Step Academy official

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STUDENT NAME	
PAPER CODE	28309
TIME ALLOWED	
Paper Date	

CLASS	10th
SUBJECT	Mathematics
TOTAL MARKS	
Paper Type	

Choose the correct answer.

1. Solution set of $x^2 - 4 = 0$ is

(A) {0, 4} **(B)** {2, -2} **(C)** {4, -4} **(D)** { }

2. Which of the following is a quadratic equation?

(A) ax + b = c **(B)** $ax^2 + bx + c$ **(C)** $ax^2 + bx + c = 0, a \neq 0$ **(D)** $ax^2 + bx + c = 0, a = 0$

3. Solution set of $x + \frac{1}{x} = 2$ is

(A) {0} **(B)** {-1} **(C)** {-1, 1} **(D)** {1}

4. The roots which do not satisfy the equation are called.

(A) complex roots **(B)** imaginary roots **(C)** extraneous roots **(D)** equal roots

5. 2 and -3 are roots of

(A) (x - 2) (x - 3) = 0 **(B)** (x + 2) (x + 3) = 0 **(C)** (x - 2) (x + 3) = 0 **(D)** (x + 2) (x - 3) = 0

6. Which of the following is a reciprocal equation?

(A) $x^2 + 2x + 2 = 0$ **(B)** $x^4 + x^3 + x^2 + x + 1 = 0$ **(C)** $\sqrt{2x+3}$ **(D)** $x^4 + 2x^3 + x^2 + 4x = 0$

7. Roots of the equation $(x - 1)^2 = 9$ are

(A) -2, 4 **(B)** 2, 4 **(C)** -4, 2 **(D)** -2, -4

8. If a + c = b, then which of the following are the root of $ax^2 + bx + c = 0$?

(A) $-1, -\frac{c}{a}$ **(B)** $-1, -\frac{a}{c}$ **(C)** $1, -\frac{c}{a}$ **(D)** $-1, \frac{c}{a}$

9. Which of the following is a quadratic equation?

(A) ax + b = c **(B)** $ax^2 + bx + c$ **(C)** $ax^2 + bx + c = 0, a \neq 0$ **(D)** $ax^2 + bx + c = 0, a = 0$

10. Which of the following is a reciprocal equation?

(A) $x^2 + 2x + 2 = 0$ **(B)** $x^4 + x^3 + x^2 + x + 1 = 0$ **(C)** $\sqrt{2x+3} = 0$ **(D)** $x^4 + 2x^3 + x^2 + 4x = 0$

11. How many roots $(x - 3)(x - 2) = 6$ exist?

(A) no **(B)** 0 **(C)** 1 **(D)** 2

12. If $a + c = b$, then which of the following are the root of $ax^2 + bx + c = 0$?

(A) $-1, -\frac{c}{a}$ **(B)** $-1, -\frac{a}{c}$ **(C)** $1, -\frac{c}{a}$ **(D)** $-1, \frac{c}{a}$

13. Solution set of $x + \frac{1}{x} = 2$ is

(A) {0} **(B)** {-1} **(C)** {-1, 1} **(D)** {1}

14. Roots of the equation $(x - 1)^2 = 9$ are

(A) -2, 4 **(B)** 2, 4 **(C)** -4, 2 **(D)** -2, -4

15. 2 and -3 are roots of

(A) $(x - 2)(x - 3) = 0$ **(B)** $(x + 2)(x + 3) = 0$ **(C)** $(x - 2)(x + 3) = 0$ **(D)** $(x + 2)(x - 3) = 0$

16. Which of the following is a radical equation?

(A) $\sqrt{2}x + 3 = 0$ **(B)** $\sqrt{2}x + \sqrt{3} = 0$ **(C)** $2x + \sqrt{3} = 0$ **(D)** $\sqrt{2x} + 3 = 0$

17. If α, β are the roots of $ax^2 + bx + c = 0$, then sum of roots is.

(A) $\frac{c}{a}$ **(B)** $\frac{a}{c}$ **(C)** $-\frac{b}{a}$ **(D)** $\frac{a}{b}$

18. If α, β are the roots of $7x^2 + 6x - 13 = 0$, the product of roots is

(A) $\frac{13}{7}$ **(B)** $-\frac{13}{7}$ **(C)** $\frac{6}{7}$ **(D)** $-\frac{6}{7}$

19. Value of $(1 + \omega + \omega^2)^{10}$ is.

(A) zero **(B)** ω^3 **(C)** ω^2 **(D)** ω^4

20. Sum and product of roots of a quadratic equation are respectively 2 and 5. The equation is.

(A) $x^2 - 2x + 5 = 0$ **(B)** $x^2 + 2x + 5 = 0$ **(C)** $x^2 - 2x - 5 = 0$ **(D)** $x^2 + 2x - 5 = 0$

21. Cube roots of 1 are

(A) $-1, \omega, \omega^2$ **(B)** $1, -\omega, \omega$ **(C)** $1, \omega, \omega^2$ **(D)** $1, \omega, \omega^3$

22. Sum of cube roots of unity is.

(A) 0 **(B)** 1 **(C)** - 1 **(D)** 2

23.

Roots of the equations $x^2 - 5x + 5 = 0$ are

(A) imaginary **(B)** rational **(C)** equal **(D)** irrational

24. The discriminant of $ax^2 + bx + c = 0$ is

(A) $b^2 + 4ac$ **(B)** $b^2 - 4ac$ **(C)** $4ac - b^2$ **(D)** $-b^2 - 4ac$

25. In a proportion a : b : : c : d, a and d are called

(A) extreme **(B)** mean **(C)** third proportional **(D)** mean proportional

26. If x varies inversely as y^2, then k is.

(A) xy **(B)** x^2y **(C)** xy^2 **(D)** x^2y^2

27. If a : b = c : d, then dividendo property is

(A) a - b : b = c - d : d **(B)** a + b : b = c + d : d **(C)** a + b : a = b = c + d : c - d **(D)** a - b : c = c - d : b

28. If 4x - 7y = 2x - 3y, then x : y is equal to.

(A) 1 : 2 **(B)** 2 : 1 **(C)** 2 : 3 **(D)** 3 : 2

29. Find x, if 12, x, and 3 are continued proportion.

(A) 6 **(B)** 36 **(C)** ±6 **(D)** -6

30. If $a^2 \propto \frac{1}{b^5}$ then

(A) $a^2 = \frac{k}{b^5}$ **(B)** $a^2 = kb^5$ **(C)** $a^2 = -kb^5$ **(D)** $b^5 = ka^2$

31. Expression $\frac{x+1}{x^3+1}$ is.

(A) An improper fraction **(B)** A proper fraction **(C)** Constant expression **(D)** An irrational expression

32. A rational fraction $\frac{p(x)}{q(x)}$ is called a proper fraction if degree of the polynomial p(x) is

(A) Less q(x) **(B)** Greater than q(x) **(C)** Equal to q(x) **(D)** greater than or equal to

33. A rational fraction $\frac{p(x)}{q(x)}$ is called a proper fraction if degree of the polynomial p(x) is

(A) Less q(x) **(B)** Greater than q(x) **(C)** Equal to q(x) **(D)** greater than or equal to

34.

