MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

TRIGONOMETRIC IDENTITIES

Others

1. Prove the trigonometric identities:

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

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2. Prove the trigonometric identities: If $T_n = \sin^n \theta + \cos^n \theta$, prove that

$$\frac{T_3 - T_5}{T_1} = \frac{T_5 - T_7}{T_3}$$

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3. prove-that-1-cota-tana-sina-cosa-seca-cosec-2a-coseca-sec-2a-sinatana-cosacota

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4. If $x = a\sec\theta + b\tan\theta$ and $y = a\tan\theta + b\sec\theta$,prove thatÂ : $x^2 - y^2 = a^2 - b^2.$

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5. If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$ Prove that : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$

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6. 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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7. If$a\cos^3\theta + 3a\cos\theta\sin^2\theta = m$ and $a\sin^3\theta + 3a\cos^2\theta\sin^\theta = n$, then prove that: $(m+n)^{2/3} + (m-n)^{2/3} = 2a^{2/3}$

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8. If $3\sin\theta + 5\cos\theta = 5,$ then show that $5\sin\theta - 3\cos\theta = \pm 3.$

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9. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n,$ Prove that $a^2 + b^2 = m^2 + n^2$

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10. If $\cos\theta + \cos^2\theta = 1$, Prove that:

$$\sin^{12}\theta + 3\sin^{10}\theta + 3\sin^8\theta + \sin^6\theta + 2\sin^4\theta + 2\sin^2\theta - 2 = 1$$

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11. If $\cot\theta = \frac{15}{8}$, then Evaluate $\frac{(2+2\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(2-2\cos\theta)}$

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12. Prove the trigonometric identities:

$$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \tan\theta + \cot\theta$$

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13. If $\sin\theta + \cos\theta = x$, Prove that : $\sin^6\theta + \cos^6\theta = \frac{4 - 3\left(x^2-1\right)^2}{4}$

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14. Prove the following identities:

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

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15. Prove that $(1-\sin\theta+\cos\theta)^2=2(1+\cos\theta)(1-\sin\theta)$

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16. Prove the following identities:

$$(\sin A+\sec A)^2+(\cos \mathrm{A}+\mathrm{c\,o\,s\,e\,cA})^2=(1+\sec A\cos ecA)^2$$

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

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17. Prove the identity:

$$(1+\tan A\tan B)^2+(\tan A-\tan B)^2=\sec^2 A\sec^2 B$$

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18. Prove the following identities:

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

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

$$\left(\sin^8\theta-\cos^8\theta\right)=\left(\sin^2\theta-\cos^2\theta\right)\left(1-2s\in^2\theta\cos^2\theta\right)$$

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19. Prove the following identities:

$$\tan^2 A-\tan^2 B=\frac{\cos^2 B-\cos^2 A}{\cos^2 B\cos^2 A}=\frac{\sin^2 A-\sin^2 B}{\cos^2 A\cos^2 B}$$

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

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20. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

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21. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, show that $m^2 - n^2 = 4\sqrt{nm}$

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22. if

$(\sec A + \tan A)(\sec B + \tan B)(\sec C + \tan C) = (\sec A - \tan A)(\sec B -$

Prove that each of the side is equal to ± 1.

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23. Prove the following identities:

$$\frac{\cos A}{1-\sin A} + \frac{\sin A}{1-\cos A} + 1 = \frac{\sin A \cos A}{(1-\sin A)(1-\cos A)}$$

$$\left((1+\cot A + \tan A)\frac{\sin A - \cos A}{\sec^3 A - \cos ec^3 A} = \sin^2 A \cos^2 A\right.$$

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24. If $\tan^2\theta = 1 - a^2$, prove that $sec\theta + \tan^3\theta \cos ec\theta = \left(2 - a^2\right)^{\frac{3}{2}}$

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25. If $a\sec\theta + btan\theta + c = 0$ and $p\sec\theta + q\tan\theta + r = 0$, prove that $(br - qc)^2 - (pc - ar)^2 = (aq - bp)^2$

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26. If $\sec\theta + \tan\theta = p$, show that $\frac{p^2 - 1}{p^2 + 1} = \sin\theta$

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27. If $\sin\theta + \cos\theta = pand\sec\theta + \cos ec\theta = q$, show that $q\left(p^2 - 1\right) = 2p$.

