

NDA Previous Years' Trigonometry Questions

1. Consider the following statements :

1) $n \left[\sin^2 67 \frac{1^\circ}{2} - \sin^2 22 \frac{1^\circ}{2} \right] > 1$ for all positive integers $n \geq 2$.

2) If x is any positive real number, then $nx > 1$ for all positive integers $n \geq 2$.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

2. Consider the following statements :

1) $\tan^{-1} 1 + \tan^{-1} (0.5) = \pi/2$

2) $\sin^{-1} (1/3) + \cos^{-1} (1/3) = \pi/2$

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

3. Consider the following statements :

1) If 3θ is an acute angle such that $\sin 3\theta = \cos 2\theta$, then the measurement of θ in radian equals to $\frac{\pi}{10}$.

2) One radian is the angle subtended at the centre of a circle by an arc of the same circle whose length is equal to the diameter of that circle.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both I and 2

D. Neither 1 nor 2

4. Consider the following statements :

1) $\sin |x| + \cos |x|$ is always positive.

2) $\sin(x^2) + \cos(x^2)$ is always positive.

Which of the above statements is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

5. What is $\frac{\cot 224^\circ - \cot 134^\circ}{\cot 226^\circ + \cot 316^\circ}$ equal to?

A. $-\operatorname{cosec} 88^\circ$

B. $-\operatorname{cosec} 2^\circ$

C. $-\operatorname{cosec} 44^\circ$

D. $-\operatorname{cosec} 46^\circ$

6. What is $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ$ equal to?

A. 2

B. 1

C. $1/2$

D. 0

7. Consider the following statements :

1) Value of $\sin \theta$ oscillates between -1 and 1

2) Value of $\cos \theta$ oscillates between 0 and 1.

Which of the above statements is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

8. If x and y are positive and $xy > 1$, then what is $\tan^{-1} x + \tan^{-1} y$ equal to?

- A. $\tan^{-1}\left(\frac{x+y}{1-xy}\right)$
- B. $\pi + \tan^{-1}\left(\frac{x+y}{1-xy}\right)$
- C. $\pi - \tan^{-1}\left(\frac{x+y}{1-xy}\right)$
- D. $\tan^{-1}\left(\frac{x-y}{1+xy}\right)$

9. Consider the following statements :

- 1) There exists no triangle ABC for which $\sin A + \sin B = \sin C$
- 2) If the angles of a triangle are in the ratio 1 : 2 : 3, then its sides will be in the ratio $1 : \sqrt{3} : 2$.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

10. What is $\sin^{-1} \sin \frac{3\pi}{5}$ equal to?

- A. $\frac{3\pi}{5}$
- B. $\frac{2\pi}{5}$
- C. $\frac{\pi}{5}$
- D. None of the above

11. The complete solution of $3 \tan^2 x = 1$ is given by

Where $n \in \mathbb{Z}$

- A. $x = n\pi \pm \frac{\pi}{3}$
- B. $x = n\pi + \frac{\pi}{3}$ only

C. $x = n\pi \pm \frac{\pi}{6}$

D. $x = n\pi + \frac{\pi}{6}$ only

12. If $A + B + C = \pi$, then what is $\cos(A + B) + \cos C$ equal to?

- A. 0
- B. $2 \cos C$
- C. $\cos C - \sin C$
- D. $2 \sin C$

13. What is $\frac{1 + \sin A}{1 - \sin A} - \frac{1 - \sin A}{1 + \sin A}$ equal to?

- A. $\sec A - \tan A$
- B. $2 \sec A \cdot \tan A$
- C. $4 \sec A \cdot \tan A$
- D. $4 \operatorname{cosec} A \cdot \cot A$

14. What is the value of $\cos 36^\circ$?

- A. $\frac{\sqrt{5} - 1}{4}$
- B. $\frac{\sqrt{5} + 1}{4}$
- C. $\frac{\sqrt{10 + 2\sqrt{5}}}{4}$
- D. $\frac{\sqrt{10 - 2\sqrt{5}}}{4}$

