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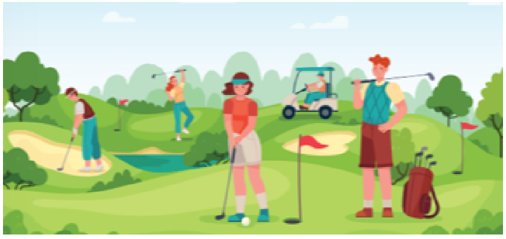
TRIGONOMETRY ABHYAS 01

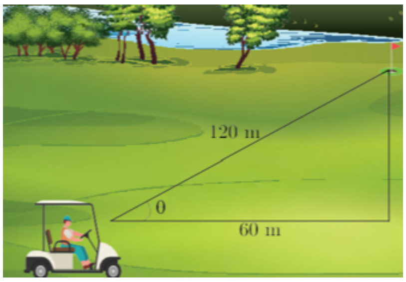
Class 10 - Mathematics

Question No. 1 to 4 are based on the given text. Read the text carefully and answer the questions:

Golf is a game played in an open field where the golfer plays his golf ball into a hole by using different types of clubs (golf instruments). In golf, a golfer plays a number of holes in a given order. 18 holes played in an order controlled by the golf course design, normally make up a game.



On your approach shot to the ninth green, the Global Positioning System (GPS) your cart is equipped with tells you the pin is 120 meter away.



1. The distance plate states the straight line distance to the hole is 60 meter. Relative to a straight line between the plate and the hole, at what acute angle should you hit the shot?
2. What is the value of the tangent of the above angle?
3. What is the length of the side opposite to the angle θ in the given picture?
4. What is the value of tangent of angle A?
5. In a right triangle ABC, $\angle C = 90^\circ$. If AC = $\sqrt{3}$ BC and $\angle B = \phi$, then find its value

   a) 45° b) 30°

   c) None of these d) 60°

6. If angles A, B, C of a ΔABC form an increasing AP, then sin B =

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

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

7. $\frac{\tan\theta}{\sec\theta-1} + \frac{\tan\theta}{\sec\theta+1}$ is equal to

   a) 2 cosecθ b) 2 tanθ secθ

   c) 2 secθ d) 2 tanθ

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

a) 90°

b) 60°

c) 75°

d) 30°

9. If 2x = sec A and $\frac{2}{x}$ = tan A then $2\left(x^2 - \frac{1}{x^2}\right)$ = ?

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

b) $\frac{1}{4}$

c) $\frac{1}{16}$

d) $\frac{1}{8}$

10. If $2\cos 3\theta = 1$ then θ= ?

a) 30°

b) 10°

c) 15°

d) 20°

11. 3 $\cos^2 60^o$ + 2 $\cot^2 30^o$ - 5 $\sin^2 45^o$ = ?

a) $\frac{17}{4}$

b) 4

c) $\frac{13}{6}$

d) 1

12. If $\sin\theta - \cos\theta = 0$ then the value of $\left(\sin^4\theta + \cos^4\theta\right)$ is

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

b) 1

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

d) $\frac{1}{4}$

13. If $\sqrt{3}\tan 2\theta - 3 = 0$ then θ = ?

a) 30^o

b) 60^o

c) 15^o

d) 45^o

14. $(\ cosec\theta - \cot\theta)^2$ =?

a) $\frac{1+sin\ \theta}{1-sin\ \theta}$

b) $\frac{1-cos\ \theta}{1+cos\ \theta}$

c) None of these

d) $\frac{1+cos\ \theta}{1-cos\ \theta}$

15. Find the value of x, if $2\sin 3x = \sqrt{3}$.

16. Prove that (1 + tan A - sec A) × (1 + tan A + sec A) = 2 tan A

17. Evaluate: sin 60° cos 30° + cos 60° sin 30°.

18. Prove the trigonometric identity:

$\cot\theta - \tan\theta = \frac{2\cos^2\theta - 1}{\sin\theta\cos\theta}$

19. If x = 3 sinθ + 4 cosθ and y = 3 cosθ – 4 sinθ then prove that $x^2 + y^2 = 25$.

20. Given that tan(A-B)=$\frac{\tan A - \tan B}{1 + \tan A . \tan B}$. Evaluate tan$15^o$.

21. Write the maximum and minimum values of sin θ

22. Find the value of θ: $2\cos 3\theta = 1$

23. Prove the trigonometric identity:

$(\sin^4\theta - \cos^4\theta + 1)\text{cosec}^2\theta = 2$

24. Prove that: $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}}$ = 2 cosec A

25. Prove that $\frac{1+\tan^2 A}{1+\cot^2 A}$ = $\sec^2$ A - 1

26. If cosθ + $\cos^2\theta$ = 1, prove that $\sin^{12}\theta + 3\sin^{10}\theta + 3\sin^8\theta + \sin^6\theta + 2\sin^4\theta + 2\sin^2\theta - 2 = 1$

27. If ∠A and ∠B are acute angles such that cos A = cos B then show that ∠A = ∠B.

28. Prove the trigonometric identity:

(sinθ + cosecθ)^2 + (cosθ + secθ)^2 = 7 + tan$^2\theta$ + cot$^2\theta$

29. Prove the trigonometric identity:

$\frac{\sin\theta}{1-\cos\theta} = cosec\theta + \cot\theta$

30. Prove the trigonometric identity:

$\sqrt{\frac{1+\cos\theta}{1-cos\theta}} = cosec\theta + \cot\theta$

31. Prove that: $\frac{(\sec\theta-\tan\theta)}{(\sec\theta+\tan\theta)} = \left(1 + 2\tan^2\theta - 2\sec\theta\tan\theta\right)$

