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MATHS

BOOKS - MARVEL MATHS (HINGLISH)

TRIGONOMETRIC FUNCTIONS OF COMPOUND ANGLES AND FACTORIZATION FORMULAE

Examples

1. Find the value of $\sin 75^\circ$.

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2. Using Addition and Subtraction Theorem, find the value $\cos 75^\circ$

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3. Using Addition and Subtraction Theorem, find the value $\tan 15^\circ$

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4. Prove that :

$$\cos(A-B)=\cos\left(\frac{\pi}{6}+A\right).\cos\left(\frac{\pi}{6}+B\right)+\sin\left(\frac{\pi}{6}+A\right).\sin\left(\frac{\pi}{6}+B\right).$$

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5. Show that: $\tan(A+B).\tan(A-B)=\dfrac{\sin^2 A-\sin^2 B}{\cos^2 A-\sin^2 B}.$

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6. Show that: $\tan 50^\circ-\tan 30^\circ-\tan 20^\circ=\tan 20^\circ.\tan 30^\circ.\tan 50^\circ.$

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7. Prove that : $\tan 22^\circ + \tan 23^\circ + \tan 22^\circ . \tan 23^\circ = 1.$

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8. Prove that : $\tan 53^\circ = \tan 37^\circ + 2\tan 16^\circ .$

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9. The value of $\frac{\tan 70^0 - \tan 20^0}{\tan 50^0} =$

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10. If $\cos(A - B) = 3/5$ and $\tan A . \tan B = 2,$ evalute : $\cos A . \cos B.$

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11. If $\tan A - \tan B = x$, and $\cot B - \cot A = y$, then find the value of $\cot(A - B)$.

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12. If $\tan(\pi \cos\theta) = \cot(\pi \sin\theta)$ then $\sin\left(\theta + \frac{\pi}{4}\right)$ equals

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13. If $\alpha + \beta = 45^\circ$, show that : $(1 + \tan\alpha)(1 + \tan\beta) = 2$. Hence, find the value of $\tan\left(22\frac{1^\circ}{2}\right)$.

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14. If $\sin(x - 30^\circ) = 2.\cos(x - 60^\circ)$, show that , $\tan x = -\sqrt{3}$.

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15. If $3\tan\theta.\ \tan\phi = 1$. evalute: $\dfrac{\cos(\theta-\phi)}{\cos(\theta+\phi)}$.

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16. If $\sin x + \sin y = a, \cos x + \cos y = b,$ then what is the value of $\cos(x-y)$?

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17. If $\cos(\alpha+\beta) = \dfrac{4}{5}; \sin(\alpha-\beta) = \dfrac{5}{13}$ and α, β lie between $0\&\dfrac{\pi}{4}$ then find the value of $\tan 2\alpha$

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18. The value of $\dfrac{\sin(-660^\circ)\tan(1050^\circ)\sec(420^\circ)}{\cos(225^\circ)\cos ec(315^\circ)\cos(510^\circ)}$ is:

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19. $4\text{-}\cot\left(\frac{\pi}{4}+\theta\right)\cot\left(\frac{\pi}{4}-\theta\right)=1$

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20. $\cos^2\left(\frac{\pi}{4}-\theta\right)+\cos^2\left(\frac{\pi}{4}+\theta\right)=\ldots.$

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21. Prove that :

$\tan 15^\circ.\tan 25^\circ+\tan 25^\circ.\tan 50^\circ+\tan 50^\circ.\tan 15^\circ=1.$

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22. Evaluate the following expression : $\sin^2.\frac{\pi}{12}+\sin^2.\frac{3\pi}{12}+\sin^2.\frac{5\pi}{12}.$

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23. $\sin 10^\circ + \sin 20^\circ + \sin 30^\circ + \ldots\ldots\ldots + \sin 360^\circ =$

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24. Find the value of: $\log(\tan 1^\circ) + \log(\tan 2^\circ) + \ldots + \log(\tan 89^\circ)$.

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25. If $\sec\theta = -13/5$, where $90^\circ < \theta < 180^\circ$, evalute : $\sin 2\theta, \cos 2\theta$ and $\tan 2\theta$.

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26. If $\cos\theta = 3/7$, and θ lies in the fourth quadrant, evaluate : $\sin(\theta/2), \cos(\theta/2), \tan(\theta/2)$.