15. What is $\sin^2(3\pi) + \cos^2(4\pi) + \tan^2(5\pi)$ equal to?

- A. 0
- B. 1
- C. 2
- D. 3

16. From an aeroplane above a straight road, the angles of depression of two positions at a distance 20 m apart on the road are observed to be 30° and 45° . The height of the aeroplane above the ground is :

- A. $10\sqrt{3}$ m
- B. $10(\sqrt{3} - 1)$ m
- C. $10(\sqrt{3} + 1)$ m
- D. 20 m

17. A ladder 9 m long reaches a point 9 m below the top of a vertical flagstaff. From the foot of the ladder, the elevation of the flagstaff is 60° . What is the height of the flagstaff?

- A. 9 m
- B. 10.5 m
- C. 13.5 m
- D. 15 m

18. What is the length of the chord of a unit circle which subtends an angle θ at the centre?

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

19. What is $\tan\left\{2\tan^{-1}\left(\frac{1}{3}\right)\right\}$ equal to?

- A. $\frac{2}{3}$
- B. $\frac{3}{4}$
- C. $\frac{3}{8}$
- D. $\frac{1}{9}$

20. What is $\cos 80^\circ + \cos 40^\circ - \cos 20^\circ$ equal to?

- A. 2
- B. 1
- C. 0

D. -19

21. If $\operatorname{cosec} \theta = \frac{29}{21}$ where $0 < \theta < 90^\circ$, then what is the value of $4\sec\theta + 4\tan\theta$?

- A. 5
- B. 10
- C. 15
- D. 20

22. Consider the following statements:

- 1) $\cos\theta + \sec\theta$ can never be equal to 1.5
- 2) $\tan\theta + \cot\theta$ can never be less than 2

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

23. If the angles of a triangle ABC are in AP and $b:a = \sqrt{3}:\sqrt{2}$, then what is the measure of angle A?

- A. 30°
- B. 45°
- C. 60°
- D. 75°

24. If $\tan A - \tan B = x$ and $\cot B - \cot A = y$, then what is the value of $\cot(A - B)$?

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

25. If angle C of a triangle ABC is a right angle, then what is $\tan A + \tan B$ equal to?

- A. $\frac{a^2 - b^2}{ab}$
- B. $\frac{a^2}{bc}$
- C. $\frac{b^2}{ca}$
- D. $\frac{c^2}{ab}$

26. What is $\cot A + \operatorname{cosec} A$ equal to ?

- A. $\tan\left(\frac{A}{2}\right)$
- B. $\cot\left(\frac{A}{2}\right)$
- C. $2 \tan\left(\frac{A}{2}\right)$
- D. $2 \cot\left(\frac{A}{2}\right)$

27. What is the minimum value of $\frac{a^2}{\cos^2 x} + \frac{b^2}{\sin^2 x}$, where $a > 0$ and $b > 0$?

- A. $(a + b)^2$
- B. $(a - b)^2$
- C. $a^2 + b^2$
- D. $|a^2 + b^2|$

28. What is $\sin(\alpha + \beta) - 2 \sin \alpha \cos \beta + \sin(\alpha - \beta)$ equal to?

- A. 0
- B. $2 \sin \alpha$
- C. $2 \sin \beta$
- D. $\sin \alpha + \sin \beta$

29. What is $\tan 25^\circ \tan 15^\circ + \tan 15^\circ \tan 50^\circ + \tan 25^\circ \tan 50^\circ$ equal to?

- A. 0
- B. 1
- C. 2

D. 4

30. If $2 \tan A = 3 \tan B = 1$, then what is $\tan (A - B)$ equal to?

- A. $\frac{1}{5}$
- B. $\frac{1}{6}$
- C. $\frac{1}{7}$
- D. $\frac{1}{9}$

31. What is $\cot\left(\frac{A}{2}\right) - \tan\left(\frac{A}{2}\right)$ equal to?

- A. $\tan A$
- B. $\cot A$
- C. $2 \tan A$
- D. $2 \cot A$

32. A ladder 9 m long reaches a point 9 m below the top of a vertical flagstaff. From the foot of the ladder, the elevation of the flagstaff is 60° . What is the height of the flagstaff?

