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MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

TRIGONOMETRIC RATIOS

Others

1. In a ΔABC right angled at C, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of $\sin A \cos B + \cos A \sin B$.

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2. The altitude AD of a $\Delta ABC,$ in which $\angle A$ obtuse and, $AD = 10cm.$ If BD=10cm and CD=$10\sqrt{3}cm,$ determine $\angle A.$

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3. A rhombus of side 20cm has two angles of 60^0 each. Find the length of the diagonals.

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4. ABC is a right triangle, right angled at $C.$ If $A = 30^0 and AB = 40$ units, find the remaining two sides and $\angle B of ABC.$

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5. Evaluate the following: $\frac{\cos 37^0}{\sin 53^0}$ (ii) $\frac{\tan 54^0}{\cot 36^0}$ (iv) $\frac{\cos ec34^0}{\sec 56^0}$

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6. Find acute angles $AandB$, if $\sin(A+2B)=\frac{\sqrt{3}}{2}and\cos(A+4B)=0, A>B\cdot$

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7. In an acute angled triangle ABC, if $\tan(A+B-C)=1$ and , $\sec(B+C-A)=2$, find the value of A, B and C

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8. If each of $\alpha, \beta and \gamma$ is a positive acute angle such that $\sin(\alpha+\beta-\gamma) = \frac{1}{2}$, $\cos(\beta+\gamma-\alpha) = \frac{1}{2}$ and $\tan(\gamma+\alpha-\beta) = 1$, find the values of $\alpha, \beta and \gamma$.

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9. In a ABC, right angled at A, if $AB = 12, AC = 5$ and $BC = 13$, find all the six trigonometric ratios of angle B.

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10. If $\cos B = \frac{1}{3}$, find the other five trigonometric ratios.

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11. In a ABC , right angled at A, if $AB = 5, AC = 12 and BC = 13,$ find $\sin B, \cos C and tan B.$

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12. If $\sin\theta = \frac{a^2 - b^2}{a^2 + b^2}$, find the values of other five trigonometric ratios.

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13. If $\cos ecA = \sqrt{10},$ find other five trigonometric ratios.

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14. If $\tan A = \sqrt{2} - 1$ show that $\sin A \cos A = \frac{\sqrt{2}}{4}$

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15. If $\cos ecA = 2$, find the value of $\frac{1}{\tan A} + \frac{\sin A}{1 + \cos A}$

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16. Evaluate the following: $(i) \sin 39^0 - \cos 51^0$ (ii) $\cos ec25^0 - \sec 65^0 + \cot 34^0 - \tan 56^0$ (iii) $\frac{\sin 36^0}{\cos 54^0} - \frac{\sin 54^0}{\cos 36^0} + \cos^2 13^0 - \sin^2 77^0$

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17. The value of $\frac{\tan 55^0}{\cot 35^0} + \cot 1^0 \cot 2^0 \cot 3^0 \cot 90^0, is$ -2 (b) 2

(c) 1 (d) 0

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18. If A + B is 90°, then $\frac{\tan A.\tan B + \tan A.\cot B}{\sin A.\sec B} - \frac{\sin^2 B}{\cos^2 A}$ is equal to:

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19. If $\frac{x \cos ec^2 30^0 \sec^2 45^0}{8\cos^2 45^0 \sin^2 60^0} = \tan^2 60^0 - \tan^2 30^0,$ than $x =$

(a)1 (b) -1 (c) 2 (d) 0

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20. The value of $\frac{\cos(90^0-\theta)\sec(90^0-\theta)\tan\theta}{\cos ec(90^0-\theta)\sin(90^0-\theta)\cot(90^0-\theta)}+\frac{\tan(90^0-\theta)}{\cot\theta}$ is

1 (b) -1 (c) 2 (d) -2

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21. If $\tan 2A=\cot(A-18^0)$, where $2A$ is an acute angle, find the value of A.

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22. Prove the following:

$\sin\theta\sin(90^0-\theta)-\cos\theta\cos(90^0-\theta)=0$

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23. Find an acute angle θ, when $\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$

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24. If $\sin(A+B) = 1$ and $\cos(A-B) = \frac{\sqrt{3}}{2}$, then find A and B.

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25. Evaluate each of the following:

$\cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 60^\circ \cot 78^\circ$

$\tan 5^\circ \tan 25^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ$

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26. Prove that: $\tan 10^0 \tan 15^0 \tan 75^0 \tan 80^0 = 1$

$\tan 1^0 \tan 2^0 \tan 3^0 \ldots . \tan 89^0 = 1$

$\cos 1^0 \cos 2^0 \cos 3^0 \ldots \ldots \cos 180^0 = 0$

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27. If $A + B = 90^0$, prove that

$$\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$$

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28. If $\sin 5\theta = \cos 4\theta$, whre $5\theta and 4\theta$ are acute angles, find the value of θ .

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29. If $\tan\theta + \frac{1}{\tan\theta} = 2$, find the value of $\tan^2\theta + \frac{1}{\tan^2\theta}$

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30. Evaluate each of the following in the simplest form:

$1).\cos ec30^0 + \cot 45^0$

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31. In a right triangle ABC, right angled at B, the ratio of $AB \to AC$ is $1:\sqrt{2}$. Find the values of $\frac{2\tan A}{1+\tan^2 A}$ and (ii) $\frac{2\tan A}{1-\tan^2 A}$

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32. In Figure, $AD = DB$ and $\angle B$ is a right angle. Determine. $(a)\ \sin\theta\ \ (b)\ \cos\theta\ \ (c)\ \tan\theta\ \ (d)\ \sin^2\theta + \cos^2\theta$

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33. Find the value of x in each of the following: (i) $\tan 3x = \sin 45^0 \cos 45^0 + \sin 30^0$, (ii) $\cos x = \cos 60^0 \cos 30^0 + \sin 60^0 \sin 30^0$, (iii) $\sin 2x = \sin 60^0 \cos 30^0 - \cos 60^0 \sin 30^0$.