If $\frac{10x-13}{(x+2)(x-9)} = \frac{3}{x+2} + \frac{7}{x-9}$, then $\frac{3}{x+2}$ and $\frac{7}{x-9}$ are called.

(A) Mixed fractions **(B)** Improper fractions **(C)** artial fractions **(D)** Constant expressions

35. Partial fractions of $\frac{1}{x^2-1}$ are of the form.

(A) $\frac{Ax+B}{x^2-1}$ **(B)** $\frac{A}{x-1} - \frac{Bx+C}{x+1}$ **(C)** $\frac{A}{x^2-1}$ **(D)** $\frac{A}{x+1} + \frac{B}{x-1}$

36.

An expression of the form $\frac{p(x)}{q(x)}$ where p(x) and q(x) are polynomials with real coefficients and q(x) ≠ 0, is called a/an

(A) Irrational fraction **(B)** Rational fraction **(C)** Polynomial expression **(D)** Constant

37. Partial fractions of $\frac{3x+2}{(x+2)(x-3)^2}$ are of the form.

(A) $\frac{A}{(x+2)} + \frac{B}{x-3}$ **(B)** $\frac{A}{(x+2)} + \frac{B}{x-3} + \frac{C}{(x-3)^2}$ **(C)** $\frac{A}{(x+2)} + \frac{Bx+C}{(x-3)^2}$ **(D)** $\frac{A}{(x+2)} + \frac{B}{(x+2)^2} + \frac{C}{(x-$

38. If $\frac{1}{x^2-1} = \frac{A}{x-1} + \frac{B}{x+1}$, then:

(A) A = $\frac{1}{2}$, B = $\frac{1}{2}$ **(B)** A = $\frac{1}{2}$, B = - $\frac{1}{2}$ **(C)** A = - $\frac{1}{2}$, B = $\frac{1}{2}$ **(D)** A = - $\frac{1}{2}$, B = - $\frac{1}{2}$

39. If f : A ⟶ B is a bijective function then

(A) n(A) ≠ n(B) **(B)** n(A) = n(B) **(C)** n(A) > n(B) **(D)** n(A) < n(B)

40. If n (A) = p, then n (A × A) =

(A) p **(B)** 2p **(C)** $2p^2$ **(D)** p^2

41. If ∫ is a binary relation in the Cartesian product of A and B and Dom ∫ ⊂ A, then ∫ is

(A) into function **(B)** injective function **(C)** not a function **(D)** onto function

42. Set of real numbers can be written in

(A) tabular form **(B)** descriptive form **(C)** set builder form **(D)** both b and c

43. If A ⊂ B then A - B =

(A) A **(B)** B **(C)** ϕ **(D)** B - A

44. If second elements of ordered pairs of a function are not repeated then it is

(A) 1 - 1 function **(B)** onto function **(C)** bijective function **(D)** into function

45. If $A \cup B = A$ and $A \cap B = B$, then

(A) $A \subset B$ **(B)** $A \not\supseteq B$ **(C)** $A \supseteq B$ **(D)** $A \neq B$

46. If R = {(2, 1), (4, 3), (2, 2)}, then Dom R =

(A) {2, 4, 2} **(B)** {2, 4} **(C)** {1, 3, 2} **(D)** none of these

47. If A - B = B - A = ϕ , then

(A) A = B **(B)** $B \subseteq A$ **(C)** $A \subseteq B$ **(D)** all a , b & c

48. If $R = \{(a, b) / a, b \in Z \wedge a + b = 0\}$, then

(A) Dom R $\subset$ Range R **(B)** Range R $\subset$ Dom R **(C)** Dom R = Range R **(D)** none of these

49. $(1 - \cos^2 \theta) \sec^2 \theta = ?$

(A) $\text{cosec}^2\theta$ **(B)** $\cot^2\theta$ **(C)** $\sec^2\theta$ **(D)** $\tan^2\theta$

50. If $\tan x = \frac{a}{b}$, then sin x = ?

(A) $\frac{a}{\sqrt{a^2 - b^2}}$ **(B)** $\frac{b}{\sqrt{a^2 - b^2}}$ **(C)** $\frac{a}{\sqrt{a^2 + b^2}}$ **(D)** $\frac{b}{\sqrt{a^2 + b^2}}$

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

(A) $\text{cosec}^2\theta$ **(B)** $2\text{cosec}^2\theta$ **(C)** $\sec^2\theta$ **(D)** $2\sec^2\theta$

52. $270^0 = ?$

(A) $\frac{3\pi}{2}$ **(B)** $\frac{\pi}{2}$ **(C)** $-\frac{\pi}{2}$ **(D)** $-\frac{3\pi}{2}$

53. If cosx = sinx, then the value of x is

(A) 30^0 **(B)** 45^0 **(C)** 60^0 **(D)** 90^0

54. Angles between 90^0 and 180^0 lie in what quadrant?

(A) 1st **(B)** 2nd **(C)** 3rd **(D)** 4th

55. The system in which the angles are measured in radians is called.

(A) CGS **(B)** sexagesimal **(C)** circular **(D)** MKS

56. $\cos \frac{2\pi}{3} = ?$

(A) 0.5 **(B)** - 0.5 **(C)** - 0.866 **(D)** 0.866

57.

If sin x = $\frac{1}{4}$, then cos x = ?

(A) $\frac{\sqrt{15}}{4}$ **(B)** $\frac{3}{4}$ **(C)** $\frac{\sqrt{17}}{4}$ **(D)** $\frac{15}{4}$

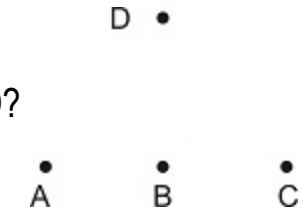
58. In a right-angled triangle projection of hypotenuse on base in equal to

(A) perpendicular **(B)** base **(C)** hypotenuse **(D)** area

59. In a right angled triangle projection of perpendicular on base is.

(A) perpendicular **(B)** base **(C)** hypotenuse **(D)** zero

60.



In the figure, AB = BC = DB = 4 cm. How many circles can pass through A, C and D?

(A) 1 **(B)** 2 **(C)** none **(D)** infinite

61. 3) Diameter of circle perpendicular to the chord _____ the chord.

(A) intersects **(B)** bisects **(C)** trisects **(D)** touches

62. How many circles can pass through a single point?

(A) 1 **(B)** 2 **(C)** 3 **(D)** infinite

63. 5) Two _____ which are equidistant from the centre are congruent.

(A) circles **(B)** diameters **(C)** segments **(D)** chords

64. Two congruent chords are equidistant from the _____ of circle.

(A) centre **(B)** diameter **(C)** circle **(D)** chord

65. Diameter of circle which bisects the chord is _____ to the chord.

(A) collinear **(B)** parallel **(C)** perpendicular **(D)** equal

66.
If two circles touch externally, the distance between their centres is equal to sum of _____ of both circle

(A) radii **(B)** diameters **(C)** circumferences **(D)** area

67. A tangent line touches the circle at _____ point (s).

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4

68.

