MATHS

BOOKS - BITSAT GUIDE

TRIGONOMETRY

Practice Exercise

1. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm. $\left(\text{Use } \pi = \frac{22}{7} \right)$

A. $11^\circ 36$

B. $12^\circ 36$

C. $12^\circ 30$

D. $12^\circ 34$

Answer: B

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2. If the three angles of a quadrilateral are $60^\circ, 60^g$ and $\frac{5\pi}{6}$ radian. Then, the fourth angle is

A. 60°

B. 96°

C. 96^g

D. None of these

Answer: B

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3. Which of the following is correct?

A. $\sin 1^\circ > \sin 1$

B. $\sin 1^\circ < \sin 1$

C. $\sin 1^\circ = \sin 1$

D. $\sin 1^\circ = \frac{\pi}{18^\circ} \sin 1$

Answer: B

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4. Given, a right angled ΔABC, whose base is 6 and perpendicular height is 8. Find the trigonometric ratios of sin A, cos A and tan A, respectively.

A. $\frac{4}{5}, \frac{3}{5}, \frac{4}{3}$

B. $\frac{2}{5}, \frac{3}{5}, \frac{4}{5}$

C. $\frac{4}{5}, \frac{1}{5}, \frac{2}{3}$

D. None of these

Answer: A

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5. The value of $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ$ is

A. 2

B. 3

C. 4

D. None of these

Answer: C

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6. The value of $\log_3 \tan 1^\circ + \log_3 \tan 2^\circ + \ldots + \log_3 \tan 89^\circ$ is

A. 3

B. 1

C. 2

D. 0

Answer: D

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7. The angle of elevation of the top of a hill from eof the verticles A,B,C of a horizontal triangle is α. The height of the hill is

A. $\frac{1}{2}b\tan\alpha\sec B$

B. $\frac{1}{2}b\tan\alpha\cos ecA$

C. $\frac{1}{2}c\tan\alpha\sin C$

D. $\frac{1}{2}a\tan\alpha\cos ecA$

Answer: D

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8. If $\cos A = \tan B$, $\cos B = \tan C$ and $\cos C = \tan A$ then show that $\sin A = \sin B = \sin C = 2\sin 18^\circ$.

A. $\sin 18^\circ$

B. $2\sin 18^\circ$

C. $2\cos 18^\circ$

D. $2\cos 36^\circ$

Answer: B

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9. If $\sin 18^\circ = \frac{\sqrt{5}-1}{4}$, then $\sin 81^\circ$ is equal to

A. $\frac{\sqrt{5}+1}{4}$

B. $\frac{\sqrt{3+\sqrt{5}}+\sqrt{5-\sqrt{5}}}{4}$

C. $\frac{\sqrt{10+2\sqrt{5}}}{4}$

D. None of these

Answer: B

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10. The given expression $\sec^2\theta = \frac{4xy}{(x+y)^2}$ is true if and only if :

A. $x + y \neq 0$

B. $x = y, x \neq 0$

C. $x = y$

D. $x \neq 0, y = 0$

Answer: C

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11. The value of $(1+\tan 1^\circ)(1+\tan 44^\circ)(1+\tan 2^\circ)(1+\tan 43^\circ)\ldots(1+\tan 22^\circ)(1+t$ is

A. 1

B. 2^{22}

C. 3^8

D. 2^{11}

Answer: B

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12. The value of $(\tan 10^\circ + \tan 35^\circ) + \tan 10^\circ \tan 35^\circ$ is

A. 0

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

C. -1

D. 1

Answer: D

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13. If $\alpha + \beta = \frac{\pi}{2} and \beta + \gamma = \alpha,$ then $\tan\alpha$ equals $2(\tan\beta + \tan\gamma)$ (b) $\tan\beta + \tan\gamma \tan\beta + 2\tan\gamma$ (d) $2\tan\beta + \tan\gamma$

A. $2(\tan\beta + \tan\gamma)$

B. $\tan\beta + \tan\gamma$

C. $\tan\beta + 2\tan\gamma$

D. $2\tan\beta + \tan\gamma$

Answer: C

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14. If $2\cos x + 2\cos 3x = \cos y$ and $2\sin x + 2\sin 3x = \sin y$, then the value of $\cos 2x$ is

A. $\frac{-7}{8}$

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

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

D. $\frac{7}{8}$

Answer: A

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15. If $\cos 5\theta = a\cos\theta + b\cos^3\theta + c\cos^5\theta + d$, then

