MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

TRIGONOMETRIC FUNCTIONS - SUM AND DIFFERENCE OF ANGLES - FOR BOARDS

Solved Examples

1. find value of $\cos 15^\circ$

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2. . Find the value of $\sin 105^\circ$

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3. Find the value : $\tan 105^0$

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4. Show that: $\sin\left(\frac{\pi}{2} - x\right)$ = cos x`

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5. Show that $\tan 75^0 + \cot 75^0 = 4$

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6. Evaluate $\sin\left\{n\pi + (-1)^n \frac{\pi}{4}\right.$, where n is an integer.

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7. Prove that: $2s \in^2 \frac{3\pi}{4} + 2\frac{\cos^2 \pi}{4} + sec^2 \frac{\pi}{3} = 10$

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8. $2\sin^2\frac{\pi}{6}+\cos ec^2\frac{7\pi}{6}\cos^2\frac{\pi}{3}=\frac{3}{2}$

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9. If A and B are positive acute angles and $\cos A=\frac{1}{7}, \cos B=\frac{13}{14}$, then show that $A-B=60^0$.

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10. If $\sin A=\frac{3}{5}, 0<A<\frac{\pi}{2}$ and $\cos B=-\frac{12}{13}, \pi<B<3\frac{\pi}{2}$, find that : $\sin(A-B)$

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11. If $\sin A = \frac{3}{5}, 0 < A < \frac{\pi}{2}$ and $\cos B = -\frac{12}{13}, \pi < B < 3\frac{\pi}{2}$, find that : $\cos(A+B)$

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12. If $\sin A = \frac{3}{5}, 0 < A < \frac{\pi}{2}$ and $\cos B = -\frac{12}{13}, \pi < B < 3\frac{\pi}{2}$, find that : $\tan(A-B)$

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13. Show that $\sin 70^0 \cos 10^0 - \cos 70^0 \sin 10^0 = \frac{\sqrt{3}}{2}$

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14. Prove that :

$$\cos\left(45^0 - A\right)\cos\left(45^0 - B\right) - \sin\left(45^0 - A\right)\sin\left(45^0 - B\right) = \sin(A+B)$$

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15. Prove that $\tan 70 = 2\tan 50 + \tan 20$

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16. Prove that: $\cos 18^0 - \sin 18^0 = \sqrt{2}\sin 27^0$

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17. Prove that : $\dfrac{\sin(x+y)}{\sin(x-y)} = \dfrac{\sin x.\cos y + \cos x.\sin y}{\sin x.\cos y - \cos x.\sin y}$

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18. Prove that: $\dfrac{\sin(A-B)}{\cos As \in B} + \dfrac{si\ln(B-C)}{\cos B\cos C} + \dfrac{\sin(C-A)}{\cos C\cos A} = 0$

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19. Show that $\cot\left(\frac{\pi}{4}+x\right)\cot\left(\frac{\pi}{4}-x\right)=1$

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20. Prove that:

$\cot x \cot 2x \cot 2x \cot 3x \cot 3x \cot x$

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21. Prove that:$\cos^2 2x-\cos^2 6x=\sin 4x\sin 8x$

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22. Prove that:

$\cos 2\theta.\cos 2\phi+\cos^2(\theta+\phi)-\cos^2(\theta-\phi)=\cos(2\theta+2\phi)$

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23. Prove that:

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

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24. If $A + B = 45^\circ$, then the value of $(1+\tan A)(1+\tan B)$ is

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25. If $\sin\alpha \sin\beta - \cos\alpha \cos\beta + 1 = 0$, then the value of $1 + \cot\alpha \tan\beta$ is

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26. If $\tan\alpha = x + 1, \tan\beta = x - 1$, show that $2\cot(\alpha - \beta) = x^2$

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

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28. If $\tan\beta=\frac{n\sin\alpha\cos\alpha}{1-n\sin^2\alpha}$, show that $\tan(\alpha-\beta)=(1-n)\tan\alpha$

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29. If α and β are the solution of the equation $a\sec\theta+b\tan\theta=c$, then show that $\tan(\alpha+\beta)=\frac{2bc}{b^2-c^2}$

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30. If $3\tan\theta\tan\phi=1$. Prove that $2\cos(\theta+\phi)=\cos(\theta-\phi)$.

