CBSE

INTRODUCTION TO TRIGONOMETRY WS 4

Class 10 - Mathematics

Section A

1. If in a $\Delta ABC, \angle C = 90^\circ$ and $\angle B = 45^\circ$, then state which of the following is true? **[1]**

   a) Perpendicular = Hypotenuse
   b) Base = Hypotenuse
   c) Base = Hypotenuse + Perpendicular
   d) Base = Perpendicular

2. The value of 2 $\sin^2 30^o$ + 3 $\tan^2 60^o$ - $\cos^2 45^o$ is: **[1]**

   a) 9
   b) $\frac{19}{2}$
   c) $3\sqrt{3}$
   d) $\frac{9}{4}$

3. $\left(\frac{2\tan 30^\circ}{1+\tan^2 30^\circ}\right)$ is equal to: **[1]**

   a) cos 60°
   b) sin 60°
   c) sin 30°
   d) tan 60°

4. $\cos^2 30^\circ \cos^2 45^\circ + 4\sec^2 60^\circ + \frac{1}{2}\cos^2 90^\circ - 2\tan^2 60^\circ$ = ? **[1]**

   a) $\frac{75}{8}$
   b) $\frac{73}{8}$
   c) $\frac{83}{8}$
   d) $\frac{81}{8}$

5. If $\sqrt{3}$ tan θ = 1, then the value of θ is **[1]**

   a) 45°
   b) 30°
   c) 90°
   d) 60°

6. The value of $\frac{\tan 30^\circ}{\cot 60^\circ}$ is **[1]**

   a) 1
   b) $\frac{1}{\sqrt{3}}$
   c) $\frac{1}{\sqrt{2}}$
   d) $\sqrt{3}$

7. (cos 0° + sin 30° + sin45°) (sin90° + cos60° - cos45°) = ? **[1]**

   a) $\frac{5}{8}$
   b) $\frac{7}{4}$
   c) $\frac{5}{6}$
   d) $\frac{3}{5}$

8. $\left(\frac{1-\tan^2 30^\circ}{1+\tan^2 30^\circ}\right)$ is equal to: **[1]**

   a) sin 60°
   b) tan 60°
   c) cos 30°
   d) cos 60°

9. If $\frac{x\csc^2 30^\circ \sec^2 45^\circ}{8\cos^2 45^\circ \sin^2 60^\circ} = \tan^2 60^\circ - \tan^2 30^\circ$, then x = **[1]**

   a) 0
   b) 2

c) -1 d) 1

10. $[\frac{3}{4}\ \tan^2 30^o - \sec^2 45^o + \sin^2 60^o]$ is equal to **[1]**

a) $\frac{5}{6}$ b) $\frac{1}{6}$

c) $\frac{-3}{2}$ d) -1

11. The value of $5\ \sin^2 90^o - 2\ \cos^2 0^o$ is: **[1]**

a) 3 b) -3

c) 5 d) -2

12. A contractor planned to install a slide for the children to play in a park. If he prefers to have a slide whose top is at a height of 1.5 m and is inclined at an angle of 30° to the ground, then the length of the slide would be **[1]**

a) $\sqrt{3}$ m b) 3 m

c) 1.5 m d) $2\sqrt{3}$ m

13. If $2\cos 3\theta = 1$ then θ= ? **[1]**

a) 30° b) 10°

c) 15° d) 20°

14. If $\sqrt{3}\tan 2\theta - 3 = 0$ then θ = ? **[1]**

a) 30^o b) 60^o

c) 15^o d) 45^o

15. If $\sin\theta = \frac{3}{4}$, then $\frac{\left(\sec^2\theta - 1\right)\cos^2\theta}{\sin\theta}$ equals: **[1]**

a) $\frac{3}{5}$ b) $\frac{9}{16}$

c) $\frac{3}{4}$ d) $\frac{4}{3}$

16. $\frac{2\tan 30^\circ}{1-\tan^2 30^\circ}$ = **[1]**

a) sin 30° b) $\tan 60^o$

c) cos 60° d) sin 60°

17. If sin A = cos A, $0 \leq A \leq 90^o$, then angle A is equal to: **[1]**

a) 60^o b) 30^o

c) 45^o d) 0^o

18. If $\tan^2 45° - \cos^2 30° = x \sin 45° \cos 45°$, then x = **[1]**

a) $\frac{1}{2}$ b) $-\frac{1}{2}$

c) 2 d) -2

19. In a right triangle ABC, $\angle C = 90^\circ$. If AC = $\sqrt{3}$ BC and $\angle B = \phi$, then find its value **[1]**