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34. If θ is an acute angle and $\tan\theta + \cot\theta = 2$, find the value of $\tan^7\theta + \cot^7\theta$.

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35. Prove that: $\frac{\cos 30^0 + \sin 60^0}{1 + \cos 60^0 + \sin 30^0} = \frac{\sqrt{3}}{2}$

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36. Find the value of θ in each of the following: (i) $2\sin 2\theta = \sqrt{3}$ (ii) $2\cos 3\theta = 1$ (iii) $\sqrt{3}\tan 2\theta - 3 = 0$

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37. An equilateral triangle is inscribed in a circle of radius 6cm. Find its side.

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38. If $\tan A = 1$ and $\tan B = \sqrt{3}$, *evaluate* $\cos A \cos B - \sin A \sin B$.

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39. Evaluate each of the following:

$$\cos\left(40^0 - \theta\right) - \sin\left(50^0 + \theta\right) + \frac{\cos^2 40^0 + \cos^2 50^0}{\sin^2 40^0 + \sin^2 50^0}$$

$$\frac{\cos 70^0}{\sin 20^0} + \frac{\cos 55^0 \cos ec35^0}{\tan 5^0 \tan 25^0 \tan 45^0 \tan 65^0 \tan 85^0}$$

$$2\left(\frac{\cos 58^0}{\sin 32^0}\right) - \sqrt{3}\left(\frac{\cos 38^0 \cos ec52^0}{\tan 15^0 \tan 60^0 tan75^0}\right)$$

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40. If $sec4A = \cos ec(A - 20^\circ)$, where 4A is an acute angle, find the value of A.

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41. Evaluate each of the following: (a)

$\cos(40^0 - \theta) - \sin(50^0 + \theta) + \dfrac{\cos^2 40^0 + \cos^2 50^0}{\sin^2 40^0 + \sin^2 50^0}$ (b)

$\dfrac{\cos 70^0}{\sin 20^0} + \dfrac{\cos 55^0 \cos ec35^0}{\tan 5^0 \tan 25^0 \tan 45^0 \tan 65^0 \tan 85^0}$ (c)

$2\left(\dfrac{\cos 58^0}{\sin 32^0}\right) - \sqrt{3}\left(\dfrac{\cos 38^0 \cos ec52^0}{\tan 15^0 \tan 60^0 tan75^0}\right)$

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42. Evaluate :

$4(\sin^4 30^0 + \cos^4 60^0) - \dfrac{2}{3}(\sin^2 60^0 - \cos^2 45^0) + \dfrac{1}{2}\tan^2 60^0$

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43. Evaluate : $\dfrac{\sin 50^0}{\cos 40^0} + \dfrac{\cos ec40^0}{\sec 50^0} - 4\cos 50^0 \cos ec40^0$

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44. Evaluate : $\tan 35^0 \tan 40^0 \tan 45^0 \tan 50^0 \tan 55^0$

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45. Evaluate :

$$\cos ec(65^0 + \theta) - \sec(25^0 - \theta) - \tan(55^0 - \theta) + \cot(35^0 + \theta)$$

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46. Evaluate : $\tan 7^0 \tan 23^0 \tan 60^0 \tan 67^0 \tan 83^0$

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47. Evaluate :

$$\frac{2\sin 68^0}{\cos 22^0} - \frac{2\cot 15^0}{5\tan 75^0} - \frac{3\tan 45^0\tan 20^0\tan 40^0\tan 50^0\tan 70^0}{5}$$

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48. Evaluate : (

$$\frac{3\cos 55^0}{7\sin 35^0}\Bigg) - \left(\frac{4}{7}\right)\frac{\cos 70^0\cos ec20^0}{\tan 5^0\tan 25^0\tan 45^0\tan 65^0\tan 85^0}$$

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49. Prove the following:

$$\frac{\cos\left(90^0-\theta\right)\sec\left(90^0-\theta\right)tan\theta}{\cos ec\left(90^0-\theta\right)\sin\left(90^0-\theta\right)\cot\left(90^0-\theta\right)} + \frac{\tan\left(90^0-\theta\right)}{\cot\theta} = 2$$

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50. Prove the following: $\frac{\tan\left(90^0 - A\right)\cot A}{\operatorname{cosec}^2 A} - \cos^2 A = 0$

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51. Prove the following:

$\sin\theta \sin\left(90^0 - \theta\right) - \cos\theta \cos\left(90^0 - \theta\right) = 0$

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52. In a $\triangle ABC$, right angled at B, if $AB = 4$ and $BC = 3$, find all the six trigonometric ratios of $\angle A$.

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53. In a $\triangle ABC$, right angled at B, if $AB = 12$ and $BC = 5$, find: (i) $\sin A$ and $\tan A$ (ii) $\cos C$ and $\cot C$

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54. If $\sin A = \frac{3}{5}$, find $\cos A$ and $\tan A$.

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55. If $\cos\theta = \frac{8}{17}$, find the other five trigonometric ratios.

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56. In a right triangle ABC right angled at B, if $\sin A = \frac{3}{5}$, find all the six trigonometric ratios of $\angle C$.

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57. If $\sin A = \frac{1}{3}$, evaluate $\cos A \cos ec\, A + \tan A \sec A$.

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58. In a right triangle ABC, right angled at C, if $\tan A = 1$, then verify that $2 \sin A \cos A = 1$.

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59. If $\sec \alpha = \frac{5}{4}$, evaluate $\frac{1 - \tan \alpha}{1 + \tan \alpha}$.

