1. Find the degree measure corresponding to the following radian measures $\left(\text{Use } \pi = \frac{22}{7}\right)$

   (i) $\left(\frac{3\pi}{4}\right)^c$ (ii) 3^c (iii) $\left(-\frac{7\pi}{5}\right)^c$ (iv) 1^c

2. Find the radian measure corresponding to the following degree measures

   (i) $135°$ (ii) $-43°30'$ (iii) $-45°$ (iv) $100°45'$

3. Find the angle between minute hand of a clock and the hour hand when the time is 7:20 AM. Why time management is important? **(Value Based)**
4. A railway train is traveling on a circular curve of 1500 metres radius at the rate of 66km/hr. Through what angle has it turned in 10 seconds?
5. A horse is tied to a post by a rope. If the horse moves along a circular path always keeping the rope tight and describes 88 metres when it has traced out $72°$ at the centre, find the length of the rope. Why should we protect our wild life? **(Value Based)**
6. Find the value of the following:-

   (i) $\sin 300°$ (ii) $\tan(-1410°)$ (iii) $\tan 135°$ (iv) $\tan\frac{7\pi}{4}$ (v) $\sin\left(\frac{13\pi}{6}\right)$

7. If $A, B.C$ and D are the angles of a cyclic quadrilateral then prove that $\cos A + \cos B + \cos C + \cos D = 0$
8. Find the value of the (i) $\sin 75°$ (ii) $\cos 105°$ (iii) $\tan\frac{\pi}{12}$
9. Prove that $\tan 7A - \tan 5A - \tan 2A = \tan 7A \tan 5A \tan 2A$
10. Prove that $\cot A \cot 2A - \cot 2A \cot 3A - \cot 3A \cot A = 1$
11. If $\cot A \cot B = 3$,prove that $2\cos(A+B) = \cos(A-B)$ **(HOTS)**
12. If $\cos(\alpha-\beta) + \cos(\beta-\gamma) + \cos(\gamma-\alpha) = -\frac{3}{2}$ then prove that $\sin\alpha + \sin\beta + \sin\gamma = \cos\alpha + \cos\beta + \cos\gamma = 0$ **(HOTS)**
13. Prove that $\frac{\sin(B-C)}{\cos B\cos C} + \frac{\sin(C-A)}{\cos C\cos A} + \frac{\sin(A-B)}{\cos A\cos B} = 0$
14. If $\cos(\alpha+\beta)\sin(\gamma+\delta) = \cos(\alpha-\beta)\sin(\gamma-\delta)$ prove that $\cot\alpha\cot\beta\cot\gamma = \cot\delta$
15. If $A + B = \frac{\pi}{4}$ then show that (i) $(1+\tan A)(1+\tan B) = 2$ (ii) $(\cot A - 1)(\cot B - 1) = 2$ (iii)Find $\tan\frac{\pi}{8}$ **(HOTS)**
16. If $\sin\alpha + \sin\beta = a$ and $\cos\alpha + \cos\beta = b$ then prove that

(i) $\cos(\alpha+\beta)=\dfrac{b^2-a^2}{b^2+a^2}$ (ii) $\tan(\alpha+\beta)=\dfrac{2ab}{a^2+b^2}$ **(HOTS)**

17. Prove that $\tan 57^\circ = \tan 17^\circ + 2\tan 40^\circ$

18. Prove that (i) $\dfrac{\cos A+\sin A}{\cos A-\sin A}=\tan\left(\dfrac{\pi}{4}+A\right)$ (ii) $\dfrac{\cos A-\sin A}{\cos A+\sin A}=\tan\left(\dfrac{\pi}{4}-A\right)$

19. Prove that $\dfrac{\cos 7^\circ-\sin 7^\circ}{\cos 7^\circ+\sin 7^\circ}=\tan 38^\circ$

20. Prove that $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \dfrac{3}{16}$

21. Prove that $4\cos 12^\circ \cos 48^\circ \cos 72^\circ = \cos 36^\circ$

22. Prove that $\sin A \sin\left(60^\circ - A\right)\sin\left(60^\circ + A\right)=\dfrac{1}{4}\sin 3A$

23. Prove that $\tan\theta \tan\left(60^\circ-\theta\right)\tan\left(60^\circ+\theta\right)=\tan 3\theta$

24. Prove that $\dfrac{\sin 5A-\sin 3A}{\cos 5A+\cos 3A}=\tan A$

25. Prove that $\dfrac{\sin A+\sin 3A}{\cos A+\cos 3A}=\tan 2A$

26. Prove that $\cot 4x\left(\sin 5x+\sin 3x\right)=\cot x\left(\sin 5x-\sin 3x\right)$

27. Prove that $\sin x+\sin 3x+\sin 5x+\sin 7x = 4\cos x\cos 2x\sin 4x$

28. Prove that $\left(\cos\alpha-\cos\beta\right)^2+\left(\sin\alpha-\sin\beta\right)^2=4\sin^2\left(\dfrac{\alpha-\beta}{2}\right)$