a) 45° b) 30°

c) 15^o d) 60°

20. $\frac{\sec 30^\circ}{cosec\ 60^\circ} = ?$ **[1]**

a) $\frac{2}{\sqrt{3}}$ b) 1

c) $\frac{\sqrt{3}}{2}$ d) $\sqrt{3}$

21. The value of sin 45° + cos 45° is **[1]**

a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$

c) 1 d) $\frac{1}{\sqrt{3}}$

22. In a right triangle ABC, $\angle B = 90^\circ$ and 2 AB = $\sqrt{3}$AC, then $\angle C$ is **[1]**

a) 90° b) 60°

c) 75° d) 30°

23. If $\sqrt{3}\tan\theta = 3\sin\theta$, ($\theta \neq 0$) then the value of $\sin^2\theta - \cos^2\theta$ is **[1]**

a) 1 b) $\frac{1}{2}$

c) 0 d) $\frac{1}{3}$

24. $\frac{2\tan 30^\circ}{1+\tan^2 30^\circ} =$ **[1]**

a) $cos60^\circ$ b) $cot60^\circ$

c) $tan60^\circ$ d) $sin60^\circ$

25. If tan θ =$\sqrt{3}$, then sec θ = **[1]**

a) $\sqrt{\frac{3}{2}}$ b) 2

c) $\frac{2}{\sqrt{3}}$ d) $\frac{1}{\sqrt{3}}$

26. [$\frac{5}{8}$ $\sec^2 60^o$ - $\tan^2 60^o$ + $\cos^2 45^o$] is equal to **[1]**

a) $\frac{-5}{3}$ b) 0

c) $\frac{-1}{4}$ d) $\frac{-1}{2}$

27. **Assertion (A):** In $\triangle$ABC, if $\angle B = 90^o$, then sin (A + C) = 1 **[1]**

Reason (R): Angle sum property of $\triangle$, $90^o + \angle A + \angle C = 180^o \Rightarrow \angle A + \angle C = 90^o$

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

28. **Assertion (A):** $\sin^2\theta$ = 1, then $\theta = 90^o$ **[1]**

Reason (R): As $\sec 60^o = 2$

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

29. **Assertion (A):** If sin θ = cos θ then tan θ = 1 **[1]**

Reason (R): We know that tan $\theta = \frac{\sin\theta}{\cos\theta}$, so tan θ = 1, as sin θ = cos θ

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

30. sin 2A = 2 sin A is true when A = **[1]**

a) 60°

b) 30°

c) 0°

d) 45°

31. Choose the correct option and justify your choice: $\frac{2\tan 30^0}{1-\tan^2 30^0}$ **[1]**

a) $\cos 60^o$

b) $\sin 30^o$

c) $\sin 60^o$

d) $\tan 60^o$

32. Evaluate 4 ($\sin^4 30°$ + $\cos^2 60°$) - 3($\cos^2 45°$ - $\sin^2 90°$) - $\sin^2 60°$. **[1]**

33. Evaluate ($\text{cosec}^2 45°$ $\sec^2 30°$) ($\sin^2 30°$ + 4 $\cot^2 45°$ - $\sec^2 60°$) **[1]**

34. Evaluate 2 $\cos^2 60°$ + 3$\sin^2 45°$ - 3$\sin^2 30°$ + 2$\cos^2 90°$. **[1]**

35. Solve $\tan 5\theta = 1$ for $0^\circ < \theta < 90$. **[1]**

36. Find the value of x, if $\sqrt{3}\tan 2x = \cos 60^\circ + \sin 45^\circ \cos 45^\circ$. **[1]**

37. If A = 30°, verify that: tan 2A = $\frac{2\tan A}{1-\tan^2 A}$ **[1]**

38. Solve $2\cos^2\theta = \frac{1}{2}$ when $0^\circ < \theta < 90^\circ$. **[1]**

39. Evaluate $\cot^2 30°$ - 2$\cos^2 60°$ - $\frac{3}{4}\sec^2 45°$ - 4 $\sec^2 30°$. **[1]**

40. Find the value of cos 30° cos 60° cos 90°. **[1]**

41. Evaluate 2$\sin^2 30°$ - 3$\cos^2 45°$ + $\tan^2 60°$. **[1]**

42. Evaluate (cos0° + sin 45° + sin30°)(sin90° - cos 45° + cos 60°). **[1]**

43. Evaluate $\frac{\sin 30^\circ - \sin 90^\circ + 2\cos 0^\circ}{\tan 30^\circ \tan 60^\circ}$. **[1]**

44. Find the value of x if cos2x = cos 60° cos 30° + sin 60° sin 30°. **[1]**

45. Write the value of $\sin^2 30^o$ + $\cos^2 60^o$. **[1]**

46. If sinθ - cosθ = 0, then find the value of $\sin^4\theta$ + $\cos^4\theta$. **[1]**

47. If tan (A + B) = $\sqrt{3}$ and tan(A - B) = $\frac{1}{\sqrt{3}}$, 0 < A + B $\leq 90^\circ$, A > B, then find the values of A and B. **[1]**