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60. If $\sin\theta = \frac{1}{2}$, show that $\left(3\cos\theta - 4\cos^3\theta\right) = 0$

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61. If $\tan A = 2$, evaluate $\sec A \sin A + \tan^2 A - \cos ec\, A$.

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62. Given $\triangle ACB$ right angled at C in which $AB = 29\ units$, $BC = 21\ units$ and $\angle ABC = \theta$. Determine the values of (i) $\cos^2\theta + \sin^2\theta$ (ii) $\cos^2\theta - \sin^2\theta$

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63. If $\cot B = \frac{12}{5}$, prove that $\tan^2 B - \sin^2 B = \sin^4 B \sec^2 B$.

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64. If $\sec \alpha = \frac{5}{4}$, verify that $\frac{\tan \alpha}{1 + \tan^2 \alpha} = \frac{\sin \alpha}{\sec \alpha}$

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65. If $\sin \theta = \frac{4}{5}$, find the value of $\frac{4 \tan \theta - 5 \cos \theta}{\sec \theta + 4 \cot \theta}$

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66. In a right triangle ABC right angled at B, $\angle ACB = \theta$, $AB = 2cm$ and $BC = 1\ cm$. Find the value of $\sin^2 \theta + \tan^2 \theta$

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67. From Fig. , write the values of: (i) $\sin A$ (ii) $\cot A$

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68. From Fig., write the values of: (i) $\tan B$ (ii) $\sin^2 B + \cos^2 B$

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69. In $\triangle OPQ$ right angled at P, $OP = 7cm$, $OQ - PQ = 1cm$. Determine the values of $\sin Q$ and $\cos Q$.

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70. In ΔPQR, right angled at Q, $PR + QR = 25cm$ and $PQ = 5cm$. Determine the values of $\sin P$, $\cos P$ and $\tan P$.

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71. In a $\triangle ABC$, right angled at C and $\angle A = \angle B$, is $\cos A = \cos B$?

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72. In a $\triangle ABC$, right angled at C and $\angle A = \angle B$, is $\tan A = \tan B$?

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73. In $\triangle ABC$, right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of (i) $\sin A \cos C + \cos A \sin C$ (ii) $\cos A \cos C - \sin A \sin C$

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74. Given that $16 \cot A = 12$; find the value of $\frac{\sin A + \cos A}{\sin A - \cos A}$.

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75. If $5 \tan \alpha = 4$, show that $\frac{5 \sin \alpha - 3 \cos \alpha}{5 \sin \alpha + 2 \cos \alpha} = \frac{1}{6}$

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76. If $\tan\theta = \frac{12}{13}$, evaluate $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$.

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77. If $\angle B$ and $\angle Q$ are acute angles such that $\sin B = \sin Q$, then prove that $\angle B = \angle Q$.

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78. If $\sin A = \frac{2}{3}$, find other trigonometric ratios.

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79. If $\cos A = \frac{4}{5}$, find other trigonometric ratios.

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80. If $\tan\theta = 11$, find other trigonometric ratios

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81. If $\sin\theta = \frac{11}{15}$, find other trigonometric ratios

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82. Given $\tan\alpha = \frac{5}{12}$, find other trigonometric ratios

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83. $\sin\theta = \frac{\sqrt{3}}{2}$, find other trigonometric ratios

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84. If $\cos\theta = \frac{7}{25}$, find other trigonometric ratios

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85. If Value of $\tan\theta = \frac{8}{15}$, find other trigonometric ratios

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86. If $\cot\theta = \frac{12}{5}$, find other trigonometric ratios

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87. If $\sec\theta = \frac{13}{5}$, find other trigonometric ratios

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88. If $\operatorname{cosec} A = \sqrt{10},$ find other five trigonometric ratios.

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89. $\cos\theta = \frac{12}{15}$ is given, find other trigonometric ratios

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90. In a $\triangle ABC$, right angled at B, $AB = 24cm$, $BC = 7cm$. Determine (i) $\sin A, \cos A$ (ii) $\sin C, \cos C$

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91. In Fig., find $\tan P$ and $\cot R$. Is $\tan P = \cot R$?

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92. If $\sin A = \frac{9}{41}$, compute $\cos A$ and $\tan A$.

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93. given : $15 \cot A = 8$ find $\sin A$ and $\sec A$

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94. In $\triangle PQR$, right angled at Q, $PQ = 4cm$ and $RQ = 3cm$. Find the values of $\sin P$, $\sin R$, $\sec P$ and $\sec R$.

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95. If $\cot\theta = \frac{7}{8}$, evaluate . 1.) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1-\cos\theta)(1+\cos\theta)}$

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96. If $3\cot A = 4$, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ or not.

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

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98. If $3\tan\theta = 4$, find the value of $\frac{4\cos\theta - \sin\theta}{2\cos\theta + \sin\theta}$

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99. If $3\cot\theta = 2$, find the value of $\frac{4\sin\theta - 3\cos\theta}{2\sin\theta + 6\cos\theta}$

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

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101. If $\sec\theta = \frac{13}{5}$, show that $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta} = 3$

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102. If $\cos\theta = \frac{12}{13}$, show that $\sin\theta(1 - \tan\theta) = \frac{35}{156}$

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103. If $\cot\theta = \frac{1}{\sqrt{3}}$, show that $\frac{1 - \cos^2\theta}{2 - \sin^2\theta} = \frac{3}{5}$

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104. If $\tan\theta = \frac{1}{\sqrt{7}}$, then $\frac{cosec^2\theta - \sec^2\theta}{cosec^2\theta + \sec^2\theta} = ?$

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105. If $\sin\theta = \frac{12}{13}$, find the value of $\frac{\sin^2\theta - \cos^2\theta}{2\sin\theta\cos\theta} \times \frac{1}{\tan^2\theta}$

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106. If $\sec\theta = \frac{5}{4}$, find the value of $\frac{\sin\theta - 2\cos\theta}{\tan\theta - \cot\theta}$

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107. If $\cos\theta = \frac{5}{13}$, find the value of $\frac{\sin^2\theta - \cos^2\theta}{2\sin\theta\cos\theta} \times \frac{1}{\tan^2\theta}$

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108. If $\tan\theta = \frac{12}{13}$, evaluate $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$.