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27. Show that $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}} = 2\cos\theta$

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28. Prove that : $\frac{1+\sin A-\cos A}{1+\sin A+\cos A} = \tan\left(\frac{A}{2}\right).$

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29. Show that : $\cos 9^\circ . \cos 18^\circ . \cos 36^\circ . \cos 72^\circ = \frac{\sin 36^\circ}{16\cos 81^\circ}$

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30. Prove that $\cos 20^0 \cos 40^0 \cos 60^0 \cos 80^0 = \frac{1}{16}.$

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31. Show that: $4\cos A.\cos\left(\frac{\pi}{3}-A\right).\cos\left(\frac{\pi}{3}+A\right) = \cos 3A$

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32. $\sin\left(\frac{\pi}{18}\right) \cdot \sin\left(5\frac{\pi}{18}\right) \cdot \sin\left(7\frac{\pi}{18}\right)$

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33. If $\tan\alpha = 3$, calculate : $\frac{2\sin 2\alpha - 3\sin 2\alpha}{4\sin 2\alpha + 5\cos 2\alpha}$.

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34. If $p\sin\theta - q\cos\theta = 0$ evalute : $p\cos 2\theta + q\sin 2\theta$.

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35. If $\tan^2\alpha = 2\tan^2\beta + 1$, evaluate : $\cos 2\alpha + \sin^2\beta$.

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36. If $\sin\alpha + \cos\alpha = \frac{1}{5}$, find $\tan\left(\frac{\alpha}{2}\right)$.

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37. If α and β are two angles in the first quadrant such that $\sin(\alpha+\beta) = 1$ and $\sin(\alpha-\beta) = 1/2$, find $\tan(\alpha+2\beta)$.

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38. $\cot 15^\circ + \cot 75^\circ + \cot 135^\circ - cosec30^\circ =$

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39. The value of $\cos$ '$(2\text{pi})/(15)\cos(4\text{pi})/(15)\cos(8\text{pi})/(15)\cos\frac{14\pi}{15}$, is

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40. Evaluate : $\cos ec 10^\circ - \sqrt{3}\sec 10^\circ$

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41. Prove that:$\tan 6^0 \tan 42^0 \tan 66^0 \tan 78^0 = 1.$

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42. $\left(1+\cos.\frac{\pi}{8}\right)\left(1+\cos.\frac{3\pi}{8}\right)\left(1+\cos.\frac{5\pi}{8}\right)\left(1+\cos.\frac{7\pi}{8}\right)$ is equal to

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43. If $\sin\theta+\sin\phi=a$ and $\cos\theta+\cos\phi=b$ find $\cos\left(\frac{\theta-\phi}{2}\right)$ in terms of a and b.

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44. If $A+B+C=\pi$, show that : $\tan A+\tan B+\tan C=\tan A.\tan B.\tan C$ Hence. Deduce the value of : $\cot A.\cot B+\cot B.\tan C+\cot C.\cot A$

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45. If $A+B+C=\pi$, show that : $\tan.\frac{A}{2}\tan.\frac{B}{2}+\tan.\frac{B}{2}\tan.\frac{C}{2}+\tan.\frac{C}{2}\tan.\frac{A}{2}=1$ Hence deduce that : $\cot.\frac{A}{2}+\cot.\frac{B}{2}+.\cot.\frac{C}{2}=\cot.\frac{A}{2}.\cot.\frac{B}{2}\tan.\frac{C}{2}.$

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46. If $A+B+C=\pi$ then $\sin 2A+\sin 2B+\sin 2C=$

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47. If $A+B+C=\pi$, prove that :

$\cos 2A+\cos 2B-\cos 2C=1-4\sin A\sin B\cos C$

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48. If $A+B+C=\pi$, prove that :

$(\cot B+\cot C)(\cot C+\cot A)(\cot A+\cot B)=\cos ecA\cos ecB\cos ecC$

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49. If $p=\tan 20^\circ$ express $\frac{\tan 160^\circ-\tan 110^\circ}{1+\tan 160^\circ.\tan 110^\circ}$ in terms of p.

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50. If $\cos\theta=\frac{1}{2}\left(a+\frac{1}{a}\right)$, show that : $\cos 3\theta=\frac{1}{2}\left(a^3+\frac{1}{a^3}\right)$

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51. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 - bx + c = 0$, show that : $a^2 + 2ac - b^2 = 0$.

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52. If $P_n = \cos^n\theta + \sin^n\theta$, show that : $2P_6 - 3P_4 + 1 = 0$.

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53. Evaluate : $\sin 163^\circ . \cos 347^\circ + \sin 73^\circ . \sin 167^\circ$.

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54. $\cos^4\left(\frac{\pi}{8}\right) + \cos^4\left(\frac{3\pi}{8}\right) + \cos^4\left(\frac{5\pi}{8}\right) + \cos^4\left(\frac{7\pi}{8}\right) =$

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55. If $\sin x + \sin^2 x = 1$. then evaluate : (i) $\cos^8 x + 2\cos^6 x + \cos^4 x$

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56. If $\sin x + \sin^2 x = 1$, then find the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x - 1$

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57. If $p\sin\theta + q\cos\theta = a$ and $p\cos\theta - q\sin\theta = b$, show that : $\frac{p+a}{q+b} + \frac{q-b}{p-a} = 0.$

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58. If $\cos\theta = \frac{a\cos\phi + b}{a + b\cos\phi}$. Show that : $\tan.\frac{\theta}{2} = \pm\sqrt{\frac{a-b}{a+b}}\tan.\frac{\phi}{2}$.