A. $a = 20$

B. $b = -30$

C. $a + c + c = 2$

D. $a + b + c + d = 1$

Answer: D

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16. If $\sin\alpha + \sin\beta = l, \quad \cos\alpha + \cos\beta = m \tan\frac{\alpha}{2}\tan\frac{\beta}{2} = n(n \neq 1), \quad$ then

is equal to

A. $\frac{l^2 - m^2}{2m}$

B. $\frac{l^2 + m^2}{2m}$

C. $\frac{l^2 + m^2}{m}$

D. None of these

Answer: B

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17. Let n be an odd integer. If $\sin n\theta = \sum_{r=0}^{n} b_r \sin^r \theta$ for every value of θ, then

A. $b_0 = 1, b_1 = 3$

B. $b_0 = 0, b_1 = n$

C. $b_0 = -1, b_1 = n$

D. $b_0 = 00, b_1 = n^2 - n + 3$

Answer: B

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18. Find the value of the expression

$$3\left[\sin^4\left(\frac{3\pi}{2} - \alpha\right) + \sin^4(3\pi + \alpha)\right] - 2\left[\sin^6\left(\frac{\pi}{2} + \alpha\right) + \sin^6(5\pi - \alpha)\right]$$

.

A. 0

B. 1

C. 3

D. $\sin 4\alpha + \sin 6\alpha$

Answer: B

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19. $\cot\theta + \cot\left(\theta + \frac{\pi}{3}\right) + \cot\left(\theta + \frac{2\pi}{3}\right)$ is equal to

A. $-\cot 3\theta$

B. $\cot 3\theta$

C. $2\cot 3\theta$

D. $3\cot 3\theta$

Answer: D

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20. $\sin^4\frac{\pi}{8}+\sin^4\frac{3\pi}{8}+\sin^4\frac{5\pi}{8}+\sin^4\frac{7\pi}{8}$ is equal to

A. 1

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

C. 2

D. $\frac{1}{4}$

Answer: B

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21. The value of $\cos\frac{\pi}{11}+\cos\frac{3\pi}{11}+\cos\frac{5\pi}{11}+\cos\frac{7\pi}{11}+\cos\frac{9\pi}{11}$, is

A. 0

B. 1

C. $1/2$

D. $-1/2$

Answer: C

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22. The angle of elevation of a stationary cloud from a point 2500m m above a lake is 15° and the angle of depression of its image in the lake is 45°. The height the cloud above the lake level is

A. $2500\sqrt{3}m$

B. $2500\sqrt{2}m$

C. $1500m$

D. $1500\sqrt{3}m$

Answer: B

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23. If $x = \cos 10^\circ \cos 20^\circ \cos 40^\circ$, then the value of x is

A. $\frac{1}{4}\tan 10^\circ$

B. $\frac{1}{8}\cot 10^\circ$

C. $\frac{1}{8}\cos ec10^\circ$

D. $\frac{1}{8}\sec 10^\circ$

Answer: A

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24. The value of $\tan A + 2\tan 2A + 4\tan 4A + 8\cot 8A$ is

A. cot A

B. tan A

C. cos A

D. sin A

Answer: D

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25. $\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ =$

A. $\frac{1}{13}$

B. $\frac{1}{14}$

C. $\frac{1}{15}$

D. $\frac{1}{16}$

Answer: B

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26. $\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi)$ is equal to

A. $\sin 2(\theta + \phi)$

B. $\cos 2(\theta + \phi)$

C. $\sin 2(thea - \phi)$

D. $\cos 2(\theta - \phi)$

Answer: C

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27. Find the value of $\cos 12^\circ + \cos 84^\circ + \cos 156^\circ + \cos 132^\circ$

A. $1/2$

B. 1

C. $-1/2$

D. $1/8$

Answer: A

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28. If $\cos(\theta + \phi) = m\cos(\theta - \phi)$, then prove that $\tan\theta = \frac{1-m}{1+m}\cot\phi$.

A. $\tan\theta$

B. $-\tan\theta$

C. $2\tan\theta$

D. None of these

Answer: D

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29. $\cos^4\frac{\pi}{8}+\cos^4\frac{3\pi}{8}+\cos^4\frac{5\pi}{8}+\cos^4\frac{7\pi}{8}=$

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

B. 2

C. 3

D. $\frac{3}{2}$

Answer: C

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30. If $\cos x + \cos y - \cos(x+y) = \frac{3}{2}$ then x=y is possible.