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109. If $\cos\theta = \frac{3}{5}$, find the value of $\frac{\sin\theta - \frac{1}{\tan\theta}}{2\tan\theta}$

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110. If $\sin\theta = \frac{3}{5}$, evaluate $\frac{\cos\theta - \frac{1}{\tan\theta}}{2\cot\theta}$

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111. If $\sec A = \frac{5}{4}$, verify that $\frac{3\sin A - 4\sin^3 A}{4\cos^3 A - 3\cos A} = \frac{3\tan A - \tan^3 A}{1 - 3\tan^2 A}$

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112. If $\sin\theta = \frac{3}{4}$, prove that $\sqrt{\frac{\cos ec^2\theta - \cot^2\theta}{\sec^2\theta - 1}} = \frac{\sqrt{7}}{3}$

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113. If $\sec A = \frac{17}{8}$, verify that $\frac{3 - 4\sin^2 A}{4\cos^2 A - 3} = \frac{3 - \tan^2 A}{1 - 3\tan^2 A}$

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114. If $\cot\theta = \frac{3}{4}$, prove that $\sqrt{\frac{\sec\theta - \cos ec\,\theta}{\sec\theta + \cos ec\,\theta}} = \frac{1}{\sqrt{7}}$

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115. If $\tan\theta = \frac{24}{7}$, find $\sin\theta + \cos\theta$.

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116. If $\sin\theta = \frac{a}{b}$, find $\sec\theta + \tan\theta$ in terms of a and b.

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117. If $8\tan A = 15$, find $\sin A - \cos A$

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118. If $3\cos\theta - 4\sin\theta = 2\cos\theta + \sin\theta$, find $\tan\theta$.

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119. If $\tan\theta = \frac{20}{21}$, show that $\frac{1 - \sin\theta + \cos\theta}{1 + \sin\theta + \cos\theta} = \frac{3}{7}$

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120. If $\cos ec\, A = 2$, find the value of $\frac{1}{\tan A} + \frac{\sin A}{1 + \cos A}$

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121. If $\angle A$ and $\angle B$ are acute angles such that $\cos A = \cos B$. then show that $\angle A = \angle B$.

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122. If $\angle A$ and $\angle P$ are acute angle such that $\tan A = \tan P$, then show that $\angle A = \angle P$.

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123. In a $\triangle ABC$, right angled at A, if $\tan C = \sqrt{3}$, find the value of $\sin B \cos C + \cos B \sin C$.

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124. State whether the following are true or false. Justify your answer. (i) The value of tan A always less than 1. (ii) $\sec A = \frac{12}{5}$ for some value of angle A (iii) cos A is the abbreviation used for the cosecant of angle A. (iv) cot A is the product of cot and A (v)$\sin\theta = \frac{4}{3}$ for some angle θ

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125. State whether the following are true or false. Justify your answer. (i) The value of tan A always less than 1. (ii)

$\sec A = \frac{12}{5}$ for some value of angle A (iii) cos A is the abbreviation used for the cosecant of angle A. (iv) cot A is the product of cot and A (v)$\sin\theta = \frac{4}{3}$ for some angle θ

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126. Evaluate each of the following in the simplest form:

$\sin 60o \cos 30 \oplus \cos 60o \sin 30o$ (ii)

$\sin 60o \cos 45 \oplus \cos 60o \sin 45o$

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127. Evaluate the following expressions:

$(i) 2\sin^2 30^o \tan 60^o - 3\cos^2 60^o \sec^2 30^o$ (ii)

$\mathrm{c\,o\,s\,e\,c}^2 30^o \sin^2 45^o - \sec^2 60^o$ (iii)

$\tan 60^o \cos ec^2 45^o + \sec^2 60^o \tan 45^o$

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128. Evaluate the following expressions:

$(i) 4\cot^2 45o - \sec^2 60^o + \sin^2 60^o + \cos^2 90^o$. (ii)

$3\cos^2 30^o + \sec^2 30^o + 2\cos 0^o + 3\sin 90^o - \tan^2 60^o$

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129. Evaluate each of the following: $\frac{\sin^2 45^o + \cos^2 45^o}{\tan^2 60^o}$ (ii)

$\frac{\sin 30^o - \sin 90^o + 2\cos 0^o}{\tan 30^o \tan 60^o}$

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130. Evaluate each of the following:

$\frac{\sin 60^o}{\cos^2 45^o} - \cot 30^o + 15\cos 90^o$ (ii)

$$\frac{5\sin^2 30^o + \cos^2 45^o - 4\tan^2 30^o}{2\sin 30^o \cos 30^o + \tan 45^o}$$

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131. Show that:

$2\left(\cos^2 45^\circ + \tan^2 60^\circ\right) - 6\left(\sin^2 45^\circ - \tan^2 30^\circ\right) = 6$ (ii)

$2\left(\cos^4 60^\circ + \sin^4 30^\circ\right) - \left(\tan^2 60^\circ + \cot^2 45^\circ\right) + 3\sec^2 30^\circ = \frac{1}{4}$

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132. Solve each of the following equations when 0^0 < theta<90^0

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

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133. Solve each of the following equations when $0 < \theta < 90$

$(i) 2\sin^2\theta = \frac{1}{2}$ $(ii) 3\tan^2\theta - 1 = 0$

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134. Find the value of θ in each of the following: (i) $2\sin 2\theta = \sqrt{3}$ (ii) $2\cos 3\theta = 1$