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28. Without using trigonometric tables, evaluate each of the following:

$$\frac{\cos^2 20^0 + \cos^2 70^0}{\sec^2 50^0 - \cot^2 40^0} + 2\cos ec^2 58^0 - 2\cot 58^0 \tan 32^0 -$$

$$4\tan 13^0 \tan 37^0 \tan 45^0 \tan 53^0 \tan 77^0$$

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29. Without using trigonometric tables, evaluate each of the following:

$$\frac{\sin^2 20^0 + \sin^2 70^0}{\cos^2 20^0 + \cos^2 70^0} + \frac{\sin(90^0 - \theta)\sin\theta}{\tan\theta} + \frac{\cos(90^0 - \theta)\cos\theta}{\cot\theta}$$

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30. Prove the trigonometric identities: $\frac{1 - \sin\theta}{1 + \sin\theta} = (\sec\theta - \tan\theta)^2$

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31. Prove the trigonometric identities: $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \cos ec\theta - \cot\theta$

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

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33. Prove that : $\frac{\sin\theta\cos\left(90^0-\theta\right)\cos\theta}{\sin\left(90^0-\theta\right)} + \frac{\cos\theta\sin\left(90^0-\theta\right)\sin\theta}{\cos\left(90^0-\theta\right)} = 1$ `

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34. If $\sec\theta + \tan\theta = x,$ obtain the values of $\sec\theta$, $tan\theta$ and $\sin\theta$.

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35. If $\sin\theta + \sin^2\theta = 1$,find the value of

$\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\cos^4\theta + 2\cos^2\theta - 2$

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36. If $\sin\theta + \sin^2\theta + \sin^3\theta = 1$, then prove that

$\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = 4$

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37. If $\cot\theta + \tan\theta = x and \sec\theta - \cos\theta = y$, prove that

$(x^2y)^{\frac{2}{3}} - (xy^2)^{2/3} = 1$

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38. If $a\cos\theta - b\sin\theta = c$, then prove that:

$a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$

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39. Prove the following identities:

$$(\sin\theta + \cos ec\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$$

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40. Prove the following identities:

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

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41. Solve: $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \cos ec\theta)$

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42. Prove the following identities:

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

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43. Prove the following trigonometric identities:

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

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44. Prove the following trigonometric identities:

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

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45. Prove the following identities: $\frac{1-\sin\theta}{1+\sin\theta} = (\sec\theta - \tan\theta)^2$

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46. If $\cos ec\theta - \sin\theta = l$ and $\sec\theta - \cos\theta = m$, prove that $l^2m^2\left(l^2 + m^2 + 3\right) = 1$

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47. If tanA=ntanB and sinA=msinB, prove that $\cos^2 A = \dfrac{m^2 - 1}{n^2 - 1}$

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48. If $x = a\sin\theta$ and $y = b\tan\theta$, then prove that $\dfrac{a^2}{x^2} - \dfrac{b^2}{y^2} = 1$

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49. If $\dfrac{\cos\alpha}{\cos\beta} = m$ and $\dfrac{\cos\alpha}{\sin\beta} = n$ show that $\left(m^2 + n^2\right)\cos^2\beta = n^2$

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50. Prove the following identities: $\cos^4 A - \cos^2 A = \sin^4 A - \sin^2 A$

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51. Prove the following identities: $\frac{\sin^2 A}{\cos^2 A} + \frac{\cos^2 A}{\sin^2 A} = \frac{1}{\sin^2 A \cos^2 A} - 2$

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52. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta and x \sin \theta = y \cos \theta,$ prove that $x^2 + y^2 = 1$

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53. If $\cos ec\theta - \sin \theta = m$ and $\sec \theta - \cos \theta = n,$ prove that $\left(m^2 n\right)^{\frac{2}{3}} + \left(mn^2\right)^{\frac{2}{3}} = 1$

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54. Prove the following identities:

$$\frac{\cos A}{1-\tan A}+\frac{\sin^2 A}{\sin A-\cos A}=\sin A+\cos A$$

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55. Prove the following identities:

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

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56. Prove the following identities:

$$\frac{\cos^2\theta}{1-\tan\theta}+\frac{\sin^3\theta}{\sin\theta-\cos\theta}=1+\sin\theta\cos\theta$$

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57. Prove the following identities: $\frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta}+\sin\theta\cos\theta=1$

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58. Prove the following trigonometric identities:

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

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59. Prove the following identities:

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

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60. Prove the following identities:

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

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61. Prove the following trigonometric identities:

$$\cot\theta - \tan\theta = \frac{2\cos^2\theta - 1}{\sin\theta\cos\theta}$$

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62. Prove the following trigonometric identities:

$$\tan\theta - \cot\theta = \frac{2\sin^2\theta - 1}{\sin\theta\cos\theta}$$

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63. Prove the following identities: $\tan^2\theta + \cot^2\theta + 2 = \sec^2\theta\,\cos ec^2\theta$