A. $x + y = 0$

B. $x = 2y$

C. $x = y$

D. $\cos^2\left(\frac{x-y}{2}\right) < 1$

Answer: B

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31. The expression $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A}$ can be written as

A. $\sin A \cos A + 1$

B. $\sec A \cos ecA + 1$

C. $\tan A + \cot A$

D. $\sec A + \cos ecA$

Answer: B

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32. Let $\cos(\alpha + \beta) = \frac{4}{5}$ and let $\sin(\alpha - \beta) = \frac{5}{13}$ where $0 \leq \alpha, \beta \leq \frac{\pi}{4}$ then $\tan 2\alpha$

A. $\frac{25}{16}$

B. $\frac{56}{33}$

C. $\frac{19}{12}$

D. $\frac{20}{7}$

Answer: B

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33. If α and β are $+$ ive acute angle satisfying the equation $3\sin^2\alpha + 2\sin^2\beta = 1$ and $3\sin 2\alpha - 2\sin 2\beta = 0$, then $\alpha + 2\beta =$

A. zero

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

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

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

Answer: C

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34. If the shadow of a pole of height $\left(\sqrt{3}+1\right)$ m standing on the ground is found to be 2 m longer, when the elevation is 30° than when elevation was α, then α is equal to

A. 15°

B. 30°

C. 45°

D. 75°

Answer: B

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35. The number of roots of the equation $3\sin^2 x = 8\cos x$ in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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36. The number of distinct real roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $-\frac{\pi}{4} \leq x \leq t\frac{\pi}{4}$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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37. If a $\cos 2\theta + b\sin 2\theta = c$ has α and β as its solution, then the value of $\tan\alpha + \tan\beta$ is

A. $-\frac{2b}{a+c}$

B. $\frac{2b}{a+c}$

C. $\frac{3b}{a+c}$

D. None of these

Answer: B

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38. If $2\sin^2\theta = 3\cos\theta$, where $0 \leq \theta \leq 2\pi$, then find the value of θ.

A. $\frac{2\pi}{3}, \frac{5\pi}{3}$

B. $\frac{\pi}{3}, \frac{5\pi}{3}$

C. $\frac{5\pi}{3}, \frac{4\pi}{3}$

D. None of these

Answer: A

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39. If the angles of a triangle are in the ratio $4:1:1$, then the ratio of the longest side to the perimeter is

A. $2\sqrt{3}-3$

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

C. $3\sqrt{2}+3$

D. $3\sqrt{2}+2$

Answer: A

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40. The set of value of the θ satisfying the inequation $2\sin^2\theta - 5\sin\theta + 2 > 0$, where $0 < \theta < 2\pi$, is

A. $\left(0, \frac{\pi}{6}\right) \cup \left(\frac{5\pi}{6}, 2\pi\right)$

B. $\left(\frac{\pi}{8}, \frac{5\pi}{6}\right)$

C. $\left(0, \frac{\pi}{8}\right) \cup \left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$

D. $\left(\frac{41\pi}{48}, \pi\right)$

Answer: A

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41. The value of θ , lying between $\theta = 0$ and $\theta = \frac{\pi}{2}$ and satisfying the equation . $\begin{vmatrix} 1+\cos^2\theta & \sin^2\theta & 4\sin 4\theta \\ \cos^2\theta & 1+\sin^2\theta & 4\sin 4\theta \\ \cos^2\theta & \sin^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0, is$

A. $\frac{7\pi}{24}$

B. $\frac{5\pi}{24}$

C. $\frac{13\pi}{24}$

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

Answer: A

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42. In any triangle ABC, prove that:

$a^3 \cos(B-C) + b^3 \cos(C-A) + c^3 \cos(A-B) = 3abc$

A. 3abc

B. 2abc

C. abc

D. 5abc

Answer: B

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43. The number of distinct solutions of $\sec x \tan x = \sqrt{3}$, where $0 \leq x \leq 3\pi$ is

A. 1

B. 2

C. 3

D. 4

Answer: A

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44. The general solution of $\sec 4x - \sec 2x = 2$ is

A. $\frac{(2n+1)\pi}{10}, \frac{(2m+1)\pi}{2}, n, m \in l$

B. $\frac{(2n+1)\pi}{5}, \frac{(2m+1)\pi}{5}, n, m \in l$

C. $\frac{(2n+2)\pi}{10}, \frac{(2m+4)\pi}{2}, n, m \in l$

D. None of these

Answer: C

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45. If $\sin 3x 4 \sin x \sin(y+x)\sin(y-x)$, where $0 \leq x \leq \pi$, then the number of solutions of this equation in each quadrant, is

A. 10

B. 5

C. 1

D. 0

Answer: B

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46. The general solution of $\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$ is.