If two congruent circles touch externally, the distance between their centres is equal to _____ of each circle.

(A) chord **(B)** circumference **(C)** radius **(D)** diameter

69. If two tangents are drawn on both ends of diameter of a circle, they are.

(A) perpendicular **(B)** parallel **(C)** intersecting **(D)** none

70. Two tangents drawn from a point outside the circle are _____.

(A) perpendicular **(B)** parallel **(C)** unequal **(D)** equal

71. How many tangents can be drawn on the circle from a point outside the circle?

(A) 1 **(B)** 2 **(C)** 3 **(D)** infinite

72. How many tangents can be drawn on the circle from a point on the circle?

(A) none **(B)** 1 **(C)** 2 **(D)** infinite

73.
An angle whose vertex is centre of circle and whose arms pass through end points of an arc, is known as _____ angle.

(A) inscribed **(B)** central **(C)** interior **(D)** exterior

74. If a circle is divided into ten equal arcs, then central angle of each arc is _____.

(A) 36^0 **(B)** 45^0 **(C)** 60^0 **(D)** 90^0

75. Central angle of an arc which includes a semicircle in it is _____.

(A) $< 90^0$ **(B)** $= 90^0$ **(C)** $< 180^0$ **(D)** $> 180^0$

76. The central angle of a quadrant of a circle is _____.

(A) 30^0 **(B)** 45^0 **(C)** 60^0 **(D)** 90^0

77. Two congruent chords of two congruent circles have _____ central angles.

(A) different **(B)** equal **(C)** proportional **(D)** acute

78. How many central angles of an arc can be drawn?

(A) one **(B)** two **(C)** finite **(D)** infinite

79. Corresponding arcs of two congruent chords of a circle are _____.

(A) unequal **(B)** major **(C)** congruent **(D)** minor

80.
If central angle of minor arc of a circle is 100^0, angle inscribed in corresponding major arc is _____.

(A) 200^0 **(B)** 100^0 **(C)** 75^0 **(D)** 50^0

81. Angle subtended by an arc at centre of circle is called _____ angle.

(A) central **(B)** inscribed **(C)** straight **(D)** reflex

82. An exterior angle of a cyclic quadrilateral is _____ the opposite interior angle.

(A) greater than **(B)** less than **(C)** equal to **(D)** supplement of

83. Central angle of minor arc of a circle is _____.

(A) $< 90^0$ **(B)** $< 180^0$ **(C)** $> 90^0$ **(D)** $> 180^0$

84. Central angle of major arc of a circle is _____.

(A) $< 90^0$ **(B)** $< 180^0$ **(C)** $> 90^0$ **(D)** $> 180^0$

85. All angles in a same segment of a circle are _____.

(A) equal **(B)** acute **(C)** obtuse **(D)** supplementary

86. Direct common tangents of unequal circles are.

(A) intersecting **(B)** coverging **(C)** not parallel **(D)** All a, b, c

87. How many circles can be drawn through three non-collinear points?

(A) infinite **(B)** 1 **(C)** 2 **(D)** 3

88. Perpendicular bisector of _____ always pass through centre of circle.

(A) tangents **(B)** secants **(C)** chords **(D)** radial segments

89. Angle between tangent and radial segment of a circle is.

(A) 30^0 **(B)** 45^0 **(C)** 60^0 **(D)** 90^0

90. A circle is inscribed in a square having length of side 6 cm. What is the radius of inscribed circle?

(A) 3 cm **(B)** 6 cm **(C)** 12 cm **(D)** 24 cm

91.
Two tangents are drawn at the ends of diameter of a circle of radius 3.5 cm. The distance between tangents is.

(A) 3.5 cm **(B)** 7 cm **(C)** 5 cm **(D)** 10.5 cm

92. Transverse common tangents intersect each other at.

(A) 1 point **(B)** 2 point **(C)** 3 point **(D)** 4 point

93. Centres and point of contact of two touching circles are : _____

(A) collinear **(B)** non-collinear **(C)** coverging **(D)** coicident

94.

Two circles having radii 3 cm and 3.2 cm respectively, touch externally. The distance between centres of the circles is.

(A) 6 cm **(B)** 02 cm **(C)** 6.2 cm **(D)** 5.3 cm

95.
Two circles with radii 4 cm and 4.8 cm respectively, touch internally. The distance between centres of the circles is.

(A) 4 cm **(B)** 8 cm **(C)** 8.8 cm **(D)** 0.8 cm

96. In which type of triangle, incentre and circumcenter are coincident?

(A) scalene **(B)** isosceles **(C)** equilateral **(D)** right triangle

97. A square is inscribed in a circle of radius 5 cm. What is the length of diagonal of the square?

(A) 2.5 cm **(B)** 5 cm **(C)** 10 cm **(D)** 20 cm

98. In a right-angled triangle projection of hypotenuse on base in equal to.

(A) perpendicular **(B)** base **(C)** hypotenuse **(D)** area

99. In an equilateral triangle projection of a side on another side is half of.

(A) perimeter **(B)** area **(C)** altitude **(D)** side

100. In a right angled triangle projection of perpendicular on base is.

(A) perpendicular **(B)** base **(C)** hypotenuse **(D)** zero

Write short answers of the following questions.

1 . Write the following quadratic equation in standard form. $(x + 2)(x - 3) = 5$

2 . Solve the following equation by factorization. $x^2 - 2x + 1 = 0$

3 . Solve the following equation by completing the square method. $x^2 + 8x = 0$

4 . Solve the following equation by quadratic formula.

5 . Solve the following equation by quadratic formula. $x^2 - 9 = 0$

6 . Solve the following equation by completing the square method. $x^2 + 4x - 32 = 0$

7 . Solve the following equation by completing the square method. $x^2 + x + 1 = 0$

8 . Solve the following equation by completing the square method. $x^2 + x + 1 = 0$

9 . Solve the following equation by quadratic formula. $2x^2 + 5x + 1 = 0$

10 . Solve the following equation by quadratic formula. $(x + 1)^2 = (2x - 1)^2$

11 .

Solve the following equation by quadratic formula. $(x + 1)^2 = (2x - 1)^2$

12 . Solve the following equation by quadratic formula. $(x - 2)(x - 6) = (2x + 1)(x + 1)$

13 . Reduce the following equation form using suitable substitution. $ax^4 + bx^2 + c = 0$

14 . Reduce the following equation form using suitable substitution. $3x + \frac{4}{6x - 2} = -1$

15 . Reduce the following equation form using suitable substitution. $8 \times 4^x - 7 \times 2^x - 1 = 0$

16 . Solve the following equation by reducing them to quadratic form. $x^4 + 16x^2 - 225 = 0$

17 . Solve the following equation by factorization without using substitution.

$8x^6 - 7x^3 - 1 = 0$ (Find only real roots)

18 . Reduce the following equation form using suitable substitution. $ax^4 + bx^2 + c = 0$

19 . Reduce the following equation form using suitable substitution. $3x + \frac{4}{6x - 2} = -1$

20 . Reduce the following equation form using suitable substitution. $8 \times 4^x - 7 \times 2^x - 1 = 0$

21 . Solve the following equation by reducing them to quadratic form. $x^4 + 16x^2 - 225 = 0$

22 . Solve the following equation by reducing them to quadratic form. $x^4 + 16x^2 - 225 = 0$

23 . Solve the following equation by factorization without using substitution.

