MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

TRIGONOMETRIC IDENTITIES

Others

1. 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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2. 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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3. If $\operatorname{cosec}\theta - \sin\theta = a^3, \sec\theta - \cos\theta = b^3,$ Prove that : $a^2b^2\left(a^2+b^2\right) = 1$

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4. If $a\cos^2\theta + 3a\cos\theta s \in^2 \theta = mandas \in^3 \theta + 3a\cos^2\theta s \in^\theta = n$, then prove that: $(m+n)^{2/3} + (m-n)^{2/3} = 2a^{2/3}$

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

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6. 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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7. 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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8. Prove that $(1-\sin\theta+\cos\theta)^2 = 2(1+\cos\theta)(1-\sin\theta)$

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9. Prove the following identities:

$(\sin A+\sec A)^2+(\cos A+\mathrm{cosec}A)^2 = (1+\sec A\,\mathrm{cosec}A)^2$

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

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10. Prove the following identities:

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

$(\tan A+\cos ecB)^2-(\cot B-\sec A)^2=2\tan A\cot B(\cos ecA+\sec B)$

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11. 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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12. Prove the following identities:

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

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

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

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14. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then $m^2 - n^2$=

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15. 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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16. 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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17. 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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18. If $\sec\theta + \tan\theta = p$, show that $\frac{p^2 - 1}{p^2 + 1} = \sin\theta$

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

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

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

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

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

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25. 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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26. 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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27. If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$, prove that

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

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28. 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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29. 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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30. 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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31. Find $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \cos ec\theta)$

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32. 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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33. Prove the following trigonometric identities:

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

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

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

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38. 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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39. 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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40. Prove the following identities: $\cos^4 A - \cos^2 A = \sin^4 A - \sin^2 A$

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41. 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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42. 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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43. 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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44. 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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45. 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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46. 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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47. Prove the following identities: $\frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta}+\sin\theta\cos\theta=1$

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48. 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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49. Prove the following identities:

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

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

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

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

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

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56. Prove the following identities:

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

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57. 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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58. $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2\cos ec\theta$

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59. 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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60. Prove the following identities: $\frac{1}{\sec\theta - \tan\theta} = \sec\theta + \tan\theta$

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61. Prove the following identities:

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

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62. 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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63. 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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64. 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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65. Prove the following identities:

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

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

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

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68. Prove the following identities:

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

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

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

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

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

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

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