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59. Prove that: $\frac{\sin x}{\cos 3x} + \frac{\sin 3x}{\cos 9x} + \frac{\sin 9x}{\cos 27x} = (\tan 27x - \tan x)$

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60. Let AandB be acute angles such that $\sin A = \sin^2 B$ and $2\cos^2 A = 3\cos^2 B$. Then A equal to

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61. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$, evaluate : $\cos\theta_1 + \cos\theta_2 + \cos\theta_3$.

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62. If x and y are real numbers such that $\sin^2\theta = \frac{x^2 + y^2}{2xy}$ show that $x = y$.

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Mcqs

1. $\sin 105^\circ + \cos 105^\circ =$

A. $\sin 15^\circ$

B. $\cos 30^\circ$

C. $\sin 45^\circ$

D. $\cos 60^\circ$

Answer: C

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2. $\sin\left(\frac{\pi}{3}+A\right).\cos\left(\frac{\pi}{3}+B\right)-\cos\left(\frac{\pi}{3}+A\right).\sin\left(\frac{\pi}{3}+B\right)=\ldots$

A. $\cos(A-B)$

B. $\sin(A-B)$

C. $\cos(A+B)$

D. none of these

Answer: B

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3. If $0 < A < (\pi/2)$ and $0 < B < (\pi/2)$, then angle $(A - B)$ lies in..... Quadrant.

A. First

B. Second

C. Third

D. Fourth

Answer: D

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4. If $0 < A < (\pi/2)$ and $0 < B < (\pi/2)$, then angle $(A - B)$ lies in..... Quadrant.

A. First

B. Second

C. Third

D. Fourth

Answer: B

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5. If $\sin A = 3/5$ and $\cos B = 9/41$, where A, B are both in the first quadrant, then $\sin(A - B) = ...$

A. $-133/205$

B. $-84/205$

C. $125/205$

D. none of these

Answer: A

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6. If

$\sin\alpha = 15/17, (\pi/2) < \alpha < \pi$ and $\sec\beta = 13/12, (3\pi/2) < \beta < 2\pi.$

then $\sin(\alpha - \beta) =$

A. $220/221$

B. $-171/221$

C. $-140/171$

D. none of these

Answer: B

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7. If $\tan\alpha = 3/4, \alpha$ in third quadrant, and $\cos\beta = 9/41, \beta$, in first quadrant, then : $\cos(\alpha+\beta) = ...$

A. $-187/84$

B. $133/205$

C. $124/205$

D. none of these

Answer: B

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8. If $\sin\theta = 1/2, \cos\phi = 12/13,$ where θ lies in the second quadrant and ϕ in the fourth then : $\tan(\theta-\phi) = ...$

A. $\frac{12+5\sqrt{3}}{26}$

B. $\frac{\left(12\sqrt{3}+5\right)}{26}$

C. $\frac{5\sqrt{3}-12}{12\sqrt{3}+5}$

D. none of these

Answer: C

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9. For any angles A and B, $\sin(A+B).\sin(A-B) = ...$

A. $\sin\left(A^2 - B^2\right)$

B. $\sin^2 A - \sin^2 B$

C. $\cos^2 A - \cos^2 B$

D. none of these

Answer: B

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10. For any angles A and B, $\cos(A+B).\cos(A-B) = \ldots..$

A. $\cos\left(A^2 - B^2\right)$

B. $\sin^2 A - \sin^2 B$

C. $\cos^2 A - \cos^2 B$

D. none of these

Answer: C

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11. $1 + \tan A . \tan(A/2) = \ldots\ldots$

A. $\sec A$

B. $\tan A$

C. $\cos A$

D. $\cot A$

Answer: A

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12. $\frac{\tan 3A + \tan A}{\tan 3A - \tan A} = . .$

A. $\tan 2A$

B. $\tan 4A$

C. $(\tan 4A)/(\tan 2A)$

D. $(\sin 4A)/(\sin 2A)$

Answer: D

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13. For any angles A,B,C. $\frac{\sin(A-B)}{\cos A.\cos B} + \frac{\sin(B-C)}{\cos B.\cos C} + \frac{\sin(C-A)}{\cos C.\cos A} = \ldots$

A. 0

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

C. $\tan(A-B-C)$

D. none of these

Answer: A

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14. $\sin x + \cos x = \sqrt{2}.\ \sin(\ldots.)$

A. $x - \frac{\pi}{4}$

B. $\frac{\pi}{4} - x$

C. $x + \frac{\pi}{4}$

D. $x - \frac{\pi}{2}$

Answer: C

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15. $\cos x - \sin x = \sqrt{2}.\ \cos(\ldots.)$