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31. $A + B = C$ and $\tan A = k \tan B$, then prove that $\sin(A - B) = \frac{k-1}{k+1} \sin C$

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32. Find the sign of the expression $\sin\theta + \cos\theta$ when $\theta = 100^0$

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33. Find the maximum and minimum values of the expression: $a\cos\theta + b\sin\theta$

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34. Find the maximum and minimum values of the expression: $3\cos\theta + 5\sin\left(\theta - \frac{\pi}{6}\right)$

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

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36. Express each of that as the sum or difference of cosines and sines:

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

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37. Express each of the following as the sum or difference of sines and cosines: $2\cos 7\theta\cos 3\theta$

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38. Express each of that as the sum or difference of cosines and sines:

$5\sin\theta.\ \sin 8\theta$

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39. Express each of that as the sum or difference of cosines and sines:

$\cos 75^\circ \cos 15^0$

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40. Show that: $s \in 50^0 \cos 85^0 = \dfrac{1 - \sqrt{2}\sin 35^0}{2\sqrt{2}}$

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41. Prove that $\sin 20^0 \sin 40^0 \sin 80^0 = \dfrac{\sqrt{3}}{8}$.

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

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43. Prove that :$\sin As \in (60^0 - A)s \in (60^0 + A) = \frac{1}{4}\sin 3A$

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44. $\tan 20^\circ \tan 40^\circ \tan 80^\circ$

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

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46. Prove that $\frac{2\cos 2A + 1}{2\cos 2A - 1} = \tan(60^0 + A)\tan(60^0 - A)\cdot$

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47. show that $\sin A.\sin(B-C)+\sin B.\sin(C-A)+\sin C.\sin(A-B)=0.$

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48. If $\alpha+\beta+90^0$, find the maximum and minimum values of $s\in\alpha s\in\beta.$

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49. Express each of that as product of sines and cosines : $\sin 4\theta+\sin 3\theta$

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50. Express each of that as product of sines and cosines : $\sin 6\theta-\sin 2\theta$

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51. Express each of that as product of sines and cosines : $\cos 2\theta + \cos 8\theta$

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52. Express each of that as product of sines and cosines : $\cos 4\theta - \cos 6\theta$

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53. Prove that: $\cos 18^0 - \sin 18^0 = \sqrt{2}\sin 27^0$

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54. Prove that : $\dfrac{\sin 5\theta + \sin 3\theta}{\cos 5\theta + \cos 3\theta} = \tan 4\theta$

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55. $\dfrac{\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta}{\cos 3\theta + \cos 5\theta + \cos 7\theta + \cos 9\theta}$

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56. $\dfrac{\sin(\theta+\phi)-2\sin\theta+\sin(\theta-\phi)}{\cos(\theta+\phi)-2\cos\theta+\cos(\theta-\phi)}=\tan\theta$

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

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58. Prove that $\cos\alpha+\cos\beta+\cos\gamma(\alpha+\beta+\gamma)=4\dfrac{\cos(\alpha+\beta)}{2}\dfrac{\cos(\beta+\gamma)}{2}\dfrac{\cos(\gamma+\alpha)}{2}$

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59. If $\cos(A+B)\sin(C-D)=\cos(A-B)\sin(C+D)$, then show that $\tan A\tan B\tan C+\tan D=0$

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60. If $s\int h\eta = n\sin(\theta + 2\alpha)$, prove that $\tan(\theta + \alpha) = \frac{1+n}{1-n}\tan\alpha$.