A. $n\pi + \frac{\pi}{8}$

B. $\frac{n\pi}{2} + \frac{\pi}{8}$

C. $(-1)^n \frac{n\pi}{2} + \frac{\pi}{8}$

D. $2n\pi + \cos^{-1}\frac{3}{2}$

Answer: C

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47. The values of x for $\sin x + \sqrt{3}\cos x = \sqrt{2}$ are

A. $2n\pi - \frac{5\pi}{12}$

B. $2n\pi - \frac{6\pi}{12}$

C. $2n\pi - \frac{\pi}{12}$

D. $2n\pi + \frac{\pi}{12}$

Answer: C

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48. The maximum and minimum values of $f(x) = 6\sin x \cos x + 4\cos 2x$ are respectively

A. 5,5

B. $-5, 5$

C. $5, \ -5$

D. $-4, 4$

Answer: C

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49. If $A = \sin^2\theta + \cos^4\theta$, for any value of θ , then the value of A is

A. $1 \leq A \leq 2$

B. $\frac{3}{4} \leq A \leq 1$

C. $\frac{13}{16} \leq A \leq 1$

D. $\frac{3}{4} \leq A \leq \frac{13}{16}$

Answer: B

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50. The minimum value of the expression $\sin\alpha + \sin\beta + \sin\gamma$, where α, β, γ are the real numbers satisfying $\alpha + \beta + \gamma = \pi$, is

A. positive

B. zero

C. negative

D. -3

Answer: C

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51. Find the minimum value of $\left(\sec^{-1}x\right)^2 + \left(\cos ec^{-1}x\right)^2$

A. $\frac{\pi^2}{2}$

B. $\frac{5\pi^2}{4}$

C. π^2

D. None of these

Answer: B

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52. If $x + \frac{1}{x} = 2$, the principal value of $\sin^{-1} x$ is

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

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

C. π

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

Answer: B

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53. If $x = \sin\left(2\tan^{-1}3\right)$ and $y = \sin\left(\frac{1}{2}\tan^{-1}\left(\frac{4}{3}\right)\right)$, then

A. $x > y$ and $y^2 = 1 - x$

B. $x < y$

C. $x > y$ and $y^2 = x$

D. $y^3 = 1 + x$

Answer: A

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54. The value of $\tan\left(2\tan^{-1}\frac{1}{5} - \frac{\pi}{4}\right)$ is

A. $\frac{7}{17}$

B. $\frac{-7}{17}$

C. $\frac{17}{7}$

D. $\frac{-17}{7}$

Answer: B

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55. The root of the equation $\tan^{-1}\left(\frac{x-1}{x+1}\right)+\tan^{-1}\left(\frac{2x-1}{2x+1}\right)=\tan^{-1}\left(\frac{23}{36}\right)$ is

A. $-\frac{3}{8}$

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

C. $\frac{3}{4}$

D. $\frac{4}{3}$

Answer: D

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56. If $x^2 + y^2 + z^2 = r^2$, then $\tan^{-1}\frac{xy}{zr} + \tan^{-1}\frac{yz}{xr} + \tan^{-1}\frac{zx}{yr} =$

A. π

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

C. 0

D. None of these

Answer: B

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57. The root of the equation $17x^2 + 17x\tan\left[2\tan^{-1}\left(\frac{1}{5}\right) - \frac{\pi}{4}\right] - 10 = 0$ is

A. $\frac{10}{7}$

B. -1

C. $-\frac{7}{17}$

D. 1

Answer: D

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58. In ΔABC, if 2s=a+b+c , then the value of $\frac{s(s-a)}{bc} - \frac{(s-b)(s-c)}{bc}$ is

A. sin A

B. cos A

C. tan A

D. None of these

Answer: B

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59. If $\cot^{-1}\sqrt{\cos\alpha} - \tan^{-1}\sqrt{\cos\alpha} = x$, then sin x equals

A. $\tan^2\left(\frac{\alpha}{2}\right)$

B. $\cot^2\left(\frac{\alpha}{2}\right)$

C. $\tan\alpha$

D. $\cot\left(\frac{\alpha}{2}\right)$

Answer: A

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60. If

$$\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - \ldots\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \ldots\right) = \frac{\pi}{2}$$

where, $0 < |x| < \sqrt{2}$, then x is equal to

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

B. 1

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

D. -1

Answer: B

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61. If $\sin^{-1}\left(\frac{4x}{x^2+4}\right)+2\tan^{-1}\left(-\frac{x}{2}\right)$ is independent of x, find the value of x

A. $-3 \leq x \leq 3$

B. $-2 \leq x \leq 2$

C. $-1 \leq x \leq 1$

D. $0 \leq x \leq 1$

Answer: B

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62. The angular elevation of a tower OP at a point A due south of it is 60° and at a point B due west of A, the elevation is 30°. If AB=3m, the height of the tower is

