Date: 29/9/2021

Q1. Write the maximum and minimum values of $\cos\theta$.

Q2. What is the maximum value of $\frac{1}{\sec\theta}$?

Q3. What is the maximum value of $\frac{1}{\text{cosec}\,\theta}$?

Q4. Evaluate each of the following in the simplest form: $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$.

Q5. Evaluate each of the following in the simplest form: $\sin 60^\circ \cos 45^\circ + \cos 60^\circ \sin 45^\circ$.

Q6. Evaluate each of the following in the simplest form: $\tan 30^\circ \sec 45^\circ + \tan 60^\circ \sec 30^\circ$.

Q7. Evaluate the following expressions: $4\cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + \cos^2 90^\circ$.

Q8. Evaluate the following expressions: $3\cos^2 30^\circ + \sec^2 30^\circ + 2\cos 0^\circ + 3\sin 90^\circ - \tan^2 60^\circ$.

Q9. Prove that: $\frac{\cos 30^\circ + \sin 60^\circ}{1 + \cos 60^\circ + \sin 30^\circ} = \frac{\sqrt{3}}{2}$.

Q10. Show that: $2(\cos^2 45^\circ + \tan^2 60^\circ) - 6(\sin^2 45^\circ - \tan^2 30^\circ) = 6$

Q11. Evaluate the following: $\frac{\sin 36^\circ}{\cos 54^\circ} - \frac{\sin 54^\circ}{\cos 36^\circ}$.

Q12. Evaluate the following: $\cos^2 13^\circ - \sin^2 77^\circ$.

Q13. Evaluate the following: $\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \,\text{cosec}\, 31^\circ$.

Q14. Prove that: $\sin 35^\circ \sin 55^\circ - \cos 35^\circ \cos 55^\circ = 0$.

Q15. Prove that: $\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 59^\circ}{\sin 31^\circ} - 8\sin^2 30^\circ = 0$.

Q16. Evaluate the following: $\left(\frac{\sin 35^\circ}{\cos 55^\circ}\right)^2 + \left(\frac{\cos 55^\circ}{\sin 35^\circ}\right)^2 - 2\cos 60^\circ$.

Q17. Evaluate the following: $\left(\frac{\sin 47^\circ}{\cos 43^\circ}\right)^2 + \left(\frac{\cos 43^\circ}{\sin 47^\circ}\right)^2 - 4\cos 43^\circ$.

Q18. Evaluate the following: $\cos(40^\circ - \theta) - \sin(50^\circ + \theta) + \frac{\cos^2 40^\circ + \cos^2 50^\circ}{\sin^2 40^\circ + \sin^2 50^\circ}$.

Q19. If $\sin 5\theta = \cos 4\theta$, where 5θ and 4θ are acute angles, find the value of θ.

Q20. Evaluate the following: $\left(\frac{\sin 27^\circ}{\cos 63^\circ}\right)^2 - \left(\frac{\cos 63^\circ}{\sin 27^\circ}\right)^2$.

Q21. Evaluate the following: $\frac{\tan 35^\circ}{\cot 55^\circ} + \frac{\cot 78^\circ}{\tan 12^\circ} - 1$.

Q22. Express $\cos 75^\circ + \cot 75^\circ$ in terms of angles between 0° and 30°.

Q23. Prove that: $\sin 48^\circ \sec 42^\circ + \cos 48^\circ \,\text{cosec}\, 42^\circ = 2$.

Q24. Prove that: $\frac{\sin 70^\circ}{\cos 20^\circ} + \frac{\text{cosec}\, 20^\circ}{\sec 70^\circ} - 2\cos 70^\circ \,\text{cosec}\, 20^\circ = 0$.

Q25. Prove that: $\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \operatorname{cosec} 31^\circ = 2$.

Q26. Prove the following: $\frac{\tan (90^\circ - A) \cot A}{\operatorname{cosec}^2 A} - \cos^2 A = 0$.

Q27. Write the value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 179^\circ \cos 180^\circ$?

Q28. If $A + B = 90^\circ$ and $\cos B = \frac{3}{5}$, what is the value of $\sin A$?

Q29. If $\tan A = \frac{3}{4}$ and $A + B = 90^\circ$, then what is the value of $\cot B$?

Q30. Prove the following: $\frac{\cos (90^\circ - A) \sin (90^\circ - A)}{\tan (90^\circ - A)} = \sin^2 A$.

Q31. Prove that: $\operatorname{cosec}^2 (90^\circ - \theta) - \tan^2 \theta = \cos^2 (90^\circ - \theta) + \cos^2 \theta$.

Q32. Find the value of θ in each of the following: $2 \sin 2\theta = \sqrt{3}$.

Q33. Find the value of θ in each of the following: $2 \cos 3\theta = 1$.

Q34. Find the value of θ in each of the following: $\sqrt{3} \tan 2\theta - 3 = 0$.

Q35. Solve the following equations when $0^\circ < \theta < 90^\circ$. $2 \cos^2 \theta = \frac{1}{2}$.

Q36. Solve the following equations when $0^\circ < \theta < 90^\circ$. $2 \sin^2 \theta = \frac{1}{2}$.

Q37. Solve the following equations when $0^\circ < \theta < 90^\circ$. $3 \tan^2 \theta - 1 = 0$.

Q38. Solve the following equations when $0^\circ < \theta < 90^\circ$. $2 \cos 3\theta = 1$.

Q39. Solve the following equations when $0^\circ < \theta < 90^\circ$. $2 \sin 2\theta = \sqrt{3}$.

Q40. Solve the following equations when $0^\circ < \theta < 90^\circ$. $\tan 5\theta = 1$.

Q41. Prove that following trigonometric identities: $(1 + \tan^2 \theta)(1 + \sin \theta)(1 - \sin \theta) = 1$.

Q42. Prove that following trigonometric identities: $(1 + \cot^2 \theta)(1 - \cos \theta)(1 + \cos \theta) = 1$.

Q43. What is the value of $9 \cot^2 \theta - 9 \operatorname{cosec}^2 \theta$?

Q44. Prove the following identities: $\frac{1}{\sec \theta - \tan \theta} = \sec \theta + \tan \theta$.

Q45. If $x = a \sin \theta$ and $y = b \tan \theta$, then prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$.

Q46. Evaluate the following: $\frac{\sin 50^\circ}{\cos 40^\circ} + \frac{\operatorname{cosec} 40^\circ}{\sec 50^\circ} - 4 \cos 50^\circ \operatorname{cosec} 40^\circ$.

Q47. Evaluate the following: $\operatorname{cosec} (65^\circ + \theta) - \sec (25^\circ - \theta) - \tan (55^\circ - \theta) + \cot (35^\circ + \theta)$

Q48. If θ is an acute angle such that $\cos \theta = \frac{3}{5}$, then $\frac{\sin \theta \tan \theta - 1}{2 \tan^2 \theta} =$

(a) $\frac{16}{625}$ (b) $\frac{1}{36}$ (c) $\frac{3}{160}$ (d) $\frac{160}{3}$

Q49. Prove that following trigonometric identities: $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 \sec^2 \theta$.

Q50. If $\tan A = \frac{5}{12}$, find the value of $(\sin A + \cos A) \sec A$.