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135. If $A = 30^\circ$ verify that $\cos 3A = 4\cos^3 A - 3\cos A$

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136. If $x = 30^\circ$, verify that : (i) $\tan 2x = \dfrac{2\tan x}{1-\tan^2 x}$ (ii) $\sin x = \sqrt{\dfrac{1-\cos 2x}{2}}$

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137. Verify that: $\sin 60o = \dfrac{2\tan 30o}{1+\tan^2 30o} = \dfrac{\sqrt{3}}{2}$ (ii) $\cos 60o = \dfrac{1-\tan^2 30o}{1+\tan^2 30o} = \dfrac{1}{2}$

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138. Verify that: (i) $\cos 60^\circ = \cos^2 30^\circ - \sin^2 30^\circ = \dfrac{1}{2}$

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139. If θ is an acute angle and $\sin\theta = \cos\theta$, find the value of $2\tan^2\theta + \sin^2\theta - 1$

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140. Given that $\sin(A+B) = \sin A\cos B + \cos A\sin B,$ find the value of $\sin 75^\circ$.

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141. In a rectangle $ABCD,$ $AB = 20cm$, $\angle BAC = 60^\circ$. Calculate side BC .

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142. Evaluate the following: (i) $\sin 45o \sin 30 \oplus \cos 45o \cos 30o$

(ii) $\sin 60o \cos 30 \oplus \cos 60o \sin 30o$

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143. Evaluate the following: (i) $\cos 60o \cos 45o - \sin 60o \sin 45o$

(ii) $\sin^2 30 \oplus \sin^2 45 \oplus \sin^2 60 \oplus \sin^2 90o$

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144. Evaluate the following: $\cos^2 30 \oplus \cos^2 45 \oplus \cos^2 60 \oplus \cos^2 90o$ (ii) $\tan^2 30 \oplus \tan^2 60 \oplus \tan^2 45o$

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145. Evaluate the following: (i)

$2\sin^2 30o - 3\cos^2 45 \oplus \tan^2 60o$ (ii)

$\sin^2 30o \cos^2 45 \oplus 4\tan^2 30 \oplus \frac{1}{2}\sin^2 90o - 2\cos^2 90 \oplus \frac{1}{24}\cos^2 0o$

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146. Evaluate the following:

$4\left(\sin^4 60 \oplus \cos^4 30o\right) - 3\left(\tan^2 60o - \tan^2 45o\right) + 5\cos^2 45o$

(ii) $\left(\cos ec^2 45o \sec^2 30o\right)\left(\sin^2 30 \oplus 4\cot^2 45o - \sec^2 60o\right)$

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147. Evaluate the following:

$\cos ec^3 30o \cos 60o \tan^3 45o \sin^2 90o \sec^2 45o \cot 30o$ (ii)

$\cot^2 30o - 2\cos^2 60o - \frac{3}{4}\sec^2 45o - 4\sec^2 30o$

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148. Evaluate the following:

$(\cos 0 \oplus \sin 45 \oplus \sin 30o)(\sin 90o - \cos 45 \oplus \cos 60o)$ (ii) $\frac{\sin 30o - \sin 90 \oplus 2\cos 0o}{\tan 30o \tan 60o}$

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149. Evaluate the following: (i) $\frac{4}{\cot^2 30o} + \frac{1}{\sin^2 60o} - \cos^2 45o$ (ii) $4\left(\sin^4 30 \oplus \cos^2 60o\right) - 3\left(\cos^2 45o - \sin^2 90o\right) - \sin^2 60o$

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150. Evaluate the following:

$$\frac{\tan^2 60 \oplus 4\cos^2 45 \oplus 3\sec^2 30 \oplus 5\cos^2 90o}{\cos ec\, 30 \oplus \sec 60o - \cot^2 30o}$$

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151. Evaluate the following:

$$\frac{\tan 45^\circ}{\cos ec\, 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5\sin 90^\circ}{2\cos 0^\circ}$$

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152. Find the value of x in each of the following: (i) $2\sin 3x = \sqrt{3}$ (ii) $2\sin\left(\frac{x}{2}\right) = 1$ (iii) $\sqrt{3}\sin x = \cos x$

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153. Find the value of x in each of the following:

$\tan x = \sin 45^\circ \cos 45^\circ + \sin 30^\circ$ (ii)

$\sqrt{3} \tan 2x = \cos 60^\circ + \sin 45^\circ \cos 45^\circ$ (iii)

$\cos 2x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$

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154. If $\theta = 30^\circ$, verify that: (i) $\tan 2\theta = \dfrac{2 \tan \theta}{1 - \tan^2 \theta}$ (ii) $\sin 2\theta = \dfrac{2 \tan \theta}{1 + \tan^2 \theta}$

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155. If $\theta = 30^\circ$, verify that: (i) $\cos 2\theta = \dfrac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$ (ii) $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$

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156. If $A = B = 60^\circ$, verify that (i)

$\cos(A - B) = \cos A \cos B + \sin A \sin B$ (ii)

$\sin(A - B) = \sin A \cos B - \cos A \sin B$ (iii)

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

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157. If $A = 30^\circ$ and $B = 60^\circ$, verify that (i)

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

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

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158. Using the formula of $\sin(A-B)=\sin A\cos B-\cos A\sin B$ find the value of sin 15°

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159. In a right triangle ABC, right angled at C, if $\angle B=60o$ and $AB=15$ units. Find the remaining angles and sides.

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160. If $\triangle ABC$ is a right triangle such that $\angle C=90^\circ$, $\angle A=45^\circ$ and $BC=7$ units. Find $\angle B$, AB and AC.