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64. Prove the following identities: $\sqrt{\sec^2\theta + \cos ec^2\theta} = \tan\theta + \cot\theta$

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65. Prove the following identities:

$(\sin\theta + \sec\theta)^2 + (\cos\theta + \cos ec\theta)^2 = (1 + \sec\theta\cos ec\theta)^2$

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66. Prove the following identities: $(\cos ec\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$

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67. Prove the following identities: $\sec^4 A - \sec^2 A = \tan^4 A + \tan^2 A$

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68. Prove the following identity:

$2\sec^2\theta - \sec^4\theta - 2\cos ec^2\theta + \cos ec^4\theta = \cot^4\theta - \tan^4\theta$

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69. Prove the following identities:

$$(\sin\theta - \sec\theta)^2 + (\cos\theta - \cos ec\theta)^2 = (1 - \sec\theta\cos ec\theta)^2$$

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70. $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\cos ec\theta$

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71. Prove the following identities:

$$\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \cos ec^2\theta = \tan^2\theta - \cot^2\theta$$

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

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73. Prove the following identities:

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

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74. Prove the following identities: $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$

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75. Prove the following identities: $\frac{\cot A + \cos ecA - 1}{\cot A - \cos ecA + 1} = \frac{1 + \cos A}{\sin A}$

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76. Prove the following identities: $\frac{\sin\theta}{\cot\theta + \cos ec\theta} = 2 + \frac{\sin\theta}{\cot\theta - \cos ec\theta}$

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77. Prove the following identities:

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

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78. Prove the following identities: $\frac{1-\cos\theta}{1+\cos\theta} = (\cos ec\theta - \cot\theta)^2$

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79. Prove the following identities: $\frac{\cos\theta}{1-\sin\theta} + \frac{\cos\theta}{1+\sin\theta} = 2\sec\theta$

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80. Prove the following identities:

$$\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{\sin^2 A - \cos^2 A} = \frac{2}{2\sin^2 A - 1} = \frac{}{1 -}$$

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81. Prove the following identities:

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

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82. Prove that $\tan\theta = \dfrac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta}$

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83. Prove the following identities: $\cot^4 A - 1 = \cos ec^4 A - 2\cos ec^2 A$

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84. Prove the following identities: $\sin^4 A + \cos^4 A = 1 - 2\sin^2 A\cos^2 A$

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85. Prove the following identities:

$$\sin^4 A - \cos^4 A = \sin^2 A - \cos^2 A = 2\sin^2 A - 1 = 1 - 2\cos^2 A$$

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86. Prove the following identities: $\sin^6 A + \cos^6 A = 1 - 3\sin^2 A \cos^2 A$

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87. Prove the following identities: $\sec^4 A - \sec^2 A = \tan^4 A + \tan^2 A$

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88. Without using trigonometric tables, evaluate each of the following:

$$\frac{\sec 39}{\cos ec51} + \frac{2}{\sqrt{3}}\tan 17 \tan 38 \tan 60 \tan 52 \tan 73 - 3\left(\sin^2 31 + \sin^2 59\right)$$

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89. Without using trigonometric tables, evaluate each of the following:

$$\frac{-\tan\theta\cot\left(90^0-\theta\right)+\sec\theta\cos ec\left(90^0-\theta\right)+\sin^2 35^0+\sin^2 55^0}{\tan 10^0\tan 20^0\tan 30^0\tan 70^0\tan 80^0}$$

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90. Without using trigonometric tables, evaluate each of the following:

$$\frac{\sec^2 54^0-\cot^2 36^0}{\cos ec^2 57^0-\tan^2 33^0}+2\sin^2 38^0\sec^2 52^0-\sin^2 45^0$$

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91. Without using trigonometric tables, evaluate each of the following:

$$\frac{2}{3}\cos ec^2 58^0-\frac{2}{3}\cot 58^0\tan 32^0-\frac{5}{3}\tan 13^0\tan 37^0\tan 45^0\tan 53^0\tan 77^0$$

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92. Prove the following trigonometric identities: (i) $\left(1-\sin^2\theta\right)\sec^2\theta=1$

(ii) $\cos^2\theta\left(1+\tan^2\theta\right)=1$

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93. Prove the following trigonometric identities: $\cos^2\theta + \frac{1}{1+\cot^2\theta} = 1$

