Date: 29/9/2021

Q1. Evaluate $\frac{\tan 65°}{\cot 25°}$.

Q2. Express cot 85° + cos 75° in terms of trigonometric ratios of angles between 0° and 45°.

Q3. If tan 2A = cot (A – 18°), where 2A is an acute angle, find the value of A.

Q4. If sec 4A = cosec (A – 20°), where 4A is an acute angle, find the value of A.

Q5. Express sin 67° +cos 75° in terms of trigonometric ratios of angles between 0° and 45°.

Q6. Evaluate the following: $\sin 60° \cos 30° + \sin 30° \cos 60°$

Q7. Evaluate the following: $2\tan^2 45° + \cos^2 30° - \sin^2 60°$

Q8. Evaluate the following: $\frac{\cos 45°}{\sec 30° + \operatorname{cosec} 30°}$

Q9. Evaluate the following: $\frac{\sin 30° + \tan 45° - \operatorname{cosec} 60°}{\sec 30° + \cos 60° + \cot 45°}$

Q10. Evaluate the following: $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$

Q11. Choose the correct option and justify your choice:

$\frac{2\tan 30°}{1+\tan^2 30°}$ = ________

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

Q12. Choose the correct option and justify your choice:

$\frac{1-\tan^2 45°}{1+\tan^2 45°}$ = ________

(a) tan 30° (b) 1 (c) sin 45° (d) 0

Q13. Choose the correct option and justify your choice:

sin 2A = 2 sin A is true when A = ________

(a) 0° (b) 30° (c) 45° (d) 60°

Q14. Choose the correct option and justify your choice:

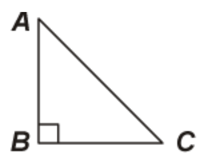
$\frac{2\tan 30°}{1-\tan^2 30°}$ = ________

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

Q15. Given tan $A = \frac{4}{3}$, find the other trigonometric ratios of the angle A.

Q16. If $\angle B$ and $\angle Q$ are acute angles such that sin B = sin Q, then prove that $\angle B = \angle Q$.

Q17. In triangle ABC, right-angled at B, if tan A = 1, then verify that 2 sin A cos A = 1.



Q18. In $\Delta\, OPQ$, right-angled at P, OP = 7 cm and OQ – PQ = 1 cm (see figure). Determine the values of sin Q and cos Q.

Q19. Prove that $\dfrac{\cot A - \cos A}{\cot A + \cos A} = \dfrac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$.

Q20. Prove that sec A (1 – sin A) (sec A + tan A) = 1.

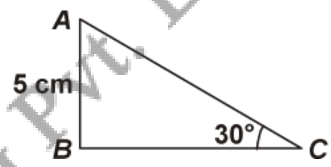
Q21. Express the ratios cos A, tan A, and sec A in terms of sin A.

Q22. If sin 3A = cos (A – 26°), where 3A is an acute angle, find the value of A.

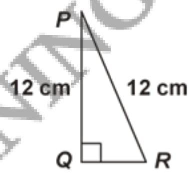
Q23. If sin (A – B) = $\dfrac{1}{2}$, cos (A + B) = $\dfrac{1}{2}$, $0° < A + B \leq 90°$, $A > B$, find A and B.

Q24. In ΔPQR, right-angled at Q (see figure), PQ = 3 cm and PR = 6 cm. Determine $\angle QPR$ and $\angle PRQ$.

Q25. In $\Delta\, ABC$, right-angled at B, AB = 5 cm and $\Delta\, ACB$ = 30° (see figure). Determine the lengths of the sides BC and AC.



Q26. In figure, find tan P – cot R.



Q27. If $\angle A$ and $\angle B$ are acute angles such that cos A = cos B, then show that $\angle A = \angle B$.

Q28. If 3 cot A = 4, check whether $\dfrac{1 - \tan^2 A}{1 + \tan^2 A} = \cos^2 A - \sin^2 A$ or not.

Q29. Given sec θ = $\dfrac{13}{12}$, calculate all other trigonometric ratios.

Q30. Given 15 cot A = 8, find sin A and sec A.

Q31. If sin A = $\dfrac{3}{4}$, calculate cos A and tan A.

Q32. In $\Delta\, PQR$, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determmine the values of sin P, cos P and tan P.

Q33. Show that:

(i) tan 48° tan 23° tan 42° tan 67° = 1

(ii) cos 38° cos 52° – sin 38° sin 52° = 0

Q34. If tan (A + B) = $\sqrt{3}$ and tan (A – B) = $\dfrac{1}{\sqrt{3}}$; $0° < A + B \leq 90°$; $A > B$, find A and B.

