A = x^2, b\cos ecA + a\cot A = y^2.$

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98. Eliminate A between the equation :

$p\sec A + q\tan A = x, p\tan A + q\sec A = y.$

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99. Eliminate A between the equation :

$l\tan A + m\sec A = n, l'\tan A - m'\sec A = n'.$

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100. If $m = \sin\theta + \cos\theta$ and $n = \sec\theta + \cos ec\theta$,

prove that $n(m+1)(m-1) = 2m$.

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101. If $\cot\theta + \cos\theta = m$, $\cot\theta - \cos\theta = n$,

show that : $\left(m^2 - n^2\right)^2 = 16mn$.

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102. If $a\cot\theta + b\cos ec\theta = x^2$, $b\cot\theta + a\cos ec\theta = y^2$,

prove that $x^4 - y^4 = b^2 - a^2$.

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103. If $x\cos\theta - y\sin\theta = a, x\sin\theta + y\cos\theta = b$, prove that $x^2 + y^2 = a^2 + b^2$.

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104. If $\cos ec\theta - \sin\theta = a^3, \sec\theta - \cos\theta = b^3$, prove that $a^2b^2\left(a^2 + b^2\right) = 1$.

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105. If $x = r\sin\theta\cos\phi, y = r\sin\theta\sin\phi, z = r\cos\theta$, prove that $x^2 + y^2 + z^2 = r^2$.

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106. If $\frac{\sin A}{\sin B} = m$, and $\frac{\cos A}{\cos B} = n$, prove that $\tan A = \pm \frac{m}{n}\sqrt{\frac{1 - n^2}{m^2 - 1}}$.

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107. If $\tan\alpha = n\tan\beta$ and $\sin\alpha = m\sin\beta$, prove that $\cos^2\alpha = \frac{m^2 - 1}{n^2 - 1}$.

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108. Which of the six t-ratios are positive for the angle :

210° ?

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109. Which of the six t-ratios are positive for the angle :

-405° ?

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110. If $\sin\theta = -\frac{1}{\sqrt{2}}$ and $\tan\theta = 1$, find the quadrant in which θ lies.

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111. Prove that $\sec\theta + \cos\theta$ can never be equal to $\frac{3}{2}$.

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112. Prove that : $\cos ec^2\theta + \sin^2\theta$ can never be less than 2.

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113. Is the equation $2\cos^2\theta + \cos\theta - 6 = 0$ possible ?

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114. Is the equation $2\sin^2\theta - \cos\theta + 4 = 0$ possible ?

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115. Find the values of the remaining functions in the following problem :

$\sin\theta = \frac{3}{5}$, θ in quadrant II.

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116. Find the values of other five trignometrtic functions in each of the following:

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

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117. Find the values of the remaining functions in the following problem :

$\cos\theta = \frac{-3}{5}$, θ in quadrant III.

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118. Find the values of the remaining functions in the following problem :

$\tan\theta = \frac{4}{3}$, θ in quadrant III.

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119. Find the values of the remaining functions in the following problem :

$\tan\theta = -\frac{5}{12}$, θ in quadrant II.

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120. Find the values of the remaining functions in the following problem :

$\cot\theta = \frac{3}{4}$, θ in quadrant III.

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121. Find the values of the remaining functions in the following problem :

$\cot\theta = -\frac{5}{12}$, θ in quadrant II.

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122. Find the values of the remaining functions in the following problem :

$\sec\theta = \frac{13}{5}$, θ in quadrant IV.

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123. Find the values of the remaining functions in the following problem :

$\sin\theta\sec\theta = -1$, θ in quadrant II.

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124. If $\cos A = \frac{21}{29}$ and A lies in the fourth quadrant, find sin A and tan A.

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125. If $\sin A = \frac{21}{29}$ and A lies in the second quadrant, find $\sec A + \tan A = \frac{-5}{2}$.

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126. If $\sin\theta\sec\theta = -1$ and θ lies in the second quadrant, find $\sin\theta$ and $\sec\theta$.

Watch Video Solution

127. If $\cos\theta \text{cosec}\theta = -1$ and θ lies in the the

fourth quadrant, find $\cos\theta$ and $\text{cosec}\theta$.

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128. If sinA :cosA :: 8: 15, find sin A and cos A.

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129. If $\cos ecA - \cot A = \frac{3}{2}$, find cos A and also the quadrant in which A lies.

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130. If $\sec A + \tan A = m$, prove that : $\sin A = \frac{m^2 - 1}{m^2 + 1}$.

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131. If $5\sin\theta = 3$, find the value of $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta}$.

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132. Prove that the equation : $\cos\theta = x + \frac{1}{x}$ is impossible if x be real.

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133. Prove that the equation : $(a + b)^2 = 4ab\sin^2\theta$ is possible only when a = b.

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134. If x and y are real, show that the equation : $\sec^2\theta = \frac{4xy}{(x + y)^2}$ is valid only when $x = y \neq 0$.

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135. Find the value of the following :

$\sin^2 30^\circ + \sin^2 45^\circ + \sin^2 60^\circ + \sin^2 90^\circ$.

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136. Find the value of the following :

$\frac{\sin 60^\circ}{\cos^2 45^\circ} - 3\tan 30^\circ$.

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137. Find the value of the following :

$3\sin^2 30^\circ + 2\tan^2 60^\circ - 5\cos^2 45^\circ$.

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138. Find the value of the following :

$2\sin^2 30^\circ - 3\cos^2 45^\circ + \cos^2 60^\circ$.

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139. Prove that :

$\cot^2 60^\circ + \sin^2 45^\circ + \sin^2 30^\circ + \cos^2 90^\circ = \frac{13}{12}$.

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140. Prove that :

$\cos ec 60^\circ \cot 30^\circ \tan 60^\circ = 2\sec^2 45^\circ \cos 30^\circ$.

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141. Prove that : $\cos^2 30^\circ, \cos^2 45^\circ, \cos^2 60^\circ$ are in A.P.

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142. Prove that : $\cot^2 30^\circ, \cot^2 45^\circ, \cot^2 60^\circ$ are in G.P.

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143. If $A = 45^\circ$, verify that : sin 2A =2 sin A cos A .

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144. If $A = 45^\circ$, verify that : $\cos 2A = \cos^2 A - \sin^2 A$.

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145. If $\theta = 30^\circ$, verify that $\tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$.

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146. If $A = 30^{\circ}$ and $B = 60^{\circ}$, verify that : $\sin(A + B) = \sin A \cos B + \cos A \sin B.$

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147. Given $\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$. If $\tan 30^{\circ} = \frac{1}{\sqrt{3}}$, verify that $\tan 60^{\circ} = \sqrt{3}.$

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148. Find the value of $\theta\left(0^{\circ} \leq \theta \leq 90^{\circ}\right)$ satisfying : $\tan\theta + \cot\theta = 2.$

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149. Find the value of $\theta\left(0^\circ \leq \theta \leq 90^\circ\right)$ satisfying : $2\sin^2\theta = 3\cos\theta$.

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150. Find the value of $\theta\left(0^\circ \leq \theta \leq 90^\circ\right)$ satisfying : $2\cos^2\theta + 5\sin\theta - 4 = 0$.

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151. If $\sin\theta = \frac{21}{29}$, prove that $\sec\theta + \tan\theta = 2\frac{1}{2}$ if θ lies between 0 and $\pi/2$.

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152. What will be the value of the expression sec θ+ tan θ and sin θ =21/29 when θ lies between $\frac{\pi}{2}$ and π?

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153. What will be the value of the expression sec θ+ tan θ and sin θ =21/29 when θ lies between $\frac{\pi}{2}$ and π?

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154. If $\sin(B + C - A) = \cos(C + A - B) = \tan(A + B - C) = 1$, find A, B, C which are positive acute angles.

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155. Find the value of :

$\cos 210^{\circ}$.

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156. Find the value of :

$\sin 225^{\circ}$.

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157. Find the value of : $\sin 765^{\circ}$.

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158. Find the value of : $\tan 330^{\circ}$.

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159. Find the value of : $\tan\frac{19\pi}{3}$.

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160. Find the value of :

$\cot\left(-315^{\circ}\right)$.

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161. Find the value of :

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

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162. Find the value of :

$\sec\frac{11\pi}{4}$.

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163. Find the value of :

$\operatorname{cosec}\left(-1410^{\circ}\right)$.

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164. Prove that: $\frac{\cos 135^{\circ}-\cos 120^{\circ}}{\cos 135^{\circ}+\cos 120^{\circ}}=3-2\sqrt{2}$.

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165. Prove that:

$\sin 150^{\circ} \cos 120^{\circ} + \cos 330^{\circ} \sin 660^{\circ} = -1.$

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166. Prove that :

$\sin 105^{\circ} + \cos 105^{\circ} = \cos 45^{\circ}.$

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167. Simplify the following :

$\sin\left(90^{\circ} + \theta\right)\tan\left(270^{\circ} + \theta\right)\cot\left(90^{\circ} + \theta\right)\operatorname{cosec}\left(270^{\circ} + \theta\right).$

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168. Simplify the following :

$$\frac{\sin(-\theta)\tan\left(180^\circ+\theta\right)\tan\left(90^\circ+\theta\right)}{\cot\left(90^\circ-\theta\right)\cos\left(360^\circ-\theta\right)\sin\left(180^\circ-\theta\right)}.$$

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169. Simplify the following :

$$\frac{\cos\left(360^\circ-\theta\right)\operatorname{cosec}\left(180^\circ+\theta\right)\cot\left(90^\circ-\theta\right)}{\sec\left(90^\circ+\theta\right)\cos(-\theta)}.$$

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170. Prove that

$$\cos\theta+\sin\left(270^\circ-\theta\right)-\sin\left(270^\circ-\theta\right)+\cos\left(180^\circ+\theta\right)=0.$$

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

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172. Prove that : $\sin^2\frac{\pi}{6}+\cos^2\frac{\pi}{3}-\tan^2\frac{\pi}{4}=-\frac{1}{2}.$

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173. Prove that: $2\sin^2\frac{\pi}{6}+\operatorname{cosec}^2\frac{7\pi}{6}\cos^2\frac{\pi}{3}=\frac{3}{2}$

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174. Prove that: $\cot^2\frac{\pi}{6}+\operatorname{cosec}\frac{5\pi}{6}+3\tan^2\frac{\pi}{6}=6$

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175. Prove that :

$$2\sin^2\frac{3\pi}{4} + 2\cos^2\frac{\pi}{4} + 2\cos^2\frac{\pi}{3} = \frac{5}{2}.$$

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176. Prove that :

$$3\sin\frac{\pi}{6}\sec\frac{\pi}{3} - 4\sin\frac{5\pi}{6}\cot\frac{\pi}{4} = 1.$$

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

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178. Prove the following:

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

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179. Find 'x' from the equation :

$$\operatorname{cosec}\left(90^\circ-\theta\right)-x\sin\left(90^\circ-\theta\right)\tan\left(180^\circ+\theta\right)=\sin\left(90^\circ+\theta\right).$$

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180. Find 'x' from the equation :

$$\operatorname{cosec}\left(90^\circ-\theta\right)-x\sin\left(90^\circ-\theta\right)\tan\left(180^\circ+\theta\right)=\sin\left(90^\circ+\theta\right).$$

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181. In any quadrilateral ABCD, prove that:

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

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182. Find all the values of θ satisfying $0 < \theta < \pi$ and

$\tan^2\theta + \cot^2\theta = 2.$

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183. Find the period of the following function:

sin 2x.

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184. Find the period of the following function: cos 3x.

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185. Find the period of the following function: tan 2x.

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186. If A, B, C and D be the angles of a cyclic quadrilateral, taken in order, prove that : $\cos\left(180^{\circ}-A\right)+\cos\left(180^{\circ}+B\right)+\cos\left(180^{\circ}+C\right)-\sin\left(90^{\circ}+D\right)=0$.

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187. If $x=\frac{11\pi}{4}$, prove that : $\sin^2 x-\cos^2 x+2\tan x-\sec^2 x=1$.