Q51. If $\tan\theta = \frac{a}{b}$, then $\frac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta}$ is equal to

(a) $\frac{a^2+b^2}{a^2-b^2}$ (b) $\frac{a^2-b^2}{a^2+b^2}$ (c) $\frac{a+b}{a-b}$ (d) $\frac{a-b}{a+b}$

Q52. If $5\tan\theta - 4 = 0$, then the value of $\frac{5\sin\theta - 4\cos\theta}{5\sin\theta + 4\cos\theta}$ is

(a) $\frac{5}{3}$ (b) $\frac{5}{6}$ (c) 0 (d) $\frac{1}{6}$

Q53. If $16\cot x = 12$, then $\frac{\sin x - \cos x}{\sin x + \cos x}$ equals

(a) $\frac{1}{7}$ (b) $\frac{3}{7}$ (c) $\frac{2}{7}$ (d) 0

Q54. If $8\tan x = 15$, then $\sin x - \cos x$ is equal to

(a) $\frac{8}{17}$ (b) $\frac{17}{7}$ (c) $\frac{1}{17}$ (d) $\frac{7}{17}$

Q55. The value of $\tan 1^\circ \tan 2^\circ \tan 3^\circ \ldots \tan 89^\circ$ is

(a) 1 (b) -1 (c) 0 (d) None of these

Q56. If $x\tan 45^\circ \cos 60^\circ = \sin 60^\circ \cot 60^\circ$, then x is equal to

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

Q57. If $x\sin(90^\circ - \theta)\cot(90^\circ - \theta) = \cos(90^\circ - \theta)$, then x =

(a) 0 (b) 1 (c) -1 (d) 2

Q58. If $\frac{x\,\mathrm{cosec}^2\,30^\circ \sec^2 45^\circ}{8\cos^2 45^\circ \sin^2 60^\circ} = \tan^2 60^\circ - \tan^2 30^\circ$, then x =

(a) 1 (b) -1 (c) 2 (d) 0

Q59. The value of $\cos^2 17^\circ - \sin^2 73^\circ$ is

(a) 1 (b) $\frac{1}{3}$ (c) 0 (d) -1

Q60. The value of $\frac{\cos^3 20^\circ - \cos^3 70^\circ}{\sin^3 70^\circ - \sin^3 20^\circ}$ is

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

Q61. If $\tan^2 45^\circ - \cos^2 30^\circ = x\sin 45^\circ \cos 45^\circ$, then x =

(a) 2 (b) -2 (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

Q62. If 5θ and 4θ are acute angles satisfying $\sin 5\theta = \cos 4\theta$, then $2\sin 3\theta - \sqrt{3}\tan 3\theta$ is equal to

(a) 1 (b) 0 (c) -1 (d) $1 + \sqrt{3}$

Q63. If θ and $2\theta - 40^\circ$ are acute angles such that $\sin\theta = \cos(2\theta - 45^\circ)$ then $\tan\theta$ is equal to

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

Q64. The value of $\frac{\cos(90^\circ - \theta)\sec(90^\circ - \theta)\tan\theta}{\mathrm{cosec}(90^\circ - \theta)\sin(90^\circ - \theta)\cot(90^\circ - \theta)} + \frac{\tan(90^\circ - \theta)}{\cot\theta}$ is

(a) 1 (b) -1 (c) 2 (d) -2

Q65. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots \cos 180^\circ$ is

(a) 1 (b) 0 (c) -1 (d) None of these

Q66. If A, B and C are interior angles of a triangle ABC, then $\sin\left(\frac{B+C}{2}\right) =$

(a) $\sin\frac{A}{2}$ (b) $\cos\frac{A}{2}$ (c) $-\sin\frac{A}{2}$ (d) $-\cos\frac{A}{2}$

Q67. If $\cos\theta = \frac{2}{3}$, then $2\sec^2\theta + 2\tan^2\theta - 7$ is equal to

(a) 1 (b) 0 (c) 3 (d) 4

Q68. If $\sec\theta + \tan\theta = x$, then $\sec\theta =$

(a) $\frac{x^2+1}{x}$ (b) $\frac{x^2+1}{2x}$ (c) $\frac{x^2-1}{2x}$ (d) $\frac{x^2-1}{x}$

Q69. If $\cos\theta + \tan\theta = x$, then $\tan\theta =$

(a) $\frac{x^2+1}{x}$ (b) $\frac{x^2-1}{x}$ (c) $\frac{x^2+1}{2x}$ (d) $\frac{x^2-1}{2x}$

Q70. $\sec^4 A - \sec^2 A$ is equal to

(a) $\tan^2 A - \tan^4 A$ (b) $\tan^4 A - \tan^2 A$ (c) $\tan^4 A + \tan^2 A$ (d) $\tan^2 A + \tan^4 A$

Q71. $\cos^4 A - \sin^4 A$ is equal to

(a) $2\cos^2 A + 1$ (b) $2\cos^2 A - 1$ (c) $2\sin^2 A - 1$ (d) $2\sin^2 A + 1$

Q72. $\frac{\sin\theta}{1+\cos\theta}$ is equal to

(a) $\frac{1+\cos\theta}{\sin\theta}$ (b) $\frac{1-\cos\theta}{\cos\theta}$ (c) $\frac{1-\cos\theta}{\sin\theta}$ (d) $\frac{1-\sin\theta}{\cos\theta}$

Q73. $\frac{\cot\theta}{\cot\theta - \cot 3\theta} + \frac{\tan\theta}{\tan\theta - \tan 3\theta}$ is equal to

(a) 0 (b) 1 (c) -1 (d) 2

Q74. If $x = a\sec\theta$ and $y = b\tan\theta$, then $b^2x^2 - a^2y^2 =$

(a) ab (b) $a^2 - b^2$ (c) $a^2 + b^2$ (d) a^2b^2

Q75. If $x = a\cos\theta$ and $y = b\sin\theta$, then $b^2x^2 + a^2y^2 =$

(a) a^2b^2 (b) ab (c) a^4b^4 (d) $a^2 + b^2$

Q76. $(\text{cosec}\,\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta)$ is equal

(a) 0 (b) 1 (c) -1 (d) None of these

Q77. The value of $(1 + \cot\theta - \text{cosec}\,\theta)(1 + \tan\theta + \sec\theta)$ is

(a) 1 (b) 2 (c) 4 (d) 0

Q78. If $a\cos\theta + b\sin\theta = 4$ and $a\sin\theta - b\cos\theta = 3$, then $a^2 + b^2 =$

(a) 7 (b) 12 (c) 25 (d) None of these

Q79. If $a\cot\theta + b\,\text{cosec}\,\theta = p$ and $b\cot\theta + a\,\text{cosec}\,\theta = q$, then $p^2 - q^2 =$

(a) $a^2 - b^2$ (b) $b^2 - a^2$ (c) $a^2 + b^2$ (d) $b - a$

Q80. The value of $\sin^2 29^\circ + \sin^2 61^\circ$ is

(a) 1 (b) 0 (c) $2\sin^2 29^\circ$ (d) $2\cos^2 61^\circ$

Q81. If $a \cos\theta + b \sin\theta = m$ and $a \sin\theta - b \cos\theta = n$, then $a^2 + b^2 =$

(a) $m^2 - n^2$ (b) m^2n^2 (c) $n^2 - m^2$ (d) $m^2 + n^2$

Q82. $9 \sec^2 A - 9 \tan^2 A$ is equal to

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

Q83. In a ΔABC, right angled at A, if $AB = 12$, $AC = 5$ and $BC = 13$, find all the six trigonoetric ratios of angle B.

Q84. If $5 \tan\alpha = 4$, Show that $\frac{5\sin\alpha - 3\cos\alpha}{5\sin\alpha + 2\cos\alpha} = \frac{1}{6}$.

Q85. Given that $16 \cot A = 12$, find the value of $\frac{\sin A + \cos A}{\sin A - \cos A}$.

Q86. In a right triangle ABC right angled at B, $\angle ACB = \theta$, $AB = 2$ cm and $BC = 1$ cm. Find the value of $\sin^2\theta + \tan^2\theta$.

Q87. If $\sin B = \frac{1}{2}$, show that $3 \cos B - 4 \cos^3 B = 0$.

Q88. If $\sec\alpha = \frac{5}{4}$, evaluate $\frac{1 - \tan\alpha}{1 + \tan\alpha}$.

Q89. If $\text{cosec}\, A = \sqrt{10}$, find other five trigonometric ratios.

Q90. In a ΔABC, right angled at A, if $AB = 5$, $AC = 12$ and $BC = 13$, find $\sin B$, $\cos C$ and $\tan B$.

Q91. In a right triangle ABC right angled at B, if $\sin A = \frac{3}{5}$, find all the six trigonometric ratios of $\angle C$.

Q92. If $\tan\theta = \frac{12}{13}$, evaluate $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$.

Q93. If $3 \tan\theta = 4$, find the value of $\frac{4\cos\theta - \sin\theta}{2\cos\theta + \sin\theta}$.

Q94. If $3 \cot\theta = 2$, find the value of $\frac{4\sin\theta - 3\cos\theta}{2\sin\theta + 6\cos\theta}$.

Q95. If $\tan\theta = \frac{a}{b}$, prove that $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \frac{a^2 - b^2}{a^2 + b^2}$.