A. $x - \frac{\pi}{4}$

B. $\frac{\pi}{2} - x$

C. $x + \frac{\pi}{4}$

D. none of these

Answer: C

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16. $\tan 20^\circ + \tan 25^\circ + \tan 20^\circ . \tan 25^\circ = ...$

A. $-\sqrt{2}$

B. 1

C. $1/\sqrt{2}$

D. -1

Answer: B

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17. $\tan 40^\circ + 2\tan 10^\circ$ is equal to

A. $\tan 20^\circ$

B. $\tan 80^\circ$

C. $\tan 50^\circ$

D. $\tan 30^\circ$

Answer: C

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18. If $A + B = 45^\circ$ then $(1 + \tan A)(1 + \tan B) =$

A. 1

B. 2

C. $\tan A.\ \tan B$

D. none of these

Answer: B

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19. If $2\sin(x+60^\circ)=\cos(x-30^\circ),$ then : $\tan=\ldots..$

A. $\sqrt{3}$

B. $\sqrt{2}$

C. $-\sqrt{2}$

D. $-\sqrt{3}$

Answer: D

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20. $\tan(45^\circ+A)\tan(45^\circ-A)=$

A. -1

B. 0

C. 1

D. $\tan 2A$

Answer: C

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21. $\tan 75^\circ + \tan 15^\circ = \ldots.$

A. $1 + \sqrt{3}$

B. $\sqrt{3} - 1$

C. $\sqrt{3}$

D. 4

Answer: D

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22. If $A + B = 90^\circ$, then : $\tan A . \tan B = \ldots$

A. not defined

B. 1

C. 0

D. none of these

Answer: B

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23. If $\sin(\theta + \phi) = 2 \sin . (\theta - \phi),$ then : $\tan \theta = K, \tan \phi,$ where K=.....

A. 1

B. 2

C. 3

D. 4

Answer: C

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24. If $\sin\theta = 2\sin(\theta + 2a)$ and $\tan(\theta + \alpha) = K.\tan\alpha$, then : K=....

A. -2

B. -1

C. 2

D. 3

Answer: A

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25. If $\sin(x - 60^\circ) = 2.\cos(x - 30^\circ)$, then : $\tan x = \ldots.$.

A. $\sqrt{3}$

B. $3\sqrt{3}$

C. $-\sqrt{3}$

D. $-3\sqrt{3}$

Answer: D

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26. If $3\tan\theta\tan\phi = 1$ then $\frac{\cos(\theta-\phi)}{\cos(\theta+\phi)}$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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27. If $\theta + \phi = \alpha, \tan\theta = K.\tan\phi$ and $\sin(\theta - \phi) = m.\sin\alpha,$ then : $m = \ldots\ldots$

A. $K - \frac{1}{K+1}$

B. $\frac{K-1}{K+1}$

C. $K + \frac{1}{K-1}$

D. $\frac{K+1}{K-1}$

Answer: B

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28. The value of $\frac{\cot 54^\circ}{\tan 36^\circ} + \frac{\tan 20^\circ}{\cot 70^\circ}$ is

A. 1

B. 2

C. 0

D. 3

Answer: B

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29. $\cos^2\left(\frac{\pi}{4}-\theta\right)+\cos^2\left(\frac{\pi}{4}+\theta\right)=\ldots.$

A. 1

B. 2

C. 3

D. none of these

Answer: A

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30. $\cot\left(\frac{\pi}{20}\right).\cot\left(\frac{3\pi}{20}\right)\cot\left(\frac{5\pi}{20}\right)\cot\left(\frac{7\pi}{20}\right)\cot\left(\frac{9\pi}{20}\right)=\ldots.$

A. -1

B. 0

C. 1

D. none of these

Answer: C

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31. $\cos\left(\frac{\pi}{12}\right) + \sin^2\left(\frac{3\pi}{12}\right) + \sin^2\left(\frac{9\pi}{12}\right) + \cos\left(\frac{11\pi}{12}\right) = \ldots$

A. -1

B. 0

C. 1

D. 2

Answer: B

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32. Statement I : $\frac{\sin^2\pi}{8}+\frac{\sin^2(3\pi)}{8}+\frac{\sin^2(5\pi)}{8}+\frac{\sin^2(7\pi)}{8}=2$

Statement II $\frac{\cos^2\pi}{8}+\frac{\cos^2(3\pi)}{8}+\frac{\cos^2(5\pi)}{8}+\cos^2\left(7\frac{\pi}{8}\right)=2$

Statement III: $\frac{\sin^2\pi}{8}+\frac{\sin^{3\pi}}{8}+\frac{\sin^2(5\pi)}{8}\frac{\sin^2(7\pi)}{8}=\frac{3}{2}$