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188. If $8\theta = \pi$, prove that $\cos\theta + \cos 7\theta = 0$.

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189. If $B + C = 60°$, show that :

$\sin\left(120° - B\right) = \sin\left(120° - C\right)$.

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190. Prove that : $\sin^2\frac{\pi}{8} + \sin^2\frac{3\pi}{8} + \sin^2\frac{5\pi}{8} + \sin^2\frac{7\pi}{8} = 2$.

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191. Prove that :

$\left[1 + \cot\alpha - \sec\left(\frac{\pi}{2} + \alpha\right)\right]\left[1 + \cot\alpha + \sec\left(\frac{\pi}{2} + \alpha\right)\right] = 2\cot\alpha$.

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192. In any triangle ABC, prove that :

$\sin(A + B) = \sin C$.

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193. In any triangle ABC, prove that :

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

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194. In any triangle ABC, prove that :

$\tan\frac{B + C - A}{2} = \cot A$.

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195. If cot A= tan (n-1) A, show that one value of A is $\frac{\pi}{2n}$.

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196. Show that the function f(x) = cos 2x is periodic and find its period.

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197. Show that the function $f(x) = \cos\left(\frac{x}{2} + \frac{\pi}{4}\right)$ is periodic and find its period.

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198. Evaluate :

$\sin 15^\circ, \cos 15^\circ, \tan 15^\circ$.

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199. Evaluate :

$\sin 75^\circ, \cos 75^\circ, \tan 75^\circ$.

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200. Prove that : $\sin 105^\circ + \cos 105^\circ = \frac{1}{\sqrt{2}}$.

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201. Prove that : $\cos 105^\circ + \cos 15^\circ = \sin 75^\circ - \sin 15^\circ$.

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202. Find $\tan 15^\circ$ and hence show that $\tan 15^\circ + \cot 15^\circ = 4$.

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203. Evaluate : $\sin^2(15^\circ + A) - \sin^2(15^\circ - A)$.

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204. Write down the values of : $\cos 68^\circ \cos 8^\circ + \sin 68^\circ \sin 8^\circ$.

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205. Write down the values of : $\cos 70^\circ \cos 10^\circ + \sin 70^\circ \sin 10^\circ$.

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206. Prove that : $\cos 130^\circ \cos 40^\circ + \sin 130^\circ \sin 40^\circ = 0.$

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207. Prove that : $\sin\left(40^\circ + \theta\right)\cos\left(10^\circ + \theta\right) - \cos\left(40^\circ + \theta\right)\sin\left(10^\circ + \theta\right) = \frac{1}{2}.$

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208. Prove the following: $\sin(n+1)x\sin(n+2)x + \cos(n+1)x\cos(n+2)x = \cos x$

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209. Prove that $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$

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

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211. Evaluate :

$\tan\dfrac{13\pi}{12}$.

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212. Find the maximum and minimum values of : $15\cos\theta - 8\sin\theta$.

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213. 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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214. If $\cos(\alpha - \beta) + \cos(\beta - \gamma) + \cos(\gamma - \alpha) = -\frac{3}{2}$, prove that $\cos\alpha + \cos\beta + \cos\gamma = \sin\alpha + \sin\beta + \sin\gamma = 0$

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215. If $\theta + \phi = 45^\circ$, prove that $(\cot\theta - 1)(\cot\phi - 1) = 2.$

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216. If $\theta - \phi = \frac{\pi}{4}$, prove that :

$(1 + \tan\theta)(1 - \tan\phi) = 2.$

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217. If $\theta - \phi = \frac{\pi}{4}$, prove that :

$(1 + \tan\theta)(1 + \tan\phi) = 2\tan\theta.$

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218. Prove that :

$\tan 69^\circ + \tan 66^\circ + 1 = \tan 69^\circ \tan 66^\circ.$

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219. Prove that :

$$\frac{\cos 13^\circ + \sin 13^\circ}{\cos 13^\circ - \sin 13^\circ} = \tan 58^\circ.$$

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220. Prove the following: $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$

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221. Prove that :

$\tan 3A - \tan 2A - \tan A = \tan 3A \tan 2A \tan A.$

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222. Prove that :

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

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223. Prove that :

$\tan 13A - \tan 9A - \tan 4A = \tan 13A \tan 9A \tan 4A.$

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224. If $\cos(\alpha + \beta)\sin(\gamma + \delta) = \cos(\alpha - \beta)\sin(\gamma - \delta)$, prove that : $\cot\alpha\cot\beta\cot\gamma = \cot\delta$.

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225. Prove that :

$$1 + \tan A\tan\frac{A}{2} = \sec A = \tan A\cot\frac{A}{2} - 1$$

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226. If $\cot\alpha\cot\beta = 2$, show that $\dfrac{\cos(\alpha + \beta)}{\cos(\alpha - \beta)} = \dfrac{1}{3}$.

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227. Prove that :

$\tan 50^\circ = \tan 40^\circ + 2\tan 10^\circ$.

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228. Prove that :

$2\tan 70^\circ = \tan 80^\circ - \tan 10^\circ$.

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229. If $\cos A = \frac{5}{13}$ and $\sin B = \frac{4}{5}$,

find sin (A + B), where A, B, (A + B) are positive acute angles.

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230. If $\tan x = \frac{a}{a+1}$ and $\tan y = \frac{1}{2a+1}$, show that one of the values of :

$x + y = \frac{\pi}{4}, a \in R, a \neq -1, a \neq -\frac{1}{2}.$

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231. In any quadrilateral ABCD, show that :

$\cos A \cos B - \cos C \cos D = \sin A \sin B - \sin C \sin D.$

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232. Prove that :

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

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233. Prove that :

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

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234. Prove that :

$$\cos^2\left(\frac{\pi}{8} + \frac{x}{2}\right) - \sin^2\left(\frac{\pi}{8} - \frac{x}{2}\right) = \frac{1}{\sqrt{2}}\cos x.$$

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235. Prove that : $\dfrac{\cos^2 33^\circ - \cos^2 57^\circ}{\sin^2 \frac{21^\circ}{2} - \sin^2 \frac{69^\circ}{2}} = -\sqrt{2}.$

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236. Find a and b such that $a \leq 3\cos\theta + 5\sin\left(\theta - \frac{\pi}{6}\right) \leq b$

holds good for all values of θ.

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237. If $\sin\alpha = \frac{15}{17}$ and $\cos\beta = \frac{12}{13}$, find the values of : $\sin(\alpha + \beta)$.

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238. If $\sin\alpha = \frac{15}{17}$ and $\cos\beta = \frac{12}{13}$,

find the values of : $\cos(\alpha - \beta)$.

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239. If $\sin\alpha = \frac{15}{17}$ and $\cos\beta = \frac{12}{13}$,

find the values of : $\tan(\alpha + \beta)$.

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240. If $\cos(\alpha + \beta) = \frac{4}{5}, \sin(\alpha - \beta) = \frac{5}{13}$ and

α, β lie between 0 and $\frac{\pi}{4}$, prove that $\tan 2\alpha = \frac{56}{33}$.

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241. Find the value of $\tan(\alpha + \beta)$, given that : $\cot\alpha = \frac{1}{2}, \alpha \in \left(\pi, \frac{3\pi}{2}\right)$

and $\sec\beta = -\frac{5}{3}, \beta \in \left(\frac{\pi}{2}, \pi\right)$ and state the quadrant in which $(\alpha + \beta)$

terminates.

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242. If $\theta + \phi = \alpha$ and $\tan\theta = k\tan\phi$,

prove that : $\sin\alpha = \dfrac{k+1}{k-1}\sin(\theta - \phi)$.

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243. Prove the following: $\cos\left(\dfrac{3\pi}{4} + x\right) - \cos\left(\dfrac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$

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

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245. Prove the following :

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

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246. Prove the following :

$$\frac{\sin x+\sin y}{\cos x+\cos y}=\tan\frac{x+y}{2}.$$

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247. Prove the following :

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

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248. Prove the following: $\frac{\sin x-\sin y}{\cos x+\cos y}=\tan\frac{x-y}{2}$

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249. Prove the following :

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

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250. Prove the following: $\cos^2 2x - \cos^2 6x = \sin 4x \sin 8x$

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

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252. Prove the following :

$$4\sin A \sin\left(60^\circ + A\right)\sin\left(60^\circ - A\right) = \sin 3A.$$

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253. Prove the following :

$\sin 10^{\circ} + \sin 20^{\circ} + \sin 40^{\circ} + \sin 50^{\circ} = \sin 70^{\circ} + \sin 80^{\circ}$.

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254. Prove the following :

$\sin 51^{\circ} + \cos 81^{\circ} = \cos 21^{\circ}$.

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255. Prove the following :

$\sin 10^{\circ} \sin 50^{\circ} \sin 70^{\circ} = \frac{1}{8}$.

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256. Prove the following :

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

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257. Prove the following :

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

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258. Prove the following :

$$\cos 10^\circ \cos 50^\circ \cos 70^\circ = \frac{\sqrt{3}}{8}.$$

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259. Prove the following :

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

Watch Video Solution

260. Prove the following :

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

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261. Prove the following :

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

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262. Prove the following :

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

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263. Prove the following :

$\tan 20^\circ \tan 40^\circ \tan 60^\circ \tan 80^\circ = 3$.

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264. Prove the following :

$\tan 20^\circ \tan 40^\circ \tan 80^\circ = \tan 60^\circ$.

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265. Prove that: $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0$

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266. Prove the following :

$$\sin\alpha + \sin\beta + \sin\gamma - \sin(\alpha + \beta + \gamma) = 4\sin\frac{\alpha + \beta}{2}\sin\frac{\beta + \gamma}{2}\sin\frac{\gamma + \alpha}{2}.$$

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267. Prove the following :

$$\cot 4\theta(\sin 5\theta + \sin 3\theta) = \cot\theta(\sin 5\theta - \sin 3\theta).$$

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268. Prove the following :

$$\cos 3\theta + \cos 5\theta + \cos 7\theta + \cos 9\theta = 4\cos\theta\cos 2\theta\cos 6\theta.$$

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269. Prove the following: $\sin 2x + 2\sin 4x + \sin 6x = 4\cos^2 x \sin 4x$

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270. Prove the following :

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

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271. Prove the following :

$\cos 7\theta + \cos 5\theta + \cos 3\theta + \cos\theta = 4\cos\theta\cos 2\theta\cos 4\theta$

for all value of θ.

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272. Prove the following :

$$\sin\alpha + \sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right) = 0.$$

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273. Prove the following :

$$\cos A + \cos\left(120^\circ - A\right) + \cos\left(120^\circ + A\right) = 0.$$

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274. Prove the following :

$$\frac{\sin 11A \sin A + \sin 7A \sin 3A}{\cos 11A \sin A + \cos 7A \sin 3A} = \tan 8A.$$

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275. Prove the following: $\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

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276. Prove the following :

$\dfrac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x.$

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

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278. Prove the following: $\dfrac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$

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

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

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281. Prove the following: $\cot 4x(\sin 5x + \sin 3x) = \cot x(\sin 5x - \sin 3x)$

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282. If $\alpha + \beta = \frac{\pi}{2}$, then the maximum value of $\cos\alpha\cos\beta$ is:

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283. If $\cos(\theta + 2\alpha) = m\cos\theta$, prove that : $\cot\alpha = \frac{1 + m}{1 - m}\tan(\theta + \alpha)$.

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284. If $\frac{\sin\beta}{\sin(2\alpha + \beta)} = \frac{m}{n}$, prove that : $\cot(\alpha + \beta) = \frac{n - m}{n + m}\cot\alpha$.

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

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

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286. Prove that :

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

$4\sin x\sin y\sin z$.

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287. If $\cos(A+B)\sin(C-D)=\cos(A-B)\sin(C+D)$,

show that :$\tan A\tan B\tan C+\tan D=0$.

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

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289. Prove that :

$\cot 2A=\frac{\cot^2 A-1}{2\cot A}$.