$8x^6 - 7x^3 - 1 = 0$ (Find only real roots)

24 . Solve the following radical equation and check your answer. $\sqrt{3x + 6} = x + 2$

25 . Solve the following radical equation and check your answer. $2\sqrt{3x + 4} - 4 + 3x = 0$

26 . Find all roots of $8x^6 - 7x^3 - 1 = 0$

27 . Find all roots of $8x^6 - 7x^3 - 1 = 0$

28 . Find the value of discriminant and describe the nature of root. $x^2 - x - 12 = 0$

29 . Find the value of discriminant and describe the nature of root. $12x^2 - 11x - 15 = 0$

30 . Discuss the nature of root of the following quadratic equation. $x^2 + 3x - 4 = 0$

31 . Discuss the nature of root of the following quadratic equation.$x^2 + 2x + 8 = 0$

32 . If roots of $x^2 + kx + 9 = 0$ are equal, find k?

33 . Find all roots of $8x^6 - 7x^3 - 1 = 0$

34 . Find all roots of $8x^6 - 7x^3 - 1 = 0$

35 . Find the three cube root of. - 8

36 . Find the three cube root of. -8

37 . Find the three cube root of. 64

38 . Show that. $(1 + 3\omega + \omega^2)^6 = 64$

39 . Show that. $(1 + 3\omega + \omega^2)^6 = 64$

40 . Show that. $\omega^{48} + \omega^{49} + \omega^{50} = 0$

41 . Find the sum and product of the root of the quadratic equation. $x^2 - 5x + 2 = 0$

42 . Find the sum and product of the root of the quadratic equation. $x^2 - 5x + 2 = 0$

43 . Find the sum and product of the root of the quadratic equation. $5x^2 - 2x + 2 = 0$

44 . If α , β are the roots of $3x^2 - 2x + 4 = 0$. Find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

45 . If α , β are the roots of $3x^2 - 2x + 4 = 0$. Find the value of $2\alpha + 2\beta + 4$

46 . If α , β are the roots of $7x^2 + 10x + 7 = 0$, form the equation whose root are. α^2 , β^2

47 . If α , β are the roots of $7x^2 + 10x + 7 = 0$, form the equation whose root are. α^2 , β^2

48 .
Use synthetic division to show that x is the solution of the polynomial and use the result to factorize the polynomial completely.

$2x^3 + 7x^2 - 6x - 8 = 0$; Factor $x + 4$

49 .
Use synthetic division to show that x is the solution of the polynomial and use the result to factorize the polynomial completely.

$x^3 + 2x^2 - 5x - 6 = 0$ if 2 and -3 are its roots.

50 . Find the value of k using synthetic division, if 3 is the zero of the polynomial $2x^3 - kx^2 + 9$.

51 . Solve the following simultaneous equation. $2x + y = 1$; $x^2 + y^2 = 10$

52 . The difference of cubes of two numbers is 91. Find them.

53 . For what values of m the roots of the equation are equal? Also solve the equation.

$(m - 1)x^2 + 2mx + m + 3 = 0$

54 . Two numbers differ by 25 and ratio between the numbers is 3 : 5. Find the number.

55 . Find a, If $\frac{a-3}{2} : \frac{5}{a-1} :: \frac{a-1}{3} : \frac{4}{a+4}$

56 . If $y \propto x$ and $y = 36$ when $x = 4$. Find the value of the constant of variation.

57 . If $y \propto x$ and $y = 10$ when $x = 4$. Find the value of x when $y = 14$.

58 . Price of 5 dozen eggs is Rs. 450. What is the price of 50 eggs?

59 . Price of 5 dozen eggs is Rs. 450. What is the price of 50 eggs?

60 . If $y \propto \frac{1}{x}$ and y = 10 when x = 4. Find the value of the constant of variation.

61 . If $y \propto \frac{1}{x}$ and y = 12 when x = 5. Find the value of x when y = 12.

62 . If $y^2 \propto \frac{1}{x}$ and y = 5 when x = 10. Find the value of y when x = 12.

63 . Find the fourth proportional 5, 10, 20

64 . Find the fourth proportional $6y^3$, $3y^2$, $8y^3$

65 . Find the third proportional. 12, 24

66 . Find the third proportional. $(a - b)^2$, $a^3 - b^3$

67 . Find mean proportional between. $30x^4y^2z^2$, $270y^4z^6$

68 . Find the value of y in the following continued proportion. 10, y, 90

69 . Find the value of y in the following continued proportion. 8, y - 4, 32

70 . Using the theorems of componendo-dividendo, prove that a : b = c : d, if $\frac{3a+5b}{3a-5b} = \frac{3c+5d}{3c-5d}$

71 . Using the theorems of componendo-dividendo, prove that a : b = c : d, if $\frac{5a+7b}{5a-7b} = \frac{5c+7d}{5c-7d}$

72 . If w : x : : y : z, then show that. $\frac{6w-5x}{6w+5x} = \frac{6y-5z}{6y+5z}$

73 . Resolve into partial fractions. $\frac{5x+3}{(x-1)(x-5)}$

74 . Resolve into partial fractions. $\frac{7x+3}{(x-2)(x-6)}$

75 . Resolve into partial fractions. $\frac{3x+5}{2x^2-5x-3}$

76 . Resolve into partial fractions. $\frac{x}{(x-a)(x-b)}$

77 . esolve into partial fractions. $\frac{7x+25}{(x+3)(x+4)}$

78 . esolve into partial fractions. $\frac{7x+25}{(x+3)(x+4)}$

79 . Verify commutative properties of Union and Intersection for the following pairs of sets.

$A = \{ 2, 3, 5, 7, 11, 13 \}$, $B = \{ x \mid x \in W \wedge 5 \leq x \leq 10 \}$

80 . Verify commutative properties of Union and Intersection for the following pairs of sets.

M = Set of vowels in English alphabets, N = Set of consonants in English alphabets.

81 .
Verify the commutative property of union and intersection, and De-Morgan's laws by Venn diagrams for the following pairs of sets.

U = { 0, 1, 2, 3, ... , 20 } , A = { 0, 5, 10, 15, 20 }, B = Set of first six whole multiple of 2.

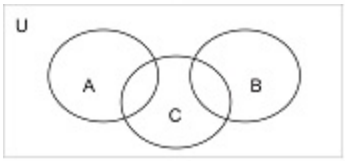
82 .
Verify the commutative property of union and intersection, and De-Morgan's laws by Venn diagrams for the following pairs of sets.

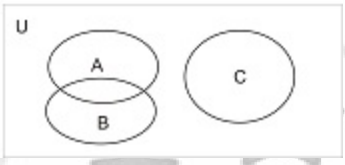
U = { x | x is an English alphabet } , E = { x | x is a letter in the word 'umbrella' } , F = { x | x is a letter in the word 'ball' }

83 . Verify : associative law of union and intersection.

84 . Verify : associative law of union and intersection.

85 . Verify : distributive property of intersection over union, for the following diagram.