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

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94. Prove: $\cos ec^2\theta + \sec^2\theta = \cos ec^2\theta\sec^2\theta$

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95. Prove the following trigonometric identities : $\cot^2\theta - \frac{1}{\sin^2\theta} = -1$

(ii) $\left(1+\tan^2\theta\right)(1+\sin\theta)(1-\sin\theta) = 1$

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96. Prove the following trigonometric identities :

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

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97. If $x=r\sin A\cos C$, $y=r\sin A\sin C$ and $z=r\cos A$, prove that $r^2=x^2+y^2+z^2$

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

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99. If $\sin\theta+\sin^2\theta=1$, prove that $\cos^2\theta+\cos^4\theta=1$

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100. If $\sec\theta + \tan\theta = p$, obtain the values of $\sec\theta, \tan\theta$ and $\sin\theta$ in terms of p.

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101. Prove the following identities:

$(i)\cos\theta\sin(90^o - \theta) + \sin\theta\cos(90^o - \theta) = 1$

$(ii)(\sin(90^o - \theta))\dfrac{\sin\theta}{\tan\theta} - 1 = -\sin^2\theta$

$(iii)\dfrac{\sin(90^o - \theta)\cos(90^o - \theta)}{\tan\theta} = 1 - \sin^2\theta$

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102. Prove: $\left(1 - \cos^2 A\right)\cos ec^2 A = 1$

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103. Prove: $\left(1+\cot^2 A\right)\sin^2 A = 1$

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104. Prove: $\tan^2\theta\cos^2\theta = 1-\cos^2\theta$

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105. Prove: $\cos ec\,\theta\sqrt{1-\cos^2\theta} = 1$

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106. Prove: $\left(\sec^2\theta - 1\right)\left(\cos ec^2\theta - 1\right) = 1$

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107. Prove: $\tan\theta + \dfrac{1}{\tan\theta} = \sec\theta\cos ec\,\theta$

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

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

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110. Prove: $\cos^2 A + \frac{1}{1+\cot^2 A} = 1$

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111. Prove: $\sin^2 A + \frac{1}{1+\tan^2 A} = 1$

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

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113. Prove: $\frac{\sin\theta}{1-\cos\theta} = \cos ec\,\theta + \cot\theta$

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114. Prove: $(\cos ec\,\theta + \sin\theta)(\cos ec\,\theta - \sin\theta) = \cot^2\theta + \cos^2\theta$

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115. Prove: $\frac{(1+\cot^2\theta)\tan\theta}{\sec^2\theta} = \cot\theta$

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116. Prove: $(\sec\theta + \cos\theta)(\sec\theta - \cos\theta) = \tan^2\theta + \sin^2\theta$

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117. Prove: $\sec A(1-\sin A)(\sec A+\tan A)=1$

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118. Prove: $(\cos ec\, A-\sin A)(\sec A-\cos A)(\tan A+\cot A)=1$

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119. Find the value of $\tan^2\theta-\sin^2\theta-\tan^2\theta\sin^2\theta$

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120. Show : $\left(1+\tan^2\theta\right)(1+\sin\theta)(1-\sin\theta)=1$

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121. Prove: $\sin^2 A \cot^2 A + \cos^2 A \tan^2 A = 1$

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122. Prove the following trigonometric identities:

$$\cot\theta - \tan\theta = \frac{2\cos^2\theta - 1}{\sin\theta\cos\theta}$$

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123. Prove the following trigonometric identities:

$$\tan\theta - \cot\theta = \frac{2\sin^2\theta - 1}{\sin\theta\cos\theta}$$

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124. Prove: $\frac{\cos^2\theta}{\sin\theta} - \cos ec\,\theta + \sin\theta = 0$

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125. Prove: $\frac{1}{1+\sin A}+\frac{1}{1-\sin A}=2\sec^2 A$

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126. Prove the following identities: $\frac{\cos\theta}{1-\sin\theta}+\frac{\cos\theta}{1+\sin\theta}=2\sec\theta$

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127. Prove: $\frac{1+\tan^2\theta}{1+\cot^2\theta}=\left(\frac{1-\tan\theta}{1-\cot\theta}\right)^2=\tan^2\theta$

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128. Prove: $\frac{1+\sec\theta}{\sec\theta}=\frac{\sin^2\theta}{1-\cos\theta}$

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129. Prove: $\sec^6\theta=\tan^6\theta+3\tan^2\theta\sec^2\theta+1$