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290. Prove that :

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

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291. Find $\tan 15^\circ$ and hence show that $\tan 15^\circ + \cot 15^\circ = 4.$

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292. Prove that :

$\tan 75^\circ + \cot 75^\circ = 4.$

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293. Given $\cos 45^\circ = \frac{1}{\sqrt{2}}$, find the value of $\cos 22\frac{1}{2}^\circ$.

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294. Prove that :

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

Watch Video Solution

295. Prove that :

$$2\tan 2x = \frac{\cos x + \sin x}{\cos x - \sin x} - \frac{\cos x - \sin x}{\cos x + \sin x}.$$

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296. Prove the following: $\cos 4x = 1 - 8\sin^2 x \cos^2 x$

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297. Prove that :

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

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298. Prove that :

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

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299. Prove that $\frac{\tan^2\theta}{\tan^2\theta - 1} + \frac{\operatorname{cosec}^2\theta}{\sec^2\theta - \operatorname{cosec}^2\theta} = -\sec 2\theta.$

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300. If $\cos\theta = \frac{1}{2}\left(a + \frac{1}{a}\right)$, prove that :

$2\cos 2\theta = a^2 + \frac{1}{a^2}$.

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301. If $\cos\theta = \frac{1}{2}\left(a + \frac{1}{a}\right)$, prove that : $2\cos 4\theta = a^4 + \frac{1}{a^4}$.

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302. If $2\cos\theta = x + \frac{1}{x}$, prove that $2\cos 3\theta = x^3 + \frac{1}{x^3}$

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303. Prove that : $2\cos\theta = \sqrt{2 + \sqrt{2 + 2\cos 4\theta}}$.

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

Watch Video Solution

305. Prove that :

$\tan A + \tan\left(60^\circ + A\right) - \tan\left(60^\circ - A\right) = 3\tan 3A.$

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306. Prove that :

$\cos^2 A + \cos^2\left(A + 120^\circ\right) + \cos^2\left(A - 120^\circ\right) = \frac{3}{2}.$

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307. If $\tan^2\theta = 2\tan^2\phi + 1$, show that $\cos 2\theta + \sin^2\phi = 0$.

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308. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ in the following:- $\tan x = -\frac{4}{3}$, x in quadrant II

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309. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ in the following:- $\cos x = -\frac{1}{3}$, x in quadrant III

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310. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ in the following:- $\sin x = \frac{1}{4}$, x in quadrant II

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311. If $\tan\frac{x}{2} = \frac{m}{n}$, prove than $m\sin x + n\cos x = n$.

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312. If $\tan\theta = \frac{a}{b}$, prove that $a\sin2\theta + b\cos2\theta = b$.

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313. Prove that $\dfrac{\cos^3\theta - \cos3\theta}{\cos\theta} + \dfrac{\sin^3\theta + \sin3\theta}{\sin\theta} = 3$.

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314. Evaluate :

$\sin \frac{3\pi}{8}$.

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315. Evaluate :

$\sin \frac{5\pi}{24}$.

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316. Evaluate :

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

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317. Prove that :

$$\sin^4\frac{\pi}{8} + \sin^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8} = \frac{3}{2}.$$

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318. Prove that : $\sqrt{\dfrac{1 - \cos\frac{5\pi}{3}}{2}} = \dfrac{1}{2}.$

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

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320. Prove the following: $\cos^2 2x - \cos^2 6x = \sin 4x \sin 8x$

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321. Find $\sin 7\frac{1}{2}^{\circ}$, $\cos 7\frac{1}{2}^{\circ}$ and $\tan 11\frac{1}{4}^{\circ}$.

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322. Prove that :

$$\tan 142\frac{1}{2}^{\circ} = 2 + \sqrt{2} - \sqrt{3} - \sqrt{6}.$$

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323. If θ be any real, prove that :

$$\cos 4\theta = 1 - 8\sin^2\theta\cos^2\theta = 1 - 8\cos^2\theta + 8\cos^4\theta.$$

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324. If θ be any real, prove that : $\sin 5\theta = 5\sin\theta - 20\sin^3\theta + 16\sin^5\theta$.

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325. Prove the following: $\cot x\cot 2x - \cot 2x\cot 3x - \cot 3x\cot x = 1$

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326. Prove that: $\sin 3x + \sin 2x - \sin x = 4\sin x\cos\frac{x}{2}\cos\frac{3x}{2}$

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

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

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329. If $\cos\theta = \frac{\cos\phi - e}{1 - e\cos\phi}$, show that : $\tan\frac{\theta}{2} = \pm\sqrt{\frac{1 + e}{1 - e}}\tan\frac{\phi}{2}$.

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330. Prove that :

$\sin 36^\circ \sin 72^\circ \sin 108^\circ \sin 144^\circ = \frac{5}{16}$.

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331. Prove that $\sin\frac{\pi}{10} + \sin\frac{13\pi}{10} = -\frac{1}{2}$.

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332. Prove that :

$$\sin^2 18^\circ + \cos^2 36^\circ = \frac{3}{4}.$$

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333. Prove that :

$$\sin^2 24^\circ - \sin^2 6^\circ = \frac{1}{8}\left(\sqrt{5} - 1\right).$$

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334. Prove that $\sin 18^\circ$ and $\cos 36^\circ$ are the roots of the equation :

$$4x^2 - 2\sqrt{5}x + 1 = 0.$$

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335. Prove that :

$$\sin 12^\circ \sin 48^\circ \sin 54^\circ = \frac{1}{8}.$$

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336. Prove that :

$$\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ = \frac{1}{16}.$$

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337. Prove that

$$\cos 6^\circ \cos 42^\circ \cos 60^\circ \cos 78^\circ = \frac{1}{16}.$$

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338. Prove that : $16\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{16\pi}{15} = 1.$

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339. Prove that :

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

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340. If $A+B+C=\pi$, then, find

$\sin 2A+\sin 2B+\sin 2C.$

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341. If $A + B + C = \pi$, then, find

$\sin 2A + \sin 2B + \sin 2C$.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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349. If $A + B + C = \pi$, prove that : $\cos A + \cos B - \cos C > 1$.

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350. If $A + B + C = \pi$, prove that : $\dfrac{\sin A + \sin B + \sin C}{\sin A + \sin B - \sin C} = \cot\dfrac{A}{2}\cot\dfrac{B}{2}$.

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

$$\frac{\sin 2A+\sin 2B+\sin 2C}{\sin A+\sin B+\sin C}=8\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}.$$

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

$$\frac{\sin 2A+\sin 2B+\sin 2C}{\cos A+\cos B+\cos C-1}=8\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}.$$

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353. If $A+B+C=180^{\circ}$, then find the value of

$$\frac{\cos A}{\sin B\sin C}+\frac{\cos B}{\sin C\sin A}+\frac{\cos C}{\sin A\sin B}.$$

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354. If $A + B + C = \pi$, then, find

$\sin 2A + \sin 2B + \sin 2C$.

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355. If $A + B + C = 180^{\circ}$, prove that :

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

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356. If $A + B + C = 180^{\circ}$, prove that :

$\sin^2 A + \sin^2 B + \sin^2 C = 2(1 + \cos A\cos B\cos C)$.

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357. If $A + B + C = 180^\circ$, prove that : $\sin^2 A + \sin^2 B - \sin^2 C = 2\sin A \sin B \cos C$.

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358. If $A + B + C = 180^\circ$, prove that : $\sin^2 A - \sin^2 B + \sin^2 C = 2\sin A \cos B \sin C$.

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359. If $A + B + C = 180^\circ$, prove that : $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2\cos A \cos B \cos C$.

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360. If $A+B+C=180^\circ$, prove that : $\cos^2 A+\cos^2 B-\cos^2 C=1-2\sin A\sin B\cos C$.

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361. If $A+B+C=180^\circ$, prove that : $\cos^2 A-\cos^2 B-\cos^2 C=2\cos A\sin B\sin C-1$.

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362. If $A+B+C=180^\circ$, prove that : $\sin^2\frac{A}{2}+\sin^2\frac{B}{2}+\sin^2\frac{C}{2}=1-2\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$.

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363. If $A+B+C=180^{\circ}$, prove that : $\sin^2\frac{A}{2}+\sin^2\frac{B}{2}-\sin^2\frac{C}{2}=1-2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$.

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

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

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366. If $A + B + C = \frac{\pi}{2}$, prove that : $\sin^2 A + \sin^2 B + \sin^2 C = 1 - 2\sin A \sin B \sin C$.

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367. If $A + B + C = 360^\circ$, prove that : $1 - \cos^2 A - \cos^2 B - \cos^2 C + 2\cos A \cos B \cos C = 0$.

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368. If $A + B + C = 180^\circ$, prove that : $\tan A + \tan B + \tan C = \tan A \tan B \tan C$.

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369. If $A + B + C = 180°$, prove that : $\tan\frac{A}{2}\tan\frac{B}{2} + \tan\frac{B}{2}\tan\frac{C}{2} + \tan\frac{C}{2}\tan\frac{A}{2} = 1.$

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370. If $A + B + C = 180°$, prove that : $\tan 2A + \tan 2B + \tan 2C = \tan 2A \tan 2B \tan 2C.$

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

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373. Find the values of the following :

$\sin 48^{\circ}$.

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374. Find the values of the following :

$\sin 23^{\circ} 26'$.

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375. Find the values of the following :

$\cos 20^{\circ} 10'$.

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376. Find the values of the following :

$\cos 16^\circ 11'$.

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377. Find the values of the following :

$\tan 54^\circ 30'$.

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378. Find the values of the following :

$\tan 42^\circ 6'$.

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379. Find the values of the following :

$\cot 131^{\circ} 20'$.

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380. Find the values of the following :

$\cot 46^{\circ} 26'$.

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381. Find $\theta, 0 < \theta < 90^{\circ}$, if :

$\sin\theta = 0.7071$.

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382. Find $\theta, 0 < \theta < 90^\circ$, if :

$\cos\theta = 0.9604.$

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383. Find $\theta, 0 < \theta < 90^\circ$, if :

$\tan\theta = 34.37.$

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384. Find $\theta, 0 < \theta < 90^\circ$, if :

$\cot\theta = 3.018.$

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385. Find the angle whose sine is 0.6479.

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386. Sketch the graphs of the following function :

$y = 2\sin x$.

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387. Sketch the graphs of the following function :

$y = 3\sin(x + 1)$.

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388. Sketch the graphs of the following function :

$y = \sin\frac{x}{2}$.

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389. Sketch the graphs of the following function :

$y = \cos\frac{x}{2}$.

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390. Sketch the graphs of the following function :

$y = 3\cos 2x$.

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391. Sketch the graphs of the following function :

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

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392. Sketch the graphs of the following function :

$y = \tan 3x$.

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393. Sketch the graphs of the following function :

$y = 2\tan x$.

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394. Sketch the graphs of the following function :

$y = \sin^2 x$.

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395. Sketch the graphs of the following function :

$y = \cos^2 x$.

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396. Draw the graph of $y = \sin x$ and $y = \cos x$, $0 \le x \le 2\pi$

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397. Sketch the graphs of the following pair of equations on the same axes : $y = \cos x$, $y = \cos 2x$, $0 \le x \le 2\pi$.

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398. Sketch the graphs of the following pair of equations on the same axes : $y = \tan x$, $y = \tan\left(x - 45^\circ\right)$.

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399. Sketch the graphs of the following pair of equations on the same axes : $y = \cos 2x, y = \cos(2x - \pi)$.

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400. Draw the graph of cos x as x vanes from 0 to π. With the help of the graph. solve the equation 3 cos x + 2 = 0.

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401. Draw the graph of cos x from 0 to π and hence find $\cos 40^{\circ}$ from the graph.

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402. Draw the graph of the following :

$$y = \sin\left(x + \frac{\pi}{3}\right).$$

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403. Draw the graph of the following :

$$y = 2\cos\left(x + \frac{\pi}{6}\right).$$

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404. Draw the graph of the following :

$$y = 2\sin\frac{x}{2}, \ -2\pi \le x \le 2\pi.$$

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405. Draw the graph of the following :

$$y = 3\sin\left(2x + \frac{\pi}{6}\right), \ -\pi \le x \le \pi.$$

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406. Draw the graph of $\tan\left(x + \frac{\pi}{4}\right)$ as x increases from : $-\frac{\pi}{4} \rightarrow \frac{7\pi}{4}, x \ne \frac{\pi}{4}, \frac{5\pi}{4}$.