Q96. Evatuate each of the following: $\frac{5\sin^2 30° + \cos^2 45° - 4\tan^2 30°}{2\sin 30° \cos 30° + \text{tann } 45°}$.

Q97. Given $\tan\theta = \frac{1}{\sqrt{5}}$, what is the value of $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta}$.

Q98. If $\sin\theta = \frac{a}{b}$, find $\sec\theta + \tan\theta$ in terms of a and b.

Q99. If $3 \cot\theta = \frac{13}{5}$, show that $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta + 9\cos\theta} = 3$.

Q100 If $\cot\theta = \frac{1}{\sqrt{3}}$, show that $\frac{1 - \cos^2\theta}{2 - \sin^2\theta} = \frac{3}{5}$.

Q101 Evaluate the following: $\sin^2 30° \cos^2 45° + 4 \tan^2 30° + \frac{1}{2} \sin^2 90° - 2 \cos^2 90° + \frac{1}{24} \cos^2 0°$.

Q102 A rhombus of side 20 cm has two angles of 60° each. Find the length of the diagonals.

Q103 In a rectangle $ABCD$, $AB = 20$ cm, $\angle BAC = 60°$. Calculate side BC.

Q104 Given that $\sin(A + B) = \sin A \cos B + \cos A \sin B$, find the value of $\sin 75°$.

Q105 Verify that: $4(\sin^4 30° + \cos^4 60°) - 3(\cos^2 45° - \sin^2 90°) = 2$.

Q106 Show that: $2(\cos^4 60° + \sin^4 30°) - (\tan^2 60° + \cot^2 45°) + 3\sec^2 30° = \frac{1}{4}$.

Q107 Evaluate the following: $(\cos 0° + \sin 45° + \sin 30°)(\sin 90° - \cos 45° + \cos 60°)$.

Q108 Evaluate the following: $\cot^2 30° - 2\cos^2 60° - \frac{3}{5}\sec^2 45° - 4\sec^2 30°$.

Q109 Evaluate the following: $4(\sin^4 60° + \cos^4 30°) - 3(\tan^2 60° - \tan^2 45°) + 5\cos^2 45°$.

Q110 Prove that : $\cos 1° \cos 2° \cos 3° \ldots \cos 180° = 0$.

Q111 Prove that : $\tan 1° \tan 2° \tan 3° \ldots \tan 89° = 1$.

Q112 Evaluate the following: $\frac{\tan^2 30° + 4\cos^2 45° + 3\sec^2 30° + 4\cos^2 90°}{\text{cosec } 30° + \sec 60° - \cot^2 30°}$.

Q113 Evaluate the following: $4(\sin^4 30° + \cos^2 60°) - 3(\cos^2 45° - \sin^2 90°) - \sin^2 60°$.

Q114 Prove the following: $\frac{\cos(90° - \theta)\sec(90° - \theta)\tan\theta}{\text{cosec}(90° - \theta)\sin(90° - \theta)\cot(90° - \theta)} + \frac{\tan(90° - \theta)}{\cot\theta} = 2$.

Q115 If $\sec 5A = \text{cosec}(A + 36°)$, where 5A is an acute angle, find the value of A.

Q116 If $\sin 5\theta = \cos 4\theta$, where 5θ and 4θ are acute angles, find the value of θ.

Q117 Find θ, if $\sin(\theta + 36°) = \cos\theta$, where $\theta + 36°$ is an acute angle.

Q118 If $\tan 2\theta = \cot(\theta + 6°)$, where 2θ and $\theta + 6°$ are acute angles, find the value of θ.

Q119 If $20 + 45°$ and $30° - \theta$ are acute angles, find the degree measure of θ satisfying

$$\sin(2\theta + 45°) = \cos(30° - \theta).$$

Q120 If $\sin\theta + \cos\theta = \sqrt{2}\sin(90° - \theta)$, determine $\cot\theta$.

Q121 Prove that: $\frac{\sin\theta\cos(90° - \theta)\cos\theta}{\sin(90° - \theta)} + \frac{\cos\theta\sin(90° - \theta)\sin\theta}{\cos(90° - \theta)} = 1$.

Q122 If θ is a positive acute angle such that $\sec\theta = \text{cosec } 60°$, find the value of $2\cos^2\theta - 1$.

Q123 If $x = 30°$, verify that $\tan 2x = \frac{2\tan x}{1 - \tan^2 x}$.

Q124 If $x = 30°$, verify that $\cos 3x = 4\cos^3 x - 3\cos x$.

Q125 If $x = 30°$, verify that $\sin 3x = 3\sin x - 4\sin^3 x$.

Q126 Find the value of x in each of the following:

$$\sin 2x = \sin 60° \cos 30° - \cos 60° \sin 30°.$$

Q127 Find the value of x in each of the following:

$$\cos x = \cos 60° \cos 30° + \sin 60° \sin 30°.$$

Q128 Find the value of x in each of the following:

$$\tan 3x = \sin 45° \cos 45° + \sin 30°.$$

Q129 If $x = 30°$, verify that $\sin x = \sqrt{\frac{1 - \cos 2x}{2}}$.

Q130 Find the value of x of the following:

$$\sqrt{3}\tan 2x = \cos 60° + \sin 45° \cos 45°.$$

Q131 Prove the following trigonometric identities: $\frac{\tan\theta + \sin\theta}{\tan\theta - \sin\theta} = \frac{\sec\theta + 1}{\sec\theta - 1}$.

Q132. Prove the following trigonometric identities: $\frac{\sin\theta}{1-\cos\theta} = \text{cosec}\,\theta + \cot\theta$.

Q133. Prove that following trigonometric identities: $\text{cosec}^2\theta + \sec^2\theta = \text{cosec}^2\theta\,\sec^2\theta$.

Q134. Find the value of x of the following:

$$\cos 2x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ.$$

Q135. Prove the following trigonometric identities: $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$.

Q136. Prove the following trigonometric identities: $\tan\theta - \cot\theta = \frac{2\sin^2\theta - 1}{\sin\theta\cos\theta}$.

Q137. Prove the following trigonometric identities: $\cot\theta - \tan\theta = \frac{2\cos^2\theta - 1}{\sin\theta\cos\theta}$.

Q138. Prove the following identities: $\frac{1-\cos\theta}{1+\cos\theta} = (\text{cosec}\,\theta - \cot\theta)^2$.

Q139. Prove the following identities: $\frac{1-\sin\theta}{1+\sin\theta} = (\sec\theta - \tan\theta)^2$.

Q140. Prove the following trigonometric identities: $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\,\theta + \cot\theta$.

Q141 Prove the following identities: $\cot^4 A - 1 = \text{cosec}^4 A - 2\,\text{cosec}^2 A$.

Q142 Prove the following identities: $\cos^4 A - \cos^2 A = \sin^4 A - \sin^2 A$.

Q143 Prove the following identities: $\tan^2\theta + \cot^2\theta + 2 = \sec^2\theta + \text{cosec}^2\theta$.

Q144 Prove the following identities: $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = 1 - 2\sec\theta\tan\theta + 2\tan^2\theta$.

Q145 Prove the following identities: $\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \text{cosec}^2\theta = \tan^2\theta - \cot^2\theta$.

Q146 Prove the following identities: $\sec^4\theta - \sec^2\theta = \tan^4\theta + \tan^2\theta$.

Q147 Prove the following identities: $(\text{cosec}\,\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1$.

Q148. Prove the following identities: $\frac{\cos\theta}{1-\sin\theta} + \frac{\cos\theta}{1+\sin\theta} = 2\sec\theta$.

Q149 Prove the following trigonometric identities: $\text{cosec}^6\theta = \cot^6\theta + 3\cot^2\theta\,\text{cosec}^2\theta + 1$.

Q150 Prove the following trigonometric identities: $\frac{(1+\sin\theta)^2 + (1-\sin\theta)^2}{2\cos^2\theta} = \frac{1+\sin^2\theta}{1-\sin^2\theta}$.

Q151 Prove the following trigonometric identities: $\tan^2\theta - \sin^2\theta = \tan^2\theta\,\sin^2\theta$.

Q152 Prove the following trigonometric identities: $(\text{Cosec}\,A - \sin A)(\sec A - \cos A)(\tan A + \cot A) = 1$.

