MATHS

BOOKS - NCERT MATHS (HINGLISH)

TRIGONOMETRIC FUNCTIONS

Short Answer Type Questions

1. Prove that $\dfrac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \dfrac{1 + \sin A}{\cos A}$.

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2. If $\dfrac{2 \sin \alpha}{1 + \cos \alpha + \sin \alpha} = y$, then prove that $\dfrac{1 - \cos \alpha + \sin \alpha}{1 + \sin \alpha}$ is also equal to y.

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3. If $m \sin \theta = n \sin(\theta + 2\alpha)$, then prove that $\tan(\theta + \alpha)\cot \alpha =$

A. $\dfrac{m + n}{2m}$

B. $\dfrac{m - n}{2n}$

C. $\dfrac{m + n}{m - n}$

D. $\dfrac{m - n}{m + n}$

Answer: C

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

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5. If $\tan x = \dfrac{b}{a}$, then find the value of $\sqrt{\dfrac{a+b}{a-b}} + \sqrt{\dfrac{a-b}{a+b}}$.

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6. Prove that $\cos\theta\cos\dfrac{\theta}{2} - \cos 3\theta\cos\dfrac{9\theta}{2} = \sin 7\theta\sin 8\theta$.

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7. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then show that $a^2 + b^2 = m^2 + n^2$.

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8. The value of $\tan 22°\,30'$

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

B. $\dfrac{\sqrt{2}}{1+\sqrt{2}}$

C. $\dfrac{1}{\sqrt{2}+1}$

D. $\dfrac{1}{\sqrt{2}-1}$

Answer: C

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9. Prove that $\sin 4A = 4\sin A \cos^3 A - 4\sin^3 A$

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10. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then prove that $m^2 - n^2 = 4\sin\theta\tan\theta$.

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11. If $\tan(A + B)p$ and $\tan(A - B) = q$, then show that
$\tan 2A = \dfrac{p + q}{1 - pq}$

12. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$, then prove that
$\cos 2\alpha + \cos 2\beta = -2\cos(\alpha + \beta)$.

13. If $\dfrac{\sin(x + y)}{\sin(x - y)} = \dfrac{a + b}{a - b}$, then show that $\dfrac{\tan x}{\tan y} = \dfrac{a}{b}$.

14. If $\tan\theta = \dfrac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$ then show that $\sin\alpha + \cos\alpha = \sqrt{2}\cos\theta$.

15. If $\sin\theta + \cos\theta = 1$, then find the general value of θ.

A. $n\pi$

B. $\dfrac{n\pi}{2}$

C. 0

D. none of these

Answer: B

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16. Find the most general value of θ satisfyingn the equation $\tan\theta = -1$ and $\cos\theta = \dfrac{1}{\sqrt{2}}$.

A. $\theta = 2n\pi + \dfrac{7\pi}{4}$.

B. $\theta = n\pi + \dfrac{7\pi}{4}$.

C. $\theta = 2n\pi + \dfrac{\pi}{4}$.

D. none of these

Answer: A

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17. If $\cot \theta + \tan \theta = 2\mathrm{cosec}\theta$, then find the general value of θ.

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

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19. If $\sec x \cos 5x + 1 = 0$, where $0 < x \le \dfrac{\pi}{2}$, then find the value of x.

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1. If $\sin(\theta + \alpha) = a \, and \, \sin(\theta + \beta) = b,$ prove that

$\cos 2(\alpha - \beta) - 4ab \cos(\alpha - \beta) = 1 - 2a^2 - 2b^2$

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2. If $\cos(\theta + \phi) = m \cos(\theta - \phi),$ then prove that

$\tan \theta = \dfrac{1 - m}{1 + m} \cot \phi.$

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3. Find the value of the expression

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

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4. If $a\cos 2\theta + b\sin 2\theta = c$ has α and β as its roots, then prove that $\tan\alpha + \tan\beta = \dfrac{2b}{a+c}$.

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5. If $x = \sec\phi - \tan\phi$ and $y = \mathrm{cosec}\phi + \cot\phi$, then show that $xy + x - y + 1 = 0$.

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6. If θ lies in the first quardrant and $\cos\theta = \dfrac{8}{17}$, then find the value of $\cos(30° + \theta) + \cos(45° - \theta) + \cos(120° - \theta)$.