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130. Prove: $\cos ec^6\theta = \cot^6\theta + 3\cot^2\theta \cos ec^2\theta + 1$

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131. Prove that: $\frac{\left(1+\tan^2\theta\right)\cot\theta}{cosec^2\theta} = \tan\theta$

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132. Prove: $\frac{1+\cos A}{\sin^2 A} = \frac{1}{1-\cos A}$

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133. Prove: $\frac{\sec A - \tan A}{\sec A + \tan A} = \frac{\cos^2 A}{(1+\sin A)^2}$

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134. Prove: $\frac{1+\cos A}{\sin A} = \frac{\sin A}{1-\cos A}$

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135. Prove: $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

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136. Prove: $\sqrt{\frac{1-\cos A}{1+\cos A}} + \sqrt{\frac{1+\cos A}{1-\cos A}} = 2\cos ec\, A$

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137. Prove: $(\sec A - \tan A)^2 = \frac{1-\sin A}{1+\sin A}$

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138. Prove: $\frac{1-\cos A}{1+\cos A} = (\cot A - \operatorname{cosec} A)^2$

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139. Prove: $\frac{1}{\sec A - 1} + \frac{1}{\sec A + 1} = 2 \operatorname{cosec} A \cot A$

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140. Prove the following identities:

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

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141. Prove: $\frac{\operatorname{cosec} A}{\operatorname{cosec} A - 1} + \frac{\operatorname{cosec} A}{\operatorname{cosec} A + 1} = 2\sec^2 A$

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

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143. Prove : $\dfrac{\tan^2 A}{1+\tan^2 A}+\dfrac{\cot^2 A}{1+\cot^2 A}=1$

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144. Prove that $\dfrac{\cot A-\cos A}{\cot A+\cos A}=\dfrac{\cos ecA-1}{\cos ecA+1}$

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

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

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147. Prove that $\frac{\cos\theta - \sin\theta + 1}{\cos\theta + \sin\theta - 1} = cosec\theta + \cot\theta$

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148. Prove: $\tan^2 A + \cot^2 A = \sec^2 A \cos ec^2 A - 2$

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149. Prove: $\frac{1 - \tan^2 A}{\cot^2 A - 1} = \tan^2 A$

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150. Prove: $1 + \frac{\cot^2\theta}{1 + \cos ec\,\theta} = \cos ec\,\theta$

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151. Prove: $\frac{\cos\theta}{\cos ec\,\theta+1}+\frac{\cos\theta}{\cos ec\,\theta-1}=2\tan\theta$

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

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153. Prove: $\frac{\tan^3\theta}{1+\tan^2\theta}+\frac{\cot^3\theta}{1+\cot^2\theta}=\sec\theta\cos ec\,\theta-2\sin\theta\cos\theta$

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154. Prove: $\left(\tan\theta+\frac{1}{\cos\theta}\right)^2+\left(\tan\theta-\frac{1}{\cos\theta}\right)^2=2\left(\frac{1+\sin^2\theta}{1-\sin^2\theta}\right)$

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155. Prove the following identity:

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

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156. Prove: $\left(\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}\right)^2=\frac{1-\cos\theta}{1+\cos\theta}$

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157. Prove: $(\sec A+\tan A-1)(\sec A-\tan A+1)=2\tan A$

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158. Prove: $(1+\cot A-\cos ec\,A)(1+\tan A+\sec A)=2$

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159. Prove:

$$(\cos ec\,\theta - \sec\theta)(\cot\theta - \tan\theta) = (\cos ec\,\theta + \sec\theta)(\sec\theta\cos ec\,\theta - 2)$$

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160. Prove:

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

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161. Prove: $\dfrac{\cos A\cos ecA - \sin A\sec A}{\cos A + \sin A} = \cos ecA - \sec A$

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162. Prove: $\dfrac{\sin A}{\sec A + \tan A - 1} + \dfrac{\cos A}{\cos ec\,A + \cot A - 1} = 1$

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163. Prove: $\dfrac{\tan A}{\left(1+\tan^2 A\right)^2}+\dfrac{\cot A}{\left(1+\cot^2 A\right)^2}=\sin A\cos A$

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164. Prove: $\sec^4 A\left(1-\sin^4 A\right)-2\tan^2 A=1$

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165. Prove: $\dfrac{\cot^2 A(\sec A-1)}{1+\sin A}=\sec^2 A\left(\dfrac{1-\sin A}{1+\sec A}\right)$

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166. Prove: $\sin^2 A\cos^2 B-\cos^2 A\sin^2 B=\sin^2 A-\sin^2 B$

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167. Prove: $\dfrac{\cot A+\tan B}{\cot B+\tan A}=\cot A\tan B$

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168. Prove: $\frac{\tan A + \tan B}{\cot A + \cot B} = \tan A \tan B$

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169. Prove: $\cot^2 A \cos ec^2 B - \cot^2 B \cos ec^2 A = \cot^2 A - \cot^2 B$.