Q35. Express the trigonometric ratios sin A, sec A and tan A in terms of cot A.

Q36. If A, B, and C are interior angles of a triangle ABC, then show that

$$\sin\left(\frac{B+C}{2}\right) = \cos\frac{A}{2}.$$

Q37. If tan A = cot B, prove that $A + B = 90°$.

Q38. Evaluate:

(i) $\dfrac{\sin^2 63^\circ + \sin^2 27^\circ}{\cos^2 17^\circ + \cos^2 73^\circ}$ (ii) $\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ$

Q39. State whether the following are true or false. Justify your answer.

(i) The value of $\tan A$ is always less than 1. (ii) $\cot A$ is the product of cot and A.

Q40. In triangle ABC, right-angled at B, if $\tan A = \dfrac{1}{\sqrt{3}}$, find the value of: $\sin A \cos C + \cos A \sin C$.

Q41. In ΔABC, right-angled at B, $AB = 24$ cm, $BC = 7$. Determine: $\sin C$, $\cos C$.

Q42. In ΔABC, right-angled at B, $AB = 24$ cm, $BC = 7$. Determine: $\sin A$, $\cos A$

Q43. In triangle ABC, right-angled at B, if $\tan A = \dfrac{1}{\sqrt{3}}$, find the value of: $\cos A \cos C - \sin A \sin C$.

Q44. Choose the correct option. Justify your choice.

(i) $9 \sec^2 A - 9 \tan^2 A =$ ______.

(a) 1 (b) 9 (c) 8 (d) 0

(ii) $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta) =$ ______.

(a) 0 (b) 1 (c) 2 (d) –1

Q45. Evaluate: (i) $\cos 48^\circ - \sin 42^\circ$ (ii) $\operatorname{cosec} 31^\circ - \sec 59^\circ$

Q46. Evaluate:

(i) $\dfrac{\sin 18^\circ}{\cos 72^\circ}$ (ii) $\dfrac{\tan 26^\circ}{\cot 64^\circ}$

Q47. State whether the following are true of false. Justify you answer.

(i) The value of $\sin\theta$ increases as θ increses. (ii) $\sin\theta = \cos\theta$ all values of θ.

Q48. Choose the correct option. Justify your choice.

(i) $(\sec A + \tan A)(1 - \sin A) =$ ______.

(a) $\sec A$ (b) $\sin A$ (c) $\operatorname{cosec} A$ (d) $\cos A$

(ii) $\dfrac{1 + \tan^2 A}{1 + \cot^2 A} =$ ______.

(a) $\sec^2 A$ (b) –1 (c) $\cot^2 A$ (d) $\tan^2 A$

Q49. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$$(\operatorname{cosec}\theta - \cot\theta)^2 = \frac{1 - \cos\theta}{1 + \cos\theta}$$

Q50. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$$

Q51. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$$

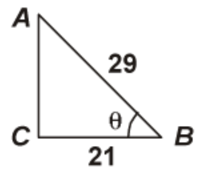
Q52. State whether the following are true or false. Justify your answer.

(i) $\sec A = \dfrac{12}{5}$ for some value of angle A. (ii) $\sin\theta = \dfrac{4}{3}$ for some angle θ.

(iii) $\cos A$ is the abbreviation used for the cosecant of angle A.

Q53. Write all the the other trigonometric ratios of $\angle A$ in terms of sec A.

Q54. Consider ΔACB, rignt-angled at C, in which AB = 29 units, BC = 21 units and $\angle ABC = \theta$ (see figure). Determine the values of



(i) $\cos^2\theta + \sin^2\theta$, (ii) $\cos^2\theta - \sin^2\theta$.

Q55. If $\cot\theta = \frac{7}{8}$, evaluate: (i) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ (ii) $\cot^2\theta$.

Q56. Prove the following identities, where the angles involved are acute angles for which the expressions are defined. $\frac{1+\sec A}{\sec A} = \frac{\sin^2 A}{1-\cos A}$ [Hint: Simplify L.H.S. and R.H.S. separately]

Q57. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\,\text{cosec}\,\theta$ [Hint: Write the expression in terms of $\sin\theta$ and $\cos\theta$]

Q58. State whether the following are true of false. Justify you answer.

(i) $\sin(A+B) = \sin A + \sin B$ (ii) The value of $\cos\theta$ increases as θ increses.