A. 1

B. 2

C. -1

D. 0

Answer: B

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33. Find the value of $\sin^2 5^\circ+\sin^2 10^\circ+\sin^2 15^\circ+\ldots\ldots\ldots\ldots+\sin^2 90^\circ.$

A. $6\frac{1}{2}$

B. $7\frac{1}{2}$

C. $8\frac{1}{2}$

D. $9\frac{1}{2}$

Answer: D

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34. If $\sec\theta = -13/5,$ where $90^\circ < \theta < 180^\circ,,$ then : $\sin\theta = \ldots\ldots$

A. $109/191$

B. $120/199$

C. $-120/169$

D. $-119/169$

Answer: C

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35. If $\cos\theta = 3/7$, and θ lies in the fourth quadrant, evaluate : $\sin(\theta/2), \cos(\theta/2), \tan(\theta/2)$.

A. $\sqrt{(2/7)}$

B. $-\sqrt{(2/5)}$

C. $-\sqrt{(5/7)}$

D. none of these

Answer: C

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36. If $\sqrt{2+\sqrt{2+2\cos 4x}} = K.\cos x$, then : $K = \ldots$.

A. 1

B. 2

C. 3

D. none of these

Answer: B

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37. For any angle A, $4\sin A.\ \sin\left(\frac{\pi}{3}-A\right).\ \sin\left(\frac{\pi}{3}+A\right)=\ldots..$

A. $\sin 2A$

B. $\sin 3A$

C. $\sin 4A$

D. none of these

Answer: B

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38. $\cos 20^\circ.\ \cos 40^\circ.\ \cos 60^\circ \cos 80^\circ\ =$

A. $1/2$

B. $1/2^2$

C. $1/2^3$

D. $1/2^4$

Answer: D

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39. $\tan 20^0 \tan 40^0 \tan 60^0 \tan 80^0$

A. 1

B. 2

C. 3

D. 4

Answer: C

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40. $\frac{1-\tan^2(45^\circ - A)}{1+\tan^2(45^\circ - A)}$ is equal to

A. $\sin 2A$

B. $\cos 2A$

C. $\tan 2A$

D. none of these

Answer: A

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41. If $\frac{\sec 8A - 1}{\sec 4A - 1} = \tan mA.\ \cot nA,$ then: $(m, n) \equiv ....$

A. (8,4)

B. (4,8)

C. (2,8)

D. (8,2)

Answer: D

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42. If : $\sin(\alpha/2)\cos(\alpha/2) = \frac{12}{25}$. then: $\sin\alpha =$

A. $21/25$

B. $22/25$

C. $23/25$

D. $24/25$

Answer: D

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43. If $\tan\alpha = 3$, calculate : $\frac{2\sin 2\alpha - 3\sin 2\alpha}{4\sin 2\alpha + 5\cos 2\alpha}$.

A. $1/3$

B. $4/9$

C. $-9/4$

D. $-4/9$

Answer: C

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44. If $\sin\alpha + \cos\alpha = \frac{1}{5}$, find $\tan\left(\frac{\alpha}{2}\right)$.

A. $1 \text{ or } (-1/2)$

B. $2 \text{ or } (-1/3)$

C. $3 \text{ or } (-1/4)$

D. none of these

Answer: B

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45. If α and β are two angles in the first quadrant such that $\sin(\alpha+\beta)=1$ and $\sin(\alpha-\beta)=1/2$, find $\tan(\alpha+2\beta)$.

A. $-\sqrt{2}$

B. $\sqrt{2}$

C. $-\sqrt{3}$

D. $\sqrt{3}$

Answer: C

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46. $\sqrt{3}\cos\sec 20^0-\sec 20^0$

A. 1

B. 2

C. 3

D. 4

Answer: D

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47. The value of $\tan 6^0 \tan 42^0 \tan 66^0 \tan 78^0$ is 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

A. 1

B. 2

C. 3

D. 4

Answer: A

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48. Statement I : $\frac{\sin^2 \pi}{8} + \frac{\sin^2(3\pi)}{8} + \frac{\sin^2(5\pi)}{8} + \frac{\sin^2(7\pi)}{8} = 2$

Statement II $\frac{\cos^2 \pi}{8} + \frac{\cos^2(3\pi)}{8} + \frac{\cos^2(5\pi)}{8} + \cos^2\left(7\frac{\pi}{8}\right) = 2$

Statement III: $\frac{\sin^2 \pi}{8} + \frac{\sin^{3\pi}}{8} + \frac{\sin^2(5\pi)}{8} \frac{\sin^2(7\pi)}{8} = \frac{3}{2}$

A. 1

B. 2

C. 3

D. 4

Answer: B

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49. For any angle θ. $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta + \sin 8\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta + \cos 8\theta} = \ldots.$ (a) $\tan\theta$ (b) $\tan 3\theta$ (c) $\tan 5\theta$ (d) none of these