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170. Prove: $\tan^2 A \sec^2 B - \sec^2 A \tan^2 B = \tan^2 A - \tan^2 B$

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171. If $3 \sin \theta + 5 \cos \theta = 5$, then show that $5 \sin \theta - 3\theta = \pm 3$.

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172. If $\cos ec\,\theta + \cot\theta = m$ and $\cos ec\,\theta - \cot\theta = n$, prove that $mn = 1$

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173. If $\cos A + \cos^2 A = 1$, find the value of $\sin^2 A + \sin^4 A$.

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174. Prove that: $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} + \sqrt{\frac{\sec\theta + 1}{\sec\theta - 1}} = 2\cos ec\,\theta$

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

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176. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}}+\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}=2\cos ec\theta$

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177. Prove that: $\frac{\sec\theta-1}{\sec\theta+1}=\left(\frac{\sin\theta}{1+\cos\theta}\right)^2$

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178. 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 $s\in\alpha s\in\beta s\in\gamma$.

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179. If $x=a\sec\theta\cos\varphi$, $y=b\sec\theta\sin\varphi$ and $z=c\tan\theta$, show that $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$

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180. If $\sin\theta = \frac{3}{5}$, find the values of other trigonometric ratios.

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181. If $\cot\theta = \frac{9}{40}$, find the values of $\cos ec\,\theta$ and $\sec\theta$.

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

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183. If $\tan\theta = \frac{12}{5}$, find the value of $\frac{1+\sin\theta}{1-\sin\theta}$

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184. If $\sin\theta = \frac{3}{5}$, find the value of $(\tan\theta + \sec\theta)^2$

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185. If $\tan\theta = \frac{3}{4}$, find the value of $\frac{1-\cos\theta}{1+\cos\theta}$

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186. If $\cos\theta = \frac{3}{5}$, find the value of $\cot\theta + \cos ec\,\theta$.

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187. If $\sin\theta + \cos\theta = \sqrt{2}\sin(90^\circ - \theta)$, determine $\cot\theta$.

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188. 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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189. If $\tan\theta + \cot\theta = 2$, find the value of $\tan^2\theta + \cot^2\theta$.

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190. If $\operatorname{cosec} A = \sqrt{2}$, find the value of $\dfrac{2\sin^2 A + 3\cot^2 A}{4\tan^2 A - \cos^2 A}$.

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191. If $\sin\theta = \dfrac{a}{\sqrt{a^2+b^2}}, 0 < \theta < 90^\circ$, find the values of $\cos\theta$ and $\tan\theta$

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192. If $\cos\theta = \dfrac{4}{5}$, find all other trigonometric ratios of angle θ.

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193. If $\sin\theta = \frac{1}{\sqrt{2}}$, find all other trigonometric ratios of angle θ.

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

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195. If $\tan\theta = \frac{3}{4}$, find the value of $\frac{1-\cos\theta}{1+\cos\theta}$

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196. If $\tan\theta = \frac{12}{5}$, find the value of $\frac{1+\sin\theta}{1-\sin\theta}$

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197. If $\cot\theta = \frac{1}{\sqrt{3}}$, find the value of $\frac{1-\cos^2\theta}{2-\sin^2\theta}$

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198. If $\cos ec\, A = \sqrt{2}$, find the value of $\frac{2\sin^2 A + 3\cot^2 A}{4\left(\tan^2 A - \cos^2 A\right)}$

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199. If $\cot\theta = \sqrt{3}$, find the value of $\frac{\cos ec^2\theta + \cot^2\theta}{\cos ec^2\theta - \sec^2\theta}$

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200. If $3\cos\theta = 1$, find the value of $\frac{6\sin^2\theta + \tan^2\theta}{4\cos\theta}$

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201. If $\sqrt{3}\tan\theta = 3\sin\theta$, prove that $(\sin^2\theta - \cos^2\theta) = \frac{1}{3}$.

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202. If $\cos ec\,\theta = \frac{13}{12}$, find the value of $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta}$

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203. If $\sin\theta + \cos\theta = \sqrt{2}\cos(90o - \theta)$, find $\cot\theta$.

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204. Define an identity.