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161. In a rectangle $ABCD$, $AB = 20cm$, $\angle BAC = 60o$, calculate side BC and diagonals AC and BD .

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162. If $\sin(A + B) = 1$ and $\cos(A - B) = 1, 0^\circ < A + B \leq 90^\circ$, $A \geq B$ find A and B .

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163. If $\tan(A - B) = \frac{1}{\sqrt{3}}$ and $\tan(A + B) = \sqrt{3}$, $0^\circ < A + B \leq 90^\circ, A > B$ find A and B .

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164. If $\sin(A-B) = \frac{1}{2}$ and $\cos(A+B) = \frac{1}{2}$, $0^o < A+B < 90^o$ and $A>B$, then find A and B.

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165. In a $\triangle ABC$ right angled at B, $\angle A = \angle C$. Find the values of (i) $\sin A \cos C + \cos A \sin C$ (ii) $\sin A \sin B + \cos A \cos B$

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166. If A and B are acute angles such that $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$ and $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$, find $A + B$.

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167. In $\triangle PQR$, right-angled at Q, $PQ = 3cm$ and $PR = 6cm$. Determine $\angle P$ and $\angle R$.

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168. Evaluate the following: (i) $\frac{\cos 80^o}{\sin 10^o} + \cos 59^o \cos ec\, 31^o$ (ii) $\frac{\cot 54^o}{\tan 36^o} + \frac{\tan 20^o}{\cot 70^o} - 2$ (iii) $\frac{2\tan 53^o}{\cot 37^o} - \frac{\cot 80^o}{tan\ 10^o}$

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169. Evaluate the following: (i) $\sec 50^o \sin 40^o + \cos 40^o \cos ec\, 50^o$ (ii) $\sec 70^o \sin 20^o - \cos 20^o \cos ec\, 70^o$

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170. Prove that: (i) $\sin 35 \sin 55 - \cos 35 \cos 55 = 0$

$(ii) \frac{\cos 70}{\sin 20} + \frac{\cos 59}{\sin 31} - 8 \sin^2 30 = 0$

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171. Express each of the following in terms of trigonometric ratios of angles between 0 and 45 : $(i) \sin 85 + \cos ec 85$

$(ii) \tan 68 + \sec 68$ $(iii) \cos ec 69 + \cot 69$

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172. Express each of the following in terms of trigonometric ratios of angles between 0 and 45 : $(i) \sin 81 + \tan 81$

$(ii) \sin 72 + \cot 72$

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173. Evaluate the following: (i)

$$\left(\frac{\sin 35}{\cos 55}\right)^2 + \left(\frac{\cos 55}{\sin 35}\right)^2 - 2\cos 60$$

$$(ii)\ \frac{2\cos 67}{\sin 23} - \frac{\tan 40}{\cot 50} - \cos 0$$

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174. Evaluate: $\left(\frac{\sin 47^\circ}{\cos 43^\circ}\right)^2 + \left(\frac{\cos 43^\circ}{\sin 47^\circ}\right)^2 - 4\cos^2 45^\circ$

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175. If A, B, C are the interior angles of a triangle ABC, prove that $\frac{\tan(B+C)}{2} = \frac{\cot A}{2}$

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176. Find θ; if $\sin(\theta + 36^\circ) = \cos\theta$; where $\theta + 36^\circ$ is an acute angle.

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177. If $\tan 2\theta = \cot(\theta + 6^\circ)$, where 2θ and $\theta + 6^\circ$ are acute angles, find the value of θ .

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178. If $tanA = \cot B$, prove that $A + B = 90^\circ$

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179. If $\sec 5A = \operatorname{cosec}(A + 36^\circ)$, where $5A$ is an acute angle, find the value of A

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180. If $sec4A = \operatorname{cosec}(A - 20^\circ)$, where 4A is an acute angle, find the value of A.

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181. Evaluate the following: (i) $\frac{\sin 20^\circ}{\cos 70^\circ}$ (ii) $\frac{\cos 19^\circ}{\sin 71^\circ}$

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182. Evaluate the following: (i) $\frac{\sin 21o}{\cos 69o}$ (ii) $\frac{\tan 10o}{\cot 80o}$ (iii) $\frac{\sec 11o}{\cos ec\, 79o}$

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183. Evaluate the following: (i) $\left(\frac{\sin 49^\circ}{\cos 41^\circ}\right)^2 + \left(\frac{\cos 41^\circ}{\sin 49^\circ}\right)^2$ (ii) $\cos 48^\circ - \sin 42^\circ$

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184. Evaluate the following: (i) $\frac{\cot 40^\circ}{\tan 50^\circ} - \frac{1}{2}\left(\frac{\cos 35^\circ}{\sin 55^\circ}\right)$ (ii) $\left(\frac{\sin 27^\circ}{\cos 63^\circ}\right)^2 - \left(\frac{\cos 63^\circ}{\sin 27^\circ}\right)^2$

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185. Evaluate the following: (i) $\frac{\tan 35^\circ}{\cot 55^\circ} + \frac{\cot 78^\circ}{\tan 12^\circ} - 1$ (ii) $\frac{\sec 70^\circ}{\cos ec\, 20^\circ} + \frac{\sin 59^\circ}{\cos 31^\circ}$

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186. Evaluate the following: (i) $\cos ec\, 31^\circ - \sec 59^\circ$ (ii) $(\sin 72^\circ + \cos 18^\circ)(\sin 72^\circ - \cos 18^\circ)$

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187. Evaluate the following: (i) $\sin 35o \sin 55o - \cos 35o \cos 55o$ (ii) $\tan 48o \tan 23o \tan 42o \tan 67o$ (iii) $\sec 50o \sin 40 \oplus \cos 40o \cos ec\, 50o$

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188. Express each one of the following in terms of trigonometric ratios of angles lying between 0° and 45°

$(i)\sin 59^\circ + \cos 56^\circ$ $(ii)\tan 65^\circ + \cot 49^\circ$

$(iii)\sec 76^\circ + \cos ec\, 52^\circ$

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189. Express each one of the following in terms of trigonometric ratios of angles lying between $0o$ and $45o$ $\cos 78 \oplus \sec 78o$ (ii) $\cos ec\, 54 \oplus \sin 72o$ (iii) $\cot 85 \oplus \cos 75o$ (iv) $\sin 67 \oplus \cos 75o$

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190. Express $\cos 75 \oplus \cot 75o$ in terms of angles between $0o$ and $30o$.