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61. If $\frac{\sin(\theta + \alpha)}{\cos(\theta - \alpha)} = \frac{1-m}{1+m}$, prove that $\tan\left(\frac{\pi}{4} - \theta\right)\tan\left(\frac{\pi}{4} - \alpha\right) = m$

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Exercise

1. Find the value of : $\cos 210^0$

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2. Using the formula of $\sin(A-B)=\sin A\cos B-\cos A\sin B$ find the value of $\sin 15^\circ$

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3. Find the value of : $\sin 75^0$

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4. Find the value of : $\tan 15^0$

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5. Find the value of : $\tan 75^0$

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6. Find $\tan(-330^\circ)$

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7. Find the value of : $\cos 1395^0$

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8. $\tan\left(\frac{11\pi}{12}\right)$

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9. Find the value of tan $\frac{13\pi}{12}$.

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10. Prove that: $s \in 105^0 + \cos 105^0 = \cos 45^0$

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11. $\sin 300^\circ \cos ec1050^\circ - \tan(-120^\circ)$

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12. $\sin 690^\circ \cos 930^\circ + \tan(-765^\circ)\cos ec(-1170^\circ)$

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13. Find the value of the : $\cos^2\left(\frac{\pi}{6}\right) + \cos ec\left(5\frac{\pi}{6}\right) + 3\tan^2\left(\frac{\pi}{6}\right)$

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14. Prove that: $2\frac{\sin\pi}{6}sec\frac{\pi}{3} - 4\frac{\sin(5\pi)}{6}\frac{\cos\pi}{4} = 1$

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15. Find the value of the : $\sin^2\left(\frac{\pi}{6}\right) + \cos^2\left(\frac{\pi}{3}\right) - \tan^2\left(\frac{\pi}{4}\right)$

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16. Prove that : $\sin 75^0 = \frac{\sqrt{6}+\sqrt{2}}{4}$

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17. Find the value of : $\tan 15^0$

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18. Evaluate $\tan\left\{(-1)^n \frac{\pi}{4}\right\}$ where n is an integer

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19. $\alpha = \frac{1}{\sqrt{10}} \cdot \sin\beta = \frac{1}{\sqrt{5}}$ (where α, β and $\alpha + \beta$ are positive acute angles). show that $\alpha + \beta = \frac{\pi}{4}$

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20. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}, 0 < A < \frac{\pi}{2}, 0 < \frac{\pi}{2}, 0 < B < \frac{\pi}{2}.$

Find the values of that : $\sin(A + B)$

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21. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}, 0 < A < \frac{\pi}{2}, 0 < \frac{\pi}{2}, 0 < B < \frac{\pi}{2}.$

Find the values of that : $\cos(A + B)$

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22. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}, 0 < A < \frac{\pi}{2}, 0 < \frac{\pi}{2}, 0 < B < \frac{\pi}{2}.$

Find the values of that : $\sin(A - B)$

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23. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}, 0 < A < \frac{\pi}{2}, 0 < \frac{\pi}{2}, 0 < B < \frac{\pi}{2}.$

Find the values of that : $\cos(A - B)$

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24. If $\sin A = \frac{1}{2}, \cos B = \frac{\sqrt{3}}{2}$, where $\frac{\pi}{2} < A < \pi$ and $0 < B < \frac{\pi}{2},$

find that : $\tan(A + B)$

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25. If $\sin A = \frac{1}{2}, \cos B = \frac{\sqrt{3}}{2}$, where $\frac{\pi}{2} < A < \pi$ and $0 < B < \frac{\pi}{2},$

find that : tan (A-B)

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26. if $\sin x = \frac{3}{5}, \cos y = -\frac{12}{13}$ where $\frac{\pi}{2} < x < \pi$ and="" $\frac{\pi}{2} < y < \pi$ then show that sin(x+y) =$-\frac{56}{65}$

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27. Evaluate : $\cos^2\left(\frac{\pi}{4} + x\right) - \sin^2\left(\frac{\pi}{4} - x\right)$

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28. Evaluate : $\sin^2\left(15^0 + A\right) - \sin^2\left(15^0 - A\right)$

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29. $\sin^2\left(\frac{\pi}{8} + \frac{A}{2}\right) - \sin^2\left(\frac{\pi}{8} - \frac{A}{2}\right)$ is equal to :

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30. Prove that:

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

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

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32. Show that : $\cos 70^0.\cos 10^0+\sin 70^0.\sin 10^0=\dfrac{1}{2}$