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205. What is the value of $(1 - \cos^2\theta)\cos ec^2\theta$?

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206. What is the value of $\left(1+\cot^2\theta\right)\sin^2\theta$?

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207. What is the value of $\sin^2\theta+\dfrac{1}{1+\tan^2\theta}$?

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208. If $\sec\theta+\tan\theta=x$, write the value of $\sec\theta-\tan\theta$ in terms of x .

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209. If $\operatorname{cosec}\theta-\cot\theta=\alpha$, write the value of $\operatorname{cosec}\theta+\cot\theta$.

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210. Write the value of $\cos ec^2(90o - \theta) - \tan^2\theta$.

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211. Write the value of $\sin A \cos(90^\circ - A) + \cos A \sin(90^\circ - A)$.

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212. Write the value of $\cot^2\theta - \frac{1}{\sin^2\theta}$.

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213. If $x = a\sin\theta$ and $y = b\cos\theta$, what is the value of $b^2x^2 + a^2y^2$?

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214. If $\sin\theta = \frac{4}{5}$, what is the value of $\cot\theta + \cos ec\,\theta$?

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215. What is the value of $9\cot^2\theta - 9\cos ec^2\theta$?

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216. What is the value of $6\tan^2\theta - \frac{6}{\cos^2\theta}$?

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217. What is the value of $\frac{\tan^2\theta - \sec^2\theta}{\cot^2\theta - \cos ec^2\theta}$?

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218. What is the value of $\left(1+\tan^2\theta\right)(1-\sin\theta)(1+s\in\ \theta)$?

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219. If $\cos A = \frac{7}{25}$, find the value of $\tan A + \cot A$.

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220. If $\sin\theta = \frac{1}{3}$, then find the value of $2\cot^2\theta + 2$.

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221. If $\cos\theta = \frac{3}{4}$, then find the value of $9\tan^2\theta + 9$.

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222. If $\sec^2\theta(1+\sin\theta)(1-\sin\theta) = k$, then find the value of k.

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223. If $\cos ec^2\theta(1+\cos\theta)(1-\cos\theta) = \lambda$, then find the value of λ.

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224. If $\sin^2\theta\cos^2\theta(1+\tan^2\theta)(1+\cot^2\theta)=\lambda$, then find the value of λ

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225. If $5x=\sec\theta$ and $\frac{5}{x}=\tan\theta$, find the value of $5\left(x^2-\frac{1}{x^2}\right)$.

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226. If $\operatorname{cosec}\theta=2x$ and $\cot\theta=\frac{2}{x}$, find the value of $2\left(x^2-\frac{1}{x^2}\right)$

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227. If $\sec\theta+\tan\theta=x$, then $\sec\theta=$

(a) $\frac{x^2+1}{x}$

(b) $\frac{x^2+1}{2x}$

(c) $\frac{x^2-1}{2x}$

(d) $\frac{x^2-1}{x}$

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228. If $\sec\theta+\tan\theta=x$, then $\tan\theta=$

(a) $\frac{x^2+1}{x}$

(b) $\frac{x^2-1}{x}$

(c) $\frac{x^2+1}{2x}$

(d) $\frac{x^2-1}{2x}$

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229. $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$ is equal to

(a)secθ+tanθ

(b) secθ−tanθ

(c) sec 2 θ+ tan 2 θ

(d) sec 2 θ− tan 2 θ

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230. The value of $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}}$ is

(a)$\cot\theta - \cos ec\,\theta$

(b) $\cos ec\,\theta + \cot\theta$

(c) $\cos ec^2\theta + \cot^2\theta$

(d) $(\cot\theta + \cos ec\,\theta)^2$

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231. $\sec^4 A - \sec^2 A$ is equal to

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232. $\cos^4 A - \sin^4 A$ is equal to

(a) $2\cos^2 A + 1$

(b) $2\cos^2 A - 1$

(c) $2\sin^2 A - 1$

(d) $2\sin^2 A + 1$

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233. $\frac{\sin\theta}{1+\cos\theta}$ is equal to

(a) $\frac{1+\cos\theta}{\sin\theta}$

(b) $\frac{1-\cos\theta}{\cos\theta}$

(c) $\frac{1-\cos\theta}{\sin\theta}$

(d) $\frac{1-\sin\theta}{\cos\theta}$

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234. $\frac{\sin\theta}{1-\cot\theta} + \frac{\cos\theta}{1-\tan\theta}$ is equal to (a) 0 (b) 1 (c) $\sin\theta + \cos\theta$ (d) $\sin\theta - \cos\theta$

