ASSIGNMENT

1. Show that any positive odd integer is of the form $6a+1$, or $6a+3$, or $6a+5$, where a is some integer.
2. Explain why $7\times11\times13+13$ and $7\times6\times5\times4\times3\times2\times1+5$ are composite numbers.
3. If n is an odd integer, then show that n^2-1 is divisible by 8.
4. Prove that, if x and y are both odd positive integers, then x^2+y^2 is even but not divisible by 4.
5. Find the quadratic polynomial each with the given number as the sum & product of its zeroes respectively.

$\frac{-1}{4}, \frac{1}{4}$

6. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes & the coefficients of the polynomial $4x^2+5\sqrt{2}x-3$.
7. Find the solution of the pair of equations $\frac{x}{10}+\frac{y}{5}-1=0$ and $\frac{x}{8}+\frac{y}{6}=15$ and find λ, if $y=\lambda x+5$.
8. By graphical method, find whether the following pair of equations are consistent or not. If consistent, solve them.
   (i) $3x+y+4=0$, $6x-2y+4=0$.
   (ii) $x-2y=6$, $3x-6y=0$
   (iii) $x+y=3$, $3x+3y=9$.
9. Find the value(s) of K for which the quadratic equation $2x^2-Kx+K=0$ has equal roots.
10. For which value(s) of K will the pair of equations $Kx+3y=K-3$, $12x+Ky=K$ has no solution?

Questions for 3 marks:-

11. Prove that $3+2\sqrt{5}$ is irrational, where $\sqrt{5}$ is irrational.
12. Prove that $\sqrt{p}+\sqrt{q}$ is irrational, where p and q are primes.
13. Show that one by only one out of n, $n+4$, $n+8$, $n+12$ and $n+16$ is divisible by 5, where n is any positive integer.

14. If the zeros of the Polynomial of $x^3 - 3x^2 + x + 1$ are $a-b$, a, $a+b$, find a and b.

15. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + K$ the remainder comes out to be $x + a$, find K and a.

16. If the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a, $a+b$, and $a+2b$ for some real numbers a and b, find the values of a and b as well as the zeroes of the given polynomial.

17. For which values of a and b the zeroes of $q(x) = x^3 + 2x^2 + a$ are also the zeroes of polynomial $p(x) = x^5 - x^4 - 4x^3 + 3x^2 + 3x + b$? Which zeros of $p(x)$ are not the zeroes of $q(x)$?

18. Places A & B are 100 Km apart on a highway. One car from A & another from B at the same time. If the car travels in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?

19. A boat goes 30 Km upstream and 44 Km downstream in 10 hours. In 13 hours, it can go 40 Km upstream and 55 Km downstream. Determine the speed of the stream and that of the boat in still water.

20. Solve the pair of equation by reducing it to a pair of linear equations :-

$$\frac{1}{3x+y} + \frac{1}{3x-y} = \frac{3}{4}$$

$$\frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = \frac{-1}{8}$$

21. Formulate the problem as a pair of equation & hence find its solutions :-

⇒ 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, & also that taken by 1 man alone.

22. A train covered a certain distance at a uniform speed. If the train would have been 10 Km/hr faster, it would have

taken 2 hours less than the scheduled time. And, if the train were slower by 10 km/h; it would have taken 3 hours more than the scheduled time. Find the distance covered by train.

23. Solve the following pair of linear equations:-

(i) $(a-b)x + (a+b)y = a^2 - 2ab - b^2$

$(a+b)(x+y) = a^2 + b^2$

[By cross Multiplication Method]

(ii) $152x - 378y = -74$

$-378x + 152y = -604$

[By elimination Method]

(iii) $\sqrt{2}x + \sqrt{3}y = 0$

$\sqrt{3}x - \sqrt{8}y = 0$

[By substitution Method]

24. Solve for x :- $\frac{1}{x+a+b} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$

25. Find the value of $\sqrt{6+\sqrt{6+\sqrt{6}\ldots}}$

26. If the roots of the quad. eq. $(a-b)x^2 + (b-c)x + (c-a) = 0$ are equal roots. Prove that $2a = b+c$

27. If the roots of the equation $(a^2+b^2)x^2 - 2(ac+bd)x + (c^2+d^2) = 0$ are equal. Prove that $\frac{a}{b} = \frac{c}{d}$.