Q153 Prove the following trigonometric identities: $(\sec\theta + \cos\theta)(\sec\theta - \cos\theta) = \tan^2\theta + \sin^2\theta$.

Q154 Prove the following identities: $\frac{\cos A}{1-\tan A} + \frac{\sin^2 A}{\sin A - \cos A} = \sin A + \cos A$.

Q155 Prove the following identities: $\sin^6 A + \cos^6 A = 1 - 3\sin^2 A\cos^2 A$.

Q156 Prove the following identities: $\sin^4 A + \cos^4 A = 1 - 2\sin^2 A\cos^2 A$.

Q157 Prove the following trigonometric identities:

$$\cot^2 A\,\text{cosec}^2 B - \cot^2 B\,\text{cosec}^2 A = \cot^2 A - \cot^2 B.$$

Q158 Prove the following trigonometric identities: $\frac{\text{cosec } A}{\text{cosec } A - 1} + \frac{\text{cosec } A}{\text{cosec } A + 1} = 2 \sec A$.

Q159 Prove the following trigonometric identities: $\sqrt{\frac{1 - \cos A}{1 + \cos A}} + \sqrt{\frac{1 + \cos A}{1 - \cos A}} = 2 \text{ cosec } A$.

Q160 Prove the following trigonometric identities: $\frac{\sec A - \tan A}{\sec A + \tan A} = \frac{\cos^2 A}{(1 + \sin A)^2}$.

Q161 Prove the following trigonometric identities: $\frac{(1 + \tan^2 \theta) \cot \theta}{\text{cosec}^2 \theta} = \tan \theta$.

Q162 If $\tan \theta + \cot \theta = 2$, find the value of $\tan^2 \theta + \cot^2 \theta$.

Q163 If $x = a \cos^3 \theta$, $y = b \sin^3 \theta$, prove that $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$.

Q164 Evaluate the following: $\tan 5° \tan 25° \tan 30° \tan 65° \tan 85°$.

Q165 Evaluate the following: $\cot 12° \cot 38° \cot 52° \cot 60° \cot 78°$.

Q166 Evaluate the following: $2\left(\frac{\cos 58°}{\sin 32°}\right) - \sqrt{3}\left(\frac{\cos 38° \text{ cosec } 52°}{\tan 15° \tan 60° \tan 75°}\right)$.

Q167 Evaluate the following: $\frac{\cos 70°}{\sin 20°} + \frac{\cos 55° \text{ cosec } 35°}{\tan 5° \tan 25° \tan 45° \tan 65° \tan 85°}$.

Q168 If $\text{cosec } \theta - \cot \theta = \alpha$, write the value of $\text{cosec } \theta + \cot \alpha$.

Q169 If $\sec \theta + \tan \theta = x$, write the value of $\sec \theta - \tan \theta$ in terms of x.

Q170 Evaluate: $\frac{\sin 18°}{\cos 72°} + \sqrt{3}\{\tan 10° \tan 30° \tan 40° \tan 50° \tan 80°\}$.

Q171 Evaluate: $\frac{3 \cos 55°}{7 \sin 35°} - \frac{4(\cos 70° \text{ cosec } 20°)}{7(\tan 5° \tan 25° \tan 45° \tan 65° \tan 85°)}$.

Q172 Evaluate: $\tan 35° \tan 40° \tan 45° \tan 50° \tan 55°$.

Q173 Evaluate: $4(\sin^4 30° + \cos^4 60°) - \frac{2}{3}(\sin^2 60° - \cos^2 45°) + \frac{1}{2}\tan^2 60°$.

Q174 Evaluate: $\frac{2}{3}(\cos^4 30° - \sin^4 45°) - 3(\sin^2 60° - \sec^2 45°) + \frac{1}{4}\cot^2 30°$.

Q175 Prove the following: $\sin(50° + \theta) - \cos(40° - \theta) + \tan 1° \tan 10° \tan 20° \tan 70° \tan 80° \tan 89° = 1$.

Q176 Evaluate: $\frac{2 \sin 68°}{\cos 22°} - \frac{2 \cot 15°}{5 \tan 75°} - \frac{3 \tan 45° \tan 20° \tan 40° \tan 50° \tan 70°}{5}$.

Q177 Prove the following identities: $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$.

Q178 Prove the following identities:

$$\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{\sin^2 A - \cos^2 A} = \frac{2}{2 \sin^2 A - 1} = \frac{2}{1 - 2 \cos^2 A}.$$

Q179 Evaluate: $\frac{\cos 58°}{\sin 32°} + \frac{\sin 22°}{\cos 58°} - \frac{4(\cos 70° \text{ cosec } 20°)}{\tan 18° \tan 35° \tan 60° \tan 72° \tan 55°}$.

Q180 If $\sec 2A = \text{cosec}(A - 42°)$, where $2A$ is an acute angle, find the value of A.

Q181 Prove that: $(1 - \sin \theta + \cos \theta)^2 = 2(1 + \cos \theta)(1 - \sin \theta)$.

Q182 If $a \cos \theta + b \sin \theta = m$ and $a \sin \theta - b \cos \theta = n$, prove that $a^2 + b^2 = m^2 + n^2$.

Q183 Prove the following identities: $\tan^2 A - \tan^2 B = \frac{\cos^2 B - \cos^2 A}{\cos^2 B \cos^2 A} = \frac{\sin^2 A - \sin^2 B}{\cos^2 A \cos^2 B}$.

Q184 Prove the following identities: $\frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta}+\sin\theta+\cos\theta=1$.

Q185 Prove the following identities: $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\operatorname{cosec}\theta$.

Q186 Prove the following identities: $(\operatorname{cosec}\theta-\cot\theta)^2=\frac{1-\cos\theta}{1+\cos\theta}$.

Q187 Without using trigonometric tables, evaluate each of the following:

$$\frac{\cos^2 20^\circ+\cos^2 70^\circ}{\sec^2 50^\circ-\cot^2 40^\circ}+2\operatorname{cosec}^2 58^\circ-2\cot 58^\circ\tan 32^\circ-4\tan 13^\circ\tan 37^\circ\tan 45^\circ\tan 53^\circ\tan 77^\circ.$$

Q188 Without using trigonometric tables, evaluate each of the following:

$$\cos(40^\circ+\theta)-\sin(50^\circ-\theta)=\frac{\cos^2 40^\circ+\cos^2 50^\circ}{\sin^2 40^\circ+\sin^2 50^\circ}.$$

Q189 Without using trigonometric tables, evaluate each of the following:

$$\frac{\sin^2 20^\circ+\sin^2 70^\circ}{\cos^2 20^\circ+\cos^2 70^\circ}+\frac{\sin(90^\circ-\theta)\sin\theta}{\tan\theta}+\frac{\cos(90^\circ-\theta)\cos\theta}{\cot\theta}.$$

Q190 If $\sin\theta+\sin^2\theta=1$, prove that $\cos^2\theta+\cos^4\theta=1$.

Q191 Without using trigonometric tables, evaluate each of the following:

$$\frac{-\tan\theta\cot(90^\circ-\theta)+\sec\theta\operatorname{cosec}(90^\circ-\theta)+\sin^2 35^\circ+\sin^2 55^\circ}{\tan 10^\circ\tan 20^\circ\tan 30^\circ\tan 70^\circ\tan 80^\circ}.$$

Q192 Without using trigonometric tables, evaluate each of the following:

$$\frac{\sec 39^\circ}{\operatorname{cosec} 51^\circ}+\frac{2}{\sqrt{3}}\tan 17^\circ\tan 38^\circ\tan 60^\circ\tan 52^\circ\tan 73^\circ-3(\sin^2 31^\circ+\sin^2 59^\circ).$$

Q193 Prove that: $\frac{\sec\theta-1}{\sec\theta+1}=\left(\frac{\sin\theta}{1+\cos\theta}\right)^2$.

Q194 If $\sqrt{3}\tan\theta=3\sin\theta$, find the value of $\sin^2\theta-\cos^2\theta$.

Q195 If $\cot\theta=\frac{15}{8}$, then evaluate $\frac{(2+2\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(2-2\cos\theta)}$.