- A. 9 m
- B. 10.5 m
- C. 13.5 m
- D. 15 m

33. Read the following information and answer the two items that follow :

Let $\frac{\tan 3A}{\tan A} = K$, where $\tan A \neq 0$ and $K \neq \frac{1}{3}$.

What is $\tan^2 A$ equal to?

- A. $\frac{K+3}{3K+1}$
- B. $\frac{K-3}{3K-1}$
- C. $\frac{3K-3}{K-1}$

D. $\frac{K+3}{3K-1}$

34. Read the following information and answer the two items that follow :

Let $\frac{\tan 3A}{\tan A} = K$, where $\tan A \neq 0$ and $K \neq \frac{1}{3}$.

For real values of $\tan A$, K cannot lie between

A. $\frac{1}{3}$ and 3

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

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

D. $\frac{1}{7}$ and 7

###COMMON###35###37### **Direction:** Read the following information and answer the three items that follow :

ABC is a trapezium such that AB and CD are parallel and BC is perpendicular to them. Let $\angle ADB = \theta$, $\angle ABD = \alpha$, $BC = p$ and $CD = q$.

###DONE###

35.

Consider the following :

1) $AD \sin \theta = AB \sin \alpha$

2) $BD \sin \theta = AB \sin (\theta + \alpha)$

Which of the above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

36. What is AB equal to?

- A. $\frac{(p^2 + q^2) \sin \theta}{p \cos \theta + q \sin \theta}$
 B. $\frac{(p^2 - q^2) \cos \theta}{p \cos \theta + q \sin \theta}$
 C. $\frac{(p^2 + q^2) \sin \theta}{q \cos \theta + p \sin \theta}$
 D. $\frac{(p^2 - q^2) \cos \theta}{q \cos \theta + p \sin \theta}$

37. If $\tan \theta = \frac{\cos 17^\circ - \sin 17^\circ}{\cos 17^\circ + \sin 17^\circ}$, then what is the value of θ ?

- A. 0°
 B. 28°
 C. 38°
 D. 52°

38. What is $\sin 3x + \cos 3x + 4 \sin^3 x - 3 \sin x + 3 \cos x - 4 \cos^3 x$ equal to?

- A. 0
 B. 1
 C. $2 \sin 2x$
 D. $4 \cos 4x$

39. The value of ordinate of the graph of $y = 2 + \cos x$ lies in the interval

- A. $[0, 1]$
 B. $[0, 3]$
 C. $[-1, 1]$
 D. $[1, 3]$

40. What is the value of $8 \cos 10^\circ \cdot \cos 20^\circ \cdot \cos 40^\circ$?

- A. $\tan 10^\circ$
 B. $\cot 10^\circ$
 C. $\operatorname{cosec} 10^\circ$
 D. $\sec 10^\circ$

41. Consider the following statements :

- 1) If ABC is a right-angled triangle, right-angled at A and if $\sin B = \frac{1}{3}$, then $\operatorname{cosec} C = 3$
- 2) If $b \cos B = c \cos C$ and if the triangle ABC is not right-angled, then ABC must be isosceles.

Which of the above statements is/are correct?

- A. 1 only
 B. 2 only
 C. Both 1 and 2
 D. Neither 1 nor 2

42. Consider the following statements :

- 1) If in a triangle ABC, $A = 2B$ and $b = c$, then it must be an obtuse-angled triangle.
- 2) There exists no triangle ABC with $A = 40^\circ$, $B = 65^\circ$ and $\frac{a}{c} = \sin 40^\circ \operatorname{cosec} 15^\circ$.