A. $3\sqrt{3}m$

B. $3\sqrt{14}m$

C. $\frac{3\sqrt{3}}{4}m$

D. $\frac{3\sqrt{6}}{4}m$

Answer: D

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63. The value of $\sin^{-1}\left\{\cos\left(\frac{43\pi}{5}\right)\right\}$ is

A. $\frac{3\pi}{5}$

B. $\frac{-7\pi}{5}$

C. $\frac{\pi}{10}$

D. $-\frac{\pi}{10}$

Answer: D

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64. If $3\tan^{-1}x + \cot^{-1}x = \pi$, then x is equal to

A. 0

B. 1

C. -1

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

Answer: B

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65. If $\left(\tan^{-1}x\right)^2 + \left(\cot^{-1}x\right)^2 = \frac{5\pi^2}{8}$, then the value of x is

A. -2

B. -3

C. -1

D. 2

Answer: C

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66. The value of $\tan\left\{\left(\cos^{-1}\left(-\frac{2}{7}\right)-\frac{\pi}{2}\right)\right\}$ is :

A. $\frac{2}{3\sqrt{5}}$

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

C. $\frac{1}{\sqrt{5}}$

D. $\frac{4}{5}$

Answer: A

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67. If $\tan^{-1}(x+3) - \tan^{-1}(x-3) = \sin^{-1}\left(\frac{3}{5}\right)$ then the value of x is

A. 3

B. 14

C. ± 4

D. 7

Answer: C

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68. If the area Δ of ΔABC is given by $\Delta = a^2 - (b-c)^2$, then : tan A =

A. $\frac{8}{14}$

B. $\frac{8}{13}$

C. $\frac{8}{15}$

D. $\frac{8}{17}$

Answer: C

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69. $\sin^{-1}\left(\frac{8}{17}\right)+\sin^{-1}\left(\frac{3}{5}\right)=$

A. $\tan^{-1}\frac{77}{35}$

B. $\tan^{-1}\frac{77}{36}$

C. $\tan^{-1}\frac{77}{37}$

D. $\tan^{-1}\frac{77}{26}$

Answer: B

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70. If $\alpha = \sin^{-1}\left(\cos\left(\sin^{-1}\right)x\right)\right)$ and $\beta = \cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)$, then find $\tan\alpha.\tan\beta$.

A. 1

B. 2

C. 3

D. 4

Answer: A

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71. The solution of $\tan\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right)$ is

A. $\frac{17}{6}$

B. $\frac{17}{7}$

C. $\frac{17}{5}$

D. $\frac{17}{4}$

Answer: A

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72. If $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right)=1$, then the value of x is

A. $\frac{1}{4}$

B. $\frac{1}{3}$

C. $\frac{1}{5}$

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

Answer: C

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73. The value of $\tan\left\{\frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\frac{1}{2}\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right\}$ is

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

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

C. $\frac{x+y}{1+xy}$

D. $\frac{x+y}{1-xy}$

Answer: D

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74. The sum of the radii of the circles, which are respectively inscribed and circumscribed about a polygon of n sides, whose side length is a, is

A. $\frac{1}{2}a\tan\left(\frac{\pi}{2n}\right)$

B. $\frac{1}{2}a\cot\left(\frac{\pi}{2n}\right)$

C. $\frac{1}{2}\cot\left(\frac{\pi}{3n}\right)$

D. $\frac{1}{2}\cot\left(\frac{\pi}{2n}\right)$

Answer: B

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75. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$, then the value of x is

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

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

C. $\frac{3\pi}{4}$

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

Answer: B

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76. The number of real solutions of $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$ is z ero b. one c. two d. infinite

A. 2,3

B. 1,0

C. $-1, 0$

D. $3, 1$

Answer: C

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77. In ΔABC, if $r_1 = r_2 + r_3 + r$, then triangle is

A. right angled triangle

B. equilateral triangle

C. isosceles triangle

D. None of these

Answer: A

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78. The value of $\cot\left(\cos ec^{-1}\frac{5}{3}+\tan^{-1}\frac{2}{3}\right)$ is

A. $\frac{5}{17}$

B. $\frac{6}{17}$

C. $\frac{3}{17}$

D. $\frac{4}{17}$

Answer: B

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79. If $\sin^{-1}\left(\frac{x}{5}\right)+\cos ec^{-1}\left(\frac{5}{4}\right)=\frac{\pi}{2}$, then the value of x is

A. 1

B. 3

C. 4

D. 5

Answer: B

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80. If $\cos^{-1} x - \cos^{-1} \frac{y}{2} = \alpha$, then $4x^2 - 4xy\cos\alpha + y^2$ is equal to