32. Prove that: $\frac{\cos\theta-\sin\theta+1}{\cos\theta+\sin\theta-1} = \text{cosec}\theta + \cot\theta$

33. If 3tanθ = 4, evaluate $\frac{3\sin\theta+2\cos\theta}{3\sin\theta-2\cos\theta}$.

34. Prove the trigonometric identity: sec$^4\theta$ - sec$^2\theta$ = tan$^4\theta$ + tan$^2\theta$.

35. If 3 cot$\theta = 4$, show that $\frac{(1-\tan^2\theta)}{(1+\tan^2\theta)} = \left(\cos^2\theta - \sin^2\theta\right)$.

36. Prove that: sec^4 A - sec^2 A = tan^4 A + tan^2 A

37. Prove that: $\frac{(1+\sin\theta)^2+(1-\sin\theta)^2}{\cos^2\theta} = 2\left(\frac{1+\sin^2\theta}{1-\sin^2\theta}\right)$

38. Prove that $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2cosec\theta$

39. Prove that $\tan^2 A - \tan^2 B = \frac{\sin^2 A-\sin^2 B}{\cos^2 A\cos^2 B}$

40. Prove the trigonometric identity:

tan^{2}A sec^{2}B - sec^{2}A tan^{2}B = tan^{2}A - tan^{2}B

41. Prove $\frac{\cos A-\sin A+1}{\cos A+\sin A-1}$ = cosec A + cot A, using the identity cosec^2 A = 1 + cot^2 A. where the angles involved are acute angles for which the expressions are defined.

42. Prove the trigonometric identity:

sin^{2}A.cos^{2}B - cos^{2}A.sin^{2}B = sin^{2}A - sin^{2}B

43. Prove the trigonometric identity: $\frac{1-\sin\theta}{1+\sin\theta} = (\sec\theta - \tan\theta)^2$

44. Prove that: cot^{2}A cosec^{2}B - cot^{2}B cosec^{2}A = cot^{2}A - cot^{2}B

45. Prove that (cosec A - sin A) (sec A - cos A) = $\frac{1}{\cot A+\tan A}$.

46. Prove: $\frac{1}{(\cot \text{A})(\sec \text{A})-\cot \text{A}} - \text{cosec A} = \text{cosec A} - \frac{1}{(\cot A)(\sec \text{A})+\cot A}$

47. Prove the identity:

2(sin$^6\theta$ + cos$^6\theta$) - 3(sin$^4\theta$ + cos$^4\theta$) + 1 = 0

48. Prove the identity:

$\frac{(1+\cot A+\tan A)(\sin A-\cos A)}{\sec^3 A- cosec^3 A} = \sin^2 A\cos^2 A$

49. If secθ + tanθ = p, prove that $\tan\theta = \frac{1}{2}\left(p - \frac{1}{p}\right)$

50. Prove the following identity: $\frac{\sin\theta}{1-\cos\theta} + \frac{\tan\theta}{1+\cos\theta}$ = $sec\theta \cdot \cos ec\theta + cot\theta$

51. If $\sin A = \frac{1}{3}$, evaluate cos A cosec A + tan A sec A.

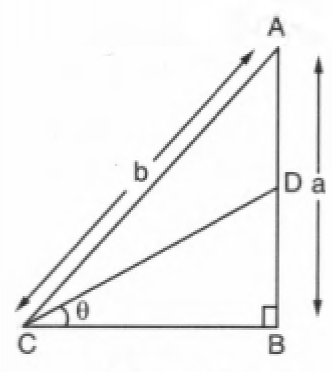
52. In Fig., AD = DB and $\angle B$ is a right angle. Determine:

i. sinθ

ii. cosθ

iii. tanθ

iv. $\sin^2\theta + \cos^2\theta$



53. Prove the trigonometric identity: $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$

54. Prove the identity:

$(\sin^8\theta - \cos^8\theta) = (\sin^2\theta - \cos^2\theta)(1 - 2\sin^2\theta \cos^2\theta)$

55. Prove the trigonometric identity: $\frac{\cot^2\theta(\sec\theta - 1)}{(1+\sin\theta)} + \frac{\sec^2\theta(\sin\theta - 1)}{(1+\sec\theta)} = 0$

56. Prove that: $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A}$ = 1 + tanA + cotA = 1 + secA cosecA

57. Prove that $\frac{(1+\cot\theta+\tan\theta)(\sin\theta-\cos\theta)}{(\sec^3\theta-\csc^3\theta)} = \sin^2\theta\cos^2\theta.$

58. Prove that: $\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta cosec\theta - 2\sin\theta\cos\theta$

59. Prove the trigonometric identity:

$\left(\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}\right)^2 = \frac{1-\cos\theta}{1+\cos\theta}$

60. Prove the following identity: $\left(\frac{1}{\sec^2\theta-\cos^2\theta} + \frac{1}{cosec^2\theta-\sin^2\theta}\right)\sin^2\theta \,.\, \cos^2\theta = \frac{1-\sin^2\theta\cdot\cos^2\theta}{2+\sin^2\theta\cdot\cos^2\theta}$