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191. If $\sin 3A = \cos(A - 26^\circ)$, where 3A is an acute angle, find the value of A.

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192. If A, B, C are the interior angles of a triangle ABC, prove that $\tan\left(\frac{C+A}{2}\right) = \frac{\cot B}{2}$ (ii) $\sin\left(\frac{B+C}{2}\right) = \frac{\cos A}{2}$

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193. Prove that: $\tan 20^\circ \tan 35^\circ \tan 45^\circ \tan 55^\circ \tan 70^\circ = 1$

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194. Prove that: $\sin 48^\circ \sec 42^\circ + \cos 48^\circ \cos ec\, 42^\circ = 2$

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195. Prove that:

$$\frac{\sin 70^\circ}{\cos 20^\circ} + \frac{\cos ec\, 20^\circ}{\sec 70^\circ} - 2\cos 70^\circ \cos ec\, 20^\circ = 0$$

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196. Prove that: $\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \cos ec\, 31^\circ = 2$

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197. If $\sin\theta = \cos(\theta - 45^\circ)$, where θ and $\theta - 45^\circ$ are acute angles, find the degree measure of θ .

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198. If A, B and C are interior angles of a triangle ABC, then show that $\sin\left(\frac{B+C}{2}\right) = \frac{\cos A}{2}$.

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199. If $2\theta + 45o$ and $30o - \theta$ are acute angles, find the degree measures of θ satisfying $\sin(2\theta + 45o) = \cos(30o - \theta)$

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200. If θ is a positive acute angle such that $\sec\theta = \cos ec\, 60o$, find the value of $2\cos^2\theta - 1$.

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201. If $\cos 2\theta = \sin 4\theta$, where 2θ and 4θ are acute angles, find the value of θ.

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202. If $\sin 3\theta = \cos\left(\theta - 6^0\right)$, where $(3\theta) and \left(\theta - 6^0\right)$ are both acute angles, then the value of θ is (a)18^0 (b) 24^0 (c) 36^0 (d) 30^0

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203. If $sec4A = \cos ec(A - 20^\circ)$, where 4A is an acute angle, find the value of A.

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204. Write the maximum and minimum values of $\sin\theta$.

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205. Write the maximum and minimum values of $\cos\theta$.

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206. What is the maximum value of $\frac{1}{\sec\theta}$?

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207. What is the maximum value of $\frac{1}{\cos ec\,\theta}$?

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208. If $\tan\theta = \frac{4}{5}$, find the value of $\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta}$.

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209. If $\cos\theta = \frac{2}{3}$, find the value of $\frac{\sec\theta - 1}{\sec\theta + 1}$.

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210. If $3\cot\theta = 4$, find the value of $\dfrac{4\cos\theta - \sin\theta}{2\cos\theta + \sin\theta}$.

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211. Given $\tan\theta = \dfrac{1}{\sqrt{5}}$, what is the value of $\dfrac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta}$

?

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212. If $\cot\theta = \dfrac{1}{\sqrt{3}}$, show that $\dfrac{1-\cos^2\theta}{2-\sin^2\theta} = \dfrac{3}{5}$

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213. If $\tan A = \frac{3}{4}$ and $A + B = 90^\circ$, then what is the value of $\cot B$?

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214. If $A + B = 90^\circ$ and $\cos B = \frac{3}{5}$, what is the value of $\sin A$?

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215. Write the acute angle θ satisfying $\sqrt{3}\sin\theta = \cos\theta$.

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216. Write the value of $\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ$.

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217. If $\tan A = \frac{3}{4}$ and $A + B = 90^\circ$, then what is the value of $\cot B$?

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218. If $\tan A = \frac{5}{12}$, find the value of $(\sin A + \cos A)\sec A$.

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219. If θ is an acute angle such that $\cos\theta = \frac{3}{5}$, then $\frac{\sin\theta\tan\theta - 1}{2\tan^2\theta} =$ (a) $\frac{16}{625}$ (b) $\frac{1}{36}$ (c) $\frac{3}{160}$ (d) $\frac{160}{3}$

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220. If $\tan\theta = \frac{a}{b}$, then $\frac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta}$ is equal to (a) $\frac{a^2+b^2}{a^2-b^2}$ (b) $\frac{a^2-b^2}{a^2+b^2}$ $(c)\frac{a+b}{a-b}$ (d) $\frac{a-b}{a+b}$

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221. If $5\tan\theta - 4 = 0$, then the value of $\frac{5\sin\theta - 4\cos\theta}{5\sin\theta + 4\cos\theta}$ is

A. $\frac{5}{3}$

B. $\frac{5}{6}$

C. 0

D. $\frac{1}{6}$

Answer: c

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222. If $16\cot x = 12$, then $\frac{\sin x - \cos x}{\sin x + \cos x}$ equals (a) $\frac{1}{7}$ (b) $\frac{3}{7}$ (c) $\frac{2}{7}$ (d) 0

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223. If $8\tan x = 15$, then $\sin x - \cos x$ is equal to

A. $\frac{8}{17}$

B. $\frac{17}{7}$

C. $\frac{1}{17}$

D. $\frac{7}{17}$

Answer: D

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224. If $\tan\theta = \frac{1}{\sqrt{7}}$, find the value of $\frac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta}$.