86 . Find the number of binary relation in the following case. $A = \{ 0, \pm 2, \pm 4 \}$, $B = \{ 0, 2, 4 \}$

87 . Find the number of binary relation in the following case. $D = \{ 1, 3, 5 \}$

88 . Find all possible binary relation in case mentioning the number of binary relation in case.

$C = \{ \pi , e \}$

89 .
If S = { 1, 2, 4, 8 }, T = { 3^0, 3^1, 3^2 }, then write the binary relation into tabular form. Find the domain and range in case.

$R_1 = \{(x, y) \mid x \in S, y \in T \wedge x = y \}$

90 .
If S = { 1, 2, 4, 8 }, T = { 3^0, 3^1, 3^2 }, then write the binary relation into tabular form. Find the domain and range in case.

$R_5 = \{(x, y) \mid x \in S, y \in T \wedge y > 2x \}$

91 .
If A = {a, e, i} and B = {w, o, u}, then check whether the relation are function from A to B or not?

$R_3 = \{(e, w), (a, o), (i, u)\}$

92 .
If A = {a, e, i} and B = {w, o, u}, then check whether the relation are function from A to B or not?

R_5 = {(a, u), (i, w), (e, o)}

93 . If A = {3, 6, 9} and B = {1, 2, 3, 4} Can you find an onto function from A to B or not?

94 . If A = {3, 6, 9} and B = {1, 2, 3, 4} Can you find an injective function from A to B or not?

95 .
If A = {3, 6, 9} and B = {1, 2, 3} then check whether the relation are function from A to B or not. Discuss their type if they are function.

R_1 = {(3, 1), (6, 2), (6, 3)}

96 .
If A = {3, 6, 9} and B = {1, 2, 3} then check whether the relation are function from A to B or not. Discuss their type if they are function.

R_3 = {(3, 3), (6, 1), (9, 2)}

97 .
If U = Set of integers, A = Set of prime numbers, B = Set of non-negative integers, then varify De-Morgan's laws of union and intersection.

98 . If R = {a, f, h, s} and S = {b, e, j, n}, then Write any 3 binary relations from R × S.

99 . If R = {a, f, h, s} and S = {b, e, j, n}, then Write any 3 binary relations from R × S.

100 . If R = {a, f, h, s} and S = {b, e, j, n}, then Write a binary relation which is an onto function.

101 . If R = {a, f, h, s} and S = {b, e, j, n}, then

Write a binary relation relation which is an injective function.

102 . If R = {a, f, h, s} and S = {b, e, j, n}, then

Write a binary relation relation which is an injective function.

103 .
The number of children born to 45 women in a certain locality up to the age of 40 years is given as. Prepare a discrete frequency distribution.

0, 2, 1, 0, 1, 2, 3, 5, 6, 3, 2, 1, 3, 4, 2, 6, 1, 5, 2, 4, 3, 0, 1, 2, 3, 0, 0, 2, 3, 4, 1, 5, 6, 2, 4, 5, 1, 3, 4, 6, 2, 3, 1, 2, 5

104 . Find arithmetic mean for the following data by definition x = 2, 4, 6, 8, 10, 12

105 . Find arithmetic mean for the following data by definition z = 0, 4, 8, 12, 16, 20, 24, 28

106 . Find arithmetic mean for the following data by definition z = 0, 4, 8, 12, 16, 20, 24, 28

107 . Find arithmetic mean for the following data by definition v = 5, 5, 5, 5, 5, 5, 5, 5, 5

108 .

The monthly incomes in rupees of ten families of a certain locality are given below. 8500, 7000, 1000, 7500, 50000, 800, 4200, 25000, 40000, 3600. Find arithmetic mean of the income by.

Using an assumed mean 30000

109 . Find median for the following data. 4, 4, 4, 4, 4, 4

110 . Find mode for the following data. 120, 130, 140, 225, 125, 225, 120

111 . Find the geometric mean for the data given below (without using logarithms). 2, 8

112 . Find the geometric mean for the data given below (without using logarithms).

4 , 4 , 4 , 4 , 4 , 4

113 . Find geometric mean of the following data by using logarithms.

x	1	2	3	4	5	6	7
∫	3	5	7	8	6	4	1

114 . Calculate harmonic mean for the following data. 0.1 , 0.2 , 0.4 , 0.5 , 0.8

115 . What is dispersion? Write the names of types of measure of dispersion.

116 . Find variance for the following data by direct formula. 30, 31, 32, 45, 20, 22, 48, 35, 27, 40

117 . Convert the measure of angles in seconds. 5^0

118 . Convert the measure of angles in seconds. $10^0 30'$

119 . Convert the measure of angles in minutes. 75^0

120 . Convert the measure of angles in minutes. $50^0 40'$

121 . Write the measures of angles in degrees correct to 4 decimal of places. 135'

122 . Write the measures of angles in degrees correct to 4 decimal of places. $60^0 60'$

123 . Convert the measures of angles in sexagesimal system ($D^0M'S''$). 60.125^0

124 . Convert in radians. Write the answers in terms of π. 45^0

125 . Convert in radians. Write the answers in terms of π. $60^0 30'$

126 . Convert in radians. Use $\pi = 3.1416$. 270^0

127 . Convert in radians. Use $\pi = 3.1416$. $180^0 45'$

128 . Write the radian measure of angles in $D^0M'S''$. $\frac{\pi}{4}$

129 . Write the radian measure of angles in $D^0M'S''$. $\frac{\pi}{12}$

130 . Write the radian measure of angles in $D^0M'S''$. 1

131 . Write the radian measure of angles in $D^0M'S''$. 12π

132 . Find length of arc and area of sector for given radius and central angle. r = 5 cm, $\theta = \frac{\pi}{3}$ radians

133 . Find length of arc and area of sector for given radius and central angle.

r = 6 dm, $\theta = 60^0 45'30''$

134 . Find radian measure of the central angle of a circular sector for the following data.

ℓ = 8 cm , r = 4 cm

135 . Find radian measure of the central angle of a circular sector for the following data.

A = 45 cm^2 , r = 10.70 cm

136 . Find radius of circle for the following information. ℓ = 4 cm , $\theta = \pi$ radians

137 . Evaluate the following.
Sin 600 - Cos 300

138 . Evaluate the following. $\frac{Tan\frac{\pi}{3} - Tan\frac{\pi}{6}}{1 + Tan\frac{\pi}{3}\, Tan\frac{\pi}{6}}$

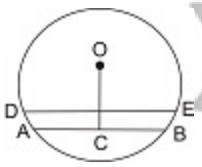
139 . Evaluate the following. $\sin\frac{\pi}{2}\cos\frac{\pi}{3} - \cos\frac{\pi}{2}\sin\frac{\pi}{3}$

140 . Write value of θ for the following ratios (0 < θ < 2π). Tan θ = 1

141 . Use basic trigonometric identities to prove the following relations. $(1 - \sin^2\theta)\sec^2\theta = 1$

142 . Use basic trigonometric identities to prove the following relations. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \frac{\sin\theta}{1+\cos\theta}$

143 .
In the figure, AB = 4 cm, OC = 3 cm. What is length of $\overline{DE}$, where $\overline{DE}$ passes through the mid-point of $\overline{OC}$?



