S 1931

Sl. No.

SSLC EXAMINATION, MARCH - 2024

MATHEMATICS

(English)

Time : 2½ Hours

Total Score : 80

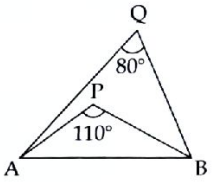
Instructions :

- Read each question carefully before answering.
- Give explanations wherever necessary.
- First **15** minutes is cool-off time. You may use this time to read the questions and plan your answers.
- No need to simplify irrationals like $\sqrt{2}$, $\sqrt{3}$, π etc., using approximations unless you are asked to do so.

Answer any three questions from 1 to 4. Each question carries 2 scores. Score 3x2=6

1. See the figure.

   If a circle is drawn with AB as diameter, what are the positions of the points P and Q with respect to this circle.



2. The haemoglobin levels in grams per decilitres of seven students are given below :

   12.9, 12.0, 12.6, 12.5, 14.1, 13.7, 13.4

   Find the median haemoglobin level.

3. The sequence of perimeters of squares of sides 1 centimetre, 2 centimetres, 3 centimetres and so on the form an arithmetic sequence.

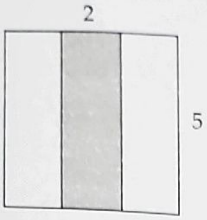
   (a) Write the sequence.

   (b) What is the common difference ?

P.T.O.

Score

4 A rectangular portion is shaded in a square of side 5 centimetres as shown in the figure. A dot is put inside the square without looking. Find the probability of the dot to be in the shaded region.



Answer any four questions from 5 to 10. Each question carries 3 scores. 4x3=12

5 Draw the coordinate axes and mark the points A(0, 0), B(2, 3) and C(4, 0). What is the perpendicular distance from B to AC ?

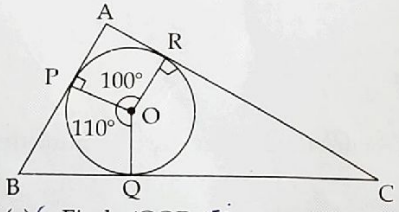
6. Ajay is 10 years older than Renuka. The product of their ages is 144.
   (a) Taking the age of Renuka as x, what is the age of Ajay in terms of x ?
   (b) Find their ages.

7. Draw a rectangle of sides 4 centimetres and 3 centimetres. Draw a square of the same area.

8. Prove that the points (3, 5), (6, 7) and (9, 9) are on the same line.

9 The n^{th} term of an arithmetic sequence is $4n+1$.
   (a) Write the common difference of the sequence.
   (b) Write the first term of the sequence.
   (c) What is the remainder obtained when the terms of this sequence is divided by 4 ?

10. AB, BC and CA are tangents to the circle centred at O, touching the circle at P, Q and R respectively, as shown in the figure.



(a) Find ∠QOR.
(b) Find the angles of triangle ABC.

Answer any eight questions from 11 to 21. Each question carries 4 scores. Score 8×4=32

11. Numbers from 1 to 50 are written on slips of paper and put in a box. Without looking, a slip is to be drawn from it.

(a) What is the probability that it is a multiple of 4 ?

(b) What is the probability that it is a multiple of 6 ?

(c) What is the probability that it is a multiple of 4 and 6 ?

12. Draw a circle of radius 2.5 centimetres and mark a point 6 centimetres away from the centre of the circle.

(a) How many tangents can be drawn to the circle from this point ?

(b) Draw the tangents to the circle from this point.

13. Consider the arithmetic sequence 8, 14, 20, . . .

(a) Is 25 a term of this sequence ?

(b) Check if 144 is a term of this sequence ?

(c) Prove that there are no perfect squares in this sequence.

14. A(2, 3), B(8, 5) and C(4, 7) are the coordinates of the vertices of triangle ABC.

P is the midpoint of AB and Q is the midpoint of BC.

(a) Find the coordinates of P and Q.

(b) Find the distance between P and Q.

15. From a circle of radius 15 centimetres, a sector of central angle 120° is cut out and rolled up to make a cone.

(a) What is the slant height of the cone ?

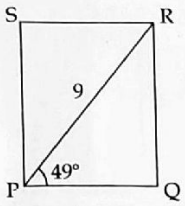
(b) What is the base radius of the cone ?

(c) Calculate the curved surface area of the cone.