28. Two pipes together can fill a cistern in $3\frac{1}{13}$ min. If one pipe takes 3 min more than the other to fill it. Find the time in which each pipe would fill the cistern.

29. If the ratio of sum of the first m and n terms of an AP is $m^2 : n^2$. Show that the ratio of its m^{th} & n^{th} terms is $(2m-1) : (2n-1)$.

30. The sum of the n terms of an AP is given by $S_n = 3n^2 - 4n$. Determine the AP and the 12^{th} terms.

31. Divide 56 into four parts which are in AP such that the ratio of product of extremes to the product of means is 5:6.

32. If S_n denotes the sum of first n terms of an AP. Prove

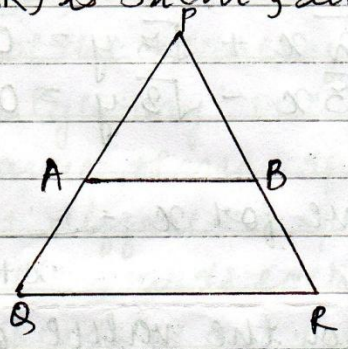
that $S_{20} = 3(S_{20} - S_{10})$

33. If the sum of m terms of an AP is as same as the sum of n terms, show that the sum of its $(m+n)$ terms is zero.

34. If the m^{th} term of an AP is $\frac{1}{n}$ and n^{th} term is $\frac{1}{m}$, then show that its $(mn)^{th}$ term is 1.

35. If the sum of p terms of an AP is q, and sum of q terms of an AP is p then prove that the sum of $(p+q)$ terms is $-(p+q)$.

36. In figure $\frac{PA}{AQ} = \frac{PB}{BR} = 3$. If the ar(PBR) is 32 cm^2, then find the area of Quadrilateral AQRB.



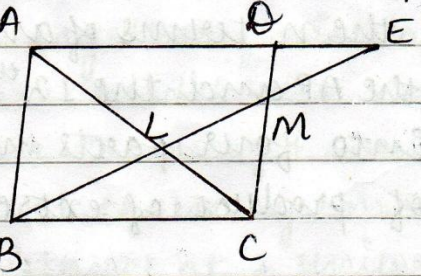
37. Prove that the sum of the squares of the sides of a rhombus is equal to the sum of squares of its diagonals.

38. The perpendicular AD on the base BC of $\triangle ABC$ intersect BC at D so that $BD = 3CD$. Prove that $2(AB)^2 = 2(AC)^2 + BC^2$.

39. $\triangle ABC$ is right angled at B and D is the mid-point of BC. Prove that $AC^2 = 4AD^2 - 3AB^2$.

40. In $\triangle ABC$, XY is parallel to BC and it divides $\triangle ABC$ into two parts of equal area. Prove that $\frac{BX}{AB} = \frac{\sqrt{2}-1}{\sqrt{2}}$

41. In given fig. M is the mid point of CD of ||gm ABCD, BM, when joined meets AC in L and AD produced in E. Prove that $EL = 2BL$.

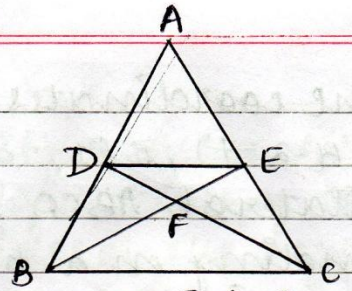


42. State and prove BPT. and converse of PGT.

43. In the given $DE \parallel BC$

$AD : DB = 5 : 4$

Find $\frac{ar(DEF)}{ar(CFB)}$



44. Point A lies on the line segment PQ joining $P(6, -6)$ and $Q(-4, -5)$ in such a way that $\frac{PA}{PQ} = \frac{2}{5}$. If point P also lies on the line $3x + K(y+1) = 0$, find the value of K.