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33. Evaluate the following: $s\in 78^0\cos 18^0-\cos 78^0 s\in 18^0$

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34. $\sin(40+\theta).\cos(10+\theta)-\cos(40+\theta)\sin(10+\theta)=\frac{1}{2}$

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35. $\sin(n+1)x\sin(n+2)x+\cos(n+1)x\cos(n+2)x=\cos x$

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36. Prove that:

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

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37. $(\sin 3x+\sin x)\sin x+(\cos 3x-\cos x)\cos x=0$

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

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39. Prove that : $\dfrac{\cos 20^0-\sin 20^0}{\cos 20^0+\sin 20^0}=\tan 25^0$

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40. Prove that : $\cos 9^0+\sin 9^0=\sqrt{2}\sin 54^0$

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

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42. Prove that: $\tan 8\theta - \tan 6\theta - \tan 2\theta = \tan 8\theta \tan 6\theta \tan 2\theta$.

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43. The value of $\tan 9^\circ + \tan 36^\circ + \tan 9^\circ . \tan 36^\circ$ is equal to

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44. Show that $\tan 3x \tan 2x \tan x = \tan 3x \tan 2x \tan$

.

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45. Show that : $\dfrac{1}{\tan 3A - \tan A} - \dfrac{1}{\cot 3A - \cot A} = \cot 2A$

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46. Show that : $\frac{1}{\tan 3A + \tan A} - \frac{1}{\cot 3A + \cot A} = \cot 4A$

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

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48. $\tan(\alpha + \beta)\tan(\alpha - \beta) = \frac{\sin^2 \alpha - \sin^2 \beta}{\cos^2 \alpha - \sin^2 \beta}$

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49. 19. Prove that

$\sin(A + B)\sin(A - B) + \sin(B + C)\sin(B - C) + \sin(C + A)\sin(C - A$

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50. Show that $\tan\{(2n+1)\pi+\theta\}+\tan\{(2n+1)\pi-\theta\}=0$

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51. If $\tan\alpha=\dfrac{m}{m+1}$ and $\tan\beta=\dfrac{1}{2m+1}$, then $\alpha+\beta$ is equal to

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52. If $A+B=\dfrac{\pi}{4}$, show that (cot A-1) (cot B-1) =2

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53. if $8\theta=\pi$ show that $\cos 7\theta+\cot\theta=0$

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54. if $\tan\alpha - \tan\beta = x$ and $\cot\beta - \cot\alpha = y$ prove that $\cot(\alpha - \beta) = \dfrac{x+y}{xy}$

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55. if $\tan\alpha = 2\tan\beta$ show that $\dfrac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)} = 3$

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56. If $\cos A + s \in B = m \; and \; s \in A + \cos B = n,$ prove that $2\sin(A+B) = m^2 + n^2 - 2.$

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57. $\tan x + \tan\left(x + \dfrac{\pi}{3}\right) + \tan\left(x + 2\dfrac{\pi}{3}\right) = 3$ prove that $\dfrac{3\tan x - \tan^3 x}{1 - 3\tan^2 x} = 1$

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58. If a right angle be divided into three parts α, β and γ, prove that $\cot\alpha = \dfrac{\tan\beta + \tan\gamma}{1 - \tan\beta\tan\gamma}$.

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59. If $\sin(\alpha + \beta) = 1\, and \sin(\alpha - \beta) = \dfrac{1}{2},\ where\ 0 \leq ,\ \beta \leq \dfrac{\pi}{2}$, then find the values of $\tan(\alpha + 2\beta) and\ \tan(2\alpha + \beta)$.

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60. if $m \cdot \tan(\theta - 30) = n \cdot \tan(\theta + 120)$, show that $\cos 2\theta = \dfrac{m + n}{2(m - n)}$.

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61. If $\alpha + \beta = \theta$ and $\dfrac{\tan\alpha}{\tan\beta} = \dfrac{x}{y}$, prove that $\sin(\alpha - \beta) = \dfrac{x - y}{x + y}\sin\theta$

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62. If α, β are the roots of the equation $a\cos\theta + b\sin\theta = c$, then prove that $\cos(\alpha+\beta) = \dfrac{a^2-b^2}{a^2+b^2}$.