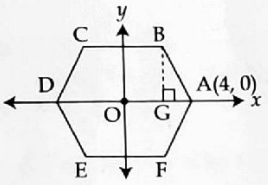
Score

16. The diagonal of a rectangle is 9 centimetres and it makes an angle 49° with one side. Find the length of the sides of the rectangle.

$(\sin 49° = 0.75, \cos 49° = 0.66)$



17. ABCDEF is a regular hexagon with origin as centre. The coordinates of the point A is (4, 0).



(a) What are the coordinates of the point D ?

(b) Find the length of BG.

(c) Write the coordinates of the points B and E.

18. The square of a number is equal to 12 added to the number. Find the number.

19. Consider the polynomial $p(x) = x^2 - 5x + 6$.

(a) Write $p(x)$ as the product of two first degree polynomials.

(b) Find the solutions of the equation $p(x) = 0$.

20. Diameters of two hemispheres are in the ratio 5 : 3.

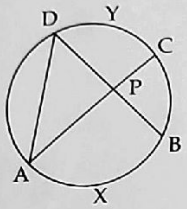
(a) Write the ratio of their radii.

(b) Find the ratio of their surface areas.

(c) If the surface area of the first hemisphere is 100 square centimetres, what is the surface area of the other ?

Score

21. The central angle of the arc AXB is 110° and the central angle of the arc CYD is 80°. Find the angles of triangle APD.



Answer any six questions from 22 to 29. Each question carries 5 scores. **6x5=30**

22. Draw a triangle of sides 5 centimetres, 6 centimetres and 7 centimetres. Draw the incircle of the triangle. Measure the radius of the incircle.

23. The ages of the workers of an organization are arranged as follows :

Age	Number of workers
20 - 30	9
30 - 40	10
40 - 50	8
50 - 60	5
60 - 70	1

(a) If the workers are arranged in order of their wages, the age of which worker is taken as the median age ?

(b) Find the median age.

24. From a point on the ground at a distance of 100 metres away from a tower, the top of the tower is seen at an angle of elevation 45°. From the top of the tower, a car is seen on the opposite side of the tower at an angle of depression 25°.

(a) Draw a rough figure showing the details given in the question.

(b) Find the height of the tower.

(c) What is the distance of the car from the tower ?

(sin 65° = 0.91, cos 65° = 0.42, tan 65° = 2.14)

25. The third term of an arithmetic sequence is 26 and its eighth term is 61.

(a) Find the common difference of the sequence.

(b) What is its first term ?

(c) Write the algebraic form of the sequence.

(d) Find the sum of the first 15 terms of the sequence.

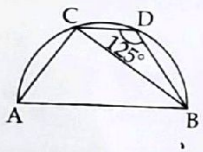
26 A vessel (without lid) in the shape of a square pyramid, made from a metallic sheet is of base perimeter 80 centimetres and slant height 26 centimetres.

(a) How many square centimetres of the metallic sheet was needed to make the vessel ?

(b) Calculate the height of the vessel.

(c) What is the capacity of the vessel in litres ?

27. C and D are points on a semicircle with AB as diameter. $\angle BDC = 125°$. CD is parallel to AB. Find the measures of :



(a) $\angle BAC$

(b) $\angle ACB$

(c) $\angle ACD$

(d) $\angle ABD$

28. The equation of a line is $2x - y - 2 = 0$.

(a) Check whether the point $(3, 4)$ is on this line.

(b) Find the coordinates of the points where this line cuts the x and y axes.

Score

29. Consider the sequence : 2, 6, 18, 54, . . .

First term = 2

Second term = $2 \times 3 = 6$

Third term = $6 \times 3 = 18$

Fourth term = $18 \times 3 = 54$ and so on.

Sequences starting with a non-zero number, and each succeeding term got by multiplying the preceding term by a fixed number except zero, are called **geometric sequences**. The fixed number multiplied is the common ratio of the sequence. Thus, in the geometric sequence 2, 6, 18, 54, . . . the first term is 2 and the common ratio is 3.

(a) The first term of a geometric sequence is 3 and common ratio is 2. Find its second and third terms.

(b) Which of the following is a geometric sequence ?

(i) 2, 4, 6, 8, . . .

(ii) 2, 4, 8, 16, . . .

(iii) 1, 4, 9, 16, . . .

(c) What is the common ratio of the geometric sequence 5, 20, 80, 320, . . . ?

(d) Write the next term of the geometric sequence 3, 9, 27, . . .