144 . Find radius of circle in the adjoining figure.

145 .
The length of an arc of a circle is 4 cm and its central angle is of measure 60^0. Find central angle of the arc of the same circle whose length is 8 cm.

146 . Draw a circle with the help of any round object, then find its centre.

147 . Inscribe a circle in a triangle DEF with sides DE = 5 cm and EF = DF = 4 cm

148 . Inscribe a circle in a triangle DEF with sides DE = 5 cm and EF = DF = 4 cm

149 . Circumscribe a circle about an equilateral triangle ABC with side 3 cm.

150 . Circumscribe a circle about an equilateral triangle ABC with side 3 cm.

Write detailed answers of the following questions.

1 . Reduce the following equation form using suitable substitution. $3\left(x^2+\frac{1}{x^2}\right)+8\left(x+\frac{1}{x}\right)+11=0$

2 . Reduce the following equation form using suitable substitution. $ak^{2x}+bk^{x}+c=0$

3 . Reduce the following equation form using suitable substitution. $(2x-1)(2x-7)(x-3)(x-1)=8$

4 . Solve the following equation by reducing them to quadratic form. $3x^2+\frac{4}{x^2}=7$

5 . Solve the following equation by reducing them to quadratic form.

$12x^4+11x^3-146x^2+11x+12=0$

6 . Solve the following equation by reducing them to quadratic form. $2^{2x}-34\times 2^{x}+64=0$

7 . Solve the following equation by reducing them to quadratic form. $5^{2x}-150\times 5^{x}+3125=0$

8 . Solve the following equation by reducing them to quadratic form. $x(x-1)(x+2)(x+3)=40$

9 . Solve the following equation by factorization without using substitution. $4\times 2^{2x}-4\times 2^{x}+1=0$

10 . Reduce the following equation form using suitable substitution. $3\left(x^2+\frac{1}{x^2}\right)+8\left(x+\frac{1}{x}\right)+11=0$

11 . Reduce the following equation form using suitable substitution. $(2x-1)(2x-7)(x-3)(x-1)=8$

12 . Solve the following equation by reducing them to quadratic form. $3x^2+\frac{4}{x^2}=7$

13 . Solve the following equation by reducing them to quadratic form. $5x^2+\frac{36}{5x^2+4}=16$

14 . Solve the following equation by reducing them to quadratic form.

$12x^4+11x^3-146x^2+11x+12=0$

15 . Solve the following equation by reducing them to quadratic form. $2^{2x}-34\times 2^{x}+64=0$

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18 . Solve the following equation by factorization without using substitution. $4\times 2^{2x}-4\times 2^{x}+1=0$

19 . Solve the following radical equation and check your answer. $\sqrt{x+2} - \sqrt{x+1} = 2$

20 . Solve the following radical equation and check your answer. $\sqrt{2x+1} + \sqrt{3x-1} = \sqrt{9x+2}$

21 . Solve the following radical equation and check your answer. $\sqrt{x^2+4x+13} + \sqrt{x^2+4x+5} = 2$

22 . Solve. $\sqrt{x^2+6x+45} - \sqrt{x^2+6x+10} = 5$

23 . Solve. $\sqrt{x^2+6x+45} - \sqrt{x^2+6x+10} = 5$

24 . Show that the roots of $2x^2 + (mx - 1)^2 = 3$, are equal if $3m^2 + 4 = 0$.

25 . Find the value of "m" when roots of the following quadratic equation are equal.

$m^2x^2 + (2m + 1)x + 1 = 0$

26 . Show that the roots of the following equation are real. $mx^2 - 2mx + m - 1 = 0$

27 . Show that the roots of the following equation is real. $(a + b)\, x^2 - ax - b = 0$

28 . Solve. $\sqrt{x^2+6x+45} - \sqrt{x^2+6x+10} = 5$

29 . Show that. $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x + \omega y + \omega^2 z)(x + \omega^2 y + \omega z)$

30 . If α **,** β **are the roots of** $3x^2 - 2x + 4 = 0$**. Find the value of** $\alpha^3\beta + \alpha\beta^3$

31 . If α **,** β **are the roots of** $7x^2 + 10x + 7 = 0$**, form the equation whose root are.** $\alpha^2 + 1$, $\beta^2 + 1$

32 . If α **,** β **are the roots of** $x^2 + 6x + 3 = 0$**, form the equation whose root are.** $(\alpha + \beta)^2$, $(\alpha - \beta)^2$

33 . Find k if α **and** $\alpha - 5$ **are the roots of** $x^2 - 3kx + 5 = 0$

34 .
Use synthetic division to find the values of p and q if x + 1 and x - 2 are factors of the polynomial $x^3 + px^2 + qx + 6$.

35 .
Use synthetic division to find the values of p and q if x + 1 and x - 2 are factors of the polynomial $x^3 + px^2 + qx + 6$.

36 . Solve the following simultaneous equation. $x^2 + 3y^2 = 14$; $3x^2 + y^2 = 6$

37 . Solve the following simultaneous equation. $2x^2 - 8xy + 6y^2 = 0$; $x^2 + y^2 = 45$

38 .
The sum of the Cartesian coordinates of a point is 9 and the sum of their squares is 45. Find the coordinates of the point.

39 . he sum of the squares of two consecutive odd integers is 34. Find the integers.

40 .
A two-digit number is decreased by 45 when the digits are reversed. If the sum of the digits is 11, find the number.

41 .
Sum of squares of two consecutive numbers is 145. The difference of their squares is 17. Find the numbers.

42 . Solve the simultaneous equations. $x^2 - y^2 = 5$; $4x^2 - 3xy = 11$

43 .
A rectangular chocolate box has volume as $x^3 + 2x^2 - 5x - 6$. Find the length and width of the box if its height is $x - 2$.

44 . If $y \propto x^3$ and $y = 125$ when $x = 5$. Find the value of x when $y = 27$.

45 .
Given that $a = 36$ and $b = 9$. If b is directly proportional to the square root of a, then find (1) b when $a + 1 = 50$. (2) a when $b = 81$.

46 .
In a river, speed (v) of water on the surface is directly proportional to the square of height (h) from bottom. If $v = 100$ m/s for $h = 10$ m. Find the speed of water at the height of 12 m.

47 . If $y \propto x^2$, then complete the following table.

x	2	4	5	3	0
y	12		108	300	

48 .
Given that $a = 27$ and $b = 3$. If b is inversely proportional to the cube root of a, then find (1) b when $3a - 1 = 14$ (2) a when $2b = 8$.