A. $\tan\theta$

B. $\tan 3\theta$

C. $\tan 5\theta$

D. none of these

Answer: C

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50. cos40+cos80+cos160 +cos 240

A. -2

B. $-1/2$

C. $-\sqrt{3}$

D. $1/\sqrt{3}$

Answer: B

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51. $\frac{\sin 70^\circ + \cos 40^\circ}{\cos 70^\circ + \sin 40^\circ}$

A. $\sqrt{2}$

B. $1/\sqrt{2}$

C. $\sqrt{3}$

D. $1/\sqrt{3}$

Answer: C

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52. If $3\sin\alpha = 5\sin\beta$, then $\dfrac{\tan\left(\frac{\alpha+\beta}{2}\right)}{\tan\left(\frac{\alpha-\beta}{2}\right)}$=

A. 1

B. 2

C. 3

D. 4

Answer: D

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53. The value of $\cos 52^\circ + \cos 68^\circ + \cos 172^\circ$ is

A. -1

B. 0

C. 1

D. none of these

Answer: B

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54. For any angle θ, $\cos\theta + \cos(120^\circ + \theta) + \cos(120^\circ - \theta) = \ldots\ldots .$

A. -1

B. 0

C. 1

D. $\sqrt{3}/2$

Answer: B

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55. $\cos^2\theta + \cos^2(120^\circ + \theta) + \cos^2(120^\circ - \theta) = \ldots\ldots$

A. $2/3$

B. $3/2$

C. $4/5$

D. $5/4$

Answer: B

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56. If $\frac{\sin 8\theta.\cos\theta - \sin 6\theta.\cos 3\theta}{\cos 2\theta.\cos\theta - \sin 3\theta.\sin 4\theta} = \tan(K\theta)$, then: $K = \ldots$

A. 1

B. 2

C. 3

D. none of these

Answer: B

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57. $\sqrt{3}\cot 20^\circ - 4\cos 20^\circ =$

A. 1

B. $\sqrt{2}$

C. $\sqrt{3}$

D. none of these

Answer: A

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58. If A, B, C are the angles of a triangle such that $\tan A = 1$ and $\tan B = 2$, then : $\tan C = \ldots\ldots\ldots$

A. $\sqrt{3}$

B. $1/\sqrt{3}$

C. 3

D. none of these

Answer: C

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59. If α is any real nubmer then: $\frac{\sin^4\alpha + \sin^2\alpha.\cos^2\alpha + \cos^2\alpha}{\cos^4\alpha + \sin^2\alpha.\cos^2\alpha + \sin^2\alpha} = \ldots.$

(a) 1 (b)2 (c) 3 (d) none of these

A. 1

B. 2

C. 3

D. none of these

Answer: A

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60. If α is any real number, then : $(\sin\alpha + \cos ec\alpha)^2 + (\cos\alpha + \sec\alpha)^2 - \left(\tan^2\alpha + \cot^2\alpha\right) = ...$

A. 3

B. -5

C. 7

D. $2\sin^2\alpha + 3\cos^2\alpha$

Answer: C

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61. If $P_n = \cos^n \theta + \sin^n \theta,$ show that : $2P_6 - 3P_4 + 1 = 0.$

A. -1

B. 0

C. 1

D. none of these

Answer: C

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62. Evaluate : $\sin 163^\circ . \cos 347^\circ + \sin 73^\circ . \sin 167^\circ .$

A. $\sqrt{2}$

B. $1/2$

C. $\sqrt{3}$

D. $1/3$

Answer: B

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63. $\cos^4\left(\frac{\pi}{8}\right)+\cos^4\left(\frac{3\pi}{8}\right)+\cos^4\left(\frac{5\pi}{8}\right)+\cos^4\left(\frac{7\pi}{8}\right)=$

A. 1

B. $1/2$

C. $3/2$

D. 2

Answer: C

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64. $\frac{1}{\cos 290^\circ}+\frac{1}{\sqrt{3}\sin 250^\circ}=$

A. $1/\sqrt{2}$

B. $3/\sqrt{2}$

C. $4/\sqrt{3}$

D. none of these

Answer: C

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65. If $\tan(\pi.\cos\theta) = \cot(\pi.\sin\theta)$, then: $\cos\left(\frac{\pi}{4} - \theta\right) = \ldots.$ (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{2\sqrt{2}}$ (d) $\frac{\sqrt{2}}{2}$

A. $1/2$

B. $1/\sqrt{2}$

C. $1/(2\sqrt{2})$

D. $\sqrt{2}/2$

Answer: C

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

A. $\sin(A - B)$

B. $\cos(A + B)$

C. $\tan(A + B)$

D. none of these

Answer: C

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67. If $x^0 = \left(\frac{13\pi}{6}\right)^c$, then: $x =$ (a) 300° (b) 930° (c) 309° (d) 390°