Q196 Without using trigonometric tables, evaluate each of the following:

$$\frac{2}{3}\operatorname{cosec}^2 58^\circ-\frac{2}{3}\cot 58^\circ\tan 32^\circ-\frac{5}{3}\tan 13^\circ\tan 37^\circ\tan 45^\circ\tan 52^\circ\tan 77^\circ.$$

Q197 If $\sin A=\frac{1}{3}$, evaluate $\cos A\operatorname{cosec} A+\tan A\sec A$.

Q198 If $\tan A=\sqrt{2}-1$ show that $\sin A\cos A=\frac{\sqrt{2}}{4}$.

Q199 In a ΔABC, right angled at B, if $AB=12$, $BC=5$, find

(i) $\sin A$ and $\tan A$ (ii) $\cos C$ and $\cot C$

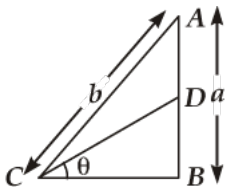
Q200 If $\operatorname{cosec} A=2$, find the value of $\frac{1}{\tan A}+\frac{\sin A}{1+\cos A}$.

Q201 Write the maximum and minimum values of $\sin\theta$.

Q202 If $\sin\theta=\frac{a^2-b^2}{a^2+b^2}$, find the values of other five trigonometric ratios.

Q203 If $\sin A=\frac{3}{5}$, find $\cos A$ and $\tan A$.

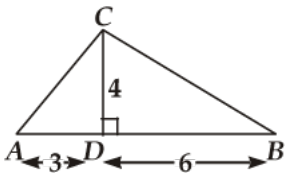
Q204 In figure, $AD = DB$ and $\angle B$ is a riht angle. Determine:



(i) $\sin\theta$ (ii) $\cos\theta$

(iii) $\tan\theta$ (iv) $\sin^2\theta + \cos^2\theta$

Q205 From figure, write the values of:



(i) $\sin A$ (ii) $\cot A$

(iii) $\tan B$ (iv) $\sin^2 B + \cos^2 B$

Q206 If $\sin\theta = \frac{4}{5}$, find the value of $\frac{4\tan\theta - 5\cos\theta}{\sec\theta + 4\cot\theta}$.

Q207 If $\sec\alpha = \frac{5}{4}$, verify that $\frac{\tan\alpha}{1+\tan^2\alpha} = \frac{\sin\alpha}{\sec\alpha}$.

Q208 If $\cot B = \frac{12}{5}$, Prove that $\tan^2 B - \sin^2 B = \sin^4 B \sec^2 B$.

Q209 If $\tan A = 2$, evaluate $\sec A \sin A + \tan^2 A - \text{cosec } A$.

Q210 If $\tan A = 1$ and $\tan B = \sqrt{3}$, evaluate $\cos A \cos B - \sin A \sin B$.

Q211 If $\tan\theta + \frac{1}{\tan\theta} = 2$, find the value of $\tan^2\theta + \frac{1}{\tan^2\theta}$.

Q212 If $\tan\theta = \frac{1}{\sqrt{7}}$, show that $\frac{\text{cosec}^2\theta - \cos^2\theta}{\text{cosec}^2\theta + \cos^2\theta} = \frac{3}{4}$.

Q213 If $\sin(A-B) = \sin A \cos B - \cos A \sin B$ and $\cos(A-B) = \cos A \cos B + \sin A \sin B$, find the values of $\sin 15°$ and $\cos 15°$.

Q214 An equlateral triangle is inscribed in a circle of radius 6 cm. Find its side.

Q215 The altitude AD of a $\angle ABC$, in which $\angle A$ obtuse and, $AD = 10$ cm. If $BD = 10$ cm and $CD = 10\sqrt{3}$ cm, determine $\angle A$.

Q216 ABC is a right triangle, right angled at C. If $A = 30°$ and $AB = 40$ units, find the remaining two sides and $\angle B$ of ΔABC.

Q217 If $\tan\theta = \frac{20}{21}$, show that $\frac{1-\sin\theta+\cos\theta}{1+\sin\theta+\cos\theta} = \frac{3}{7}$.

Q218 If $3\cos\theta - 4\sin\theta = 2\cos\theta + \sin\theta$, find $\tan\theta$.

Q219 If $\cot\theta = \frac{3}{4}$, prove that $\sqrt{\frac{\sec\theta - \text{cosec}\,\theta}{\sec\theta + \text{cosec}\,\theta}} = \frac{1}{\sqrt{7}}$.

Q220 If $\sec A = \frac{17}{8}$, verify that $\frac{3-4\sin^2 A}{4\cos^2 A - 3} = \frac{3-\tan^2 A}{1-3\tan^2 A}$.

Q221 If $\sec A = \frac{5}{4}$, verify that $\frac{3\sin A - 4\sin^2 A}{4\cos^2 A - 3\cos A} = \frac{3\tan A - \tan^2 A}{1-3\tan^2 A}$.

Q222 If $\sin\theta = \frac{3}{4}$, prove that $\sqrt{\frac{\text{cosec}^2\theta - \cot^2\theta}{\sec^2\theta - 1}} = \frac{\sqrt{7}}{3}$.

Q223 If A, B and C are the interior angles of a ΔABC, show that:

(i) $\sin\frac{B+C}{2} = \cos\frac{A}{2}$ (ii) $\cos\frac{B+C}{2} = \sin\frac{A}{2}$

Q224 If $A + B = 90°$, prove that $\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$.

Q225 If A, B and C are the interior angles of a triangle ABC, prove that : $\tan\frac{B+C}{2} = \cot\frac{A}{2}$.

Q226 If A and B are acute angles such that $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$ and $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A + \tan B}$, find $A + B$.

Q227 In a rectangle $ABCD$, $AB = 20$ cm. $\angle BAC = 60°$, calculate side BC and diagonals AC and BD.

Q228 If ΔABC is a right triangle such that $\angle C = 90°$, $\angle A = 45°$ and $BC = 7$ units. Find $\angle B$, AB and AC.

Q229 In a right triangle ABC, right angled at C, if $\angle B = 60°$ and $AB = 15$ units. Find the remaining angles and sides.

Q230 In a ΔABC right angled at B, $\angle A = \angle C$. Find the values of

(i) $\sin A \cos C + \cos A \sin C$ (ii) $\sin A \sin B + \cos A \cos B$.

Q231 If θ is an acute angle and $\tan\theta + \cot\theta = 2$, find the value of $\tan^7\theta + \cot^7\theta$.

Q232 Find an acute angle θ, when $\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$.

Q233 Prove the following identities: $\frac{\sin^2 A}{\cos^2 A} + \frac{\cos^2 A}{\sin^2 A} = \frac{1}{\sin^2 A \cos^2 A} - 2$.

Q234 Prove the following identities: $\sec^4 A - \sec^2 A = \tan^4 A + \tan^2 A$.

Q235 Prove the following identities: $\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cot\theta$.

Q236 Prove the following identities: $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$.

Q237 Prove the following identities: $\frac{\sin\theta}{1 - \cos\theta} + \frac{\tan\theta}{1 + \cos\theta} = \sec\theta \operatorname{cosec}\theta + \cot\theta$.

Q238 Find acute angles A and B, if $\sin(A + 2B) = \frac{\sqrt{3}}{2}$ and $\cos(A + 4B) = 0$, $A > B$.

Q239 If θ is an acute angle and $\sin\theta = \cos\theta$, find the value of $2\tan^2\theta + \sin^2\theta - 1$.

Q240 If $\sin(A + B) = 1$ $\cos(A - B) = \frac{\sqrt{3}}{2}$, $0 < A + B \le 90°$, $A > B$ then find A and B.

Q241 If $x = r \sin A \cos C$, $y = r \sin A \sin C$ and $z = r \cos A$, prove that $r^2 = z^2 + y^2 + z^2$.

Q242 If $\frac{\cos\alpha}{\cos\beta} = m$ and $\frac{\cos\alpha}{\sin\beta} = n$, show that $(m^2 + n^2)\cos^2\beta = n^2$.

Q243 If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, show that $q(p^2 - 1) = 2p$.

Q244 Prove the following identities: $\frac{\tan^3\theta}{1 + \tan^2\theta} + \frac{\cot^3\theta}{1 + \cot^2\theta} = \sec\theta \operatorname{cosec}\theta - 2\sin\theta\cos\theta$.

Q245 Prove the following identities: $\cot^2 A\left(\frac{\sec A - 1}{1 + \sin A}\right) + \sec^2 A\left(\frac{\sin A - 1}{1 + \sec A}\right) = 0$.