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407. Draw the graph of tan x as x increases from 0 to 2π and use it to find a solution of the equation tan x = 1, where $0 < x < \pi$.

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408. Find the Principal solution of the following :

$\sin x = \frac{\sqrt{3}}{2}.$

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409. Find the Principal solution of the following :

$\tan x = - \frac{1}{\sqrt{3}}.$

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410. Find the principal and general solutions of the following equation:- $\cot x = - \sqrt{3}$

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411. Find the principal and general solutions of the following equation:- $\operatorname{cosec} x = -2$

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412. Solve the following trigonometric equation :

$\sin\theta = -1.$

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413. Solve the following trigonometric equation :

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

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414. Solve the following trigonometric equation :

$\tan\theta = \sqrt{3}.$

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415. Solve the following trigonometric equation :

$\sec x = 2.$

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416. Solve the following trigonometric equation :

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

Watch Video Solution

417. Solve the following trigonometric equation :

$\operatorname{cos}ecx = -2.$

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418. Solve the following trigonometric equation :

$\sec x = \sec(x + \pi).$

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419. Solve the following trigonometric equation :

$$\sin\theta\cos\theta = \frac{\sqrt{3}}{4}.$$

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420. Solve the following trigonometric equation :

$\tan^2\theta = 1.$

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421. Solve the following trigonometric equation :

sin x= tan x.

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422. Solve the following trigonometric equation :

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

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423. Solve the following trigonometric equation :

$\sin m\theta + \sin n\theta = 0.$

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424. Solve the following trigonometric equation :

$\cos m\theta + \cos n\theta = 0.$

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425. Solve the following trigonometric equation :

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

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

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427. Solve the following trigonometric equation :

$\tan 2\theta \tan 3\theta = 1.$

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428. Solve the following trigonometric equation :

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

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429. Solve the following trigonometric equation :

$\cos 3\theta + \cos\theta - 2\cos 2\theta = 0.$

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430. Solve the following trigonometric equation :

$\cos 3\theta + 8\cos^3\theta = 0.$

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431. Solve the following trigonometric equation :

$4\cos^2 x + 6\sin^2 x = 5.$

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432. Solve the following trigonometric equation :

$7\sin^2 x + 3\cos^2 x = 4.$

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433. Solve the following trigonometric equation :

$2\cos^2\theta - 5\sin\theta + 1 = 0.$

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434. Solve the following trigonometric equation :

$2\sin^2\theta + \sqrt{3}\cos\theta + 1 = 0.$

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435. Solve the following trigonometric equation :

$2\cos^2\theta = 3\sin\theta.$

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436. Solve the following trigonometric equation :

$\text{cos}ec^2\theta = 2\cot\theta.$

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437. Solve the following trigonometric equation :

$\tan\theta + \cot\theta = 2.$

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438. Solve the following trigonometric equation :

$\tan^2\theta + \cot^2\theta = 2.$

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439. Solve the following trigonometric equation :

$\cos x + \cos 7x = \cos 4x$.

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440. Solve the following trigonometric equation :

$\sin 7\theta + \sin 4\theta + \sin \theta = 0$.

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441. Solve the following trigonometric equation :

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

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442. Solve the following trigonometric equation :

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

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443. Solve the following trigonometric equation :

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

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444. Solve the following trigonometric equation :

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

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445. Solve the following trigonometric equation :

$\sin 2x - \sin 4x + \sin 6x = 0.$

Watch Video Solution

446. Solve the following trigonometric equation :

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

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447. Solve the following trigonometric equation :

$\sin 7x = \sin x + \sin 3x.$

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448. Solve the following trigonometric equation :

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

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449. Solve the following trigonometric equation :

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

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450. Solve the following trigonometric equation :

$\sin\theta + \cos\theta = 1.$

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451. Solve the following trigonometric equation :

$\cos\theta - \sin\theta = -1.$

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452. Solve the following trigonometric equation :

$\sqrt{3}\cos\theta - \sin\theta = 1.$

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453. Solve the following trigonometric equation :

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

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454. Solve the following trigonometric equation :

$2\sin x + \sqrt{3}\cos x = 1 + \sin x.$

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455. Solve the following trigonometric equation :

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

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456. Solve the following trigonometric equation :

$\sec\theta - \tan\theta = \sqrt{3}.$

Watch Video Solution

457. Solve the following trigonometric equation :

$\sqrt{2}\sec\theta - \tan\theta = 1.$

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458. Solve the following trigonometric equation :

$\cos ec\theta = \cot\theta + \sqrt{3}.$

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459. Solve the following trigonometric equation :

$2\tan\theta - \cot\theta - 1 = 0.$

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460. Solve the following trigonometric equation :

$$\cot^2 x + \frac{3}{\sin x} + 3 = 0.$$

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461. Solve the following trigonometric equation :

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

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462. Solve the following trigonometric equation :

$$3\tan^2 x + 2\sqrt{3}\tan x - 3 = 0.$$

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463. Solve the following trigonometric equation :

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

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464. Solve the following trigonometric equation :

$$\tan^3 x - 3\tan x = 0.$$

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465. Solve the following trigonometric equation :

$$4\sin x\cos x + 2\sin x + 2\cos x + 1 = 0.$$

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466. Solve the following trigonometric equation :

$\sin x \tan x - 1 = \tan x - \sin x.$

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467. Solve the following trigonometric equation :

$4\cos x - 3\sec x = \tan x.$

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468. Solve the following trigonometric equation :

$\cot x + \tan x = 2\operatorname{cosec} x.$

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469. Solve the following trigonometric equation :

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

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470. Solve the following trigonometric equation :

$\mathrm{cos}ec^3 2\theta = 4\mathrm{cos}ec 2\theta.$

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471. Solve the following trigonometric equation :

$\tan\theta + \tan 2\theta + \tan 3\theta = 0.$

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472. Solve the following trigonometric equation :

$\tan x + \tan 2x + \sqrt{3}\tan x\tan 2x = \sqrt{3}.$

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473. Find the most general value of θ, which satisfies both the equations :

$\sin\theta = -\frac{1}{2}, \cos\theta = -\frac{\sqrt{3}}{2}.$

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474. Find the most general value of θ, which satisfies both the equations :

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

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475. Find the most general value of θ, which satisfies both the equations :

$$\cot\theta = -\frac{1}{\sqrt{3}}, \operatorname{cosec}\theta = -\frac{2}{\sqrt{3}}.$$

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476. Find the general solution of the equations :

$$\sin(x - y) = \frac{1}{2}, \cos(x + y) = \frac{1}{2}.$$

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477. Find all the numbers between 0 and 2π, which satisfy the equation $2\sin^2\theta = 3\cos\theta$.

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478. Find all values of A between 0° and 720°,

which satisfy the equation $2\cos^2 A - 5\cos A + 2 = 0$.

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479. In any triangle ABC, prove that : $\sin\frac{A-B}{2} = \frac{a-b}{c}\cos\frac{C}{2}$.

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480. In any triangle ABC, prove that : $a\sin\left(\frac{A}{2}+B\right) = (b+c)\sin\frac{A}{2}$.

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481. In any triangle ABC, prove that :

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

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482. In any triangle ABC, prove that : $\frac{a-b}{c}=\frac{\sin\frac{A-B}{2}}{\cos\frac{C}{2}}$.

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483. In any triangle ABC, prove that : $\frac{b-c}{a}=\frac{\sin\frac{B-C}{2}}{\cos\frac{A}{2}}$.

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484. In any triangle ABC, prove that :

$\cos\frac{B-C}{2}=2\sin\frac{A}{2}$, when $b+c=2a$.

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485. If the sides be a,b,c then show that a

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

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486. In any triangle ABC, prove that :

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

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487. In any triangle ABC, prove that:

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

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488. In any triangle ABC, prove that:

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

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489. In any triangle ABC, prove that :

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

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490. In any triangle ABC, prove that :

$$a^3\sin(B - C) + b^3\sin(C - A) + c^3\sin(A - B) = 0.$$

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491. In any triangle ABC, prove that :

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

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492. In any triangle ABC, prove that : $a(\cos C - \cos B) = 2(b - c)\cos^2\frac{A}{2}$.

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493. In any triangle ABC, prove that :

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

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494. In any triangle ABC, prove that : $\left(c^2 - a^2 + b^2\right)\tan A = \left(a^2 - b^2 + c^2\right)\tan B = \left(b^2 - c^2 + a^2\right)\tan C.$

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495. In any ΔABC, $2[bc\cos A + ca\cos B + ab\cos C] =$

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496. In any triangle ABC, prove that : $(b + c)\cos A + (c + a)\cos B + (a + b)\cos C = a + b + c.$

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497. In any triangle ABC, prove that :

$\left(b^2 - c^2\right)\cot A + \left(c^2 - a^2\right)\cot B + \left(a^2 - b^2\right)\cot C = 0.$

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498. In any triangle ABC, prove that :

$$\left(b^2 - c^2\right)\tan B \tan C + \left(c^2 - a^2\right)\tan C \tan A + \left(a^2 - b^2\right)\tan A \tan B = 0.$$

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499. In any triangle ABC, prove that :

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

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500. In any triangle ABC, prove that : $\dfrac{\tan C}{\tan A} = \dfrac{b^2 + c^2 - a^2}{a^2 + b^2 - c^2}$.

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501. In any triangle ABC, prove that : $b^2\sin 2C + c^2\sin 2B = 2bc\sin A.$

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502. In any triangle ABC : If a cos A = b cos B, prove that either the triangle is isosceles or right-angled.

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503. In any triangle ABC : If sin 2A = sin 2B + sin 2C, prove that either $B = 90^\circ$ or $C = 90^\circ$.

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504. In ΔABC, if $\sin^2 A + \sin^2 B = \sin^3 C$, then the triangle is

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505. In any triangle ABC : If $\frac{\cos A}{a} = \frac{\cos B}{b}$, prove that the triangle is isosceles.

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506. Prove that the area of a sector of circle with radius r and central angle θ° is $\frac{1}{2}r^2\theta$.

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507. Prove that the area of a sector of a circle of radius r and an arc of length s is $\frac{1}{2}$ rs.

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508. The greatest angle of a cyclic quadrilateral is three times the least. The other two angles are in the ratio 4 : 5. Find all the angles in radians.

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509. A wire 121 cm long is bent so as to lie along the arc of a circle of 90 cm radius. Find the degrees of angle subtended at the centre by the arc.

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510. Prove that:

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

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511. Prove that $\frac{\tan^2\theta}{\tan^2\theta - 1} + \frac{\cos ec^2\theta}{\sec^2\theta - \cos ec^2\theta} = -\sec 2\theta.$

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512. Prove that:

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

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513. Eliminate α between the equations:

$\frac{\sin^2\alpha}{\cos\alpha} = a^3$ and $\frac{\cos^2\alpha}{\sin\alpha} = b^3.$

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514. Find the value of

$3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4\left(\sin^6 x + \cos^6 x\right).$

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515. Given, $\sin x = -\frac{3}{7}$ and x belongs to the third quadrant,

obtain the value of tan x- sec x.

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516. If $7\sin A = 24\cos A$ and $0 < A < \frac{\pi}{2}$,

find $14\tan A - 25\cos A - 7\sec A$.

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517. If $\sec\theta = x + \frac{1}{4x}$, then prove that $\sec\theta + \tan\theta = 2x$ or $\frac{1}{2x}$.

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518. If $\tan\theta = \frac{p}{q}$, show that :

$$\frac{p\sin\theta - q\cos\theta}{p\sin\theta + q\cos\theta} = \frac{p^2 - q^2}{p^2 + q^2}.$$

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519. If $\sin x + \sin^2 x = 1$, show that : $\cos^4 x + \cos^2 x = 1$.