(iii) $\cot A$ is not defined for $A = 0°$.

Q59. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \text{cosec}\,A + \cot A$, Using the identify $\text{cosec}^2 A = 1 + \cot^2 A$.

Q60. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$(\text{cosec}\,A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$. [Hint: Simplify L.H.S. and R.H.S. separately]

Q61. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$$

Q62. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$$\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$$

Q63. Prove that $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$, using the identity $\sec^2\theta = 1 + \tan^2\theta$.

Q64. Prove the following identities, where the angles involved are acute angles for which the expressions are defined.

$$\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$$

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S1. 1.

S2. $\tan 5° + \sin 15°$.

S3. $\angle A = 36°$.

S4. $\angle A = 22°$.

S5. $\cos 23° + \sin 15°$

S6. 1

S7. 2

S8. $\dfrac{3\sqrt{2} - \sqrt{6}}{8}$

S9. $\dfrac{43 - 24\sqrt{3}}{11}$

S10. $\dfrac{67}{12}$

S11. (a)

S12. (d)

S13. (a)

S14. (c)

S15. $\sin A = 4/5$, $\cos A = 3/5$, $\tan A = 4/3$, $\cot A = 3/4$, $\text{cosec A} = 5/4$, $\sec A = 5/3$.

S16. Proved.

S17. Verified.

S18. $\sin Q = 7/25$, $\cos Q = 24/25$.

S19. Proved.

S20. Proved.

S21. $\cos A = \sqrt{1 - \sin^2 A}$, $\tan A = \dfrac{\sin A}{\sqrt{1 - \sin^2 A}}$, $\sec A = \dfrac{1}{\sqrt{1 - \sin^2 A}}$.

S22. 29°.

S23. $A = 45°$ and $B = 15°$.

S24. $\angle QPR = 60°$ and $\angle PRQ = 30°$.

S25. $BC = 5\sqrt{3}$ cm, $AC = 10$ cm.

S26. 0.

S27. **Proved.**

S28. Yes.

S29. $\sin\theta = \frac{5}{13}$, $\cos\theta = \frac{12}{13}$, $\tan\theta = \frac{5}{12}$, $\cot\theta = \frac{12}{5}$, $\operatorname{cosec}\theta = \frac{13}{5}$.

S30. $\sin A = \frac{15}{17}$, $\sec A = \frac{17}{8}$.

S31. $\cos A = \frac{\sqrt{7}}{4}$, $\tan A = \frac{3}{\sqrt{7}}$.

S32. $\sin P = \frac{12}{13}$, $\cos P = \frac{5}{13}$, $\tan P = \frac{12}{5}$.

S33. Proved.

S34. $\angle A = 45°$, $\angle B = 15°$.

S35. $\sin A = \frac{1}{\sqrt{1+\cot^2 A}}$, $\tan A = \frac{1}{\cot A}$, $\sec A = \frac{\sqrt{1+\cot^2 A}}{\cot A}$.

S36. Proved.

S37. Proved.

S38. (i) 1 (ii) 1

S39. (i) False (ii) True

S40. 1

S41. $\sin C = \frac{24}{25}$, $\cos C = \frac{7}{25}$.

S42. $\sin A = \frac{7}{25}$, $\cos A = \frac{24}{25}$.

S43. 0

S44. (i) (b) (ii) (c)

S45. (i) 0 (ii) 0

S46. (i) 1 (ii) 1

S47. (i) True. (ii) False.

S48. (i) (d) (ii) (d)

S49. Proved.

S50. Proved.

S51. Proved.

S52. (i) False (ii) False (iii) False

S53. $\sin A = \frac{\sqrt{\sec^2 A - 1}}{\sec A}$, $\cos A = \frac{1}{\sec A}$, $\tan A = \sqrt{\sec^2 A - 1}$, $\cot A = \frac{1}{\sqrt{\sec^2 A - 1}}$, $\text{cosec } A = \frac{\sec A}{\sqrt{\sec^2 A - 1}}$.

S54. (i) $\cos^2\theta + \sin^2\theta = 1$ (ii) $\cos^2\theta - \sin^2\theta = 41/841$

S55. (i) $\frac{49}{64}$. (ii) $\frac{49}{64}$.

S56. Proved.

S57. Proved.

S58. (i) False. (ii) False. (iii) True.

S59. Proved.

S60. Proved.

S61. Proved.

S62. Proved.

S63. Proved.

S64. Proved.