MATHS

BOOKS - NCERT MATHS (ENGLISH)

INTRODUCTION TO TRIGoNOMETRY AND ITS APPLICATIONS

Multiple Choice Questions

1. If $\cos A = \dfrac{4}{5}$, then the value of $\tan A$ is

A. $\dfrac{3}{5}$

B. $\dfrac{3}{4}$

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

D. $\dfrac{5}{3}$

Answer: B

2. if $\sin A = \dfrac{1}{2}$, then the value of $\cot A$

A. $\sqrt{3}$

B. $\dfrac{1}{\sqrt{3}}$

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

D. 1

Answer: A

3. The value of the expression

$$\cos ec(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)$$

is

A. -1

B. 0

C. 1

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

Answer: B

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4. If $\sin\theta = \dfrac{a}{b}$, then $\cos\theta$ is equal to

A. $\dfrac{b}{\sqrt{b^2 - a^a}}$

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

C. $\dfrac{\sqrt{b^2 - a^2}}{b}$

D. $\dfrac{a}{\sqrt{b^2 - a^2}}$

Answer: C

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5. If $\cos(\alpha + \beta) = 0$, then $\sin(\alpha - \beta)$ can be reduced to

A. $\cos \beta$

B. $\cos 2\beta$

C. $\sin \alpha$

D. $\sin 2\alpha$

Answer: B

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

A. 0

B. 1

C. 2

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

Answer: B

7. If $\cos 9\alpha = \sin \alpha$ and $9\alpha < 90°$, then the value of $\tan 5\alpha$ is

A. $\dfrac{1}{\sqrt{3}}$

B. $\sqrt{3}$

C. 1

D. 0

Answer: C

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8. If $\triangle ABC$ is right angled at C, then the value of $\cos(A + B)$ is

A. 0

B. 1

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

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

Answer: A

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9. If $\sin A + \sin^2 A = 1,$ then the value of $\cos^2 A + \cos^4 A$ is

A. 1

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

C. 2

D. 3

Answer: A

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10. If $\sin\alpha = \dfrac{1}{2}$ and $\cos\beta = \dfrac{1}{2}$, then the value of $(\alpha + \beta)$ is

A. $0°$

B. $30°$

C. $60°$

D. $90°$

Answer: D

11. Find the value of

$$\left[\frac{\sin^2 22° + \sin^2 68°}{\cos^2 22° + \cos^2 68°} + \sin^2 63° + \cos 63° \sin 27° \right]$$

A. 3

B. 2

C. 1

D. 0

Answer: B

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12. If $4 \tan \theta = 3,$ then $\left(\dfrac{4 \sin \theta - \cos \theta}{4 \sin \theta + \cos \theta} \right)$ is equal to

A. $\dfrac{2}{3}$

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

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

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

Answer: C

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13. if $\sin\theta - \cos\theta = 0$, then the value of $\left(\sin^4\theta + \cos^4\theta\right)$

A. 1

B. $\dfrac{3}{4}$

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

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

Answer: C

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14. Find the value of $\sin(45° + \theta) - \cos(45° - \theta)$

A. $2\cos\theta$

B. 0

C. $2\sin\theta$

D. 1

Answer: B

15. A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then find the angle of elevation of the sun.

A. $60°$

B. $45°$

C. $30°$

D. $90°$

Answer: A

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Very Short Answer Type Questions

1. Prove that : $\dfrac{\tan 47°}{\cot 43°} = 1$

2. State True or False: The value of the expression $\left(\cos^2 23° - \sin^2 67°\right)$ is positive.

3. State True or False:

The value of the expression $\left(\sin 80° - \cos 80°\right)$ is negative.

4. If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A =$

5. $(\tan\theta + 2)(2\tan\theta + 1) = 5\tan\theta + \sec^2\theta$

A. $5\tan\theta + \sec\theta$

B. $5\tan\theta + 2\sec^2\theta$

C. $5\tan^2\theta + \sec^2\theta$

D. none of these

Answer: B

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6. If the length of the shadow of a tower is increasing, then the angle of elevation of the Sun is also increasing. Is it true? Justify your answer.

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7. If a man standing on a platform 3 m above the surface of a lake observes a cloud and its reflection in the lake, then the angle of elevation of the cloud is equal to the angle of depression of its reflection.

8. The value of $2\sin\theta$ can be $a + \dfrac{1}{a}$, where a is a positive number and $a \neq 1$.

9. $\cos\theta = \dfrac{a^2 + b^2}{2ab}$, where a and b are two distinct numbers such that $ab > 0$.

10. The angle of elevation θ of the top of a tower is $30°$. If the height of the tower is doubled, then new $\tan\theta$ will be

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

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

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

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

Answer: D

11. If the height of a tower and the distance of the point of observation from its foot, both are increased by 10%, then the angle of elevation of its top remains unchanged.