29. Prove that $\dfrac{\cos 4x+\cos 3x+\cos 2x}{\sin 4x+\sin 3x+\sin 2x}=\cot 3x$

30. Prove that $\dfrac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}=\tan 4A$

31. Prove that $\dfrac{\cos 8A\cos 5A-\cos 12A\cos 9A}{\sin 8A\cos 5A+\cos 12A\sin 9A}=\tan 4A$

32. Prove that $\dfrac{\cos 2A\cos 3A-\cos 2A\cos 7A+\cos A\cos 10A}{\sin 4A\sin 3A-\sin 2A\sin 5A+\sin 4A\sin 7A}=\cot 6A\cot 5A$

33. If three angles A, B, C are in A.P. prove that $\cot B=\dfrac{\sin A-\sin C}{\cos C-\cos A}$

34. Prove that $\sin\alpha+\sin\beta+\sin\gamma-\sin(\alpha+\beta+\gamma)=4\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\beta+\gamma}{2}\right)\sin\left(\frac{\gamma+\alpha}{2}\right)$

35. If $\sin 2A=\lambda\sin 2B$, prove that: $\frac{\tan(A+B)}{\tan(A-B)}=\frac{\lambda+1}{\lambda-1}$

36. Prove that $\frac{\cos(A+B+C)+\cos(-A+B+C)+\cos(A-B+C)+\cos(A+B-C)}{\sin(A+B+C)+\sin(-A+B+C)+\sin(A-B+C)-\sin(A+B-C)}=\cot C$ **(HOTS)**

37. Prove that $\frac{\sin 2\theta}{1+\cos 2\theta}=\tan\theta$

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

39. Prove that $\frac{\cos\theta}{1+\sin\theta}=\tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$

40. Prove that $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}}=2\cos\theta$ **(HOTS)**

41. Prove that $\cos^2 A+\cos^2(A+120^\circ)+\cos^2(A-120^\circ)=\frac{3}{2}$

42. Prove that $\cos 4x=1-8\sin^2 x\cos^2 x$

43. Prove that $\frac{\sin x}{\cos 3x}+\frac{\sin 3x}{\cos 9x}+\frac{\sin 9x}{\cos 27x}=\frac{1}{2}(\tan 27x-\tan x)$ **(HOTS)**

44. Prove that $\frac{\sin 5x-2\sin 3x+\sin x}{\cos 5x-\cos x}=\tan x$

45. Prove that $\cos A\cos 2A\cos 2^2 A\cos 2^3 A\cdots cos 2^{n-1}A=\frac{\sin 2^n A}{2^n\sin A}$ **(HOTS)**

46. Prove that $\tan 4\theta=\frac{4\tan\theta(1-\tan^2\theta)}{1-6\tan^2\theta+\tan^4\theta}$

47. Prove that $\tan\alpha+2\tan 2\alpha+4\tan 4\alpha+8\cot 8\alpha=\cot\alpha$ **(HOTS)**

48. Prove that $\tan\frac{\pi}{8}=\sqrt{2}-1$

49. Find the value of $\sin\frac{\pi}{8}$

50. If $\cos x=-\frac{3}{5},\frac{\pi}{2}<x<\pi$, then find $\sin\frac{x}{2},\cos\frac{x}{2}$ and $\tan\frac{x}{2}$

51. Prove that $\sin^2\left(\frac{\pi}{8}+\frac{A}{2}\right)-\sin^2\left(\frac{\pi}{8}-\frac{A}{2}\right)=\frac{1}{\sqrt{2}}\sin A$