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225. If $\tan\theta = \frac{3}{4}$, then $\cos^2\theta - \sin^2\theta =$ (a) $\frac{7}{25}$ (b) 1 (c) $-\frac{7}{25}$ (d) $\frac{4}{25}$

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226. If θ is an acute angle such that $\tan^2\theta = \frac{8}{7}$, then the value of $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ is (a) $\frac{7}{8}$ (b) $\frac{8}{7}$ (c) $\frac{7}{4}$ (d) $\frac{64}{49}$

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227. If $3\cos\theta = 5\sin\theta$, then the value of $\frac{5\sin\theta - 2\sec^3\theta + 2\cos\theta}{5\sin\theta + 2\sec^3\theta - 2\cos\theta}$ is (a) $\frac{271}{979}$ (b) $\frac{316}{2937}$ (c) $\frac{542}{2937}$ (d) None of these

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228. If $\tan^2 45^\circ - \cos^2 30^\circ = x\sin 45^\circ \cos 45^\circ$, then x is (a) 2 (b) -2 (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

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229. The value of $\cos^2 17^\circ - \sin^2 73^\circ$ is (a) 1 (b) $\frac{1}{3}$ (c) 0 (d) -1

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230. The value of $\frac{\cos^3 20^\circ - \cos^3 70^\circ}{\sin^3 70^\circ - \sin^3 20^\circ}$ is (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 1 (d) 2

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231. If A and B are complementary angles, then $(a)\sin A = \cos B$ $(b)\cos A = \sin B$ (c) $\tan A = \cot B$ (d) $\sec A = \cos ec\, B$

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232. If $x \sin(90^\circ - \theta)\cot(90^\circ - \theta) = \cos(90^\circ - \theta)$, then $x =$

A. (a) 0

B. (b) 1

C. (c) -1

D. (d) 2

Answer: null

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233. If $x\tan 45^\circ \cos 60^\circ = \sin 60^\circ \cot 60^\circ$, then x is equal to

A. (a) 1

B. (b) $\sqrt{3}$

C. (c) $\frac{1}{2}$

D. (d) $\frac{1}{\sqrt{2}}$

Answer: null

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234. If angles $A,\ B,\ C$ of a $\triangle ABC$ form an increasing AP, then $\sin B =\ (a)\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) 1 (d) $\frac{1}{\sqrt{2}}$

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235. If θ is an acute angle such that $\sec^2\theta = 3$, then the value of $\frac{\tan^2\theta - \cos ec^2\theta}{\tan^2\theta + \cos ec^2\theta}$ is (a) $\frac{4}{7}$ (b) $\frac{3}{7}$ (c) $\frac{2}{7}$ (d) $\frac{1}{7}$

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236. The value of $\tan 1o \tan 2o \tan 3o \ldots \tan 89o$ is (a) 1 (b) -1 (c) 0 (d) None of these

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237. The value of $\cos 1^{\circ} \cos 2^{\circ} \cos 3^{\circ}$ ..... $\cos 180^{\circ}$ is $(a) 1 (b) 0 (c) -1$ (d) None of these

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238. The value of $\tan 10o \tan 15o \tan 75o \tan 80o$ is -1 (b) 0 (c) 1 (d) None of these

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239. If θ and $2\theta - 45^{\circ}$ are acute angles such that $\sin\theta = \cos(2\theta - 45^{\circ})$, then $\tan\theta$ is equal to (a) 1 (b) -1 (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

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240. If 5θ and 4θ are acute angles satisfying $\sin 5\theta = \cos 4\theta$, then $2\sin 3\theta - \sqrt{3}\tan 3\theta$ is equal to

A. (a) 1

B. (b) 0

C. (c) -1

D. (d) $1 + \sqrt{3}$

Answer: null

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241. $\frac{2\tan 30^\circ}{1-\tan^2 30^\circ}$ is equal to (a)$\sin 60^\circ$ (b) $\cos 60^\circ$ (c) $\tan 60^\circ$ (d) $\sin 30^\circ$

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242. $\frac{1-\tan^2 45^\circ}{1+\tan^2 45^\circ}$ is equal to

A. (a)$\tan 90^\circ$

B. (b) 1

C. (c) $\sin 45^\circ$

D. (d) $\sin 0^\circ$

Answer: null

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243. $\sin 2A = 2\sin A$ is true when $A = (a)0^\circ$ (b) 30° (c) 45° (d) 60°

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244. $\frac{2\tan 30^\circ}{1-\tan^2 30^\circ}$ is equal to $(a)\cos 60^\circ$ (b) $\sin 60^\circ$ (c) $\tan 60^\circ$ (d) $\sin 30^\circ$

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245. If A, B and C are interior angles of a triangle ABC, then show that $\sin\left(\frac{B+C}{2}\right) = \cos\left(\frac{A}{2}\right)$.

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246. If $\cos\theta = \frac{2}{3}$, then $2\sec^2\theta + 2\tan^2\theta - 7$ is equal to (a) 1 (b) 0 (c) 3 (d) 4

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247. $\tan 5 \otimes x \tan 30 \otimes x4 \tan 85o$ is equal to $\frac{4}{\sqrt{3}}$ (b) $4\sqrt{3}$ (c) 1 (d) 4

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248. In Fig. 5.47, the value of $\cos\varphi$ is (FIGURE) $\frac{5}{4}$ (b) $\frac{5}{3}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

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249. In Figure, $AD = 4cm$, $BD = 3cm$ and $CB = 12cm$, find $\cot\theta$. $(a)\frac{12}{5}(b)\frac{5}{12}(c)\frac{13}{12}(d)\frac{12}{13}$

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