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235. The value of $(1+\cot\theta-\operatorname{cosec}\theta)(1+\tan\theta+\sec\theta)$ is (a) 1 (b) 2 (c) 4 (d) 0

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236. $\frac{\tan\theta}{\sec\theta-1}+\frac{\tan\theta}{\sec\theta+1}$ is equal to

(a) $2\tan\theta$

(b) $2\sec\theta$

(c) $2\operatorname{cosec}\theta$

(d) $2\,tan\theta\sec\theta$

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237. $(\operatorname{cosec}\theta-\sin\theta)(\sec\theta-\cos\theta)(\tan\theta+\cot\theta)$ is equal (a) 0 (b) 1 (c) -1 (d) None of these

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238. If $x = a\cos\theta$ and $y = b\sin\theta$, then $b^2x^2 + a^2y^2 =$

(a)a^2b^2

(b) ab

(c) $a^4\, b^4$

(d) $a^2 + b^2$

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239. If $x = a\sec\theta$ and $y = b\tan\theta$, then $b^2x^2 - a^2y^2 =$

(a)ab

(b) $a^2 - b^2$

(c) $a^2 + b^2$

(d) a^2b^2

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240. $\frac{\cot\theta}{\cot\theta - \cot 3\theta} + \frac{\tan\theta}{\tan\theta - \tan 3\theta}$ is equal to

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241. $2\left(\sin^6\theta + \cos^6\theta\right) - 3\left(\sin^4\theta + \cos^4\theta\right)$ is equal to

(a)0 (b) 1 (c) -1 (d) None of these

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242. If $a\cos\theta + b\sin\theta = 4$ and $a\sin\theta - b\cos\theta = 3$, then $a^2 + b^2$ =

(a)7

(b) 12

(c) 25

(d) None of these

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243. If $a\cot\theta + bc\,o\,s\,e\,c\theta = p$ and $b\cot\theta + ac\,o\,s\,e\,c\theta = q$, then $p^2 - q^2 =$

(a)$a^2 - b^2$

(b) $b^2 - a^2$

(c) $a^2 + b^2$

(d) $b - a$

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244. The value of $\sin^2 29 \oplus \sin^2 61o$ is (a) 1 (b) 0 (c) $2\sin^2 29o$ (d) $2\cos^2 61o$

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245. If $x = r\sin\theta\cos\varphi$, $y = r\sin\theta\sin\varphi$ and $z = r\cos\theta$, then (a) $x^2 + y^2 + z^2 = r^2$ (b) $x^2 + y^2 - z^2 = r^2$ (c) $x^2 - y^2 + z^2 = r^2$ (d) $z^2 + y^2 - x^2 = r^2$

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246. If $\sin\theta + \sin^2\theta = 1$, then $\cos^2\theta + \cos^4\theta =$

(a) -1

(b) 1

(c) 0

(d) None of these

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247. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then $a^2 + b^2 =$

(a) $m^2 - n^2$

(b) m^2n^2

(c) $n^2 - m^2$

(d) $m^2 + n^2$

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248. If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A =$

(a) -1

(b) 0

(c) 1

(d) None of these

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249. If $x = a\sec\theta\cos\varphi$, $y = b\sec\theta\sin\varphi$ and $z = c\tan\theta$, then $\frac{x^2}{a^2} + \frac{y^2}{b^2} =$ (a) $\frac{z^2}{c^2}$ (b) $1 - \frac{z^2}{c^2}$ (c) $\frac{z^2}{c^2} - 1$ (d) $1 + \frac{z^2}{c^2}$

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250. If $a\cos\theta - b\sin\theta = c$, then $a\sin\theta + b\cos\theta =$ (a) $\pm\sqrt{a^2 + b^2 + c^2}$

(b) $\pm\sqrt{a^2 + b^2 - c^2}$ (c) $\pm\sqrt{c^2 - a^2 - b^2}$ (d) None of these

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251. $9\sec^2 A - 9\tan^2 A$ is equal to

(a) 1

(b) 9

(c) 8

(d) 0

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252. (1+tanθ+secθ)(1+cotθ−cosec θ)= (a) 0 (b) 2 (c) 1

(d) −1

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253. (secA+tanA)(1−sinA)= (a)secA (b) sinA (c) cosec A (d) cosA

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254. $\frac{1+\tan^2 A}{1+\cot^2 A}$ is equal to $\sec^2 A$ (b) -1 (c) $\cot^2 A$ (d) $\tan^2 A$

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