52. Prove that $\cot\frac{\pi}{24}=\sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$ **(HOTS)**

53. Prove that $\tan 144\frac{1}{2^\circ}=2+\sqrt{2}-\sqrt{3}-\sqrt{6}$ **(HOTS)**

54. Prove that $\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}+\cos^2\frac{5\pi}{8}+\cos^2\frac{7\pi}{8}=2$

55. Prove that $\cos 4A=1-8\cos^2 A+8\cos^4 A$

56. Solve: $\sin 2x+\cos x=0$

57. Solve $\sin 2x+\sin x=0$

58. Solve: $\cos 5x+\cos 3x+\cos x=0$

59. Solve: $\cos 3x+\cos x-\cos 2x=0$

60. Solve: $2\cos^2 x+3\sin x=0$

61. Solve: $\sec^2 2x=1-\tan 2x$

62. Solve: $\sqrt{3}\cos x-\sin x=\sqrt{3}$

63. Solve: $\cos x+\sin x=1$

64. Solve: $\cos x+\sqrt{3}\sin x=1$

65. In any ΔABC prove that $a\sin(B-C)+b\sin(C-A)+c\sin(A-B)=0$

66. In any ΔABC prove that $b\cos B+c\cos C=a\cos(B-C)$

67. In any ΔABC prove that $\frac{b^2-c^2}{\cos B+\cos C}+\frac{c^2-a^2}{\cos C+\cos A}+\frac{a^2-b^2}{\cos A+\cos B}=0$ **(HOTS)**

68. In any ΔABC prove that $\sin\left(\frac{B-C}{2}\right)=\left(\frac{b-c}{a}\right)\cos\frac{A}{2}$

69. $a(\cos C-\cos B)=2(b-c)\cos^2\frac{A}{2}$

70. In any ΔABC prove that $\frac{c}{a+b}=\frac{1-\tan\frac{A}{2}\tan\frac{B}{2}}{1+\tan\frac{A}{2}\tan\frac{B}{2}}$

71. In any ΔABC prove that $\frac{c}{a-b}=\frac{\tan\frac{A}{2}+\tan\frac{B}{2}}{\tan\frac{A}{2}-\tan\frac{B}{2}}$

72. In any ΔABC prove that $a^2 \sin(B-C) = (b^2 - c^2)\sin A$

73. In any ΔABC prove that $\dfrac{b^2 - c^2}{a^2} = \dfrac{\sin(B+C)}{\sin(B-C)}$

74. In any ΔABC prove that $\dfrac{a^2 + b^2}{a^2 + c^2} = \dfrac{1 + \cos(A-B)\cos C}{1 + \cos(A-C)\cos B}$ **(HOTS)**

75. In any ΔABC prove that $(b-c)\cot\dfrac{A}{2} + (c-a)\cot\dfrac{B}{2} + (a-b)\cot\dfrac{A}{2} = 0$

76. In any ΔABC prove that $\dfrac{\cos 2A}{a^2} - \dfrac{\cos 2B}{b^2} = \dfrac{1}{a^2} - \dfrac{1}{b^2}$

77. If $a\cos A = b\cos B$ then prove that triangle is either isosceles or right angled.

78. In any ΔABC prove that $\dfrac{\cos A}{a} + \dfrac{\cos B}{b} + \dfrac{\cos C}{c} = \dfrac{a^2 + b^2 + c^2}{2abc}$

79. In any ΔABC prove that $b(c\cos A - a\cos C) = c^2 - a^2$

80. In any ΔABC prove that $\dfrac{c - b\cos A}{b - c\cos A} = \dfrac{\cos B}{\cos C}$

81. In any ΔABC prove that $2\left(b\cos^2\dfrac{C}{2} + c\cos^2\dfrac{B}{2}\right) = a + b + c$

82. In any ΔABC prove that $4\left(bc\cos^2\dfrac{A}{2} + ca\cos^2\dfrac{B}{2} + ab\cos^2\dfrac{C}{2}\right) = (a+b+c)^2$ **(HOTS)**

83. In any ΔABC prove that $\left(\dfrac{b^2 - c^2}{a^2}\right)\sin 2A + \left(\dfrac{c^2 - a^2}{b^2}\right)\sin 2B + \left(\dfrac{a^2 - b^2}{c^2}\right)\sin 2C = 0$

$(a-b)^2\cos^2\dfrac{C}{2} + (a+b)^2\sin^2\dfrac{C}{2} = c^2$

84. In any ΔABC if $\angle B = 60°$, prove that $(a+b+c)(a-b+c) = 3ac$ **(HOTS)**

85. In any ΔABC prove that $(b^2 + c^2 - a^2)\tan A = (c^2 + a^2 - b^2)\tan B = (a^2 + b^2 - c^2)\tan C$ **(HOTS)**

86. In any ΔABC prove that $(b^2 - c^2)\cot A + (c^2 - a^2)\cot B + (a^2 - b^2)\cot C = 0$

87. Draw graph of (i) $y = \sin(2x)$ (ii) $y = 2\cos 3x$ (iii) $\tan\left(x + \dfrac{\pi}{4}\right)$ (iv) $\cos\left(\dfrac{\pi}{2} + x\right)$