MATHS

BOOKS - KALYANI MATHS (ASSAMESE ENGLISH)

RELATIONS BETWEEN TRIGONOMETRIC RATIOS AND RELATED IDENTITIES

Example

1. Find the value of $\tan^2\theta\sin^2\theta+\sin^2\theta-\tan^2\theta-1$=0

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2. Prove that $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\cos ec\theta$

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

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4. Prove that $\frac{\cos A-\sin A+1}{\cos A+\sin A-1}=\cos ecA+\cot A$

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Exercise

1. Express $\sin\theta$, $\cos\theta$,$\cot\theta$in terms of $\sec\theta$.

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2. Express $\tan\theta$, $\sec\theta$, $\cot\theta$in terms of $\cos\theta$.

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3. Expresssin θ,cos θ,tan θin terms of cos $ec\theta$.

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4. Express cos θ, cot θ, tan θin terms of sin θ.

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5. Prove the following identities using geometry

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

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6. Prove the following identities using geometry

$1 + \tan^2\theta = \sec^2\theta$

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7. Prove the following identities using geometry

$1 + \cot^2\theta = \cos ec^2\theta$

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8. Prove the following

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

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9. Prove the following

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

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10. Prove the following

$\tan^2\theta - \sin^2\theta = \tan^2\theta \cdot \sin^2\theta$

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11. Prove the following

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

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12. Prove the following

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

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13. Prove the following

$$\sec^2\theta + \cos ec^2\theta = \sec^2\theta \cdot \cos ec^2\theta$$

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14. Prove the following

$$1+\frac{\cot^2\theta}{1+\cos ec\theta}=\cos ec\theta$$

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15. Prove the following

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

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16. Prove the following

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

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17. Prove the following

$$\left(\cos^2 A\cdot\sin^2 B\right)-\left(\sin^2 A\cdot\cos^2 B\right)=\cos^2 A-\cos^2 B$$

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18. Prove the following

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

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19. Prove the following

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

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20. Prove the following

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

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21. Prove the following

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

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22. Prove the following

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

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23. Prove the following

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

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24. Prove the following

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

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25. Prove the following

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

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26. Prove the following

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

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27. Prove the following

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

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28. Prove the following

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

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29. Prove the following

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

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30. Prove the following

$$\frac{1+\tan^2\theta}{1+\cot^2\theta} = \left(\frac{1+\tan\theta}{1+\cot\theta}\right)^2 = \tan^2\theta$$

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31. Prove the following

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

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32. Prove the following

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

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33. Prove the following

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

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34. Prove the following

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

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35. Prove the following

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

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36. Prove the following

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

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37. If

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

Prove that each side is equal to ± 1.

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

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39. If $\tan^4\theta - \tan^2\theta = 1$, then prove that $\cos^4\theta + \cos^2\theta = 1$

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40. If $3\tan\theta + \cot\theta = 5\,\mathrm{cosec}\,\theta$, then prove that $\cos\theta = 1/2$

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41. If $7\sin^2\theta + 3\cos^2\theta = 4$, then prove that $\tan\theta = \frac{1}{\sqrt{3}}$

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42. If $\mathrm{cosec}\,\theta + \cot\theta = k$, then prove that $\cos\theta = \frac{k^2 - 1}{k^2 + 1}$

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43. If $\tan\theta + \cot\theta = 2$, then prove that $\tan^{10}\theta + \cot^{10}\theta = 2$

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44. If $\sin\theta + \cos ec\theta = 2$, then prove that $\sin^{100}\theta + \cos ec^{100}\theta = 2$

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45. If $\sin\theta - \cos\theta = 1$, then prove that $\sin\theta + \cos\theta = \pm 1$

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46. If $\cos^2\theta - \sin^2\theta = \tan^2\phi$, then prove that $\cos^2\phi - \sin^2\phi = \tan^2\theta$

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47. If $\tan\theta = \dfrac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$ then prove that $\sqrt{2}(\cos\theta) = \cos\alpha + \sin\alpha$