Q246 Prove the following identities: $(\tan A + \operatorname{cosec} B)^2 - (\cot B - \sec A)^2 = 2\tan A \cot B (\operatorname{cosec} A + \sec B)$.

Q247 Prove the following identities: $(1 + \tan A \tan B)^2 + (\tan A - \tan B)^2 = \sec^2 A \sec^2 B$.

Q248 Prove the following identities: $\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta = 1$

Q249 Prove the following identities: $(\sin^8\theta - \cos^8\theta) = (\sin^2\theta - \cos^2\theta)(1 - 2\sin^2\theta\cos^2\theta)$

Q250 Prove the following identities: $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0$

Q251 Prove the following identities: $\frac{(1 + \sin\theta)^2 + (1 - \sin\theta)^2}{\cos^2\theta} = 2\left(\frac{1 + \sin^2\theta}{1 - \sin^2\theta}\right)$.

Q252 If $\tan A = n \tan B$ and $\sin A = m \sin B$, prove that $\cos^2 A = \frac{m^2 - 1}{n^2 - 1}$.

Q253 If $\text{cosec}\ \theta - \sin\theta = m \sec\theta - \cos\theta = n$, prove that $(m^2 n)^{2/3} + (mn^2)^{2/3} = 1$.

Q254 If $\sec\theta + \tan\theta = p$, obtain the values of $\sec\theta$, $\tan\theta$ and $\sin\theta$ in terms of p.

Q255 If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$, prove that $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$.

Q256 If $\text{cosec}\ \theta - \sin\theta = a^3$, $\sec\theta - \cos\theta = b^3$, prove that $a^2 b^2 (a^2 + b^2) = 1$.

Q257 If $\cos^3\theta + 3a\cos\theta\sin^2\theta = m$, $a\sin^3\theta + 3a\cos^2\theta\sin\theta = n$, prove that $(m+n)^{2/3} + (m-n)^{2/3} = 2a^{2/3}$

Q258 If $3\sin\theta + 5\cos\theta$, prove that $5\sin\theta - 3\cos\theta = \pm 3$.

Q259 If $\sec\theta + \tan\theta = x$, obtain the values of $\sec\theta$, $\tan\theta$ and $\sin\theta$.

Q260 If $\text{cosec}\ \theta + b\cot\theta = m$ and $\text{cosec}\ \theta - \cot\theta = n$, prove that $mn = 1$.

Q261 In a ΔABC right angled at C, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of $\sin A \cos B + \cos A$ in B.

Q262 In a ΔABC, right angled at A, if $\tan C = \sqrt{3}$, find the value of $\sin B \cos C + \cos B \sin C$.

Q263 Prove the following identities: $(\sin\theta + \text{cosec}\ \theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$.

Q264 Prove the following identities: $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$.

Q265 Prove the following identities:

$$\frac{1}{\text{cosec}\ A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\text{cosec}\ A + \cot A}.$$

Q266 Prove the following identities: $(1 + \cot\theta - \text{cosec}\ \theta)(1 + \tan\theta + \sec\theta) = 2$.

Q267 Prove the following identities: $\frac{\sin\theta}{\cot\theta + \text{cosec}\ \theta} = 2 + \frac{\sin\theta}{\cot\theta - \text{cosec}\ \theta}$.

Q268 Prove the following identities:

$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A.$$

Q269 Prove the following identities: $\frac{\cos^2\theta}{1 - \tan\theta} + \frac{\sin^3\theta}{\sin\theta - \cos\theta} = 1 + \sin\theta\cos\theta$.

Q270 Prove the following identities:

$$(1 + \tan^2 A) + \left(1 + \frac{1}{\tan^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}.$$

Q271 If $\sec\theta + \tan\theta = p$, show that $\frac{p^2 - 1}{p^2 + 1} = \sin\theta$.

Q272 If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.

Q273 Prove the following identities:

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

Q274 Prove the following identities:

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

Q275 Prove the following identities:

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

Q276 Prove that: $\sqrt{\frac{\sec\theta-1}{\sec\theta+1}}+\sqrt{\frac{\sec\theta+1}{\sec\theta-1}}=2\operatorname{cosec}\theta.$

Q277 If $x = a\sec\theta + b\tan\theta$ and $y = a\tan\theta + b\tan\theta$, prove that $x^2 - y^2 = a^2 - b^2$.

Q278 If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, find the value of $5\left(x^2-\frac{1}{x^2}\right)$.

Q279 Prove that: $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}+\sqrt{\frac{1-\sin\theta}{1+\sin\theta}}=2\sec\theta.$

Q280 If each of α, β and γ is a positive acute angle such that

$$\sin(\alpha+\beta-\gamma)=\frac{1}{2},\quad \cos(\beta+\gamma-\alpha)=\frac{1}{2}\quad\text{and}\quad \tan(\gamma+\alpha-\beta)=1,$$

find the values of α, β and γ.

Q281 If $\angle A$ and $\angle P$ are acute angles such that $\tan A = \tan P$, then show that $\angle A = \angle P$.

Q282 If $T_n = \sin^n\theta + \cos^n\theta$, prove that $\frac{T_3 - T_5}{T_1} = \frac{T_5 - T_7}{T_3}$.

Q283 If $(\sec A + \tan A)(\sec B + \tan B)(\sec C + \tan C) = (\sec A - \tan A)(\sec B - \tan B)(\sec C + \tan C)$. Prove that each of the side is equal to ± 1.

Q284 Prove the following identities: $\frac{(1+\cot A+\tan A)(\sin A-\cos A)}{\sec^3 A-\operatorname{cosec}^3 A}=\sin^2 A\cos^2 A.$

Q285 Prove the following identities: $\frac{\cos A}{1-\sin A}+\frac{\sin A}{1-\cos A}+1=\frac{\sin A\cos A}{(1-\sin A)(1-\cos A)}.$

Q286 Prove the following identities: $(\sin A + \sec A)^2 + (\cos A + \operatorname{cosec} A)^2 = (1 + \sec A \operatorname{cosec} A)^2$.

Q287 In an acute angled triangle ABC, if $\tan(A + B + C) = 1$, sev $(B + C - A) = 2$, find the value of A, B and C.

Q288 If $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta = y\cos\theta$, prove that $x^2 + y^2 = 1$.

Q289 If $\operatorname{cosec}\theta - \sin\theta = l$ and $\sec\theta - \cos\theta = m$, prove that $l^2m^2(l^2 + m^2 + 3) = 1$.

Q290 If $\sin\theta + \cos\theta = x$, prove that: $\sin^6\theta + \cos^6\theta = \frac{4 - 3(x^2-1)^2}{4}$.

Q291 If $x = a\sec\theta\cos\phi$, $y = b\sec\theta\sin\phi$ and $z = c\tan\theta$, show that: $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1.$

Q292 Given that:

$$(1 + \cos\alpha)(1 + \cos\beta)(1 + \cos\gamma) = (1 - \cos\alpha)(1 - \cos\beta)(1 - \cos\gamma)$$

Show that one of the values of each member of this equality is $\sin\alpha\sin\beta\sin\gamma$.

Q293 If $\cos\theta + \cos^2\theta = 1$, prove that: $\sin^{12}\theta + 3\sin^{10}\theta + 3\sin^8\theta + \sin^6\theta + 2\sin^4\theta + 2\sin^2\theta - 2 = 1$.

Q294 Prove the following identities: $\left(\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}\right)^2=\frac{1-\cos\theta}{1+\cos\theta}.$

Q295 If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$, prove that $(x^2y)^{2/3} - (xy^2)^{2/3} = 1$.

Q296 If $\sin\theta + \sin^2\theta = 1$, find the value of $\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\cos^4\theta + 2\cos^2\theta - 2$.

Q297 Prove the following identities: $2\sec^2\theta - \sec^4\theta - 2\operatorname{cosec}^2\theta + \operatorname{cosec}^4\theta = \cot^4\theta - \tan^4\theta$.

Q298 Prove the following identities: $(\sin\theta + \sec\theta)^2 + (\cos\theta + \operatorname{cosec}\theta)^2 = (1 + \sec\theta \operatorname{cosec}\theta)^2$.

Q299 If $\sin\theta + \sin^2\theta + \sin^3\theta = 1$, then prove that $\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = 4$.