49 . Find the fourth proportional. $y^2 - 11y + 24$, $y - 3$, $y^3 - y^2$

50 . Find the third proportional. $\frac{x^2 - y^2}{x^2 + y^2}, \frac{x - y}{x^2 - xy + y^2}$

51 . Using the theorem of componendo-divideno, find the value of $\frac{a + 5b}{a - 5b} + \frac{a + 5c}{a - 5c}$, if $a = \frac{10bc}{b + c}$

52 . Using the theorem of componendo-divideno, find the value of $\frac{a + 3x}{a - 3x} + \frac{a + 2y}{a - 2y}$, if $a = \frac{6xy}{x + y}$

53 . Solve the following. $\frac{\sqrt{x+3} + \sqrt{x-3}}{\sqrt{x+3} - \sqrt{x-3}} = 2$

54 .
The area of a trapezoid varies jointly as the height h and sum of the lengths of parallel sides S. If area of the trapezoid is $20m^2$, its height is 5m and base are 3m and 5m, find the constant of variation. Then write the general equation for the area of trapezoid.

55 . If $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ **, then** $\frac{3x^3 + 5y^3 + 7z^3}{3a^3 + 5b^3 + 7c^3} = \left(\frac{3x + 5y + 7z}{3a + 5b + 7c}\right)^3$

56 . Resolve into partial fractions. $\frac{6x^2 - 15x + 13}{(x + 4)(3x - 1)^2}$

57 . Resolve into partial fractions.

$$\frac{2x-1}{(x+2)^2(x-3)}$$

58 . Resolve into partial fractions. $\frac{6x^2+3x+8}{x(x^2+2)}$

59 . Resolve into partial fractions. $\frac{1}{x(x^2+5)^2}$

60 . Resolve into partial fractions. $\frac{x^2}{(x^2+3)^2(x-1)}$

61 . Resolve into partial fractions. $\frac{2}{(x^2+1)^2(x^2-1)}$

62 . Resolve into partial fractions. $\frac{5x^2+3x+7}{(x^2+15)(x^2-9)}$

63 . Verify distributive law of union over intersection for the following sets.

A = { 1, 2, 3, ... } , B = { -1, -2, -3, ... }, C = { 0, ±1, ±2, ±3, ... }

64 .
If U = { 0, 1, 2, 3, ... , 20 } , A = { 1, 3, 5, ... , 19 }, B = { 0, 2, 4, ... , 20 }, then prove that.

$(A \cup B)' = A' \cap B'$

65 . Verify De Morgan's laws for the following sets, when

$U = \{ x \mid x \in N \wedge 1 \leq x \leq 10 \}$, $X = \{ x \mid x \in P \wedge 1 < x < 10 \}$ and $Y = \{ x \mid x \in O \wedge 1 \leq x < 10 \}$

66 . Prove by using Venn diagram. (P ∪ Q) ∪ R = P ∪ (Q ∪ R)

P = { 0, 1, 2, 3 } , Q = { 2, 3, 4, 5, 6 }, R = { 5, 6, 7, 8, 9 }

67 . Prove by using Venn diagram. (P ∩ Q) ∩ R = P ∩ (Q ∩ R)

P = { 0, 1, 2, 3 } , Q = { 2, 3, 4, 5, 6 }, R = { 5, 6, 7, 8, 9 }

68 .
In a group of 30 Mathematics students, 20 like Algebra and 15 like both Geometry and Algebra. Show the data by Venn diagram. Also find how many students like Geometry.

69 . If A = {2, 4, 6, 8, 10}, B = {0, ± 2, ± 4, ± 6, ± 8}, C = {-2, -4, -6, -8, -10}, then verify that.

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

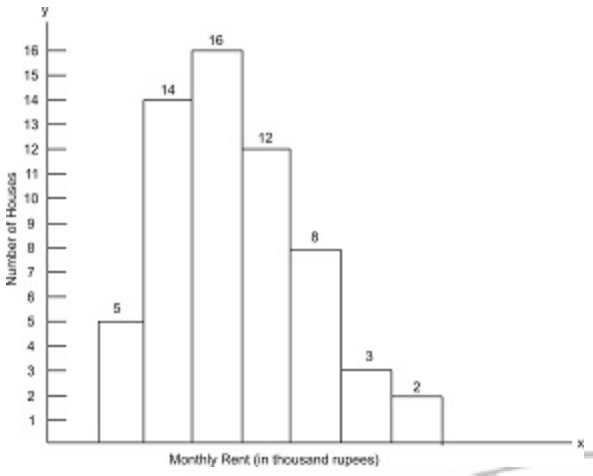
70 .
Read the following frequency table and give answers to the question. 1. What is the total number of values in the data? (2) In which class interval 8th value of the data lies? (3) What is number of values less than 21? (4) Which group contains highest number of values? (5) What is the lower

limit of the last class? (6) What is the lower boundary of the last class? (7) What is the size of the class interval? (8) Find class marks of all groups.

Class Interval	1-10	11-20	21-30	31-40	41-50	51-60
Frequency	5	4	8	9	2	2

71 .

Title: A histogram showing the monthly rent of some houses in a sector of Islamabad. (1) What is the total number of houses? (2) What is the number of houses whose rent in between Rs. 30, 000 to Rs. 40, 000? (3) What percent of houses have rent between Rs. 10, 000 to Rs. 30, 000? (4) In which group the greatest number of houses lie?



72 .

In a saving group, there are 400 members, and the number of savings certificates held by them is shown in the following table. Construct a histogram of the distribution of saving certificates.

Class Interval	1-50	51-100	101-150	151-200	201-300	301-400	401-500
No. of members	10	15	30	40	120	100	85

73 .

Scores on a reading speed test were grouped into the following frequency distribution. (1) Find the class marks. (2) Draw a histogram. (3) Draw a frequency polygon on histogram. (4) Draw a commulative frequency polygon.

Classes	24-27	27-30	30-33	33-36	36-39	39-42	42-45
∫	3	17	20	30	13	11	4

74 .

The following are the scores made by two batsmen A and B in a series of innings. Find arithmetic mean of scores of both players and state who is better as run getter?

A	12	15	6	73	7	19	199	36	84	29
B	47	12	76	48	4	51	37	48	13	0

75 . For the following frequency distribution find arithmetic mean by Direct method / definition

Class intervals	0-5	5-10	10-15	15-20	20-25
Frequencies	5	7	10	6	2

76 . Find arithmetic mean from the following data.

Classes	1-9	10-18	19-27	28-36	37-45

∫	10	15	18	15	12

77 . Find arithmetic mean from the following data.

Classes	1-9	10-18	19-27	28-36	37-45
∫	10	15	18	15	12

78 . Find mean for the following discrete frequency distribution.

x	0	1	2	3	4	5
∫	3	5	9	4	2	1

79 . Find mode for the following discrete frequency distribution.

x	0	1	2	3	4	5
∫	3	5	9	4	2	1

80 . Find harmonic mean for the following frequency distribution.

Heights (inches)	60 - 62	63 - 65	66 - 68	69 - 71	72 - 74
∫	5	18	42	27	8

81 . Find 2-years centered moving averages for the data.

Years	2010	2011	2012	2013	2014	2015	2016	2017
Production	80	75	72	85	77	75	80	75

82 .
For the following frequency distribution. Draw a frequency polygon. (1) Estimate mode graphically from frequency polygon. (2) Construct cumulative frequency polygon. (3) Estimate median and quartiles graphically from the cumulative frequency polygon.

Classes	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
∫	3	14	26	15	9	8

83 . Calculate 7 days moving averages for the following record of attendance.