45. If the point $A(-2, 1)$, $B(a, b)$, $C(4, -1)$ are collinear and $a - b = 0$, find the values of a and b.

46. If the points $P(-3, 9)$, $Q(a, b)$ and $R(4, -5)$ are collinear and $a + b = 1$, find the values of a and b.

47. If the points $A(1, -4)$, $B(b, c)$ and $C(5, -1)$ are collinear & $2b + c = 4$, find the values of b and c.

48. If the points $P(2, 2)$ is equidistant from the point $A(-2, K)$ and $B(-2K, 3)$, find K. Also find the length of AP.

49. Points $A(-1, y)$ and $B(5, 7)$ lie on a circle with centre $O(2, -3)$. Find the value of y. Hence, find the radius of a circle.

50. Find the values of K for which the points $(3K - 1, K - 2)$, (K, K) and $(K - 1, -K - 2)$ are collinear.

51. Points P, Q, R and S divide the line segment joining the points $A(1, 2)$ and $B(6, 7)$ in 5 equal parts. Find the coordinates of the points P, Q and R.

52. Find the area of ΔABC with $A(1, -4)$ and the mid points of sides through A being $(2, -1)$ and $(0, -1)$.

53. The points $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of ΔABC.

(i) The median from A meets BC at D. Find the coordinates of the point D.

(ii) Find the coordinates of the point P on AD such that $AP : PD = 2 : 1$.

(iii) Find the coordinates of point Q and R on medians BE and CF, respectively such that $BQ : QE = 2 : 1$ and $CR : RF = 2 : 1$.

(iv) What are the coordinates of the centroid of the ΔABC?

54. If A(-3, 5), B(-2, -7), C(1, -8) and D(6, 3) are the vertices of a quadrilateral ABCD, find its area.

55. A boy standing on a horizontal plane finds a bird flying at a distance of 100 mt. from him at an elevation of 30°. A girl standing on the roof of 20 mt high building. Find the angle of elevation of the same bird to be 45°. Both the boy and the girl are on opposite side of the bird. Find the distance of the bird from girl.

56. If the angle of elevation of a cloud from a point h meter above the lake is x and the angle of depression of its reflection in the lake is β. Prove that the height of the clould is $h\left[\frac{\tan\beta + \tan x}{\tan\beta - \tan x}\right]$ mt.

57. A man in a boat, rowing away from a light house 100 mt high takes 2 mins to change the angle of elevation of the top of the light house from 60° to 30°. Find the speed of the boat in meters.

58. A ladder rests against a vertical wall at an inclination x to the horizontal. Its foot is pulled away from the wall through a distance p so that its upper end slides a distance q down the wall and then the ladder makes an angle β to the horizontal. Show that

$$\frac{p}{q} = \frac{\cos\beta - \cos x}{\sin x - \sin\beta}$$

59. If the Ratio of the length of a pole and its shadow is 1 : 1, find the angle of elevation of the sun.

60. From a window h mt high above the ground of a house in a street, the angles of elevation & depression of the top and the foot of another house on the opposite side of the street are θ and ϕ respectively. Show that the height of the opposite house is h $(1 + \tan\theta * \cot\phi)$.

61. From an aeroplane vertically above a straight horizontal plane, the angles of depression of two consecutive Km. stone on the opposite sides of the aeroplane are found to be α and β. Show that the height of aeroplane is $\frac{\tan\alpha \cdot \tan\beta}{\tan\alpha + \tan\beta}$

62. On a horizontal plane, there is a vertical tower with a flag pole on the top of the tower. At a point 9 mt away from the foot of the tower, the angles of elevation of the top and bottom of the flag pole are 60° and 30° respectively. Find the height of the tower and the flag pole.

