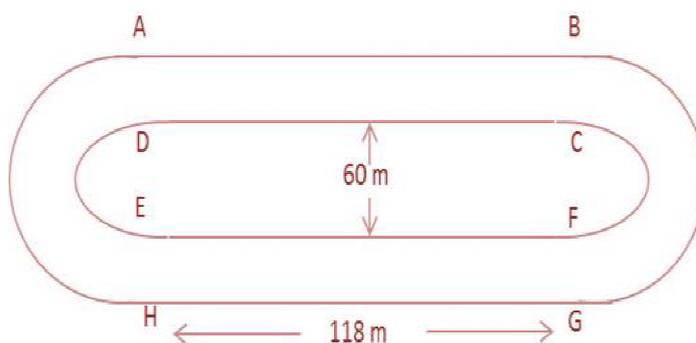
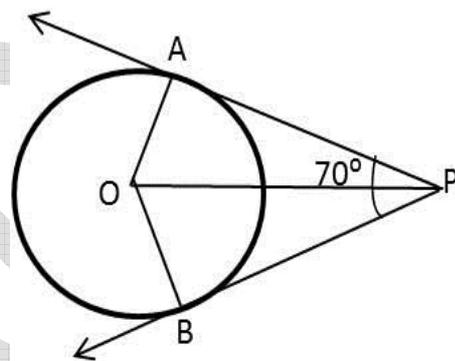


ARMY PUBLIC SCHOOL, DAGSHAI

Class – X (MATHEMATICS) – Winter Break Assignment

Note: Dear students solve the given questions in separate thin note book with understanding.

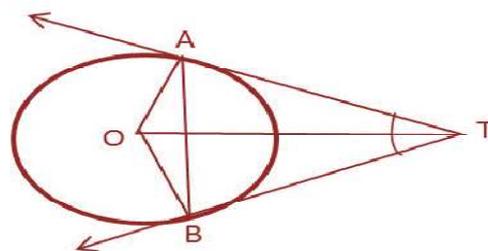
- The surface area of a metallic sphere is  $616 \text{ cm}^2$ . It is melted and recast into a cone of height 28 cm. Find diameter of the base of cone so formed.
- Find the length of wire of diameter  $\frac{3}{5} \text{ cm}$  that can be drawn from a solid sphere of radius 12 cm  
(Write the answer in m)
- In the adjoining figure, If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of  $70^\circ$ , then find  $\angle POA$ .
- Determine the ratio in which the line segment joining the points A (1, -1) and B (4, 9) is divided by the line  $3x - 2y + 4 = 0$ .
- Sum of the areas of two squares is  $640 \text{ m}^2$ . If the difference of their perimeters is 64 m, find the sides of the two squares.
- A lot consists of 52 laptops of which 46 are good, 4 have only minor defects and 2 have major defects. Smith will buy a phone if it is good but the trader will only buy it only if it has no major defect. One phone is selected at random, from the lot. Find the probability that
  - it is acceptable to Smith
  - it is acceptable to the trader
  - it is acceptable neither to Smith nor to the trader
- In a nursery, 37 plants have been arranged in the first row, 35 in the second, 33 in the third and so on. If there are 5 plants in last row, how many plants are there in the nursery?
- An electrician needs to reach a point 1.6 m below the top of the pole of height 8 m to undertake the repair work. If he has to incline the ladder at 60 degrees angle to the horizontal, what should be the length of the ladder to enable him to reach the required position?
- A circus tent is cylindrical to a height of 3 m and conical above it. If its base radius is 52.5 m and the slant height of the conical portion is 53 m, find the area of canvas needed to make the tent.
- Draw a line segment of 8 cm and then divide it internally in the ratio 3:2.
- If the co-ordinates of the mid points of sides AB, BC and CA of  $\triangle ABC$  are (1, 1), (2, -3) and (3, 4) respectively, then find the co-ordinates of the centroid.
- A park's jogging track has its left and right ends as semi-circles. The distance between the two inner parallel line segments is 60 m



and the length of the straight part of the track is 118 m. If the track is 12 m wide, find

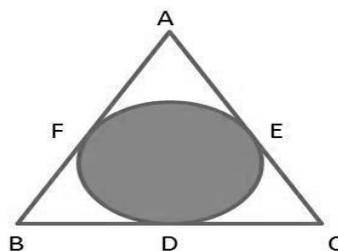
- i) the length of the track along its inner edge.
- ii) the area of the track.