Q300 If $\tan^2\theta = 1 - a^2$, prove that $\sec\theta + \tan^3\theta \operatorname{cosec}\theta = (2 - a^2)^{3/2}$.

Q301 Prove the following identities:

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \tan A + \cot A = 1 + \sec A \operatorname{cosec} A.$$

Q302 If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, show that $m^2 - n^2 = 4\sqrt{mn}$.

Q303 If $a\cos\theta - b\sin\theta = c$, prove that $a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$.

Q304 If $\sec\theta = x + \frac{1}{4x}$, prove that : $\sec\theta + \tan\theta = 2x$ or $\frac{1}{2x}$.

Date: 29/9/2021

S1. -1 and 1.

S2. Value of $\dfrac{1}{\sec\theta} = 1$.

S3. Value of $\dfrac{1}{\operatorname{cosec}\theta} = 1$.

S4. $\sin 60° \cos 30° + \cos 60° \sin 30° = 1$.

S5. $\sin 60° \cos 45° + \cos 60° \sin 45° = \dfrac{\sqrt{3}+1}{2\sqrt{2}}$.

S6. $\tan 30° \sec 45° + \tan 60° \sec 30° = \dfrac{\sqrt{2}+2\sqrt{3}}{\sqrt{3}}$.

S7. $4\cot^2 45° - \sec^2 60° + \sin^2 60° + \cos^2 90° = \dfrac{3}{4}$.

S8. $3\cos^2 30° + \sec^2 30° + 2\cos 0° + 3\sin 90° - \tan^2 60° = \dfrac{67}{12}$.

S9. Proved.

S10. Proved.

S11. $\dfrac{\sin 36°}{\cos 54°} - \dfrac{\sin 54°}{\cos 36°} = 0$.

S12. $\cos^2 13° - \sin^2 77° = 0$

S13. $\dfrac{\cos 80°}{\sin 10°} + \cos 59° \operatorname{cosec} 31° = 2$

S14. Proved.

S15. Proved.

S16. $\left(\dfrac{\sin 35°}{\cos 55°}\right)^2 + \left(\dfrac{\cos 55°}{\sin 35°}\right)^2 - 2\cos 60° = 1$.

S17. $\left(\dfrac{\sin 47°}{\cos 43°}\right)^2 + \left(\dfrac{\cos 43°}{\sin 47°}\right)^2 - 4\cos 43° = 0$.

S18. $\cos(40° - \theta) - \sin(50° + \theta) + \dfrac{\cos^2 40° + \cos^2 50°}{\sin^2 40° + \sin^2 50°} = 1$.

S19. Value of $\theta = 10°$.

S20. 0.

S21. 1.

S22. $\sin 15° + \tan 15°$.

S23. Proved.

S24. Proved.

S25. Proved.

S26. Proved.

S27. 0.

S28. Value of $\sin A = \frac{3}{5}$.

S29. Value of $\cot B = \frac{3}{4}$.

S30. Proved.

S31. Proved.

S32. Value of $\theta = 30°$.

S33. Value of $\theta = 20°$.

S34. Value of $\theta = 30°$.

S35. $\theta = 60°$.

S36. $\theta = 30°$.

S37. $\theta = 30°$.

S38. $\theta = 20°$.

S39. $\theta = 30°$.

S40. $\theta = 9°$.

S41. Proved.

S42. Proved.

S43. Value of $9 \cot^2 \theta - 9 \operatorname{cosec}^2 \theta = -9$.

S44. Proved.

S45. Proved.

S46. -2.

S47. 0.

S48. (c) $\frac{3}{160}$.

S49. Proved.

S50. $\frac{17}{12}$.

S51. (a) $\frac{a^2+b^2}{a^2-b^2}$.

S52. (c) 0.

S53. (a) $\frac{1}{7}$.

S54. (d) $\frac{7}{17}$.

S55. (a) 1.

S56. (a) 1.

S57. (b) 1.

S58. (a) 1.

S59. (c) 0.

S60. (c) 1.

S61. (d) $\frac{1}{2}$.

S62. (b) 0.

S63. (a) 1.

S64. (c) 2.

S65. (b) 0.

S66. (b) $\cos\frac{A}{2}$.

S67. (b) 0.

S68. (b) $\frac{x^2+1}{2x}$.

S69. (d) $\frac{x^2-1}{2x}$.

S70. (c) $\tan^4 A + \tan^2 A$.

S71. (b) $2\cos^2 A - 1$.

S72. (c) $\dfrac{1-\cos\theta}{\sin\theta}$.

S73. (b) 1.

S74. (d) a^2b^2.

S75. (a) a^2b^2.

S76. (b) 1.

S77. (b) 2.

S78. (c) 25.

S79. (b) $b^2 - a^2$.

S80. (a) 1.

S81. (d) $m^2 + n^2$.

S82. (d) 0.

S83. All the trigonometric ratios are:

$\sin B = \dfrac{5}{13}$, $\cos B = \dfrac{12}{13}$, $\tan B = \dfrac{5}{12}$, $\operatorname{cosec} B = \dfrac{13}{5}$, $\sec B = \dfrac{13}{12}$, $\cot B = \dfrac{12}{5}$.

S84. Proved.

S85. Value of $\dfrac{\sin A + \cos A}{\sin A - \cos A} = 7$.

S86. Value of $\sin^2\theta + \tan^2\theta = \dfrac{24}{5}$.

S87. Proved.

S88. $\dfrac{1-\tan\alpha}{1+\tan\alpha} = \dfrac{1}{7}$.

S89. Other five trigonometric ratios are:

$\sin A = \dfrac{1}{\sqrt{10}}$, $\cos A = \dfrac{3}{\sqrt{10}}$, $\tan A = \dfrac{1}{3}$, $\sec A = \dfrac{\sqrt{10}}{3}$, $\cot A = 3$.

S90. $\sin B = \dfrac{12}{13}$, $\cos C = \dfrac{12}{13}$ and $\tan B = \dfrac{12}{5}$.

S91. All the six trigonometric ratios of $\angle C$ are:

$\sin C = \dfrac{4}{5}$, $\cos C = \dfrac{3}{5}$, $\tan C = \dfrac{4}{3}$, $\operatorname{cosec} C = \dfrac{5}{4}$, $\sec C = \dfrac{5}{3}$, $\cot C = \dfrac{3}{4}$.

S92. $\frac{312}{25}$.

S93. Value of $\frac{4\cos\theta - \sin\theta}{2\cos\theta + \sin\theta} = \frac{4}{5}$.

S94. Value of $\frac{4\cos\theta - \sin\theta}{2\cos\theta + \sin\theta} = \frac{1}{3}$.

S95. Proved.

S96. $\frac{5}{6}(2-\sqrt{3})$.

S97. Value of $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta} = \frac{2}{3}$.

S98. $\sqrt{\frac{b+a}{b-a}}$.

S99. Proved.

S100. Proved.

S101. 2.

S102. 20 cm.

S103. $BC = 20\sqrt{3}$ cm.

S104. Value of $\sin 75° = \frac{\sqrt{3}+1}{2\sqrt{2}}$.

S105. Proved.

S106. Proved.

S107. $\frac{7}{4}$.

S108. $\frac{-13}{3}$.

S109. 1.

S110. Proved.

S111. Proved.

S112. 9.

S113. 2.

S114. Proved.

S115. Value of $A = 9°$.

S116. $\theta = 10°$.

S117. $\theta = 27°$.

S118. $\theta = 28°$.

S119. 15°.

S120. $\sqrt{2} + 1$

S121. Proved.

S122. $\frac{1}{2}$.

S123. $\sqrt{3}$.

S124. 0.

S125. 1.

S126. Value of $x = 15°$.

S127. Value of $x = 30°$.

S128. Value of $x = 15°$.

S129. $\frac{1}{2}$.

S130. Value of $x = 15°$.

S131. Proved.

S132. Proved.

S133. Proved.

S134. Value of $x = 15°$.

S135. Proved.

S136. Proved.

S137. Proved.

S138. Proved.

S139. Proved.

S140. Proved.

S141. Proved.

S142. Proved.

S143. Proved.

S144. Proved.

S145. Proved.

S146. Proved.

S147. Proved.

S148. Proved.

S149. Proved.