Which of the above statements is/are correct?

- A. 1 only
 B. 2 only
 C. Both 1 and 2
 D. Neither 1 nor 2

###COMMON###43###45### **Direction:** Read the following information and answer the three items that follow :

Let $t_n = \sin^n \theta + \cos^n \theta$.

###DONE###

43.

What is $\frac{t_3 - t_5}{t_5 - t_7}$ equal to?

- A. $\frac{t_1}{t_3}$
 B. $\frac{t_3}{t_5}$
 C. $\frac{t_5}{t_7}$

D. $\frac{t_1}{t_7}$

44. What is $t_1^2 - t_2$ equal to?

- A. $\cos 2\theta$
- B. $\sin 2\theta$
- C. $2 \cos \theta$
- D. $2 \sin \theta$

45. What is the value of t_{10} where $\theta = 45^\circ$?

- A. 1
- B. $\frac{1}{4}$
- C. $\frac{1}{16}$
- D. $\frac{1}{32}$

46. If $\sin x + \sin y = \cos y - \cos x$, where $0 < y < x < \frac{\pi}{2}$, then what is $\tan\left(\frac{x-y}{2}\right)$ equal to?

- A. 0
- B. $\frac{1}{2}$
- C. 1
- D. 2

47. A and B are positive acute angles such that $\cos 2B = 3 \sin^2 A$ and $3 \sin 2A = 2 \sin 2B$. What is the value of $(A + 2B)$?

- A. $\frac{\pi}{6}$
- B. $\frac{\pi}{4}$
- C. $\frac{\pi}{3}$
- D. $\frac{\pi}{2}$

48. What is the value of $\cos 48^\circ - \cos 12^\circ$?

- A. $\frac{\sqrt{5}-1}{4}$
 B. $\frac{1-\sqrt{5}}{4}$
 C. $\frac{\sqrt{5}+1}{2}$
 D. $\frac{1-\sqrt{5}}{8}$

###COMMON###49###51### **Direction:** Read the following information and answer the three items that follow :

Let $a \sin^2 x + b \cos^2 x = c$; $b \sin^2 y + a \cos^2 y = d$ and $p \tan x = q \tan y$.

###DONE###

49.

What is $\tan^2 x$ equal to?

- A. $\frac{c-b}{a-c}$
 B. $\frac{a-c}{c-b}$
 C. $\frac{c-a}{c-b}$
 D. $\frac{c-b}{c-a}$

50. What is $\frac{d-a}{b-d}$ equal to?

- A. $\sin^2 y$
 B. $\cos^2 y$
 C. $\tan^2 y$
 D. $\cot^2 y$

51. What is $\frac{p^2}{q^2}$ equal to?

- A. $\frac{(b-c)(b-d)}{(a-d)(a-c)}$
 B. $\frac{(a-d)(c-a)}{(b-c)(d-b)}$

- C. $\frac{(d-a)(c-a)}{(b-c)(d-b)}$
 D. $\frac{(b-c)(b-d)}{(c-a)(a-d)}$

###COMMON###52###54###**Direction:** Read the following information and answer the three items that follow :

Let $\alpha = \beta = 15^\circ$.

###DONE###

52.

What is the value of $\sin \alpha + \cos \beta$?

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

53. What is the value of $\sin 7\alpha - \cos 7\beta$?

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

54. What is $\sin(\alpha + 1^\circ) + \cos(\beta + 1^\circ)$ equal to?

- A. $\sqrt{3} \cos 1^\circ + \sin 1^\circ$
 B. $\sqrt{3} \cos 1^\circ - \frac{1}{2} \sin 1^\circ$
 C. $\frac{1}{\sqrt{2}} (\sqrt{3} \cos 1^\circ - \sin 1^\circ)$

D. $\frac{1}{\sqrt{2}}(\sqrt{3} \cos 1^\circ + \sin 1^\circ)$