A. $-4\sin^2\alpha$

B. $4\sin^2\alpha$

C. 4

D. $2\sin 2\alpha$

Answer: B

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81. In ΔABC, if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$, then the triangle is

A. right angled

B. obtuse angled

C. equilateral

D. isosceles

Answer: C

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82. The angles of a triangle ABC are in the ratio $3:5:4$ then $a+b+c\sqrt{2}=$

A. 2b

B. 2c

C. 3b

D. 2a

Answer: C

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83. In ΔABC, if $\angle A = 30^\circ, \angle B = 45^\circ$ and $a = 1$, then the values of b and c are respectively

A. $\sqrt{2}, \frac{\sqrt{3}+1}{\sqrt{2}}$

B. $\sqrt{2}, \frac{\sqrt{3}-1}{\sqrt{2}}$

C. $\sqrt{3}, \frac{\sqrt{3}-1}{\sqrt{2}}$

D. $\sqrt{2}, \frac{\sqrt{3}+2}{\sqrt{2}}$

Answer: A

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84. Let ABC be a triangle such that $\angle A = 45^\circ, \angle B = 75^\circ,$ then $a + c\sqrt{2}$ is equal to

A. 2a

B. 2a+1

C. 3a

D. 2a-1

Answer: A

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85. If a^2, b^2 and c^2 are in AP, then cotA, cotB and cotC are in

A. AP

B. GP

C. HP

D. AGP

Answer: A

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86. In a ΔABC, $\left(\frac{b}{c}+\frac{c}{b}\right)\cos A+\left(\frac{a}{b}+\frac{b}{a}\right)\cos C+\left(\frac{a}{c}+\frac{c}{a}\right)\cos B$ is equal to

A. 4

B. 5

C. 3

D. 2

Answer: C

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87. If in a ΔABC, the tangent of half the difference of two angles is one-third the tangent of half the sum of the angles. Then, the ratio of the sides opposite to the angles is

A. $2:1$

B. $1:2$

C. $3:1$

D. $1:1$

Answer: A

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Bitsat Archives

1. Number of roots of the equation $|\sin x \cos x| + \sqrt{2 + tan^2 x + \cot^2 x} = \sqrt{3}, x \in [0, 4\pi] are$

A. 1

B. 2

C. 3

D. None of these

Answer: D

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2. The greatest and least values of $\left(\sin^{-1}x\right)^2+\left(\cos^{-1}x\right)^2$ are respectively

A. $\frac{\pi^2}{4}$ and 0

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

C. $\frac{5\pi^2}{4}$ and $\frac{\pi^2}{8}$

D. $\frac{\pi^2}{4}$ and $\frac{-\pi^2}{4}$

Answer: C

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3. Find the number of solutions of $\cos x=|1+\sin x|, 0\le x\le 3\pi$

A. 1

B. 2

C. 3

D. 4

Answer: C

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4. The vaue of the expression $\sin\left[\cot^{-1}\left\{\cos\left(\tan^{-1}\right)\right\}\right]$ is

A. 0

B. 1

C. $\frac{1}{\sqrt{3}}$

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

Answer: D

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5. An object is observed from the points A, B and C lying in a horizontal straight line which passes directly underneath the object. The angular elevation at B is twice that at A and at C three times that at A. If $AB = a$, BCb then the height of the object is

A. $\frac{3a}{2b}\sqrt{(a+b)(3b-a)}$

B. $\frac{3}{2b}\sqrt{(a+b)(3a-b)}$

C. $\frac{a}{2b}\sqrt{(a+b)(3b-a)}$

D. None of these

Answer: C

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6. If $\tan 20^\circ = \lambda$, then $\frac{\tan 160^\circ - \tan 110^\circ}{1 + (\tan 160^\circ)(\tan 110^\circ)} =$

A. $\left(\frac{1-p^2}{2p}\right)$

B. $\left(\frac{2p}{1+p^2}\right)$

C. $\left(\frac{1+p}{2p}\right)$

D. $\left(\frac{1-p}{2p}\right)$

Answer: A

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7. The angles of a triangle are in AP and the least angle is 30°. What is the greatest angle (in radian) ?