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1. $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\cos ec\theta$

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2. Prove that $\dfrac{\tan A}{1+\sec A} - \dfrac{\tan A}{1-\sec A} = 2\cos ecA$

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3. If $\tan A = \dfrac{3}{4}$, then $\sin A \cos A = \dfrac{12}{25}$.

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4. $(\sin \alpha + \cos \alpha)(\tan \alpha + \cot \alpha) = \sec \alpha + \cos ec\alpha$

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5. Prove that

$(\sqrt{3} + 1)(3 - \cot 30°) = \tan^3 (60)° - 2\sin 60°$

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6. Show that 1+$\cot^2 \alpha$ / (1+cos $ec\,\alpha$)=cos $ec\,\alpha$

7. $\tan\theta + \tan(90° - \theta) = \sec\theta \times \sec(90° - \theta)$

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8. Find the angle of elevation of the Sun when the shadow of a pole $h\ m$ high is $\sqrt{3}h\ m$ long.

    A. $30°$

    B. $45°$

    C. $60°$

    D. $90°$

Answer: A

9. If $\sqrt{3}\tan\theta = 1$ then find value of $\sin^2\theta - \cos^2\theta$

10. A ladder 15 m long just reaches the top of a vertical wall. If the ladder makes an angle of 60^0 with the wall, then the height of the wall is $15\sqrt{3}m$ (b) $\dfrac{15\sqrt{3}}{2}m$ (c) $\dfrac{15}{2}m$ (d) $15m$

11. Simplify: $\left(1 + \tan^2\theta\right)\left(1 - \sin\theta\right)\left(1 + \sin\theta\right)$

12. If $2\sin^2\theta - \cos^2\theta = 2,$ find the value of θ.

13.   Evaluate   :

$$\frac{\cos^2(45+\theta) + \cos^2(45-\theta)}{\tan(60°+\theta)\tan(30°-\theta)} + \cos ec(75°+\theta) - \sec(15°-\theta)$$

14. An observer, $1.5m$ tall, is $20.5m$ away from a tower $22m$ high. Determine the angle of elevation of the top of the tower from the eye of the observer.

A. $60°$

B. $45°$

C. $30°$

D. $90°$

Answer: B

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15. Prove the following identity:

$\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$

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Long Answer Types Questions

1. If $\cos ec\theta + \cot \theta = p$, then prove that the $\cos \theta = \dfrac{p^2 - 1}{p^2 + 1}$

2. Prove that $\sqrt{\sec^2 \theta + \cos ec^2\theta} = \tan \theta + \cot \theta.$

3. The angle of elevation of the top of a tower from a certain point is 30° . If the observer moves 20 m towards the tower, the angle of elevation of the top of the tower increases by 15° . Then height of the tower is

4. If $1 + \sin^2 \theta = 3 \sin \theta \cos \theta,$ then prove that $\tan \theta = 1$ or $\dfrac{1}{2}.$

5. If $\sin\theta + 2\cos\theta = 1$, then prove that $2\sin\theta - \cos\theta = 2$.

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6. The angle of elevation of the top of a tower from two distinct points s and t from foot are complementary. Prove that the height of the tower is $\sqrt{st}$.

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7. The shadow of a tower standing on a level ground is found to be 40 m longer when the Suns altitude is 30° than when it is 60°. Find the height of the tower.

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8. A vertical tower Stands on a horizontal plane and is surmounted by a vertical flag staff of height h. At a point on the plane, the angles of Elevation of the bottom and the top of the flag staff are α and β respectively Prove that the height of the tower is $\dfrac{h \tan \alpha}{\tan \beta - \tan \alpha}$

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9. if $\tan \theta + \sec \theta = l$ then prove that $\sec \theta = \dfrac{l^2 + 1}{2l}$

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10. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \cos ec\theta = q$; show that $q(p^2 - 1) = 2p$

11. $If\, a\sin\theta + b\cos\theta = C,$ then prove that $a\cos\theta - b\sin\theta = \sqrt{a^2 + b^2 - c^2}$

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

13. The angle of elevation of the top of a tower 30 m high from the foot of another tower in the same plane is $60°$ and the angle of elevation of the top of the second tower from the foot of the first tower is $30°$. Find the distance between the two and also the height of the tower.

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14. From the top of a tower h m high, angles of depression of two objects, which are in line with the foot of the tower are α and $\beta(\beta > \alpha)$. Find the distance between the two objects.

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16. The angle of elevation of the top of a vertical tower from a point on the ground is 60º. From another point 10 m vertically above the first, its angle of elevation is 30º. Find the height of the tower.

17. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the height of the cloud is $\dfrac{h(\tan\beta + tan\alpha)}{\tan\beta - tan\alpha}$

18. The lower window of a house is at a height of 2m above the ground and its upper window is 4m vertically above the tower window. At certain instant the angles of elevation of a balloon from these windows are observed to be $60°$ and $30°$, respectively. Find the height of the balloon above the ground.

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