DISTRICT INSTITUTE OF EDUCATION AND TRAINING THIRUVANANTHAPURAM

EVALUATION TOOL FOR CLASS X – 2022 FEBRUARY

MATHEMATICS

Time : 2½ Hr. Total Score : 80

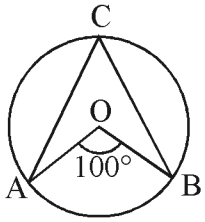
General Instructions:

- 15 minute is given as cool-off time. This time is to be used to read and understand the questions well.
- If a question contains choices, the required number of questions need to be answered.
- No need to be simplify irrationals like $\sqrt{2}$, $\sqrt{3}$, π etc using approximations unless you are asked to do so.

PART I

A. Answer any 4 questions from 1 to 6. Each carries 1 score. (4 × 1 = 4)

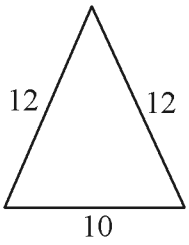
1. 7, 13, 19, ... is an arithmetic sequence. What is its common difference?
2. Write the polynomial $x^2 - 16$ as the product of two first degree polynomials.
3. The volume of a sphere is 100 cubic centimetres. What is the volume of a sphere having radius twice that of the given sphere?
4. In the figure, 'O' is the centre of the circle. $\angle AOB = 100°$. What is the measure of $\angle ACB$?



5. A circle with centre at the origin passes through the point (3, 4). What is the radius of the circle?
6. A box contains 7 black beads and 5 white beads. A bead is taken from the box without looking, what is the probability that the bead being black?

B. Answer all questions from 7 to 10. Choose the correct answer from the bracket. Each carries 1 score. (4×1=4)

7. If $\sin x = \cos x$, then what is x?
   (30°, 45°, 60°, 90°)
8. The sides of one lateral face of a square pyramid are 10 cm, 12cm and 12 cm. What is the base area of this square pyramid in square centimetres?



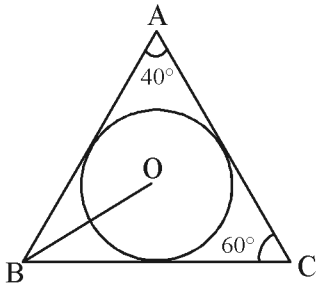
(144, 100, 120, 40)

9. $x + y = 6$ is the equation of a line. What are the coordinates of the point where this line cut y-axis.

   [(6, 0), (3, 3), (0, 6), (0, 0)]

10. In the figure 'O' is the centre of the incircle of triangle ABC.

    $\angle BAC = 40°$. $\angle ACB = 60°$. What is the measure of $\angle OBC$?



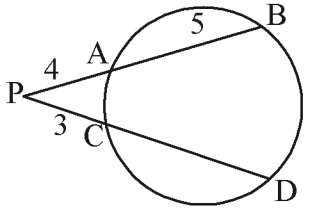
(40°, 80°, 50°, 60°)

PART II

A. Answer any 3 questions from 11 to 15. 2 score each. **(3×2=6)**

11. In the figure, the chords AB and CD are extended to meet at P.

    PA = 4 centimetres, AB = 5 centimetres, PC = 3 centimetres.



    a. What is the length of PB?

    b. Find the length of CD.

12. 5^{th} term of an arithmetic sequence is 17 and its 9^{th} term is 29, then

    a. What is the common difference?

    b. Find the first term.

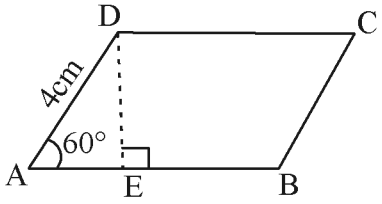
13. The weights (in kg) of some children in a club are given below.

    30, 46, 42, 36, 38, 44, 34, 40, 32

    a. What is the mean weight?

    b. What is the median weight?

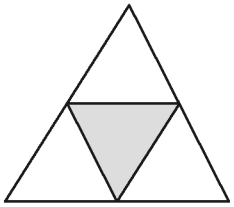
14. In parallelogram ABCD, AB = 10 centimetres, AD = 4 centimetres, $\angle A = 60°$



    a. Calculate the length of DE.

    b. Find out the area of the parallelogram ABCD.

15. In the figure, the shaded triangle is formed by joining the midpoints of the sides of the large triangle. Area of the large triangle is 60 square centimetres.



a. What is the area of the shaded triangle?

b. If we put a dot in the figure, without looking. What is the probability that the dot would be with in the shaded triangle?

B. Answer any 2 questions from 16 to 18. 2 score each. (2×2=4)

16. The area of a triangle is 45 square centimetres and its perimeter is 30 centimetres. What is its inradius? **2**

17. The sum of first 'n' terms of an arithmetic sequence is $4n^2 + 3n$.

a. What is the first term of the sequence?

b. Calculate the sum of first 10 terms of the sequence. **2**

18. The points (1, 5) and (3, 9) are joined to form a line.

a. What is the slope of the line?

b. Find the equation of the line.

PART III

A. Answer any 3 questions from 19 to 23. 4 score each. (3×4=12)

19. Draw a circle of radius 3 centimeters. Draw a triangle with two angles 50°, 70° and all its vertices are on this circle.

20. Perimeter of a rectangle is 32 centimetres and its area is 60 square centimetres.

a. If the length of the rectangle is taken as x centimetres. then what is its breadth?

b. Form a second degree equation and find out length and breadth of the rectangle.