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520. If $\sin x + \cos x = \sqrt{2}\cos x$, show that : $\sqrt{2}\sin x = \cos x - \sin x$.

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521. If a $\cos\theta - b\sin\theta = c$, then find the value of a $\sin\theta + b\cos\theta$.

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522. If $A + B = \alpha$ and $\sin A = k \sin B$, show that :

$$\tan A = \frac{k \sin\alpha}{1 + k \cos\alpha}.$$

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523. Prove that $\sin\frac{\pi}{14}\sin\frac{3\pi}{14}\sin\frac{5\pi}{14}\sin\frac{7\pi}{14} = \frac{1}{8}$.

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524. Prove that :

$$\cos^2 A + \cos^2\left(A + 120^\circ\right) + \cos^2\left(A - 120^\circ\right) = \frac{3}{2}.$$

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525. Prove that $\cos A \cos 2A \cos 4A \cos 8A = \frac{\sin 16A}{16 \sin A}$.

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526. If α and β are two real numbers such that $\alpha - \beta \neq 2n\pi$, n is integer which satisfy the equation $a\cos\phi + b\sin\phi = c$, then prove that: $\cos(\alpha + \beta) = \dfrac{a^2 - b^2}{a^2 + b^2}$.

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527. If α and β are two real numbers satisfying the equation $a\cos x + b\sin x = c$, prove that : $\sin(\alpha + \beta) = \dfrac{2ab}{a^2 + b^2}$.

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528. If α and β are two real numbers satisfying the equation a cos x + b sin x = c, prove that : $\tan(\alpha + \beta) = \dfrac{2ab}{a^2 - b^2}$.

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529. If $\frac{\sin^4\theta}{a}+\frac{\cos^4\theta}{b}=\frac{1}{a+b}$, prove that $\frac{\sin^{12}\theta}{a^5}+\frac{\cos^{12}\theta}{b^5}=\frac{1}{(a+b)^5}$

.

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

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531. If $a\tan\alpha+b\tan\beta=(a+b)\tan\left(\frac{\alpha+\beta}{2}\right)$, where $\alpha\neq\beta$, prove that : $a\cos\beta=b\cos\alpha$.

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532. If α and β are the solution of $a\cos\theta + b\sin\theta = c$, then

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533. If α and β are the solutions of $a\cos\theta + b\sin\theta = c$,

then prove that : $\cos(\alpha - \beta) = \dfrac{2c^2 - \left(a^2 + b^2\right)}{a^2 + b^2}$.

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534. If α and β are distinct roots of the equation : $a\tan\theta + b\sec\theta = c$,

prove that $\tan(\alpha + \beta) = \dfrac{2ac}{a^2 - c^2}$.

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535. Prove that $\cot 7\dfrac{1}{2}^\circ = \dfrac{1 + \cos 15^\circ}{\sin 15^\circ}$.

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536. Prove that $4\cos 36^\circ + \cot 7\frac{1^\circ}{2} = \sqrt{1} + \sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{5} + \sqrt{6}.$

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537. Prove that $\tan 82\frac{1_0}{2} = \left(\sqrt{3} + \sqrt{2}\right)\left(\sqrt{2} + 1\right)$

or $\cot 7\frac{1_0}{2} = \sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}.$

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538. Prove that $4\sin 27^\circ = \sqrt{5 + \sqrt{5}} + \sqrt{3 - \sqrt{5}}.$

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539. If $\tan\beta = \dfrac{Q\sin\alpha}{P + Q\cos\alpha}$, prove that : $\tan(\alpha - \beta) = \dfrac{P\sin\alpha}{Q + P\cos\alpha}$.

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540. Prove that $\cot\theta\cot 2\theta + \cot 2\theta\cot 3\theta + 2 = \cot\theta(\cot\theta - \cot 3\theta)$.

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541. Prove that:

$$\frac{\cos 2A\cos 3A - \cos 2A\cos 7A + \cos A\cos 10A}{\sin 4A\sin 3A - \sin 2A\sin 5A + \sin 4A\sin 7A} = \cot 6A\cot 5A.$$

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

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

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543. If $\theta_1, \theta_2, \theta_3, \ldots\ldots., \theta_n$ are in AP whose common difference is d, then show that

$\sin d\left\{\sec\theta_1\sec\theta_2\sec\theta_2\sec\theta_3 + \ldots\ldots.. + \sec\theta_{n-1}\sec\theta_n\right\} = \tan\theta_n - \tan\theta_1.$

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

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

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545. In any triangle ABC, prove that :

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

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546. In any triangle ABC, prove that :

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

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547. If $A + B + C = 180^{\circ}$, prove that :

$\sin(B + C - A) + \sin(C + A - B) + \sin(A + B - C) = 4\sin A\sin B\sin C$.

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548. If $A + B + C = 180^{\circ}$, prove that :

$\cos(-A + B + C) + \cos(A - B + C) + \cos(A + B - C) = 1 + 4\cos A\cos B\cos C$

.

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549. If $A+B+C=180^{\circ}$, prove that : $\sin(B+C-A)+\sin(C+A-B)+\sin(A+B-C)=4\sin A\sin B\sin C$.

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550. If in $\triangle ABC$, $\cot A+\cot B+\cot C=\sqrt{3}$, prove that the triangle is equilateral.

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

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552. If A+B +C =2S, prove that : $\sin(S - A) + \sin(S - B) + \sin(S - C) - \sin S = 4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$.

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553. If A+B +C =2S, prove that : $\cos^2 S + \cos^2(S - A) + \cos^2(S - B) + \cos^2(S - C) = 2 + 2\cos A\cos B\cos C$.

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554. If $x + y + z = xyz$, prove that : $\frac{2x}{1 - x^2} + \frac{2y}{1 - y^2} + \frac{2z}{1 - z^2} = \frac{2x}{1 - x^2}.\frac{2y}{1 - y^2}.\frac{2z}{1 - z^2}$.

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

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

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556. If $xy + yz + zx = 1$, prove that :

$$\frac{x}{1 - x^2} + \frac{y}{1 - y^2} + \frac{z}{1 - z^2} = \frac{4xyz}{\left(1 - x^2\right)\left(1 - y^2\right)\left(1 - z^2\right)}.$$

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557. Find the solutions $x \in [0, 2\pi]$ of : $\sin 2x - 12(\sin x - \cos x) + 12 = 0$

.

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558. Solve the following trigonometric equation :

$\cos 3\theta + 8\cos^3\theta = 0.$

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559. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$,then $\cos^2(\theta - \pi/4)$ is equal to

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560. Find all the solution of $4\cos^2 x\sin x - 2\sin^2 x = 3\sin x$

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561. In any triangle ABC, prove that : $\dfrac{b^2 - c^2}{a^2} = \dfrac{\sin(B - C)}{\sin(B + C)}$.

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562. Find the radian measure of the following degree measure

40º20\`

A. $\frac{121}{540}$ radians

B. $\frac{540}{121}$ radians

C. $\frac{121}{540}\pi$ radians

D. None of these.

Answer:

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563. Radian measures of 520° is :

A. $\frac{26\pi}{9}$

B. $\frac{26}{9}$

C. $\frac{26}{9\pi}$

D. None of these.

Answer:

Watch Video Solution

564. The value of $(25)^0$ is :

A. 25π

B. $\frac{25}{180}$

C. $\frac{5\pi}{36}$

D. $\frac{36}{5\pi}$.

Answer:

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565. Find the value of : $\sin 765^\circ$.

A. 1

B. $\sqrt{2}$

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

D. 765°.

Answer:

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566. Find the value of : $\tan \frac{19\pi}{3}$.

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. $-\sqrt{3}$

D. $-\frac{1}{\sqrt{3}}$.

Answer:

Watch Video Solution

567. Value of $\sin\frac{31\pi}{3}$ is :

A. $\frac{31\pi}{3}$

B. $\frac{2}{\sqrt{3}}$

C. $\frac{\sqrt{3}}{2}$

D. None of these.

Answer:

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568. Let $\sin\theta$ be -ve and $\cos\theta$ be + ve, then θ lies in :

A. Ist quadrant

B. IInd quadrant

C. IIIrd quadrant

D. IVth qudrant.

Answer:

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569. Let $\sin\theta = -\dfrac{1}{2}$ and $\cos\theta = -\dfrac{\sqrt{3}}{2}$, then θ lies in :

A. Ist quadrant

B. IInd quadrant

C. IIIrd quadrant

D. IVth qudrant.

Answer:

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570. If $\sin\theta = \frac{\sqrt{3}}{2}$ and $\cos\theta = -\frac{1}{2}$ then θ lies in :

A. Ist quadrant

B. IInd quadrant

C. IIIrd quadrant

D. IVth qudrant.

Answer:

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571. $\cos\left(\frac{3\pi}{2} - x\right)$ equals :

A. cosx

B. sinx

C. $-\cos x$

D. $-\sin x$.

Answer:

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572. $\tan(2\pi - x)$ equals:

A. tanx

B. $-\tan x$

C. cotx

D. $-\cot x$.

Answer:

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573. $\cos(2\pi + x)$ equals:

A. $\cos x$

B. $\sin x$

C. $-\cos x$

D. $-\sin x$.

Answer:

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574. The conversion of -4 radian into degree is :

A. $229^{\circ} 5' 29''$

B. 300°

C. $-229^{\circ} 5' 29''$

D. None of these.

Answer:

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575. The conversion of 6 radian into degree is :

A. 35°

B. 210°

C. $343^{\circ} 38' 11''$

D. None of these.

Answer:

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576. The conversion of $\frac{7\pi}{6}$ radian into degree is : 1) 120° 2) 147° 3) $146^{\circ}32'14''$ 4) 210°.

A. 120°

B. 147°

C. $146^{\circ}32'14''$

D. 210°.

Answer:

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577. The principal solution of $\sec x = 2$ is:

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

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

C. $\frac{7\pi}{3}$

D. $\frac{2\pi}{3}$.

Answer:

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578. The principal solution of $\tan x = \sqrt{3}$ is:

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

B. $\frac{4\pi}{3}$

C. $\frac{2\pi}{3}$

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

Answer:

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579. The principal solution of $\tan x = -\sqrt{3}$ is:

A. $-\frac{5\pi}{3}$

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

C. 3π

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

Answer:

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580. The conversion of $40^\circ 20'$ into radians is :

A. π radians

B. $\frac{15}{9}\pi$ radians

C. $\frac{121\pi}{540}$ radians

D. None of these.

Answer:

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581. The conversion of $\frac{5\pi}{3}$ radians into degrees is :

A. 90°

B. 120°

C. 300°

D. None of these.

Answer:

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582. Conversion of 25° into radians :

A. $\frac{5\pi}{36}$ radians

B. Zero radians

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

D. None of these.

Answer:

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583. Reciprocal of $cosec\theta$ is :

A. $\cos\theta$

B. $\tan\theta$

C. $\sin\theta$

D. None of these.

Answer:

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584. The maximum value of $\cos\theta$ is :

A. 1

B. Zero

C. -2

D. None of these.

Answer:

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585. The minimum value of $\sin\theta$ is :

A. 0

B. 1

C. -1

D. None of these.

Answer:

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586. If $\sin x = \frac{1}{3}$, then sin 3x is:

A. $\frac{23}{27}$

B. $-\frac{23}{27}$

C. $\sqrt{\frac{23}{27}}$

D. $\frac{4\sqrt{2}}{9}$.

Answer:

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587. The minimum value of $(\cos\theta + \sin\theta)$ is:

A. 0

B. 1

C. -1

D. - $\sqrt{2}$.

Answer:

Watch Video Solution

588. The period of the function sin 3x is:

A. π

B. 2π

C. 3π

D. None of these.

Answer:

Watch Video Solution

589. The maximum value of $\sin\theta\cos\theta$ is :

A. 1

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

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

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

Answer:

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590. The maximum value of $\sin\theta\cos\theta$ is :

A. 1

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

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

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

Answer:

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591. The value of π radians is equal to :

A. 90°

B. 180°

C. 270°

D. 360°.

Answer:

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592. The period of $\sin^2\theta$ is :

A. π^2

B. π

C. 2π

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

Answer:

Watch Video Solution

593. If $\sin\theta = -\frac{1}{2}$ and $\cos\theta = \frac{\sqrt{3}}{2}$, then θ lies in:

A. Ist quadrant

B. IInd quadrant

C. IIIrd quadrant

D. IVth qudrant.

Answer:

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594. Find the general values of θ which satisfies the equation $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$

A. $\theta = n\pi + \frac{7\pi}{4}$

B. $\theta = n\pi + (-1)^n \frac{7\pi}{4}$

C. $\theta = 2n\pi + \frac{7\pi}{4}$

D. None of these.

Answer:

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595. The equations $\cos t = \frac{2}{5}, \sin t = \frac{3}{5}$ have:

A. a unique solution

B. infinitely many solutions

C. precisely two solutions

D. no solution .

Answer:

Watch Video Solution

596. The equations $\sin t = \frac{1}{4}, \cos t = \frac{3}{4}$ have:

A. no solution

B. a unique solution

C. infinitely many solutions

D. precisely two solutions.

Answer:

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597. The maximum value of $5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3$ is :

A. 5

B. 10

C. 11

D. -1.

Answer:

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598. If $\sin x = \frac{1}{3}$, then sin 3x is:

A. $\frac{23}{27}$

B. - $\frac{23}{27}$

C. $\sqrt{\frac{23}{27}}$

D. $\frac{4\sqrt{2}}{9}$.

Answer:

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599. In a triangle, $\cos ecA(\sin B \cos C + \cos B \sin C)$ is equal to :

A. $\frac{c}{a}$

B. $\frac{a}{c}$

C. 1

D. None of these.

Answer:

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600. In a triangle, $\sec A(\cos B \cos C - \sin B \sin C)$ is equal to :

A. -1

B. 0

C. 1

D. None of these.

Answer:

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601. If $\sin\theta = \sin\alpha$, then the value of $\sin\frac{\theta}{3}$ is:

A. $\sin\frac{\alpha}{3}$

B. $\sin[(2\pi - \alpha)/3]$

C. $\sin[(\pi + \alpha)/3]$

D. $\sin\left(-\frac{\alpha}{3}\right)$.

Answer:

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602. $\cos 52^\circ + \cos 68^\circ + \cos 172^\circ$ is equal to :

A. 0

B. 1

C. 2

D. 3

Answer:

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603. The value of $\cos 52^\circ + \cos 68^\circ + \cos 172^\circ$ is:

A. 1

B. 0

C. -1

D. None of these.

Answer:

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604. If in two circles, arcs of the same length subtend angles 60° and 75° at the centre, find the ratio of their radii.

A. $\frac{3}{4}$

B. $\frac{4}{3}$

C. $\frac{\sqrt{3}}{2}$

D. $\frac{9}{16}$.

Answer:

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605. If in two circles, arcs of the same length subtend angles 60° and 75° at the centre, find the ratio of their radii.

A. $4:5$

B. $5:4$

C. Not derivable

D. None of these.

Answer:

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606. The minimum value of $(\cos\theta + \sin\theta)$ is:

A. 0

B. 1

C. -1

D. $-\sqrt{2}$.

Answer:

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607. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$, then the value of $(\theta + \phi)$ is :

A. π

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

C. 0

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

Answer:

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608. The period of the function sin 3x is:

A. π

B. 2π

C. 3π

D. None of these.

Answer:

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609. The period of the function f(x) = cos 4x + tan 3x is :

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

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

C. π

D. None of these.

Answer:

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610. The number of points of intersection of $2y - 1 = 0$ and $y = \sin x, \ -2\pi \leq x \leq 2\pi$, is :

A. 1

B. 2

C. 3

D. 4

Answer:

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611. The expression $\dfrac{\cos 2b - \cos 2a}{\sin 2b - \sin 2a}$ is equal to:

A. $-\tan(a+b)$

B. $-\tan(a-b)$

C. $\cot(a+b)$

D. $-\cot(a+b)$.

Answer:

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612. If $\tan x = \frac{b}{a}$, then the value of a cos 2x+b sin 2x is :

A. a

B. $a - b$

C. $a + b$

D. b.

Answer:

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613. If $\sin 5\theta = \cos 4\theta$ where 5θ and 4θ are acute angles, find the value of θ.

A. 12°

B. 15°

C. 18°

D. 21°.

Answer:

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614. If $2\sin\theta = a + \frac{1}{a}$, a is real, then the solution set for a is :

A. $a = 1$

B. $a = -1$

C. $a = \pm 1$

D. all real values of a.

Answer:

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615. The maximum value of a cos x + b sin x is :

A. $a + b$

B. $a - b$

C. $|a| + |b|$

D. $\sqrt{a^2 + b^2}$.

Answer:

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616. If in a ΔABC, $\sin A = \sin^2 B$ and $2\cos^2 A = 3B$, then the ΔABC is

A. right-angled

B. obtuse-angled

C. isosceles

D. equilateral.

Answer:

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617. If the angle opf a triangle are in the ratio $1:2:3$, then show that the sides opposite to the respective angle are in the ratio $1:\sqrt{3}:2$.

A. $1:\sqrt{3}:2$

B. $\sqrt{3}:1:2$

C. $\sqrt{3}:\sqrt{2}:1$

D. $1:\sqrt{3}:\sqrt{2}$.

Answer:

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618. If in a triangle, $\frac{a}{\cos A}=\frac{b}{\cos B}=\frac{c}{\cos C}$, then the triangle is :

A. right-angled

B. isosceles but not equilateral

C. obtuse-angled

D. equilateral.

Answer:

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619. Let the angles A, B, C of $\triangle ABC$ be in A.P. and let $b : c = \sqrt{3} : \sqrt{2}$.

Then angle A is :

A. 45°

B. 60°

C. 75°

D. None of these.

Answer:

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620. The period of $\sin 2\theta$ is :

A. π^2

B. π

C. 2π

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

Answer:

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621. If $y = \sec^2\theta + \cos^2\theta, \theta \neq 0$, then :

A. y=0

B. $y \leq 2$

C. $y \geq -2$

D. ygt2.

Answer:

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622. The sides BC, CA and AB of a triangle ABC are of lengths a, b and c respectively. If D is the mid-point of BC and AD is perpendicular to AC, then the value of cos A cos C is:

A. $\frac{3\left(a^2 - c^2\right)}{2ac}$

B. $\frac{2\left(a^2 - c^2\right)}{3bc}$

C. $\frac{\left(a^2 - c^2\right)}{3ac}$

D. $\frac{3\left(c^2 - a^2\right)}{3ac}$.

Answer:

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623. The angle of elevation of the top of a hill from a point is α. After walking b metres towards the top up a slope inclined at an angle β to the horizontal,the angle of elevation of the top becomes γ.Then the height of the hill is :

A. $\dfrac{b\sin\alpha\sin(\gamma - \beta)}{\sin(\gamma - \alpha)}$

B. $\dfrac{b\sin\alpha\sin(\gamma - \alpha)}{\sin(\gamma - \beta)}$

C. $\dfrac{b\sin(\gamma - \beta)}{\sin(\gamma - \alpha)}$

D. $\dfrac{b\sin(\gamma - \beta)}{\sin\alpha\sin(\gamma - \alpha)}$

Answer:

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624. If $\tan\left(\frac{x}{2}\right) = \operatorname{cosec}x - \sin x$, then find the value of $\tan^2\left(\frac{x}{2}\right)$.

A. $2 - \sqrt{5}$

B. $2 + \sqrt{5}$

C. $-2 - \sqrt{5}$

D. $-2 + \sqrt{5}$.

Answer:

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625. Consider the system of equations in x, y, z as $x\sin 3\theta - y + z = 0$, $x\cos 2\theta + 4y + 3z = 0$, 2x + 7y + 7z = 0. If this system has a non-trival solution, then for integer n, values of θ are given by :

A. $\pi\left(n + \frac{(-1)^n}{3}\right)$

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

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

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

Answer:

Watch Video Solution

626. Prove that

$$\cos^4.\ \frac{\pi}{8}+\cos^4.\ \frac{3\pi}{8}+\cos^4.\ \frac{5\pi}{8}+\cos^4.\ \frac{7\pi}{8}=\frac{3}{2}$$

A. 0

B. $1/2$

C. $3/2$

D. 1

Answer:

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627. Prove that : $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right)=\frac{2b}{a}$.

A. $\frac{2a}{b}$

B. $\frac{2b}{a}$

C. $\frac{a}{b}$

D. $\frac{b}{a}$.

Answer:

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628. The equation $\sqrt{3}\sin x+\cos x=4$ has:

A. only one solution

B. two solutions

C. infinitely many solutions

D. no solution.

Answer:

Watch Video Solution

629. The value of $\cos 15^{\circ} \cos 7\frac{1}{2}^{\circ} \sin 7\frac{1}{2}^{\circ}$ is:

A. $1/2$

B. $1/8$

C. $1/4$

D. $1/16$.

Answer:

Watch Video Solution

630. The most general values of 'x' for which $\sin x + \cos x = \min_{a \in R}\left[1, a^2 - 4a + 6\right]$ are given by

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

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

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

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

Answer:

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631. If $a = 2\sqrt{2}, b = 6, A = 45°$, then:

A. no triangle is possible

B. one triangle is possible

C. two triangles are possible

D. either no triangle or two triangles are possible.

Answer:

Watch Video Solution

632. In triangle ABC, if $\sin A \sin B = \frac{ab}{c^2}$, then the triangle is :

A. equilateral

B. isosceles

C. right angled

D. obtuse angled.

Answer:

Watch Video Solution

633. The value of : $\left(1+\cos\frac{\pi}{6}\right)\left(1+\cos\frac{\pi}{3}\right)\left(1+\cos\frac{2\pi}{3}\right)\left(1+\cos\frac{7\pi}{6}\right)$ is:

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

B. $\frac{3}{8}$

C. $\frac{3}{4}$

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

Answer:

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634. $P=\frac{1}{2}\sin^2\theta+\frac{1}{3}\cos^2\theta$, then :

A. $\frac{1}{3}\leq P\leq\frac{1}{2}$

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

C. $2 \le P \le 3$

D. - $\frac{\sqrt{13}}{6} \le P \le \frac{\sqrt{13}}{6}$.

Answer:

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635. The smallest value of $5\cos\theta + 12$ is :

A. 5

B. 12

C. 7

D. 17

Answer:

Watch Video Solution

636. Smallest form of $\dfrac{2}{\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4x}}}}$ is :

A. $\sec\frac{x}{2}$

B. sec x

C. cosec x

D. 1

Answer:

Watch Video Solution

637. If $5\cos 2\theta + 2\cos^2\left(\frac{\theta}{2}\right) + 1 = 0$, when $(0 < \theta < \pi)$, then the values of θ are :

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

B. $\frac{\pi}{3}, \cos^{-1}(3/5)$

C. $\cos^{-1}(3/5) \pm \pi$

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

Answer:

Watch Video Solution

638. If $aandb$ are positive quantities such that $a > b,$ the minimum value of $a\sec\theta - b\tan\theta$ is (a) $2ab$ (b) $\sqrt{a^2 - b^2}$ (c) $a - b$ (d) $\sqrt{a^2 + b^2}$

A. $\frac{1}{\sqrt{a^2 - b^2}}$

B. $\frac{1}{\sqrt{a^2 + b^2}}$

C. $\sqrt{a^2 + b^2}$

D. $\sqrt{a^2 - b^2}$.

Answer:

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639. If $A + B = 45^{\circ}$ then then (cot A- 1) (cot B- 1) is equal to :

A. 1

B. $1/2$

C. -2

D. 2

Answer:

Watch Video Solution

640. The solution of the equation : $[\sin x + \cos x]^{1 + \sin 2x} = 2, \ -\pi \le x \le \pi$, is :

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

B. π

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

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

Answer:

Watch Video Solution

641. If $\sin A - \sqrt{6}\cos A = \sqrt{7}\cos A$, then: $\cos A + \sqrt{6}\sin A$ is equal to :

A. $\sqrt{6}\sin A$

B. $\sqrt{7}\sin A$

C. $\sqrt{6}\cos A$

D. $\sqrt{7}\cos A$.

Answer:

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642. If tan A and tan B are the roots of $abx^2 - c^2x + ab = 0$, where a, b, c are the sides of the tnangle ABC, then the value of $\sin^2 A + \sin^2 B + \sin^2 C$ is :

A. 1

B. 3

C. 4

D. 2

Answer:

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643. In a ΔABC, if $a = 3, b = 4, c = 5$, then find the distance between its incentre and circumcentre.