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
I	24	55	29	48	52	55	61
II	27	52	32	43	53	56	65

84 .
Find standard deviation for the following set of 15 values. Also find percentage of values lying within the limits $\bar{x} \pm$ S and $\bar{x} \pm$ 2S.

10 , 20 , 11 , 9 , 15 , 13 , 12 , 19 , 18 , 15 , 14 , 12 , 18 , 20 , 16

85 .
A motorcycle is traveling on a curve along a highway. The curve is an arc of a circle with radius of 10 km. If the motorcycle's speed is 42 km/h, what is the angle in degrees through which the motorcycle will turn in 21 minutes?

86 . For θ = $\frac{\pi}{6}$, verify the following statement. Tan 2θ = $\frac{2Tan\theta}{1-Tan^2\theta}$

87 . For θ = $\frac{\pi}{6}$, verify the following statement. Sin 3θ = 3Sin θ - 4 $Sin^3\theta$

88 . For θ = $\frac{\pi}{6}$, verify the following statement. $Sec^2\theta - Tan^2\theta = 1$

89 . Use basic trigonometric identities to prove the following relations. $\frac{1}{sec\theta - tan\theta} = \sec\theta + \tan\theta$

90 . Use basic trigonometric identities to prove the following relations. $\frac{tan\theta + sin\theta}{tan\theta - sin\theta} = \frac{sec\theta + 1}{sec\theta - 1}$

91 . Use basic trigonometric identities to prove the following relations.

$\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

92 . Solve the following right-angled triangle. $\triangle PQR$, $\angle Q = 90^0$, $\angle P = 60^0$, $PQ = 4\sqrt{3}$ cm

93 . Solve the following right-angled triangle. $\triangle xyz$, $\angle x = 90^0$, YZ = 16 m , XZ = 8 m

94 . If $x = r \cos\alpha \sin\beta$, $y = r \cos\alpha \cos\beta$ and $z = r \sin\alpha$, then find value of $x^2 + y^2 + z^2$.

95 .
From a point at a distance of 20 m from a tree, angle of elevation of top of a tree is 30^0. Find height of tree.

96 .
The window of a room is in the shape of an equilateral triangle. Th length of side is 1.6 m. Find height of the window.

97 .
Two pillars of equal height stand on either side of a roadway which is 120 m wide. At a point on the road between pillars, the angles of elevation of the pillars are 60^0 and 30^0. Find height of each pillar and position of the point.

98 .
Two men on opposite sides of a tree are in line with it. They observe that angles of elevation of top of tree are 30^0 and 60^0. The height of tree is 15 m. Find distance between men

99 .
From a point A on ground at a distance of 200 m angle of elevation of top of a tower is α. There is another point B 80 m nearer to the tower. The angle of elevation of top of tower from B is β. If $\tan\alpha = \frac{2}{5}$, find height of tower and value of .

100 . Find sinα, tanα and secα, if $\cos\alpha = \frac{5}{13}$ and $< \frac{\pi}{2} < \theta . \pi$

101 .
In $\triangle ABC$, AB = 5 cm, BC = 5 cm, CA = 6 cm and $\overline{AD} \perp \overline{BC}$. Find length of altitude AD and area of $\triangle ABC$.

102 .
In $\triangle ABC$, AB = 5 cm, BC = 5 cm, CA = 6 cm and $\overline{AD} \perp \overline{BC}$. Find length of altitude AD and area of $\triangle ABC$.

103 .
Prove that sum of squares of diagonals of a (1) parallelogram (2) rectangle, is equal to twice the sum of squares of line segments joining midpoints of opposite sides.

104 . A straight line drawn from the centre of a circle to bisect the chord is perpendicular to the chord

105 . Prove that Perpendicular drawn from the centre of a circle on a chord bisect it.

106 . Prove that Perpendicular drawn from the centre of a circle on a chord bisect it.

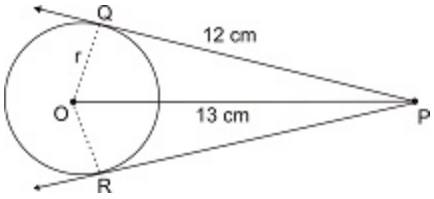
107 . Prove that Two chords of a circle which are equidistant from the centre are congruent.

108 .
Prove that The tangent to a circle and the radial segment joining the point of contact and the centre are perpendicular to each other.

109 . Prove that The two tangents drawn to a circle from a point outside the circle are equal in length.

110 .
Prove that If two circles touch internally, the distance between their centres is equal to the difference of their radii.

111 . Find r in the following figure.



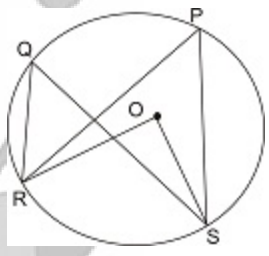
112 .
Ali is whirling a stone tied with a string of length 3 feet. All of a sudden string is broken and the stone moves along tangent direction of circular path and hits a point 5 feet away from Ali. Find the distance covered by the stone.

113 . Prove that If two arcs of a circle are congruent, then the corresponding chords are equal.

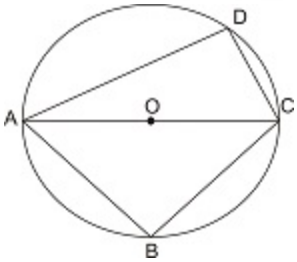
114 . Prove that The angle in a semi-circle is a right angle

115 . Prove that The angle in a segment less than semi-circle is greater than a right angle.

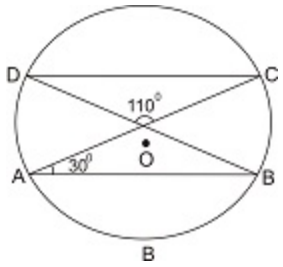
116 . In the adjoining $\angle P = 450^0$. Find values of $\angle Q$ and $\angle ROS$.



117 . In the adjoining figure $\angle BAC = 45^0$ and $\angle ACD = 60^0$. Find $\angle ABC$, $\angle BCA$, $\angle CAD$.



118 . In the figure, $\overline{AB}$ is parallel to $\overline{CD}$. Find the values of $\angle AEB$, $\angle B$, $\angle C$ and $\angle D$.



119 .
Three non-collinear points A, B and C are such that AB = BC = 3 cm and $\angle B = 120^0$. Construct a circle passing through points, A, B and C.

120 .
Find the centre of an arc DEF, such that chord DE = 3.5 cm , chord EF = 4.2 cm and angle between both segments is 60^0.

121 .
Construct a circle of radius 3.3 cm, then circumscribe (1) a square (2) a regular hexagon about the circle.

122 .
Draw an arc ABC. Take a point X outside the arc and draw a tangent from X to the arc without using the centre of the arc.

123 .
Construct a circle of radius 3cm. Draw two tangents from a point A, 5.8cm away from the centre of the circle.

124 .
Construct two touching circles of radii 2.6cm and 3.2cm. Draw: A common tangent that passes through the point of intersection of both circles. (ii) A common tangent that does not pass through the point of intersection of both circles. (iii) Two common tangents.

125 . Construct a circle that touches both the arms of angles (i) 60° (ii) 75°.