A. 300°

B. 930°

C. 309°

D. 390°

Answer: D

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68. If $y^c = 27^\circ$, then: $y =$ (a) $\left(\frac{20\pi}{3}\right)^c$ (b) $\left(\frac{20\pi}{3}\right)$ (c) $\left(\frac{3\pi}{20}\right)$ (d) $\frac{\pi}{20}$

A. $\left(\frac{20\pi}{3}\right)^c$

B. $\frac{20\pi}{3}$

C. $\frac{3\pi}{20}$

D. $\frac{\pi}{20}$

Answer: C

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69. The value of $\cot 5^\circ \cdot \cot 15^\circ \cdot \cot 25^\circ \cdot \cot 35^\circ \cdot \cot 45^\circ \cdot \cot 55^\circ \cdot \cot 65^\circ \cdot \cot 75^\circ \cdot \cot$ is _____

A. 1

B. $\frac{1}{\sqrt{2}}$

C. $\frac{1}{2}$

D. 0

Answer: A

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70. Find the value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \ldots\ldots\ldots\ldots + \sin^2 90^\circ$.

A. $7\frac{1}{2}$

B. $8\frac{1}{2}$

C. $9\frac{1}{2}$

D. 8

Answer: C

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71. If $\tan\alpha = \frac{1}{3}$ and $\tan\beta = \frac{1}{2}$, then: $\tan(\alpha+\beta) =$

A. 1

B. -1

C. 2

D. 3

Answer: A

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72. If $\cos ec\theta + \cot\theta = \frac{11}{2}$, then $tan\theta =$

A. $\frac{21}{22}$

B. $\frac{15}{16}$

C. $\frac{44}{117}$

D. $\frac{22}{21}$

Answer: C

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73. If $\tan\theta = \frac{-1}{\sqrt{5}}$ and θ lies in the fourth quadrant, then: $\cos\theta =$

A. $\frac{\sqrt{5}}{\sqrt{6}}$

B. $\frac{2}{\sqrt{6}}$

C. $\frac{1}{2}$

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

Answer: A

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74. If $\sin x + \sin^2 x = 1$. then evaluate $\cos^8 x + 2\cos^6 x + \cos^4 x$

A. 0

B. -1

C. 2

D. 1

Answer: D

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75. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 179^\circ$ is

A. $\frac{1}{\sqrt{2}}$

B. 0

C. 1

D. none of these

Answer: B

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76. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then: $A + B =$ (a) $\frac{\pi}{4}$ (b) 0 (c) π (d) $\frac{\pi}{6}$

A. $\frac{\pi}{4}$

B. 0

C. π

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

Answer: A

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77. The $\sin\theta + \cos ec\theta = 2,$ then: $\sin^2\theta + \cos ec^2\theta =$

A. 1

B. 4

C. 2

D. 8

Answer: C

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78. $8\sin.\ \frac{x}{8}.\cos.\ \frac{x}{2}.\cos.\ \frac{x}{4}.\cos.\ \frac{x}{8} =$

A. $8\cos x$

B. $\cos x$

C. $8\sin x$

D. $\sin x$

Answer: D

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79. If $\tan\theta + \sec\theta = \sqrt{3},$ then: $\theta =$

A. $\frac{5\pi}{6}$

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: C

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80. If $\sin A + \sin B + \sin C = 3$. Then: $\cos A + \cos B + \cos C =$ (a) 0

(b) 1 (c) 2 (d) 3

A. 0

B. 1

C. 2

D. 3

Answer: A

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81. Let `0

A. $\tan\left(x - \frac{\pi}{4}\right)$

B. $\tan\left(\frac{\pi}{4} - x\right)$

C. $\tan\left(x + \frac{\pi}{4}\right)$

D. $\tan^2\left(\frac{\pi}{4} + x\right)$

Answer: B

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82. If, in a ΔABC, $\tan A = 1$ and $\tan B = 2$, then: $\tan C =$ (a) 1 (b) 2 (c) 3 (d) 4

A. 1

B. 2

C. 3

D. 4

Answer: C

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83. If, in a ΔABC, $\tan A = 1$ and $\tan B = 2$, then: $\tan C =$

A. $\frac{1}{x} - \frac{1}{y}$

B. $\frac{1}{x} + \frac{1}{y}$

C. $\frac{1}{y} - \frac{1}{x}$

D. $x - y$

Answer: B

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84. The value of $\sin^2 75^0 - \sin^2 15^0$ is $1/2$ b. $\sqrt{3}/2$ c. 1 d. 0

A. $\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

C. 1

D. 0

Answer: B

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85. If ΔABC is a right-angled at A, then: $\cos^2 B + \cos^2 C =$

A. -2

B. -1

C. 1

D. 0

Answer: C

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86. $\sin^6 A + \cos^6 A + 3\sin^2 A.\cos^2 A =$

A. 0

B. 1

C. 2

D. 3

Answer: B

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87. If $\cos(A-B)=\frac{3}{5}$ and $\tan A \tan B=2$, then

A. $\cos A.\cos B=\frac{1}{5}$

B. $\cos A.\cos B=-\frac{1}{5}$

C. $\sin A.\sin B=-\frac{6}{5}$

D. $\sin A.\sin B=-\frac{1}{5}$

Answer: C

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88. If A, B, C, D be the angles of acyclic quadrilateral, show that : $\cos A+\cos B+\cos C+\cos D=0$.