63. A bicycle wheel makes 500 revolutions in moving 11 Km. Find the diameter of wheel.

64. In the adjoining fig., ABCD is a Rectangle with AB = 14 cm and BC = 7 cm. Taking DC, BC and AD three semicircles are drawn. Find the area of non-shaded region.

65. In the adjoining figure, ABC is a triangle right-angled at A. Find the area of the shaded region if AB = 6 cm, BC = 10 cm and O is the centre of incircle of ΔABC.

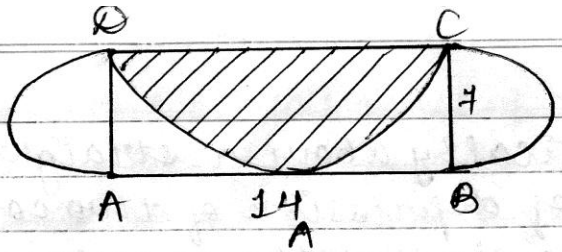
66. In a single throw of a pair of different dice, what is the probability of getting (i) a prime no. on each die (ii) a total of 9 or 11.

67. All of the black face cards are removed from a pack of 52 playing cards. The remaining cards are mixed then a card is drawn randomly. Find the probability of (a) getting a face card (b) getting a red card (c) getting a black card (d) getting a jack

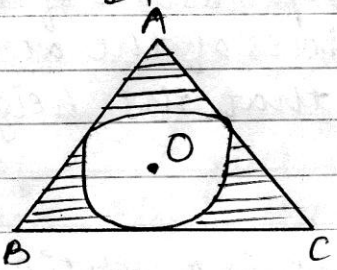
68. A solid ball is exactly fitted inside the cubical box of side 2a. Find the volume of the ball.

69. Find the mean of first n natural numbers.

64.



65.



70. A piece of wire 11 cm long is bent into the form of an arc of a circle subtending an angle of 45° at its centre. Find the Radius of the circle.

71. The length of a cinema hall is 20 m and its width is 16 m. The sum of the areas of its floor & flat roof is equal to the surface area of its four walls. Find the height of the wall.

72. An integer is chosen between 0 to 155. What is the probability that the no. is
(a) A prime no. divisible by 3.
(b) Multiple of 13

73. A letter is chosen at random from the letters of the words "ASSASSINATION". Find the probability that the letter chosen is (i) a vowel (ii) A consonants

74. Find the unknown entries a, b, c, d, e, f in the following table :

Heights (cm)	Frequency	cumulative frequency
150-155	20	a
155-160	18	b
160-165	c	59
165-170	24	d
170-175	e	94
175-180	6	f

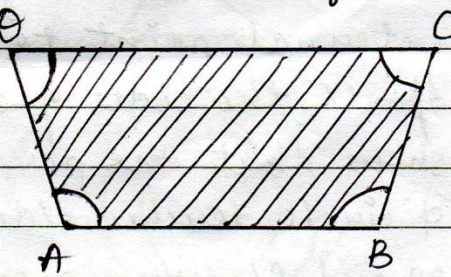
Total - 100

75. If the median of the following frequency distribution table is 28.5, find the missing frequencies.

Class-Interval	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	f_1	20	15	f_2	5	60

76. A Right-circular cone is divided into 3 parts by trisecting its height by two planes drawn parallel to its base. Show that the volumes of three parts starting from the top are in the ratio 1:7:19.

77. In the adjoining fig., ABCD is a trapezium with AB || DC. AB = 18 cm, DC = 32 cm. Distance b/w AB & DC is 14 cm. If areas of equal radii is 7 cm taking A, B, C, D as centres have been drawn, find the area of shaded region.



78. Water is flowing at the rate of 15 Km/hr through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in pond rise by 21 cm?

79. From a circular canvas of diameter 56 m, a sector of 270° was cut and a conical tent was formed by joining the straight ends of the piece. Find the volume of the tent.