A. $\frac{7\pi}{12}$

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

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

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

Answer: D

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8. If $A + B + C = 90^\circ$, then $\frac{\cot A + \cot B + \cot C}{\cot A \cot B \cot C}$ is equal to

A. 1

B. cot A cos B cot C

C. -1

D. 0

Answer: A

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9. In ΔABC, if a=2, b=3 and $\sin A = \frac{2}{3}$. Then, cos C is equal to

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

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

C. $\frac{2}{\sqrt{13}}$

D. $\frac{1}{\sqrt{13}}$

Answer: B

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10. If $4\sin^{-1}x + \cos^{-1}x = \pi$, then x is equal to

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

B. 2

C. 1

D. $\frac{1}{3}$

Answer: A

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11. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$, then the value of $\theta + \phi$ is

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

B. π

C. 0

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

Answer: D

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12. If $\sin\theta = \frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$, $\forall n \in l$, then most general values of θ is

A. $2n\pi + \frac{\pi}{6}, \forall n \in l$

B. $2n\pi + \frac{\pi}{4}, \forall n \in l$

C. $2n\pi + \frac{\pi}{3}, \forall n \in l$

D. $2n\pi + \frac{\pi}{3}, \forall n \in l$

Answer: A

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13. The function sin x + cos x is maximum, when x is equal to

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

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

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

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

Answer: B

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14. Principal value of $\sin^{-1}.\left(-\frac{\sqrt{3}}{2}\right)$ is

A. $-\frac{2\pi}{3}$

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

C. $\frac{4\pi}{3}$

D. $\frac{5\pi}{3}$

Answer: B

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15. If angles A,B and C are in AP, then $\frac{a+c}{b}$ is equal to

A. $2\sin\left(\frac{A-C}{2}\right)$

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

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

D. $\sin\left(\frac{A-C}{2}\right)$

Answer: B

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

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

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

C. $\cos\frac{\pi}{8}$

D. $\frac{1+\sqrt{2}}{2\sqrt{2}}$

Answer: B

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17. The solution of the equation $\sec\theta - \cos ec\theta = \frac{4}{3}$ is

A. $\frac{1}{2}\left[n\pi + (-1)^n \sin^{-1}\frac{3}{4}\right]$

B. $\frac{n\pi}{2} + (-1)^n \sin^{-1}\frac{3}{4}$

C. $n\pi + (-1)^n \sin^{-1}\frac{3}{4}$

D. None of these

Answer: A

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18. What is the minimum value of $9\tan^2\theta + 4\cot^2\theta$?

A. 13

B. 9

C. 6

D. 12

Answer: D

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19. If $a \leq \sin^{-1}x + \cos^{-1}x + \tan^{-1}x \leq b$, then

A. $a = 0, b = \pi$

B. $a = 0, b = \frac{\pi}{2}$

C. $a = \frac{\pi}{2}, b = \pi$

D. None of these

Answer: A

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20. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$ and $\cos^{-1} x - \cos^{-1} y = \frac{\pi}{3}$, then $(x, y) =$

A. $(0, 1)$

B. $(1/2, 1)$

C. $(1, 1/2)$

D. $(\sqrt{3}/2, 1)$

Answer: B

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21. The sum of inradius and circumradius of incircle and circumcircle of a regular polygon of side n is

A. $\frac{a}{4}\cot\frac{\pi}{2n}$

B. $a\cot\frac{\pi}{n}$

C. $\frac{a}{2}\cot\frac{\pi}{2n}$

D. $a\cot\frac{\pi}{2n}$

Answer: C

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22. If ΔABC if $\angle A=\frac{\pi}{2}$ then $\cos^2 B+\cos^2 C$ equals

A. -2

B. -1

C. 1

D. 0

Answer: C

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23. In ΔABC, if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and $a = 2$, then area of the triangle is

A. 1 sq unit

B. 2 sq units

C. $\frac{\sqrt{3}}{2}$ sq units

D. $\sqrt{3}$ sq units

Answer: D

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24. A longer side of a parallelogram is 10 cm and the shorter is 6 cm. If the longer diagonal makes an angle 30° with the longer side, then the length of the longer diagonal (in cm) is

A. $5\sqrt{3}+\sqrt{11}$

B. $4\sqrt{3}+\sqrt{11}$

C. $5\sqrt{3}+\sqrt{13}$

D. $5\sqrt{3}-1$

Answer: A

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25. The value of $\sqrt{3}\,\text{cosec}\,20^\circ - \sec 20^\circ$ is equal to:

A. 2

B. $2\sin 20^\circ \cdot \text{cosec}\,40^\circ$

C. 4

D. $4\sin 20^\circ \cdot \cos ec40^\circ$

Answer: C

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26. If $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$ then which of the following is equal to 1 ?