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

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8. Find the general solution of the equation

$5\cos^2\theta + 7\sin^2\theta - 6 = 0.$

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9. Find the gereral of the equation

$\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x.$

A. $x = \dfrac{n\pi}{2} + \dfrac{\pi}{2}$

B. $x = \dfrac{n\pi}{2} + \dfrac{\pi}{4}$

C. $x = \dfrac{n\pi}{2} + \dfrac{\pi}{6}$

D. $x = \dfrac{n\pi}{2} + \dfrac{\pi}{8}$

Answer: D

10. find the general solution of the equation $\left(\sqrt{3} - 1\right)\sin\theta + \left(\sqrt{3} + 1\right)\cos\theta = 2$

Objective Type Questions

1. If $\sin\theta + \cos ec\theta = 2$, then $\sin^2\theta + \cos ec^2\theta$ is equal to

A. 1

B. 4

C. 2

D. None of these

Answer: C

2. If $f(x) = \cos^2 x + \sec^2 x$, then

   A. f(x) < 1

   B. f(x) $= 1$

   C. $2 <$ f(x) < 1

   D. f(x) ≥ 2

Answer: D

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

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

B. π

C. 0

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

Answer: D

4. Which of the following is not correct ?

A. $\sin\theta = -\dfrac{1}{5}$

B. $\cos\theta = 1$

C. $\sec\theta = \dfrac{1}{2}$

D. $\tan\theta = 20$

Answer: C

5. The value of $\tan 1° \tan 2° \tan 3° ... \tan 89°$ is

A. 0

B. 1

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

D. Not defined

Answer: B

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6. The value of $\dfrac{1 - \tan^2 15°}{1 + \tan^2 15°}$ is

A. 1

B. $\sqrt{3}$

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

D. 2

Answer: C

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

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

B. 0

C. 1

D. -1

Answer: B

8. If $\tan \theta = 3$ and θ lies in third quadrant then $\sin \theta =$

A. $\dfrac{1}{\sqrt{10}}$

B. $-\dfrac{1}{\sqrt{10}}$

C. $\dfrac{-3}{\sqrt{10}}$

D. $\dfrac{3}{\sqrt{10}}$

Answer: C

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9. $\tan 75 - \cot 75 =$

A. $2\sqrt{3}$

B. $2 + \sqrt{3}$

C. $2 - \sqrt{3}$

D. 1

Answer: A

10. Which of the following is correct ?

A. $\sin 1° > \sin 1$

B. $\sin 1° < \sin 1$

C. $\sin 1° = \sin 1$

D. $\sin 1° = \dfrac{\pi}{18°}\sin 1$

Answer: B

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

A. $\dfrac{\pi}{2}$

B. $\dfrac{\pi}{3}$

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

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

Answer: D

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12. The minimum of $3\cos x + 4\sin x + 8$ is

A. 5

B. 9

C. 7

D. 3

Answer: D

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13. $\tan 3A - \tan 2A - \tan A =$ is equal to

A. $\tan 3A \tan 2A \tan A$

B. $-\tan 3A \tan 2A \tan A$

C. $\tan A \tan 2A - \tan 2A \tan 3A - \tan 3A \tan A$

D. None of the above

Answer: A

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14. The value of $\sin(45° + \theta) - \cos(45° - \theta)$ is

A. $2 \cos \theta$

B. $2 \sin \theta$

C. 1

D. 0

Answer: D

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15. The value of $\cot\left(\dfrac{\pi}{4} + \theta\right)\cot\left(\dfrac{\pi}{4} - \theta\right)$ is

A. -1

B. 0

C. 1

D. Not defined

Answer: C

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

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

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

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

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

Answer: B

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17. The value of $\cos 12° + \cos 84° + \cos 156° + \cos 132°$ is

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

B. 1

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

D. $\dfrac{1}{8}$

Answer: C

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18. If $\tan A = \dfrac{1}{2}$ and $\tan B = \dfrac{1}{3}$, then $\tan(2A + B)$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

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19. The value of $\sin \dfrac{\pi}{10} \sin \dfrac{13\pi}{10}$ is

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

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

C. $-\dfrac{1}{4}$

D. 1

Answer: C

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20. The value of $\sin 50° - \sin 70° + \sin 10°$ is

A. 1

B. 0

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

D. 2

Answer: B

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21. If $\sin \theta + \cos \theta = 1$, then the value of $\sin 2\theta$ is

A. 1

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

C. 0

D. -1

Answer: C

22. If $\alpha + \beta = \dfrac{\pi}{4}$ then $(1 + \tan \alpha)(1 + \tan \beta) =$

A. 1

B. 2

C. -2

D. Not defined

Answer: B

23. If $\sin\theta = \dfrac{-4}{5}$ and θ lies in third quadrant, then the value of $\cos\dfrac{\theta}{2}$ is

A. $\dfrac{1}{5}$

B. $-\dfrac{1}{\sqrt{10}}$

C. $-\dfrac{1}{\sqrt{5}}$

D. $\dfrac{1}{\sqrt{10}}$

Answer: C

24. The number of solutions of equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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25. The value of $\sin\left(\dfrac{\pi}{18}\right) + \sin\left(\dfrac{\pi}{9}\right) + \sin\left(\dfrac{2\pi}{9}\right) + \sin\left(\dfrac{5\pi}{18}\right)$ is

A. $\sin\dfrac{7\pi}{18} + \sin\dfrac{4\pi}{9}$

B. 1

C. $\cos\dfrac{\pi}{6} + \cos\dfrac{3\pi}{7}$

D. $\cos\dfrac{\pi}{9} + \sin\dfrac{\pi}{9}$

Answer: A

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26. If A lies in the second quadrant and $3\tan A + 4 = 0$, then find the value of $2\cot A - 5\cos A + \sin A$.