80. A solid cone of radius 'r' and height 'h' is placed over a solid cylinder having same base and same height as that of a cone. Prove that the total surface area of the combined solid is $r\pi\left[\sqrt{r^2+h^2}+3r+2h\right]$

81. In a game the entry fee is ₹ 20. This game consists of tossing a coin 3 times. If one or two tail show entry fee is returned. If 3 heads come up then the double the entry fee is paid, otherwise you will lose. For tossing a coin 3 times, find the probability that one person :-

(a) lose the entry fee

(b) get ₹ 40

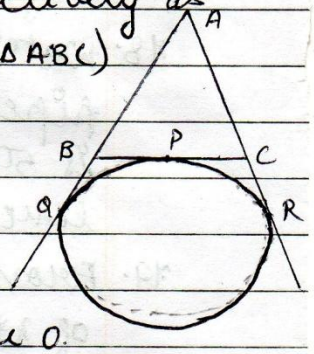
(c) just get ₹ 20

82. 500 persons are taking dip into a cuboidal pond which is 80 m long and 50 m broad. What is the rise in water level in the pond if the average displacement of the water by a person is $0.04 m^3$.

83. Prove that the lengths of tangents drawn from an external point to a circle are equal.

84. If all the sides of a parallelogram touches a circle show that the parallelogram is a rhombus.

85. A circle touches sides BC of a $\triangle ABC$ at P and touches AB and AC when produced at Q and R respectively as shown in fig. show that $AQ = \frac{1}{2}$ (Perimeter of $\triangle ABC$)

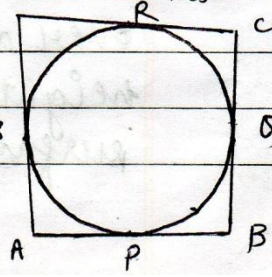


86. Prove that the tangents at the extremities chord make equal angles with the chord.

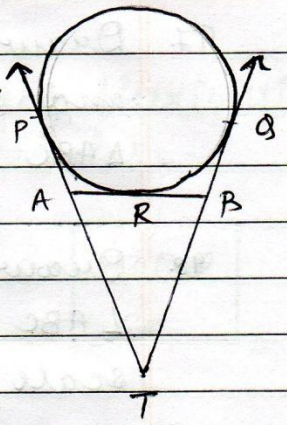
87. PQR is a right angled triangle with PQ = 12 cm and QR = 5 cm. A circle with centre O and radius x is incribed in $\triangle PQR$. Find the value of x.

88. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

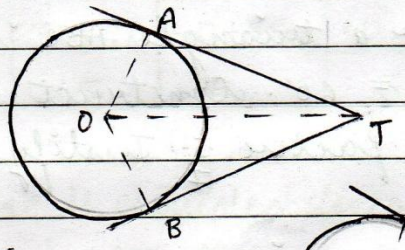
89. In fig., a circle touches all the four sides of a quad. ABCD with AB = 6 cm, BC = 7 cm and CD = 4 cm. find AD.



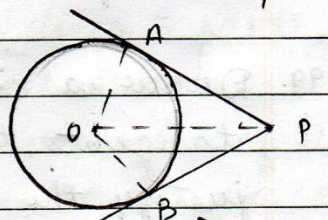
90. TP and TQ are tangents from T to the circle with centre O and R is any point on the circle. If AB is a tangent to the circle at R. prove that TA + AR = TB + BR.



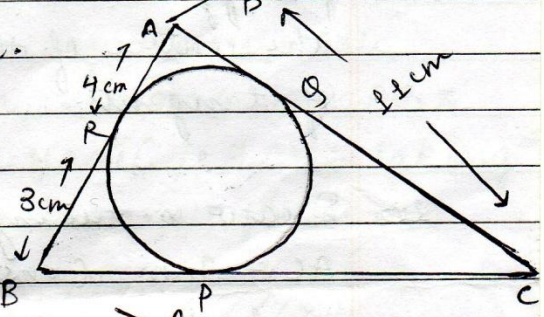
91. In fig. If ∠ATO = 40° find ∠AOB.