A. 4

B. -2

C. 1

D. 0

Answer: D

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89. If $\sin. \frac{\alpha}{2} + \cos. \frac{\alpha}{2} = 1.4,$ then: $\sin \alpha =$

A. $\frac{50}{47}$

B. $\frac{47}{50}$

C. $\frac{24}{25}$

D. $\frac{25}{24}$

Answer: C

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90. If $\tan \alpha + \cot \alpha = m$ then value of $\tan^4 \alpha + \cot^4 \alpha$ is

A. $m^4 - 4m^2 + 2$

B. $m^4 + 4m^2 - 2$

C. $m^4 - 4m^2 - 2$

D. $m^4 + 4m^2 + 2$

Answer: A

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91. If $\cos\theta + \cos\phi = a$ and $\sin\theta - \sin\phi = b$, then: $2\cos(\theta + \phi)$=

A. $a^2 - b^2 - 2$

B. $a^2 - b^2 + 2$

C. $a^2 + b^2 + 2$

D. $a^2 + b^2 - 2$

Answer: D

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92. If $\sin x + \cos ecx = 2$, then, for all $n \in N$, the value of: $\sin^n x + \cos ec^n x =$ (a) 2 (b) 2^n (c) 2^{n-1} (d) 2^{n-2}

A. 2

B. 2^n

C. $2^n - 1$

D. $2^n - 2$

Answer: A

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93. If $\sin A + \sin B + \sin C = \frac{3\sqrt{3}}{2}$. then: ΔABC is (a) isosceles (b) right angled (c) equilateral (d) obtuse angled

A. isosceles

B. right-angled

C. equilateral

D. obtuse-angled

Answer: C

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94. In triangle ABC, $\cos^2 A + \cos^2 B - \cos^2 C = 1$, then the triangle is necessarily

A. isosceles

B. right-angled

C. equilateral

D. obtuse-angled

Answer: B

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95. If $\tan x = b/a$, then: $a\cos 2x + b\sin 2x =$

A. a

B. $a - b$

C. $a + b$

D. b

Answer: A

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96. $\dfrac{\sin^2 3A}{\sin^2 A} - \dfrac{\cos^2 3A}{\cos^2 A} =$

A. $\cos 2A$

B. $8\cos 2A$

C. $\dfrac{1}{8}\cos 2A$

D. $\dfrac{1}{4}\cos 2A$

Answer: B

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97. If $tan\theta_1 tan\theta_2 = k,$ then $\frac{\cos(\theta_1 - \theta_2)}{\cos(\theta_1 + \theta_2)} = \frac{1+k}{1-k}$ b. $\frac{1-k}{1+k}$ c. $\frac{k+1}{k-1}$ d. $\frac{k-1}{k+1}$

A. $\frac{1+k}{1-k}$

B. $\frac{1-k}{1+k}$

C. $\frac{k+1}{k-1}$

D. $\frac{k-1}{k+1}$

Answer: A

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98. $\tan 5x . \tan 3x . \tan 2x =$

A. $\tan 5x - \tan 3x - \tan 2x$

B. $\frac{\sin 5x - \sin 3x - \sin 2x}{\cos 5x - \cos 3x - \cos 2x}$

C. $\tan 5x + \tan 3x + \tan 2x$

D. 0

Answer: A

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99. If $a + b\tan\theta = \sec\theta$ and $b - a\tan\theta = 2\sec\theta$, then: $a^2 + b^2 =$

A. 4

B. 8

C. 5

D. 6

Answer: C

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100. If $\cos 25^0 + \sin 25^0 = p$, then $\cos 50^0$ is $\sqrt{2 - p^2}$ (b) $-\sqrt{2 - p^2}$ $p\sqrt{2 - p^2}$ (d) $-p\sqrt{2 - p^2}$

A. $\sqrt{2 - p^2}$

B. $-p\sqrt{2 - p^2}$

C. $p\sqrt{2 - p^2}$

D. $-\sqrt{2 - p^2}$

Answer: C

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101. If $\tan(x + y) = 33$ and $x = \tan^{-1} 3$ then y will be

A. 0.3

B. $\tan^{-1}(1.3)$

C. $\tan^{-1}(0.3)$

D. $\tan^{-1}\left(\frac{1}{18}\right)$

Answer: C

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