13. In the adjoining figure, If TA and TB are two tangents drawn to a circle with centre O from an external point T, prove that  $\angle ATB = 2\angle OAB$ .



14. In the adjoining figure, D, E, and F are the points where the incircle of the triangle ABC touches the sides BC, CA, and AB respectively. Show that:-

$$AF + BD + CE = AE + BF + CD = \frac{3}{2} (\text{perimeter of triangle ABC})$$



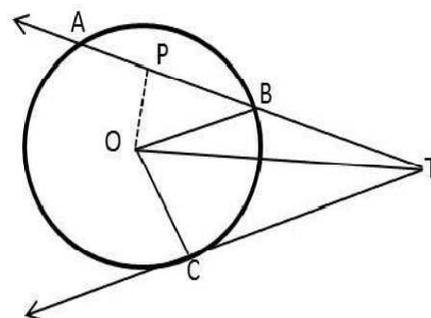
15. The sum of two numbers is 20 and the sum of their reciprocals is  $\frac{5}{24}$ . Find the numbers

16. From a solid cylinder of height  $h = 16$  cm and diameter  $d = 8$  cm, a conical cavity of same height and same diameter is carved out. Find the volume and total surface area of the remaining solid.

17. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why?

- i) The amount of air present in a balloon when  $\frac{1}{5}$ th of the air remaining in the balloon is removed by a vacuum pump at a time.
- ii) The cost of digging a well after every meter of digging, if it costs Rs 125 for the first meter and increases by Rs. 65 for every subsequent meter.

18. In the adjoining figure, TBA is a secant to the circle with center O intersecting the circle at A and B. TC is a tangent segment, prove that  $TA \times TB = TC^2$



19. Stacy's house has an overhead tank in the shape of a cylinder which is filled by pumping water from a cuboidal sump. The sump has dimensions  $1.57 \text{ m} \times 1.44 \text{ m} \times 95 \text{ cm}$ . the overhead tank has its radius 60 cm and height 95 cm. Find the height of the water left in the sump after the overhead tank has been completely filled with water from the sump which had been full. Compare the capacity of the tank with that of the sump. (Use pi as 3.14 )

20. From a point on the ground 60 m away from the foot of a tower, the angle of elevation of the top of the tower is  $30^\circ$ . The angle of elevation to the top of a water tank (on the top of the

tower) is  $45^\circ$ . Find the (i) height of the tower (ii) the depth of the tank.

21. Draw two concentric circles of radii 3 cm and 5 cm. Construct a tangent to smaller circle from a point on the larger circle. Also measure its length.
22. Using Euclid's lemma, show that the cube of any positive integer is of the form  $9q$  or  $9q+1$  or  $9q+8$  for integer  $q$ .
23. Verify the relationship between the zeroes and coefficients for  $4x^2 + 12x + 9$ .
24. If  $\alpha, \beta$  are the zeros of the polynomial  $6y^2 - 7y + 2$ , find a quadratic polynomial whose zeros are  $1/\alpha$  and  $1/\beta$ .
25. On dividing the polynomial  $4x^4 - 5x^3 - 39x^2 - 46x - 2$  by the polynomial  $g(x)$ , the quotient is  $5x - 3$  and remainder is  $2x + 4$ . Find the polynomial  $g(x)$ .
26. Find the values of  $a$  and  $b$  for which the following system of linear equations has infinite number of solutions:-  
 $2x - 3y = 7$  and  $(a + b)x - (a + b - 3)y = 4a + b$
27. Solve the following system of linear equations graphically:  $3x + y - 11 = 0$  and  $x - y - 1 = 0$ . Shade the region bounded by these lines and  $y$ -axis.
28. If  $\tan 2A = \cot (A - 180)$ , where  $2A$  is an acute angle, find the value of  $A$ .
29. If  $4\tan A = 3$ , evaluate  $((4\sin A - \cos A + 1)/(4\sin A + \cos A - 1))$
30. Prove that the area of an equilateral triangle described on one side of the square is equal to half the area of the equilateral triangle described on one of its diagonal.
31. If the area of two similar triangles is equal, prove that they are congruent
32. Find the value of  $p$  for which the points  $(-5,1)$ ,  $(1,p)$  and  $(4,-2)$  are collinear.
33. A jar contains 54 marbles each of which blue, green or white. The probability of selecting a blue marble at random from the jar is  $1/3$  and the probability of selecting a green marble at random is  $4/9$ . How many white marbles does the jar contain?
34. Find the mode of the following distribution table.