A. $\dfrac{-53}{10}$

B. $\dfrac{23}{10}$

C. $\dfrac{37}{10}$

D. $\dfrac{7}{10}$

Answer: B

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27. The value of $\cos^2 48° - \sin^2 12°$ is

A. $\dfrac{\sqrt{5}+1}{8}$

B. $\dfrac{\sqrt{5}-1}{8}$

C. $\dfrac{\sqrt{5}+1}{5}$

D. $\dfrac{\sqrt{5}+1}{2\sqrt{2}}$

Answer: A

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28. If $\tan\alpha = \dfrac{1}{7}$ and $\tan\beta = \dfrac{1}{3}$, $then,$ $\cos 2\alpha$ is equal to

A. $\sin 2\beta$

B. $\sin 4\beta$

C. $\sin 2\beta$

D. $\cos 2\beta$

Answer: B

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29. If $\tan \theta = \dfrac{a}{b}$, then $b \cos 2\theta + a \sin 2\theta$ is equal to

A. a

B. b

C. $\dfrac{a}{b}$

D. None of these

Answer: B

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30. If for real values of x, $\cos \theta = x + \dfrac{1}{x}$, then

A. θ is an acute angle

B. θ is right angle

C. θ is an obtuse angle

D. No value of θ is possible

Answer: D

31. The value of $\dfrac{\sin 50°}{\sin 130°}$ is ..... .

A. 0

B. 1

C. -1

D. None of these

Answer: B

Fillers

1. If $K = \sin\left(\dfrac{\pi}{18}\right)\sin\left(\dfrac{5\pi}{18}\right)\sin\left(\dfrac{7\pi}{18}\right)$, then the numerical value of K is____

2. If $\tan A = \dfrac{1 - \cos B}{\sin B}$, then $\tan 2A = \tan B$

3. If $\sin x + \cos x = a$, then

(i) $\sin^6 x + \cos^6 x = $ .... .

(ii) $|\sin x - \cos x| = $ .... .

4. In a triangle ABC, $C = 90°$, then the equation whose roots are $\tan A, \tan B$ is

5. $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x) =$

6. Given x > 0, then value of $f(x) = -3\cos\sqrt{3 + x + x^2}$ lie in the interval ....

7. The maximum distance of a point on the graph of the function $y = \sqrt{3}\sin x + \cos x$ from X-axis is

True False

1. If $\tan A = \dfrac{1 - \cos B}{\sin B}$, then $\tan 2A = \tan B$

2. The equality $\sin A + \sin 2A + \sin 3A = 3$ holds for some real value of A.

3. $\sin 10^\circ$ is greater than $\cos 10^\circ$.

4. $\cos \dfrac{2\pi}{15} \cos \dfrac{4\pi}{15} \cos \dfrac{8\pi}{15} \cos \dfrac{16\pi}{15} = \dfrac{1}{16}$

5. One value of θ which satisfies the equation $\sin^4 \theta - 2\sin^2 \theta - 1$ lies between 0 and 2π.

6. If $\operatorname{cosec} x = 1 + \cot x$, then $x = 2n\pi, 2n\pi + \dfrac{\pi}{2}$

7. If $\tan \theta + \tan 2\theta + \sqrt{3}\tan \theta \tan 2\theta = \sqrt{3}$, then $\theta = \dfrac{n\pi}{3} + \dfrac{\pi}{9}$.

8. If $\tan(\pi \cos \theta) = \cot(\pi \sin \theta)$, then $\cos\left(\theta - \dfrac{\pi}{4}\right) = \pm \dfrac{1}{2\sqrt{2}}$.

9. In the following match each item given under the Column I to its

correct answer given under the Column II.

Column I	Column II
(i) $\sin(x + y)\sin(x - y)$	(a) $\cos^2 x - \sin^2 y$
(ii) $\cos(x + y)\cos(x - y)$	(b) $1 - \tan\theta / 1 + \tan\theta$
(iii) $\cot\left(\dfrac{\pi}{4} + \theta\right)$	(c) $1 + \tan\theta / 1 - \tan\theta$
(iv) $\tan\left(\dfrac{\pi}{4} + \theta\right)$	(d) $\sin^2 x - \sin^2 y$