21. The end points of a diameter of a circle are P(2,4) and Q(8,4).

a. What are the coordinates of the centre of the circle?

b. What is the radius of the circle?

c. What are the coordinates of the endpoints of the diameter perpendicular to PQ?

22. A circular metal sheet is cut into three equal sectors and a cone is made by rolling up one of the sectors. Radius of the circular sheet is 12 centimeters.

a. What is the slant height of the cone?

b. What is the central angle of the sector?

c. What is the base radius of the cone?

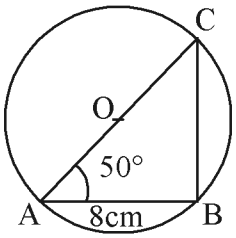
d. Find the curved surface area of the cone.

23. Draw a circle of radius 3cm. Mark a point P at a distance 8 centimeters from its centre. Draw tangents PA and PB to this circle and measure them.

B. Answer any one from questions 24 and 25. 4 score each. **(1×4=4)**

24. In the figure AC is the diameter of the circle with centre 'O'.

$\angle CAB = 50°$, AB = 8 centimetres.



a. What is the measure of $\angle ABC$?

b. Find the measure of $\angle ACB$.

c. Find the length of the diameter.

(sin 40 = 0.64, sin 50 = 0.77)

25. A box contains 6 black balls and 9 white balls. Another box contains 5 black balls and 4 white balls. A ball is taken from each box.

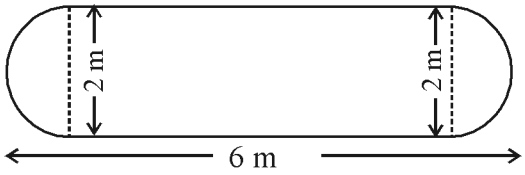
a. What is the probability of both being white?

b. What is the probability of one being black and one white?

PART IV

A. Answer any 3 questions from 26 to 29. 6 score each. **(3×6=18)**

26.



The shape of a petrol tank is shown in the figure. It has two hemispheres attached at two ends of a cylinder. Total length of the tank is 6 meters and the common diameter is 2 meters.

a. What is the length of the cylindrical part?

b. What is the volume of the cylindrical part?

c. What is the volume of one hemispherical part?

d. How many litres of petrol does the tank contain?

27. A circle is drawn with origin as centre and radius 5 units..

a. Write the coordinates of the points where the circle cut the x axis.

b. Write the coordinates of the points where the circle cut the y axis.

c. What is the y coordinate of a point on the circle having x coordinate 3?

28. A person standing at the bank of a river sees the top of a tree at the opposite side of the river at an elevation of 60°. Stepping 30 metres back, he sees it at an elevation of 30°.
    a. Draw a rough figure using the given data.
    b. What is the width of the river?
    c. Find the height of the tree.
29. a. Draw a rectangle with length 6 centimetres and breadth 4 centimetres.
    b. Draw a square of the same area.

B. Answer any 2 questions from 30 to 32. 6 score each. (2 × 6 = 12)

30. The product of two consecutive multiples of 3 is 270.
    a. If the smaller multiple is taken as 'x'. What is the next multiple of 3?
    b. Form a second degree equation in x, using the given data.
    c. What are the numbers?
31. If $p(x) = x^2 - 15x + 26$
    a. What number is $p(2)$?
    b. Write $p(x)$ as the product of two first degree polynomials.
    c. What are the solutions of the equation, $p(x) = 0$?
32. The table below shows the children in a class sorted according to their scores in mathematics examination.

Scores	Number of students
0 - 10	5
10 - 20	11
20 - 30	10
30 - 40	13
40 - 50	6

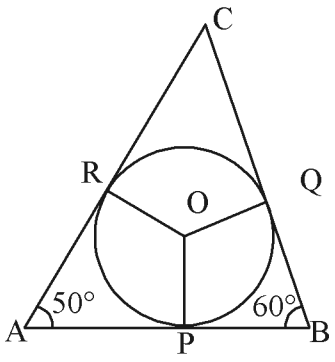
    a. If the students are arranged in ascending order of scores, the score of the student at what position is taken as the median?
    b. What is assumed to be the score of the student at the 17^{th} position?
    c. Find the median score.

PART V

Answer any two questions from 33 to 35. Each carries 8 scores. (2×8=16)

33. a. Which is the first three digit multiple of 3?
    b. Write the sequence of three digit numbers which are multiples of 3. How many numbers are there in this sequence?
    c. Write the sequence of three digit numbers leaving a remainder 1 on division by 3. Find the sum of all numbers in this sequence.

34. a. In the figure, the centre of the circle is 'O'. The sides of



triangle ABC are tangents of the circle at the points P, Q and R. $\angle A = 50°$, $\angle B = 60°$. Find the measures of $\angle APO$, $\angle POR$, $\angle POQ$ and $\angle QOR$.

b. Draw a circle of radius 2.5 centimetres. Draw a triangle with two angles 50°, 60° and all its sides touching the circle.

35. The sides of the rectangle ABCD is parallel to the axes. The coordinates of the vertices of this rectangle are A(1, 2), B(x, 2), C(5, 4), D(1, y)

a. Find x, y.

b. Find the coordinates of the midpoints of the sides of this rectangle.

c. Prove that the quadrilateral formed by joining these midpoints is a rhombus.