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

B. $\frac{\sqrt{3}}{2}$

C. $\frac{3}{2}$

D. $\frac{5}{2}$.

Answer:

Watch Video Solution

644. In triangle ABC the value of $\frac{\cot\frac{A}{2}\cot\frac{B}{2} - 1}{\cot\frac{A}{2}\cot\frac{B}{2}}$ is :

A. $\frac{a}{a+b+c}$

B. $\frac{2c}{a+b+c}$

C. $\frac{2a}{a+b+c}$

D. $\frac{2b}{a+b+c}$.

Answer:

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645. In a triangle ABC if $\angle A = 60^{\circ}$,a=5,b= 4, then c is a root of the equation :

A. $c^2 - 5c - 9 = 0$

B. $c^2 - 4c - 9 = 0$

C. $c^2 - 10c + 25 = 0$

D. $c^2 - 5c - 41 = 0.$

Answer:

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646. From the top of a tower, the angle of depression of a point on the ground is 60°. If the distance of this point from the tower is $\frac{1}{\sqrt{3}+1}$ metres, then the height of the tower is :

A. $\frac{4\sqrt{3}}{2}$ metres

B. $\frac{\sqrt{3}+3}{2}$ metres

C. $\frac{\sqrt{3}-3}{2}$ metres

D. $\frac{\sqrt{3}}{2}$ metres .

Answer:

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647. If α and β satisfying $2\sec 2\alpha = \tan\beta + \cot\beta$, then $\alpha + \beta$=

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

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

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

D. π.

Answer:

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648. Value of $1 + \cos 56^\circ + \cos 58^\circ - \cos 66^\circ$ is:

A. $4\cos 28^\circ \cos 29^\circ \sin 33^\circ$

B. $4\cos 28^\circ \sin 29^\circ \sin 33^\circ$

C. $4\sin 28^\circ \cos 29^\circ \cos 33^\circ$

D. $4\cos 28^\circ \sin 29^\circ \sin 33^\circ$.

Answer:

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649. Value of $\cos^2(A - B) + \cos^2 B - 2\cos(A - B)\cos A \cos B$ is:

A. $\cos^2 A$

B. $\sin^2 A$

C. $\tan^2 A$

D. $\cot^2 A$.

Answer:

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650. The co-ordinates of the incentre of the triangle having sides $3x - 4y = 0$, $5x + 12y = 0$ and $y - 15 = 0$ are:

A. $(1, 8)$

B. $(-1, 8)$

C. $(1, -8)$

D. $(1, 4)$

Answer:

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651. If $1+\sin x+\sin^2 x+....$ up to $\infty = 4+2\sqrt{3}, 0 < x < \pi$ and $x \ne \frac{\pi}{2}$, then x=

A. $\frac{\pi}{3}, \frac{2\pi}{3}$

B. $\frac{\pi}{6}, \frac{\pi}{3}$

C. $\frac{\pi}{3}, \frac{5\pi}{6}$

D. $\frac{2\pi}{3}, \frac{\pi}{6}$.

Answer:

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652. Which one of the following is possible ?

A. $\tan\theta = 45$

B. $\cos\theta = \frac{7}{3}$

C. $\sin\theta = \frac{a^2 + b^2}{a^2 - b^2}, (a \neq b)$

D. $\sec\theta = \frac{4}{5}$.

Answer:

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653. If one side of a triangle is double the other and the angles opposite to these sides differ by 60°, then the triangle is :

A. isosceles

B. right angled

C. obtuse angled

D. acute angled.

Answer:

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654. Find the value of

$3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4\left(\sin^6 x + \cos^6 x\right).$

A. 14

B. 11

C. 12

D. 13

Answer:

Watch Video Solution

655. A horse is tied to post by a rope. If the horse moves along circular path always keeping the tight and describes 88m, when it has traced out 72° at centre, find the length of rope.

A. 45 metres

B. 35 metres

C. 22 metres

D. 56 metres.

Answer:

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656. Prove that the minimum value of $3\cos x + 4\sin x + 5$ is 0.

A. 5

B. 6

C. 7

D. None of these.

Answer:

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657. Equation $\cos 2x + 7 = a(2 - \sin x)$ can have a real solution for :

A. all values of a

B. $a \in [2, 6]$

C. $a \in (-\infty, 2)$

D. $a \in (0, \infty)$.

Answer:

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658. Number of solutions of $|x - 1| = \cos x$ is:

A. 2

B. 3

C. 4

D. None of these.

Answer:

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

A. $1 \leq P \leq 2$

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

C. $\frac{1}{2} \leq P \leq \frac{3}{4}$

D. $\frac{1}{4} \leq P \leq \frac{1}{2}$.

Answer:

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660. When θ varies over the real numbers, the maximum value of $\cos\theta + \cos 2\theta$ is:

A. 2

B. $\frac{7}{8}$

C. $\frac{9}{8}$

D. 0

Answer:

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661. In ΔABC, if $\sin^2 A + \sin^2 B = \sin^3 C$, then the triangle is

A. right-angled but need not be isosceles

B. right angled and isosceles

C. isosceles, but need not be right-angled

D. equilateral.

Answer:

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662. If $\tan\theta = \frac{1}{\sqrt{7}}$, then $\left(\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta}\right)$=

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

B. $\frac{3}{4}$

C. $\frac{5}{4}$

D. 2

Answer:

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663. $\sin 47^\circ + \sin 61^\circ - \sin 11^\circ - \sin 25^\circ =$

A. $\sin 7^\circ$

B. $\cos 7^\circ$

C. $\sin 36^\circ$

D. $\cos 36^\circ$.

Answer:

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664. The most general of θ satisfying $\tan\theta + \tan\left(\frac{3\pi}{4} + \theta\right) = 2$ are given by

A. $2n\pi + \frac{\pi}{3}, n \in Z$

B. $n\pi \pm \frac{\pi}{3}, n \in Z$

C. $2n\pi \pm \frac{\pi}{6}, n \in Z$

D. $n\pi \pm \frac{\pi}{6}, n \in Z.$

Answer:

Watch Video Solution

665. In $\triangle ABC, s = \frac{a+b+c}{2}$, then $\left(b\cos^2\frac{C}{2} + c\cos^2\frac{B}{2}\right)$ equals:

A. s

B. 2s

C. 3s

D. 4s.

Answer:

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666. If $\sin^4 x - \cos^4 x = p$, then which one of the following is correct ?

A. p=1

B. p=0

C. $|p| > 1$

D. $|p| \leq 1$.

Answer:

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667. If $\cos\theta < \sin\theta$ and θ lies in the first quadrant, then which one of the following is correct ?

A. $0 < \theta < \pi/4$ only

B. $\pi/4 < \theta < \pi/2$

C. $0 < \theta < \pi/3$

D. $\pi/3 < \theta < \pi/2.$

Answer:

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668. The angle of elevation from a point on the bank of a river of the top of a temple on the other bank is 45°. Retreating 50 m, the observer finds the new angle of elevation as 30°. What is the width of the river ?

A. 50m

B. $50\sqrt{3}m$

C. $\frac{50}{\sqrt{3} - 1}m$

D. 100m.

Answer:

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669. If $\sin^2 x + \sin^2 y = 1$, then what is the value of cot (x + y) ?

A. 1

B. $\sqrt{3}$

C. 0

D. $1/\sqrt{3}$.

Answer:

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670. What is the value of $\cos 10^\circ + \cos 110^\circ + \cos 130^\circ$?

A. -1

B. 0

C. 1

D. 2

Answer:

Watch Video Solution

671. What is the value of $\tan\left(-1575^{\circ}\right)$?

A. 1

B. $1/2$

C. 0

D. -1.

Answer:

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672. For which acute angle θ $\operatorname{cosec}^2\theta = 3\sqrt{3}\cot\theta - 5$?

A. $5\pi/12$

B. $\pi/3$

C. $\pi/6$

D. $\pi/4$.

Answer:

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673. If $\tan^2\theta = 2\tan^2\phi + 1$, then which of the following is correct ?

A. $\cos(2\theta) = \cos(2\phi) - 1$

B. $\cos(2\theta) = \cos(2\phi) + 1$

C. $\cos(2\theta) = [\cos(2\phi) + 1]/2$

D. $\cos(2\theta) = [\cos(2\phi) - 1]/2$.

Answer:

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674. The value of $\sin 10^{\circ} \sin 50^{\circ} \sin 70^{\circ}$ is equal to

A. $1/8$

B. $3/8$

C. $5/8$

D. $7/8$.

Answer:

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675. The sines of two angles of a triangle are equal to $\frac{5}{13}$ and $\frac{99}{101}$.

What is the cosine of the third angle ?

A. $\frac{255}{1313}$

B. $\frac{265}{1313}$

C. $\frac{275}{1313}$

D. $\frac{770}{1313}$.

Answer:

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676. After subtending an angle of $1000\,^{\circ}$ from its initial position, the revolving line will be situated in which one of the following quadrants ?

A. First quadrant

B. Second quadrant

C. Third quadrant

D. Fourth quadrant.

Answer:

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677. One radian is approximately equal to which one of the following :

A. 90°

B. 180°

C. 57°

D. 47°.

Answer:

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678. If $\cot(x+y)=\frac{1}{\sqrt{3}}$, $\cot(x-y)=\sqrt{3}$, then what are the smallest positive values of x and y respectively ?

A. $45^\circ, 30^\circ$

B. $30^\circ, 45^\circ$

C. $15^\circ, 60^\circ$

D. $45^\circ, 15^\circ$.

Answer:

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679. In $\sin A = \frac{1}{\sqrt{5}}, \cos B = \frac{3}{\sqrt{10}}$, A, B being positive acute angles, then what is (A + B) equal to ?

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$.

Answer:

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680. $x = \sin\theta\cos\theta$, and $y = \sin\theta + \cos\theta$ are satisfied by which one of the following equations ?

A. $y^2 - 2x = 1$

B. $y^2 + 2x = 1$

C. $y^2 - 2x = -1$

D. $y^2 + 2x = -1$.

Answer:

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681. A man observes the elevation of a balloon to be 30°. He then walks 1 km towards the balloon and finds that the elevation is 60°. What is the height of the balloon ?