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48. If $\tan^2\alpha = 1 + \tan^2\beta$,then prove that$\cos^2\beta = \cot^2\alpha$

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49. 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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50. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$then prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

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51. If $\tan\theta + \sin\theta = m$and $\tan\theta - \sin\theta = n$prove that $m^2 - n^2 = 4\sqrt{mn}$

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52. Show that $(a+b)^2 = 4ab\cos^2\theta$ is possible if$a = b$

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53. Eliminate θ x=r costheta, y=r sintheta`

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54. Eliminate θ and ϕ

$x\sin\theta = a, y\tan\theta = b$

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55. Eliminate θ, $x = a\cos^3\theta$,$y = b\sin^3\theta$

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56. Eliminate θ and ϕ

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

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57. Eliminate θ and ϕ

$\cos\theta + \sin\theta = a, \sin\theta \cdot \cos\theta = b$

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58. Eliminate θ and ϕ

$\sin\theta + \cos\theta = x, \tan\theta + \cot\theta = y$

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59. Eliminate θ

$x = a\sin\theta, y = a\cos\theta$

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60. Eliminate θ and ϕ

$\sin\theta + \cos\theta = a, \sin^3\theta + \cos^3\theta = b$

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61. Eliminate θ and ϕ

$\sin\theta + \sin\phi = a$,$\cos\theta + \cos\phi = b, \theta - \phi$=a

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62. If $x = a\sec\theta \cdot \cos\phi$y=b $\sec\theta \cdot \sin\phi$, $z = c\tan\theta$ then prove that $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$

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63. Find the value of $\frac{\sin\theta}{\cos ec\theta} + \frac{\cos\theta}{\sec\theta} - 1$

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64. If θ is a positive acute angle and $2\cos\theta = \frac{1}{2}\sec\theta$,find the value of θ.

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65. If θ be positive acute angle $\sin 3\theta = \cos(2\theta + 15)$,find the value of θ.

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66. If $\sec\theta - \tan\theta = \frac{1}{2}$,find the value of $\sec\theta + \tan\theta$

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67. If $\sin\theta - \cos\theta = 0$,find the value of $\sec\theta + \cos ec\theta$

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68. Fill in the gap

$4\sec^2(49) - 4\tan^2(49)$is equal to .....

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69. Fill in the gap

$\sin 25 - \cos 65$is equal to .....

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70. Fill in the gap

If $\tan(x + 28) = \cot x$,then value of x is.....

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71. Fill in the gap

If $\sin\theta = x$ then $\sec\theta$ in terms of x is.....

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72. Fill in the gap

If $\tan A = \cot B$,where A and B are two acute angles then A+B is.....

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73. Choose the correct option

$\cos ec^2 A - \cot^2 B = 1$is possible if

a)$A > B$ b)A=B c)$A < B$ d)None

A. AgtB

B. A=B

C. AltB

D. None

Answer:

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74. Choose the correct option

In a triangle ABC, $\sin\left(\frac{A+B}{2}\right)$ is equal to

a) $\frac{\cos(B-C)}{2}$ b) $\frac{\cos(C-A)}{2}$ c) $\cos\left(\frac{A}{2}\right)$ d) $\cos\left(\frac{C}{2}\right)$

A. $\frac{\cos(B-C)}{2}$

B. $\frac{\cos(C-A)}{2}$

C. $\frac{\cos A}{2}$

D. $\frac{\cos C}{2}$

Answer:

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75. Choose the correct option

The value of $\sin\theta\cos(90-\theta)+\cos\theta\sin(90-\theta)$ is

A. 1

B. 0

C. 2

D. -1

Answer:

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76. Choose the correct option

If $x=3\sec^2\theta, y=\tan^2\theta-2$, then x-3y is equal to

A. 3

B. 4

C. 9

D. 5

Answer:

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77. If $\tan\theta = p - \frac{1}{4p}$, then $\sec\theta - \tan\theta =$

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