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63. If α, β are the roots of the equation $a\cos\theta + b\sin\theta = c$, then prove that $\cos(\alpha+\beta) = \dfrac{a^2-b^2}{a^2+b^2}$.

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64. Find the maximum and minimum values of the following expressions

(i) $a\cos\theta - b\sin\theta$(ii)$7\cos\theta + 24\sin\theta$

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65. Find the maximum and minimum values of the following expressions

(i) $a\cos\theta - b\sin\theta$(ii)$7\cos\theta + 24\sin\theta$

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66. Express each of the products into sums or difference of sines and cosines : $2\cos 3\theta.\ \sin 2\theta$

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67. Express each of the products into sums or difference of sines and cosines : $2\sin 5\theta.\ \cos 3\theta$

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68. Express each of the products into sums or difference of sines and cosines : $\cos 9\theta.\ \cos 4\theta$

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69. Express each of the products into sums or difference of sines and cosines : $\sin 75^0 . \cos 15^0$

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70. Prove tha $\sin 25^0 \cos 115^0 = \frac{1}{2}(\sin 40^0 - 1)$

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71. Prove that: $\sin 20^0 \sin 40^0 \sin 60^0 \sin 80^0 = \frac{3}{16}$

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72. Prove that: $\cos 20^0 \cos 40^0 \cos 80^0 = \frac{1}{8}$

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73. Prove that : $\tan 20^0 \tan 40^0 \tan 60^0 \tan 80^0 = 3$

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74. Prove that: $\cos 10^0 \cos 30^0 \cos 50^0 \cos 70^0 = \frac{3}{16}$

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75. $\tan 20^0 \tan 30^0 \tan 40^0 \tan 80^0 = 1$

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76. Prove that: $2 \cos \theta \cos \left(\frac{\pi}{3} + \theta\right) \cos \left(\frac{\pi}{3} - \theta\right) = \cos 3\theta$

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77. Prove that $\frac{5x}{2}\cos 2x\cos\frac{x}{2}\cos 3x\cos\frac{9x}{2} = s \in 5x$ $s \in \frac{5x}{2}$.

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78. Show that:

$s \in (B-C)\cos(A-D)+\sin(C-A)\cos(B-D)+\sin(A-B)\cos(C-$

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79. If $\alpha+\beta=90^0$, show that the maximum value of $\cos\alpha.\cos\beta$ is $\frac{1}{2}$.

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80. Prove that $\tan\theta\cdot\tan(60-\theta)\cdot\tan(60+\theta)=\tan 3\theta$ and hence find the value of $\tan 5^0\cdot\tan 55^0\cdot\tan 65^0\cdot\tan 75^0$

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81. If $\cos\alpha = \frac{1}{\sqrt{2}}, \sin\beta = \frac{1}{\sqrt{3}}$, show that $\tan\left(\frac{\alpha+\beta}{2}\right)\cot\left(\frac{\alpha-\beta}{2}\right) = 5 + 2\sqrt{6}$ or $5 - 2\sqrt{6}$

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82. Express each of that as product of sines and cosines : $\cos 9\theta^0 + \cos 3\theta$

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83. Express each of that as product of sines and cosines : $\sin 2\theta + \sin 4\theta$

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84. Express each of that as product of sines and cosines : $\cos 12\theta - \cos 4\theta$

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85. Express each of that as product of sines and cosines : $\sin 9\theta + \sin 5\theta$

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86. Prove that: $s \in 65^0 + \cos 65^0 = \sqrt{2}\cos 20^0$

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87. Prove that: $s \in 47^0 + \cos 77^0 = \cos 17^0$

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88. Prove that : $\dfrac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$

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89. Prove that : $\dfrac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = \dfrac{-\sin 2x}{\cos 10x}$

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90. Prove that : $\frac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

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91. Prove that : $\frac{\cos 10^0 - \sin 10^0}{\cos 10^0 + \sin 10^0} = \tan 35^0$

