

**SAMAGRA SHIKSHA, KERALA**  
**SECOND TERMINAL EVALUATION - 2019**  
**MATHEMATICS - IX**

**E 903**

Time :  $2\frac{1}{2}$  Hours

Score : 80

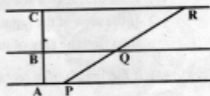
**Instructions**

- Read the instructions before answering the questions
- Give explanations wherever necessary
- Simplifications using approximate values of  $\pi, \sqrt{2}, \sqrt{3}$  need to be done only if specifically asked.
- First 15 minutes time is cool - off time.

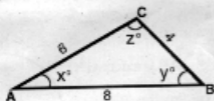
**Answer any 3 Questions from 1 to 4. Each question carries 2 scores. (3 x 2 = 6)**

1. In the figure AP, BQ and CR are three parallel lines, AC = 5 centimetres, PR = 10 centimetres and AB = 2 centimetres.

- (a) What is AB : BC?  
 (b) Find the length of QR.



2. Compare the two triangles given below and find the lengths of QR and PR.

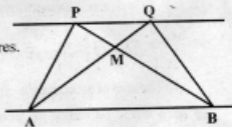


3.  $p(x) = 5x^3 - 7x^2 + 8x + 100$   
 Find  $p(0)$  and  $p(1)$ .

4. Diameter of a circle is 10 centimetres. Find the area of the circle.

**Answer any 5 Questions from 5 to 11. Each question carries 3 scores. (5 x 3 = 15)**

5. In the figure AB and PQ are parallel lines.  
 (a) Area of triangle ABP is 100 square centimetres.  
 Find the area of triangle ABQ.  
 (b) Write another two pairs of triangles with equal area.

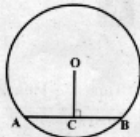


6. (a) Write 3 fractions closer and closer to  $\frac{1}{9}$  and whose denominators are powers of 10.  
 (b) Write the decimal form of  $\sqrt{0.1111\dots}$ .

7. In the figure, AB is the chord of the circle with centre O.

OC is perpendicular to AB.

- (a) If  $AB = 6$  centimetres, then find BC.  
 (b) Prove that perpendicular from the centre of a circle to a chord, bisects the chord.

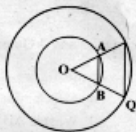


8. Length of a rectangle is 6 centimetres and breadth is 4 centimetres.

- (a) What is the ratio of length and breadth?  
 (b) Draw a rectangle with perimeter 26 centimetres and sides are in the above ratio.

9. In the figure, the radii of circles with centre 'O' are in the ratio 2 : 3.

- (a)  $AB : PQ = \dots\dots\dots$   
 (b) Find the ratio of the areas of triangles.  
 (c) If the area of the small triangle is 24 square centimetres, then find the area of large triangle.



10. (a) If the length of a rectangle having perimeter 20 centimetres is taken as  $x$  and the breadth as  $b(x)$ , then  $b(x) = \dots\dots\dots$

- (b) If the breadth of rectangle having area 24 square centimetres is taken as  $x$  and the length as  $p(x)$ , then  $p(x) = \dots\dots\dots$

- (c) Among  $b(x)$  and  $p(x)$ , which is a polynomial?

- 11 In the figure O is the centre of the circle and AB is a diameter.

$\angle BOC = 60^\circ$ , arc length of BPC is  $20\pi$  centimetres.

- (a) What is  $\angle AOC$ ?  
 (b) What is the arc length of AQC?  
 (c) Find the perimeter of the circle.



**Answer any 7 Questions from 12 to 21. Each question carries 4 scores. ( $7 \times 4 = 28$ )**

12. (a) Which among the following products are natural numbers?

$$(\sqrt{10} \times \sqrt{2}, \sqrt{12} \times \sqrt{3}, \sqrt{10} \times \frac{1}{\sqrt{2}}, \sqrt{12} \times \frac{1}{\sqrt{3}})$$

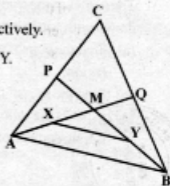
- (b) The area of a rectangle is  $\sqrt{128}$  square metres and its length is 4 metres. Find its breadth.

13. In a circle of radius 13 centimetres, there are two parallel chords of lengths 10 centimetres and 24 centimetres.

- (a) What is the distance from the centre of the circle to the chord of length 10 centimetres?  
 (b) If the chords are in the same side of the centre, then find the distance between them.

- 14 In triangle ABC, P and Q are midpoints of AC and BC respectively. X and Y are midpoints of AM and BM respectively.

- (a) If  $AB = 10$  centimetres, find the lengths of PQ and XY.  
 (b) Prove that  $AX = XM = MQ$ .



- 15 Draw a triangle with perimeter 13 centimetres whose sides are in the ratio 2 : 3 : 4.

- 16 (a)  $p(x) = ax + b$  is a first degree polynomial. Find  $p(1)$ .

- (b) Write a first degree polynomial with  $p(1) = 1$  and  $p(2) = 3$ .

- 17 Perimeter of the regular hexagon in the figure is 24 centimetres.

- (a) What is the radius of the circle?

- (b) Find perimeter of the circle.

- (c) Construct a regular hexagon of perimeter 24 centimetres.

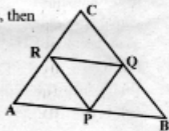


- 18 P, Q and R are midpoints of the sides of the triangle ABC.

- (a) If the area of triangle ABC is 12 square centimetres, then find area of parallelogram APQR.

- (b)  $AB = 6$  centimetres,  $BC = AC = 5$  centimetres.

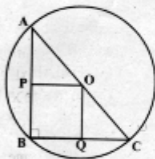
Draw triangle ABC and draw a parallelogram whose area is half the area of the triangle.