Class-interval:-	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency :-	5	8	7	12	28	20	10	10
35. A boat goes 30Km upstream and 44Km downstream in 10 hours. In 13hours, it can go 40Km upstream and 55 Km downstream. Determine the speed of the boat in still water.
36. Find all the zeroes of the polynomial  $(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ , if two of its zeroes are  $(2 + \sqrt{3})$  and  $(2 - \sqrt{3})$ .
37. Prove that  $\sqrt{7}$  is an irrational number.
38. In an equilateral triangle  $\triangle ABC$ ,  $D$  is a point on side  $BC$  such that  $BD = 1/3 BC$ .  
Prove that  $9 (AD)^2 = 7 (AB)^2$
39. State and prove Thales Theorem with well labeled figure.
40. If  $A(-2, 1)$ ,  $B(a, 0)$ ,  $C(4, b)$  and  $D(1, 2)$  are the vertices of a parallelogram  $ABCD$ , find the values of  $a$  and  $b$ .  
Hence find the lengths of its sides.

41. If A(-5, 7), B(-4, -5), C(-1, -6) and D(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD.

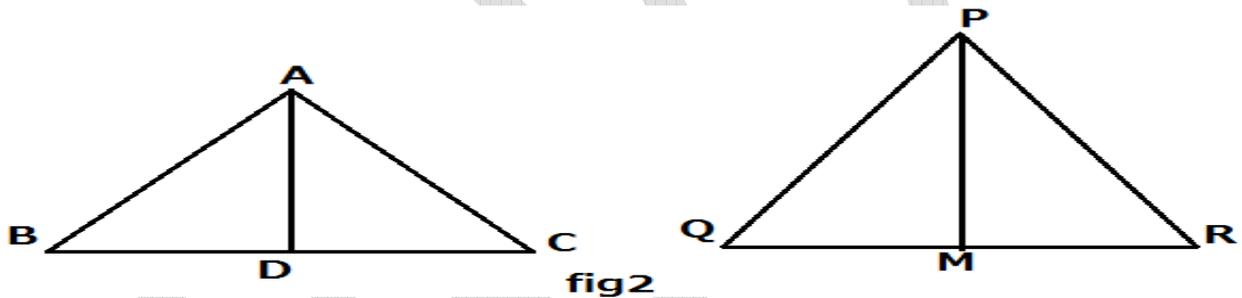
42. Prove that:-  $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}$

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

44. For the following frequency distribution, draw both the types of cumulative frequency curves on the same graph paper and then determine the median.

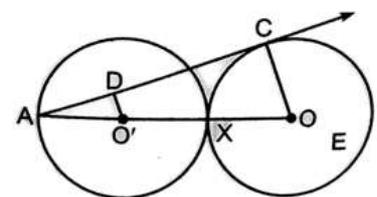
Marks Obtained	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Number of students	4	8	12	6	6

45. In fig2, sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of triangle PQR. Prove that  $\Delta ABC \sim \Delta PQR$ .



46. The houses in a row are numbered consecutively from 1 to 49. Show that there exists a value of X such that sum of numbers of houses preceding the house numbered X is equal to sum of the number of houses following X. Find the value of X.

47. In fig.7, two equal circles, with centre O and Q, touch each other at X. OQ produced meets the circle with centre Q at A. AC is tangent to the circle with centre O, at point C. QD is perpendicular to AC. Find the value of DQ/CO



48. If the ratio of the sum of first n terms of two AP's is

49.  $(7n + 1) : (4n + 27)$ , find the ratio of their mth terms.

50. Solve for x :-  $\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}, x \neq 1, 2, 3$

Revise the complete syllabus from NCERT BOOK including optional exercises.