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92. Prove that: $\cos 80^0 + \cos 40^0 - \cos 20^0 = 0$

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93. prove that $\sin 10^0 + \sin 20^0 + \sin 40^0 + \sin 50^0 = \sin 70^0 + \sin 80^0$

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94. Prove that: $\cos 20^0 + \cos 100^0 + \cos 140^0 = -0$

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95. $\frac{\cos \pi}{5} + \frac{\cos(2\pi)}{5} + \frac{\cos(6\pi)}{5} + \frac{\cos(7\pi)}{5} = 0$

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96. Prove that :$\cos\left(\frac{\pi}{12}\right) - \sin\left(\frac{\pi}{12}\right) = \frac{1}{\sqrt{2}}$

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97. $\sin\left(\frac{5\pi}{18}\right) - \cos\left(\frac{4\pi}{9}\right) = \sqrt{3}\sin\left(\frac{\pi}{9}\right)$

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98. Prove that: $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = \sqrt{2}\sin x$

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

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100. Prove that $\cos\alpha+\cos\beta+\cos\gamma(\alpha+\beta+\gamma)=4\frac{\cos(\alpha+\beta)}{2}\frac{\cos(\beta+\gamma)}{2}\frac{\cos(\gamma+\alpha)}{2}$

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101. Prove that : $\frac{\sin x-\sin y}{\cos x+\cos y}=\tan\left(\frac{x-y}{2}\right)$

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102. Prove that : $\frac{\sin x+\sin y}{\cos x+\cos y}=\tan\left(\frac{x+y}{2}\right)$

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103. Prove that : $\frac{\sin x + \sin y}{\sin x - \sin y} = \tan\left(\frac{x+y}{2}\right).\cot\left(\frac{x-y}{2}\right)$

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104. Prove that: $s \in 3x + s \in 2x \quad s \in x = 4 \quad s \in x \quad \cos\frac{x}{2}\cos\frac{3x}{2}$

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105. show that $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\sin 4x \cos 2x \cos x.$

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106. Prove that : $\frac{\sin\theta + \sin 3\theta + \sin 5\theta}{\cos\theta + \cos 3\theta + \cos 5\theta} = \tan 3\theta$

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107. Prove that : $\dfrac{\cos 4\theta + \cos 3\theta + \cos 2\theta}{\sin 4\theta + \sin 3\theta + \sin 2\theta} = \cot 3\theta$

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108. Prove that : $\dfrac{\sin\theta + 2\sin 3\theta + \sin 5\theta}{\sin 3\theta + 2\sin 5\theta + \sin 7\theta} = \dfrac{\sin 3\theta}{\sin 5\theta}$

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109. $\dfrac{\cos 3\theta + 2\cos 5\theta + \cos 7\theta}{\cos\theta + 2\cos 3\theta + \cos 5\theta} = \cos 2\theta - \sin 2\theta \tan 3\theta.$

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110. Prove that : $\dfrac{\sin 5\theta - 2\sin 3\theta + \sin\theta}{\cos 5\theta - \cos\theta} = \tan\theta$

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111. If $\cos ecA + \sec A = \cos ecB + \sec B$, prove that $\tan A \tan B = \frac{\cot(A+B)}{2}$

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

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113. Prove that : $\sin\alpha + \sin\beta + \sin\gamma - \sin(\alpha+\beta+\gamma) = 4\sin\left(\frac{\alpha+\beta}{2}\right).\sin\left(\frac{\beta+\gamma}{2}\right).\text{si}$

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114. $\frac{\cos(A-B)}{\cos(A+B)} + \frac{\cos(C+D)}{\cos(C-D)} = 0 \Rightarrow \tan A \tan B \tan C \tan D =$

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115. If $\sin 2A = \lambda \sin 2B$ prove that $\left(\frac{\tan(A+B)}{\tan(A-B)}\right) = \frac{\lambda+1}{\lambda-1}$

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

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117. If $y\sin\phi = x\sin(2\theta+\phi)$ show that $(x+y)\cot(\theta+\phi) = (y-x)\cot\theta.$

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