A. $\tan 2\theta$

B. $\tan 3\theta$

C. $\tan^2\theta$

D. $\tan^3\theta$

Answer: B

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27. $\{x \in R : \cos 2x + 2\cos^2 x = 2\}$ is equal to

A. $\left\{2n\pi + \frac{\pi}{3} : n \in Z\right\}$

B. $\left\{n\pi \pm \frac{\pi}{6} : n \in Z\right\}$

C. $\left\{n\pi + \frac{\pi}{3} : n \in Z\right\}$

D. $\left\{2n\pi - \frac{\pi}{3} : n \in Z\right\}$

Answer: B

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28. If $\sin^{-1}\left(\frac{3}{x}\right) + \sin^{-1}\left(\frac{4}{x}\right) = \frac{\pi}{2}$, then x is equal to

A. 3

B. 5

C. 7

D. 11

Answer: B

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29. In ΔABC, if $\frac{1}{b+c}+\frac{1}{c+a}=\frac{3}{a+b+c}$, then C is equal to

A. 90°

B. 60°

C. 45°

D. 30°

Answer: B

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30. In a triangle , if $r_1=2r_2=3r_3$, then $\frac{a}{b}+\frac{b}{c}+\frac{c}{a}$ is equal to

A. $\frac{75}{60}$

B. $\frac{155}{60}$

C. $\frac{176}{60}$

D. $\frac{191}{60}$

Answer: D

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31. From the top of a hill h metres high the angles of depression of the top and the bottom of a pillar are α and β respectively. The height (in metres) of the pillar is

A. $\frac{h(\tan\beta - \tan\alpha)}{\tan\beta}$

B. $\frac{h(\tan\alpha - \tan\beta)}{\tan\alpha}$

C. $\frac{h(\tan\beta + \tan\alpha)}{\tan\beta}$

D. $\frac{h(\tan\beta + \tan\alpha)}{\tan\alpha}$

Answer: A

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32. The number of solutionsof the equation

$1 + \sin x \sin^2 \frac{x}{2} = 0$ in $[-\pi, \pi]$ is

A. zero

B. one

C. two

D. three

Answer: A

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33. The solution set of the equation $\sin^{-1} x = 2\tan^{-1} x$ is

A. $\{1, 2\}$

B. $\{-1, 2\}$

C. $\{-1, 1, 0\}$

D. $\left\{1, \frac{1}{2}, 0\right\}$

Answer: C

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34. If $\cos A + \cos B = a$, and $\sin A + \sin B = b$ where $a, b \neq 0$, then $\sin(A + B)$ is equal to

A. $\frac{a^2 + b^2}{2}$

B. $\frac{a^2 - b^2 + 2}{2}$

C. $\frac{a^2 + b^2 - 2}{2}$

D. None of these

Answer: C

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35. In ΔABC, $(a-b)^2 \frac{\cos^2(c)}{2} + (a+b)^2 \sin^2 \frac{c}{2} =$

A. a^2

B. b^2

C. c^2

D. None of these

Answer: C

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36. The horizontal distance between two towers is 60 m and the angle of depression of the top of the first tower as seen from the top to the second is 30. If the height of the second tower is 150 m, then the height of the first tower is

A. $90m$

B. $\left(150 - 60\sqrt{3}\right)m$

C. $\left(150+20\sqrt{3}\right)m$

D. None of these

Answer: C

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37. If $12\cot^2\theta - 31\cos ec\theta + 32 = 0$, then the value of $\sin\theta$ is

A. $\frac{3}{4}$ or 1

B. $\frac{2}{3}$ or $-\frac{2}{3}$

C. $\frac{4}{5}$ or $\frac{3}{4}$

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

Answer: C

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38. The general solution of $\sin x - \cos x = \sqrt{2}$, for any integer n is

A. $n\pi$

B. $2n\pi + \frac{3\pi}{4}$

C. $2n\pi$

D. $(2n+1)\pi$

Answer: B

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39. In ΔABC, if the sides are a=3, b=5 and c=4, then $\sin\frac{B}{2} + \cos\frac{B}{2}$ is equal to

A. $\sqrt{2}$

B. $\frac{\sqrt{3}+1}{2}$

C. $\frac{\sqrt{3}-1}{2}$

D. 1

Answer: A

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40. $\sin^{-1}(1-x) - 2\sin^{-1} x = \frac{\pi}{2}$, then x is equal to

A. $\{0, -1/2\}$

B. $\{1/2, 0\}$

C. $\{0\}$

D. $\{-1, 0\}$

Answer: C

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41. If θ is an acute angle and $\sin\frac{\theta}{2} = \sqrt{\frac{x-1}{2x}}$ then $\tan\theta$ is equal to

A. $x^2 - 1$

B. $\sqrt{x^2-1}$

C. $\sqrt{x^2+1}$

D. x^2+1

Answer: B

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