S150. Proved.

S151. Proved.

S152. Proved.

S153. Proved.

S154. Proved.

S155. Proved.

S156. Proved.

S157. Proved.

S158. Proved.

S159. Proved.

S160. Proved.

S161. Proved.

S162. Value of $\tan^2\theta + \cot^2\theta = 2$.

S163. Proved.

S164. $\tan 5^\circ \tan 25^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ = \frac{1}{\sqrt{3}}$.

S165. $\cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 60^\circ \cot 78^\circ = \frac{1}{\sqrt{3}}$.

S166. $2\left(\frac{\cos 58^\circ}{\sin 32^\circ}\right) - \sqrt{3}\left(\frac{\cos 38^\circ \operatorname{cosec} 52^\circ}{\tan 15^\circ \tan 60^\circ \tan 75^\circ}\right) = 1.$

S167. $\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 55^\circ \operatorname{cosec} 35^\circ}{\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ} = 2.$

S168. $\frac{1}{\alpha}$.

S169. $\frac{1}{x}$.

S170. 2.

S171. $-\frac{1}{7}$.

S172. $\tan 35° \tan 40° \tan 45° \tan 50° \tan 55° = 1$.

S173. $\frac{11}{6}$.

S174. $\frac{113}{24}$.

S175. Proved.

S176. 1.

S177. Proved.

S178. Proved.

S179. $\frac{6-\sqrt{3}}{3}$.

S180. Value of $A = 44°$.

S181. Proved.

S182. Proved.

S183. Proved.

S184. Proved.

S185. Proved.

S186. Proved.

S187. -1.

S188. $\cos(40° + \theta) - \sin(50° - \theta) = \frac{\cos^2 40° + \cos^2 50°}{\sin^2 40° + \sin^2 50°} = 1$.

S189. $\frac{\sin^2 20° + \sin^2 70°}{\cos^2 20° + \cos^2 70°} + \frac{\sin(90° - \theta)\sin\theta}{\tan\theta} + \frac{\cos(90° - \theta)\cos\theta}{\cot\theta} = 2$.

S190. Proved.

S191. $2\sqrt{3}$.

S192. 0.

S193. Proved.

S194. Value of $\sin^2\theta - \cos^2\theta = \frac{1}{3}$.

S195. Proved.

S196. -1.

S197. $\cos A \operatorname{cosec} A + \tan A \sec A = \dfrac{16\sqrt{2}+3}{8}$.

S198. Proved.

S199. (i) $\sin A = \dfrac{5}{13}$ and $\tan A = \dfrac{5}{12}$ (ii) $\cos C = \dfrac{5}{13}$ and $\cot C = \dfrac{5}{12}$

S200. Value of $\dfrac{1}{\tan A} + \dfrac{\sin A}{1+\cos A} = 2$.

S201. -1 and 1.

S202. Values of other five trigonometric ratios are:

$\cos\theta = \dfrac{2ab}{a^2+b^2}$, $\tan\theta = \dfrac{a^2-b^2}{2ab}$, $\operatorname{cosec}\theta = \dfrac{a^2+b^2}{a^2-b^2}$, $\sec\theta = \dfrac{a^2+b^2}{2ab}$, $\cot\theta = \dfrac{2ab}{a^2-b^2}$.

S203. $\cos A = \dfrac{4}{5}$ and $\tan A = \dfrac{3}{4}$.

S204. (i) $\sin\theta = \dfrac{a}{\sqrt{4b^2-3a^2}}$ (ii) $\cos\theta = \dfrac{2\sqrt{b^2-a^2}}{\sqrt{4b^2-3a^2}}$ (iii) $\tan\theta = \dfrac{a}{2\sqrt{b^2-a^2}}$ (iv) $\sin^2\theta + \cos^2\theta = 1$

S205. (i) $\sin A = \dfrac{4}{5}$ and $\sin A = \dfrac{2}{\sqrt{13}}$ (ii) $\cot A = \dfrac{3}{4}$

(iii) $\tan B = \dfrac{2}{3}$ and $\cos B = \dfrac{3}{\sqrt{13}}$ (iv) $\sin^2 B + \cos^2 B = 1$

S206. $\dfrac{1}{2}$.

S207. Proved.

S208. Proved.

S209. $\sec A \sin A + \tan^2 A - \operatorname{cosec} A = \dfrac{12-\sqrt{5}}{2}$.

S210. $\cos A \cos B - \sin A \sin B = \dfrac{1-\sqrt{3}}{2\sqrt{2}}$.

S211. Value of $\tan^2\theta + \dfrac{1}{\tan^2\theta} = 2$.

S212. Proved.

S213. Values of $\sin 15° = \dfrac{\sqrt{3}-1}{2\sqrt{2}}$ and $\cos 15° = \dfrac{\sqrt{3}+1}{2\sqrt{2}}$.

S214. $6\sqrt{3}$ cm.

S215. 105°.

S216. $AC = 20\sqrt{3}$ units, $BC = 20$ units and $\angle B = 60°$.

S217. Proved.

S218. $\tan\theta = \frac{1}{5}$.

S219. Proved.

S220. Proved.

S221. Proved.

S222. Proved.

S223. (i) Proved. (ii) Proved.

S224. Proved.

S225. Proved.

S226. $A + B = 45°$.

S227. $BC = 20\sqrt{3}$ cm, $AC = 40$ cm, $BD = 40$ cm.

S228. $\angle B = 45°$, $AC = 7$ and $AB = 7\sqrt{2}$.

S229. $\angle A = 30°$, $BC = 7.5$ units and $AC = \frac{15}{2}\sqrt{3}$ units.

S230. (i) 1 (ii) $\frac{1}{\sqrt{2}}$

S231. Value of $\tan^7\theta + \cot^7\theta = 2$

S232. Proved.

S233. Proved.

S234. Proved.

S235. Proved.

S236. Proved.

S237. Proved.

S238. 45°.

S239. Value of $2\tan^2\theta + \sin^2\theta - 1 = \frac{3}{2}$.

S240. $A = 60°$ and $B = 30°$.

S241. Proved.

S242. Proved.

S243. Proved.

S244. Proved.

S245. Proved.

S246. Proved.

S247. Proved.

S248. Proved.

S249. Proved.

S250. Proved.

S251. Proved.

S252. Proved.

S253. Proved.

S254. Values of $\sec\theta = \frac{1}{2}\left(p + \frac{1}{p}\right)$, $\tan\theta = \frac{1}{2}\left(p - \frac{1}{p}\right)$ and $\sin\theta = \frac{p^2 - 1}{p^2 + 1}$ in terms of p.

S255. Proved.

S256. Proved.

S257. Proved.

S258. Proved.

S259. The values of $\sec\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$, $\tan\theta = \frac{1}{2}\left(x - \frac{1}{x}\right)$ and $\sin\theta = \frac{x^2 - 1}{x^2 + 1}$.

S260. Proved.

S261. Value of $\sin A \cos B + \cos A \sin B = 1$.

S262. Value of $\sin B \cos C + \cos B \sin C = 1$.

S263. Proved.

S264. Proved.

S265. Proved.

S266. Proved.

S267. Proved.

S268. Proved.

S269. Proved.

S270. Proved.

S271. Proved.

S272. Proved.

S273. Proved.

S274. Proved.

S275. Proved.

S276. Proved.

S277. Proved.

S278. $\frac{1}{5}$.

S279. Proved.

S280. Values of $\alpha = 37\frac{1^\circ}{2}$, $\beta = 45^\circ$ and $\gamma = 52\frac{1^\circ}{2}$.

S281. Proved.

S282. Proved.

S283. Proved.

S284. Proved.

S285. Proved.

S286. Proved.

S287. Values of $A = 60^\circ$, $B = 52\frac{1^\circ}{2}$ and $C = 67\frac{1^\circ}{2}$.

S288. Proved.

S289. Proved.

S290. Proved.

S291. Proved.

S292. Proved.

S293. Proved.

S294. Proved.

S295. Proved.

S296. Value of $\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^{8}\theta + \cos^{6}\theta + 2\cos^{4}\theta + 2\cos^{2}\theta - 2 = 1$.

S297. Proved.

S298. Proved.

S299. Proved.

S300. Proved.

S301. Proved.

S302. Proved.

S303. Proved.

S304. Proved.