- 19 In the right triangle ABC, P and Q are the midpoints of AB and BC respectively. O is the centre of the circle.

- (a) What is the measure of  $\angle APO$ ?

- (b) Prove that triangles APO and CQO are similar.



20. If the length of rectangles having perimeter 50 centimetres is taken as  $x$  and its area as  $a(x)$ , then

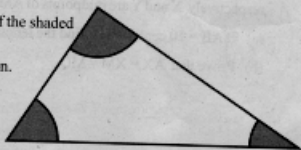
- (a) Write the relationship between  $x$  and  $a(x)$  as an equation.

- (b) Find  $a(10)$  and  $a(15)$ .

- (c) If  $a(7) = a(k)$  and  $k$  is an even number, then what number is  $k$ ?

- 21 The angles of the triangle are in the ratio 2 : 3 : 4. Three arcs of radius 4 centimetres are drawn with vertices as centres.

- (a) Find the sum of central angles of the shaded region.  
 (b) Find the area of the shaded region.  
 What is the ratio of the areas of the shaded sectors?



**Section 5 Questions from 22 to 28. Each question carries 5 scores. (5 x 5 = 25)**

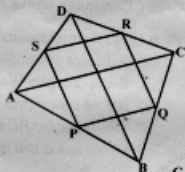
22. Total number of cars and autorickshaws in a garage is 23. The total number of wheels of these vehicles is 81.

- (a) If the number of cars is taken as  $x$ , then what is the total number of wheels of cars?  
 (b) Find the number of cars and autorickshaws.

- 23 Draw an equilateral triangle with side 5 centimetres. Draw its circumcircle and measure its radius.

- 24 In the figure, quadrilateral PQRS is drawn by joining the midpoints of the sides of the quadrilateral ABCD.

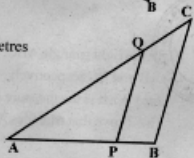
- (a) If  $AC = 10$  centimetres, then find  $PQ$ .  
 (b) Prove that quadrilateral PQRS is a parallelogram.  
 (c) If  $AC = BD$ , what type of quadrilateral is PQRS?



- 25 In the figure,  $PQ$  and  $BC$  are parallel.  $AB = 8$  centimetres and  $PB = 2$  centimetres.

- (a) Find  $AP : AB$ .  
 (b) In triangle  $XYZ$ ,  $XY = 9$  centimetres,  $\angle X = 50^\circ$ ,  $\angle Y = 60^\circ$ . Draw the triangle having

angles same to that of  $XYZ$  and with sides  $\frac{3}{4}$ th of the sides of  $XYZ$ .

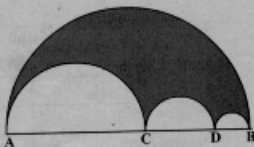


- 26 (a) If length of the side of a square is taken as  $x$  centimetre and its perimeter as  $p(x)$ , then  $p(x) = \dots\dots\dots$   
 (b) If each side of the square with side  $x$  is increased by 2 centimetres, then what is the perimeter of the new square?  
 (c) If each side of the square is increased by 3 centimetres, then the increase in perimeter is  $\dots\dots\dots$

- 27 In the figure, AB is the diameter of the semi circle. Three semi circles with diameters AC, CD and DB are drawn.

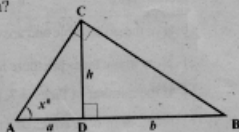
$$AC = 4 \text{ centimetres. } CD = \frac{AC}{2}, \quad DB = \frac{CD}{2}$$

- (a) What is the arc length of semi circle with diameter AC?  
 (b) What is the arc length of semi circle with diameter AB?



- (c) What is the perimeter of the shaded region?
- 28 In triangle ABC,  $\angle ACB = 90^\circ$  and CD is perpendicular to AB.

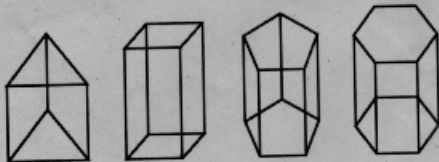
- (a) If  $\angle A = 50^\circ$ , find  $\angle ACD$ .  
 (b) Prove that angles of triangles ACD and BCD are equal.  
 (c) Prove that if the perpendicular from the right angled vertex of a right triangle divides the opposite side into parts of lengths  $a$  and  $b$  and if the length of the perpendicular is  $h$ , then  $h^2 = ab$ .



Read the given passage carefully and write answers to the following questions. Each question carries one score (6 x 1 = 6)

- 29 Look at the following shapes. Generally we call such shapes as prisms. We can see geometrical shapes such as triangles, squares, rectangles, pentagons etc. on them. These are called 'faces' of the prism.

Edge is the intersection of two faces and vertex is the point of intersection of three faces. The faces on top and bottom are called 'bases', and edges on these faces are called 'base edges.' The base of a triangular prism is triangle.



Name of prism	No. of base edges	No. of faces ( $f$ )	No. of Vertices ( $v$ )	No. of Edges ( $e$ )
Triangular Prism	3	5	6	9
Rectangular Prism	4	6	8	12
Pentagonal Prism	5	7	10	15
Hexagonal Prism	6	8	12	18

Observe the given table and answer the following questions.

- How many faces are there for a prism having 6 base edges?
- If the number of faces is 7, then what is the number of vertices?
- Number of base edges of a prism is 7, what is the number of edges?
- If the number of base edges is  $n$ , then what is the number of edges?
- If the number of base edges is  $n$ , then what is the number of faces?
- If the number of faces =  $f$ , the number of vertices =  $v$ , and number of edges =  $e$ , then what is  $f + v - e$ ?