A. $\frac{1}{2}$ km

B. $\frac{\sqrt{3}}{2}$ km

C. $\frac{1}{3}$ km

D. 1 km .

Answer:

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682. The number of integral values of k for which the equation 7 cos x + 5 sinx = 2k+1, has a solution is :

A. 4

B. 8

C. 10

D. 12

Answer:

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683. In a triangle ABC, $2ca\sin\frac{A-B+C}{2}=$

A. $a^2+b^2-c^2$

B. $c^2+a^2-b^2$

C. $b^2-c^2-a^2$

D. $c^2-a^2-b^2$.

Answer:

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684. The period of $\sin^2\theta$ is :

A. π^2

B. π

C. 2π

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

Answer:

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685. If $y = \sec^2\theta + \cos^2\theta, \theta \neq 0$, then :

A. y=0

B. $y \leq 2$

C. $y \geq -2$

D. y > 2.

Answer:

Watch Video Solution

686. If α is a root of $25\cos^2\theta + 5\cos\theta - 12 = 0, \frac{\pi}{2} < \alpha < \pi$, then $\sin 2\alpha$ is equal to :

A. $\frac{24}{25}$

B. $-\frac{24}{25}$

C. $\frac{13}{18}$

D. $-\frac{13}{18}$.

Answer:

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687. If $\sin(\alpha+\beta)=1, \sin(\alpha-\beta)=\frac{1}{2}$, then $\tan(\alpha+2\beta).\tan(2\alpha+\beta)$ is equal to :

A. 1

B. -1

C. zero

D. None of these.

Answer:

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688. In a $\triangle ABC, \tan\frac{A}{2}=\frac{5}{6}, \tan\frac{C}{2}=\frac{2}{5}$, then :

A. a,c, b are in A.P.

B. a, b, c are in A.P.

C. b, a, c are in A.P.

D. a, b, c are in G.P.

Answer:

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689. The equation a sin x + b cos x = c, where $|c| > \sqrt{a^2 + b^2}$ has :

A. a unique solution

B. infinite no. of solutions

C. no solution

D. None of these.

Answer:

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690. In a triangle ABC, a = 4, b=3, $\angle A = 60^\circ$, then c is the root of the equation :

A. $c^2 - 3c - 7 = 0$

B. $c^2 + 3c + 7 = 0$

C. $c^2 - 3c + 7 = 0$

D. $c^2 + 3c - 7 = 0$.

Answer:

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691. If in a triangle, $a\cos^2\frac{C}{2} + c\cos^2\frac{A}{2} = \frac{3b}{2}$, then its sides will be in-

A. are in G.P.

B. are in H.P.

C. satisfy a + b=c

D. are in A.P.

Answer:

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692. The angles of a triangle are in the ratio 4: 1: 1, then the ratio of the largest side to the perimeter is :

A. $1:1+\sqrt{3}$

B. $2:3$

C. $\sqrt{3}:2+\sqrt{3}$

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

Answer:

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693. If $u=\sqrt{a^2\cos^2\theta+b^2\sin^2\theta}+\sqrt{a^2\sin^2\theta+b^2\cos^2\theta}$, then the difference between the maximum and minimum values of u^2 is given by :

A. $2\left(a^2+b^2\right)$

B. $2\sqrt{a^2+b^2}$

C. $(a+b)^2$

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

Answer:

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694. If α, β be such that $\pi < \alpha - \beta < 3\pi$. If $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{27}{65}$, then the value of $\cos\frac{\alpha - \beta}{2}$ is :

A. $-\frac{3}{\sqrt{130}}$

B. $\frac{3}{\sqrt{130}}$

C. $\frac{6}{65}$

D. $-\frac{6}{65}$.

Answer:

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695. If θ and ϕ are acute angles, $\sin\theta = \frac{1}{2}$, $\cos\phi = \frac{1}{3}$, then the value of $(\theta + \phi)$ is:

A. $\left(\frac{\pi}{3}, \frac{\pi}{2}\right]$

B. $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$

C. $\left(\frac{2\pi}{3}, \frac{5\pi}{6}\right]$

D. $\left(\frac{5\pi}{6}, \pi\right]$.

Answer:

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696. The sides of a triangle, $\sin\alpha, \cos\alpha$ and $\sqrt{1 + \sin\alpha\cos\alpha}$ Then the greatest angle of the triangle is :

A. 60°

B. 90°

C. 120°

D. 150°.

Answer:

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697. If the angle opf a triangle are in the ratio $1:2:3$, then show that the sides opposite to the respective angle are in the ratio $1:\sqrt{3}:2$.

A. $1:3:5$

B. $2:3:4$

C. $3:2:1$

D. $1:2:3$.

Answer:

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698. If in $\Delta ABC,$ the altitudes from the vertices A, B and C on opposite sides are in HP, then sin A sin B and sin C are in

A. A.P.

B. G.P.

C. H.P.

D. A -G Progression.

Answer:

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699. if $\cos(\alpha - \beta) = 1 and \cos(\alpha + \beta) = \frac{l}{e},$ where $\alpha, \beta\mu \in [-\pi, \pi]$. Number of pairs of α, β which satisfy both the equations is 0 (b) 1 (c) 2 (d) 4

A. 0

B. 1

C. 2

D. 4

Answer:

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700. The number of solutions of the pair of equations: $2\sin^2\theta - \cos 2\theta = 0, 2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is :

A. Zero

B. One

C. Two

D. Four.

Answer:

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701. If p and q are positive real numbers such that $p^2 + q^2 = 1$, then the maximum value of (p +q) is :

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

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

C. $\sqrt{2}$

D. 2

Answer:

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702. If $\sin^{-1}\left(\frac{x}{5}\right) + \operatorname{cosec}^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then a value of x is

A. 3

B. 4

C. 5

D. 1

Answer:

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703. AB is a vertical pole with B at the ground level and A at the top. A man finds that the angle of elevation of the point A from a certain point C on the ground is 60°. He moves away from the pole along the line BC to a point D such that CD =7m. From D, the angle of elevation of the point A is 45°. Then the length of the pole is:

A. $\frac{7\sqrt{3}}{2}\frac{1}{\sqrt{3}+1}m$

B. $\frac{7\sqrt{3}}{2}\frac{1}{\sqrt{3}-1}m$

C. $\frac{7\sqrt{3}}{2}\left(\sqrt{3}+1\right)m$

D. $\frac{7\sqrt{3}}{2}\left(\sqrt{3}-1\right)m.$

Answer:

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704. For $0 < \theta < \frac{\pi}{2}$, the solution (s) of $\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + \left((m-1)\frac{\pi}{4}\right)\right)\operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}.$ Find correct options

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

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

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

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

Answer:

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705. If $\frac{\sin^4 x}{2}+\frac{\cos^4 x}{3}=\frac{1}{5}$, then

A. $\tan^2 x=\frac{2}{3}$

B. $\frac{\sin^8 x}{8}+\frac{\cos^8 x}{27}=125$

C. $\tan^2 x=\frac{1}{3}$

D. $\frac{\sin^8 x}{8}+\frac{\cos^8 x}{27}=\frac{2}{125}$.

Answer:

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706. Let A and B denote the statements

$A : \cos\alpha + \cos\beta + \cos\gamma = 0$

$B : \sin\alpha + \sin\beta + \sin\gamma = 0$

If $\cos(\beta - \gamma) + \cos(\gamma - \alpha) + \cos(\alpha - \beta) = -\frac{3}{2}$,

then

A. A is false and B is true

B. both A and B are true

C. both A and B are false

D. A is true and B is false.

Answer:

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707. For a regular polygon, let r and R be the radii of the inscribed and the cirumscribed circles, respectively. A false statement among the following is

(a)there is a regular polygon with $\frac{r}{R}=\frac{1}{2}$

(b)there is a regular polygon with $\frac{r}{R}=\frac{1}{\sqrt{2}}$

(c)there is a regular plygon with $\frac{r}{R}=\frac{2}{3}$

(d)there is a regular plygon with $\frac{r}{R}=\frac{\sqrt{3}}{2}$

A. There is a regular polygon with $\frac{r}{R}=\frac{1}{2}$

B. There is a regular polygon with $\frac{r}{R}=\frac{1}{\sqrt{2}}$

C. There is a regular polygon with $\frac{r}{R}=\frac{2}{3}$

D. There is a regular polygon with $\frac{r}{R}=\frac{\sqrt{3}}{2}$.

Answer:

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708. If the angles A, B and C of a triangle are in an arithmetic progression and if a, b and c denote the lenghts of the sides opposite to A, B and C respectively, then the value of the expression $\frac{a}{c}\sin 2C+\frac{c}{a}\sin 2A$ is

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

B. $\frac{\sqrt{3}}{2}$

C. 1

D. $\sqrt{3}$.

Answer:

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709. Let ABC be a triangle such that $\angle ABC=\frac{\pi}{6}$. If a, b and c denote the lengths of the sides opposite to A,B and C, respectively. Then, the value (s) of x for which $a = x^2 + x + 1$, $b = x^2 - 1$ and $x = 2x + 1$ is (are)

A. $-\left(2+\sqrt{3}\right)$

B. $1+\sqrt{3}$

C. $2+\sqrt{3}$

D. $4\sqrt{3}$.

Answer:

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710. Let $\cos(\alpha+\beta) = \frac{4}{5}$ and let $\sin(\alpha+\beta) = \frac{5}{13}$ where $0 \le \alpha, \beta \le \frac{\pi}{4}$, then $tan2\alpha =$

A. $\frac{25}{16}$

B. $\frac{56}{33}$

C. $\frac{19}{12}$

D. $\frac{20}{7}$.

Answer:

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711. If $A = \sin^2 x + \cos^4 x$, then for all real x

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

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

C. $1 \leq A \leq 2$

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

Answer:

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712. The possible values of $\theta \in (0, \pi)$ such that $\sin(\theta) + \sin(4\theta) + \sin(7\theta) = 0$ are

A. $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

B. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$

C. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

D. $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$

Answer:

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713. Prove that $\frac{3}{4} \leq \cos^2\theta + \sin^4\theta \leq 1$. Hence deduce that $\frac{3}{4} \leq \sin^2\theta + \cos^4\theta \leq 1$.

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714. Prove that :

$$\frac{2\cos 2^{n}\theta + 1}{2\cos\theta + 1} = (2\cos\theta - 1)(2\cos 2\theta - 1)\left(2\cos 2^{2}\theta - 1\right)\ldots\ldots\ldots\ldots\left(2\cos 2^{n-1}\theta - 1\right)$$

.

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715. Prove that

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

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716. Solve: $2(\cos x + \cos 2x) + \sin 2x(1 + 2\cos(x)) = 2\sin x, \ -\pi \le x \le \pi.$

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717. Find the values of x in $(-\pi, \pi)$, which satisfy the equation : $8^{1+|\cos x|+\cos^2 x+\ldots\ldots \to \infty} = 4^3$.

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718. If $p\tan\theta = \tan p\theta$, then show that : $\dfrac{\sin^2 p\theta}{\sin^2\theta} = \dfrac{\sin p^2}{1+\left(p^2-1\right)\sin^2\theta}$.

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719. If a+b+c=0, then what is the value of $\dfrac{a^2}{bc}+\dfrac{b^2}{ca}+\dfrac{c^2}{ab}$

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720. Given the product p of sines of the angles of a triangle and the product q of their cosines, find the cubic equation whose coefficients are functions of p and q and whose roots are tangents of the angles of the triangle .

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721. In a $\triangle ABC$, if $\frac{\sin A}{\sin C} = \frac{\sin(A - B)}{\sin(B - C)}$.

Prove that a^2, b^2, c^2 are in A.P.

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722. If $\frac{\tan 3A}{\tan A} = k$, show that $\frac{\sin 3A}{\sin A} = \frac{2k}{k - 1}$ and hence or otherwise prove that either $k > 3$ or $k < \frac{1}{3}$.

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723. Prove that :

$$\frac{\tan 5\theta + \tan 3\theta}{\tan 5\theta - \tan 3\theta} = 4\cos 2\theta \cos 4\theta.$$

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724. Prove that :

$$\sin x \sin y \sin(x - y) + \sin y \sin z \sin(y - z) + \sin z \sin x \sin(z - x) +$$

$$\sin(x - y)\sin(y - z)\sin(z - x) = 0.$$

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725. Solve the equation :

$$\sin\theta + \sin 3\theta + \sin 5\theta = 0.$$

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726. Solve : $\sec\theta - \operatorname{cosec}\theta = \frac{4}{3}$.

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727. Solve :

$5\sin x\cos y = 1, 4\tan x = \tan y$.

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728. If A,B,C are the angles of a triangle and $\sin^3\theta = \sin(A - \theta)\sin(B - \theta)\sin(C - \theta)$, prove that: $\cot\theta = \cot A + \cot B + \cot C$.

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729. If the sides a, b, c of a triangle are in A.P., then find the value of $\tan\frac{A}{2} + \tan\frac{C}{2}$ in terms of $\cot\frac{B}{2}$.

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730. Two sides of a triangle are of lengths $\sqrt{6}$ and 4 and the angle opposite to smaller side is 30°.

How many such triangles are possible ? Find the length of their third side and area.

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