48. If 2 $\cos^2$ ($\frac{A}{2}$) = 1, then find A. **[1]**

49. Evaluate cosec 30° + cot 45° in the simplest form **[1]**

50. Evaluate $\cos^2 30°$ + $\cos^2 45°$ + $\cos^2 60°$ + $\cos^2 90°$. **[1]**

51. Evaluate $\sin^2 30°$ + $\sin^2 45°$ + $\sin^2 60°$ + $\sin^2 90°$. **[1]**

52. Evaluate $\frac{\tan^2 60^\circ + 4\cos^2 45^\circ + 3\sec^2 30^\circ + 5\cos^2 90^\circ}{cosec 30^\circ + \sec 60^\circ - \cot^2 30^\circ}$ **[1]**

Section B

53. **Fill in the blanks:** **[2]**

(a) If tan θ =$\sqrt{3}$, then sec θ = _____. **[1]**

(b) If x tan 45^ocos60^o = sin60^o cot 60^o, then the value of x is _____. **[1]**

Section C

54. in a ΔABC right angled at B, $\angle A = \angle C$. find the values of **[5]**

i. sin A cos C + cos A sinC.

ii. sin A sin B + cos A cosB.

55. Find the value of tan 60° geometrically. **[5]**

56. Evaluate: $4\left(\sin^4 60^\circ + \cos^4 30^\circ\right) - 3\left(\tan^2 60^\circ - \tan^2 45^\circ\right) + 5\cos^2 45^\circ$ **[5]**

57. Evaluate : $\sin^2 30° \cos^2 45° + 4 \tan^2 30° + \frac{1}{2}\sin^2 90° - 2\cos^2 90° + \frac{1}{24}$. **[5]**

58. Evaluate : $\tan^2 30° \sin 30° + \cos 60° \sin^2 90° \tan^2 60° - 2 \tan 45° \cos^2 0° \sin 90°$. **[5]**

59. Evaluate: $(\cos 0° + \sin 45° + \sin 30°)(\sin 90° - \cos 45° + \cos 60°)$ **[5]**

60. Evaluate: $\frac{\tan^2 60° + 4\sin^2 45° + 3\sec^2 60° + 5\cos^2 90°}{\text{cosec } 30° + \sec 60° - \cot^2 30°}$ **[5]**

61. Evaluate: $\cot^2 30° - 2\cos^2 60° - \frac{3}{4}\sec^2 45° - 4\sec^2 30°$ **[5]**

62. If in an acute angle $\triangle ABC$, **[5]**

sec (B + C - A) = 2 and tan (C + A - B) = $\frac{1}{\sqrt{3}}$; find the three angles of $\triangle ABC$.

63. Evaluate: $4(\sin^4 30° + \cos^4 60°) - 3(\cos^2 45° - \sin^2 90°)$ **[5]**

64. Evaluate the following: $\frac{2\cos^2 60° + 3\sec^2 30° - 2\tan^2 45°}{\sin^2 30° + \cos^2 45°}$. **[5]**

65. Evaluate: $\sin^2 30° + \sin^2 45° + \sin^2 60° + \sin^2 90°$ **[5]**

66. If cosec A = 2, find the value of $\frac{1}{\tan A} + \frac{\sin A}{1 + \cos A}$. **[5]**

Section D

67. **State True or False:** **[8]**

(a) The value of cot $\frac{\pi}{3} = \frac{1}{\sqrt{3}}$. **[1]**

(b) The value of cosθ increase as θ increases. **[1]**

(c) The value of sinθ + cosθ is always greater than 1. **[1]**

(d) cot A is not defined for A = 0^o. **[1]**

(e) sinθ = cosθ for all values of θ. **[1]**

(f) If sinθ - cosθ = 0, $(0 \leq \theta \leq 90^o)$, then the value of θ is 60^o. **[1]**

(g) The trigonometric function sin (A + B) = sin A + sin B. **[1]**

(h) The value of sinθ increases as θ increases. **[1]**