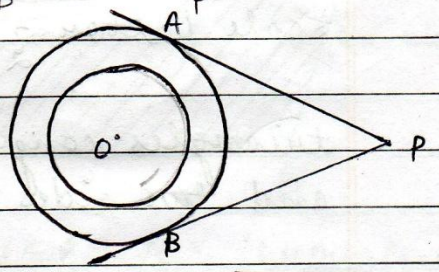
92. In fig. OP is equal to diameter. Prove that ABP is an equilateral triangle



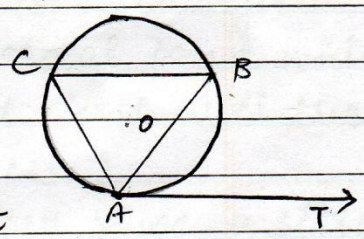
93. ΔABC is circumscribing a circle. Find the length of BC.



94. Radius of two circles are 5cm and 3cm from external point P. Tangent PA and PB are drawn to these circles if AP = 12cm. find the length of BP.

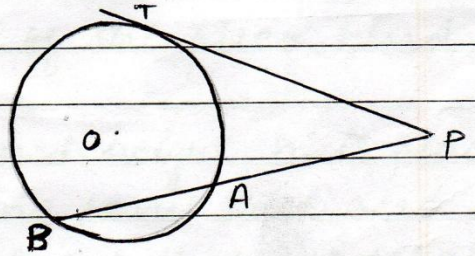


95. ΔABC inscribed in a circle with centre O. AT is the tangent at A. Show that ∠BAT = ∠ACB.



96. From an external point P, a tangent PT and a line segment PAB is drawn to a circle with centre O. Prove that

$$PT^2 = PA \cdot PB$$



97. Draw an isosceles triangle ABC in which AB = BC = 6 cm and BC = 5 cm. Construct a triangle PQR similar to ΔABC in which PQ = 8 cm. Also justify the construction.

98. Draw a triangle ABC in which AB = 5 cm, BC = 6 cm and ∠ABC = 60°. Construct a triangle similar to ΔABC with scale factor $\frac{5}{7}$. Justify the construction.

99. Draw a circle of radius 4 cm. Construct a pair of tangents to it, the angle between which is 60°. Also justify the construction. Measure the distance between the centre of the circle and the point of intersection of tangents.

100. Draw a triangle ABC in which AB = 4 cm, BC = 6 cm and AC = 9 cm. Construct a triangle similar to ΔABC with scale factor $\frac{3}{2}$. Justify the construction. Are the two triangles congruent? Note that all the three angles and two sides of the two triangles are equal.

101. If mode = 80 and mean = 110. then find the median.

102. The mean of marks scored by 100 students was found to be 40. Later on it was discovered that a score of 53 was misread as 83. Find the correct mean.

103. Find the missing value of p for the following distribution whose mean is 12.50.

x	5	8	10	12	p	20	25
y	2	5	8	22	7	4	2

104. Find the mean of following distribution by step-deviation method.

Class	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	5	6	8	12	6	3

105. The mean of the following distribution is 62.8. find f_1 and f_2.

Class	0-20	20-40	40-60	60-80	80-100	100-120	Total
Frequency	5	F_1	10	F_2	7	8	50

106. If the median of the following is 46. Find the value of x and y.

C.I.	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total
Frequency	12	30	x	65	y	25	18	230

107. Find the value of mode of following distribution :-

Daily Wages	31-36	37-42	43-48	49-54	55-60	61-66
No. of workers	6	12	20	15	9	4

108. Draw 'less than Ogive' and 'more than Ogive' for the following distribution and hence find its median.

Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	8	12	24	6	10	15	25

109. Find the value of f_1 from the following data if the mode is 65.

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	6	8	f_1	f_2	6	5

Where frequency 6, 8, f_1 and f_2 are in ascending order.

110. Calculate the average daily income (in ₹) of the following data about men working in a company.

Daily income (in ₹)	< 100	< 200	< 300	< 400	< 500
No. of men	12	28	34	41	50