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Seat No.

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MT - GEOMETRY - SEMI PRELIM - II : PAPER - 4

Time : 2 Hours

(Pages 4)

Max. Marks : 40

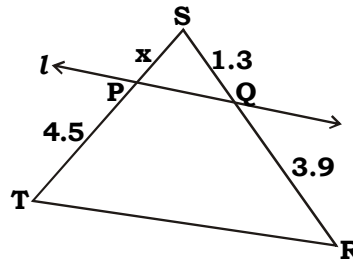
Note :

- (i) All questions are compulsory.
- (ii) Use of calculator is not allowed.

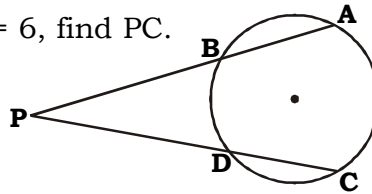
Q.1. Solve ANY FIVE of the following :

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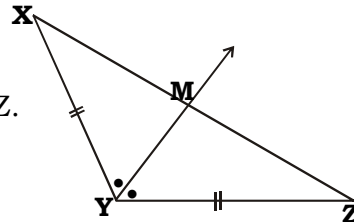
- (i) Find the value of x in the adjoining figure, if line l is parallel to one of the sides of the given triangle.



- (ii) If $PB = 3$, $PD = 4$, $PA = 6$, find PC .



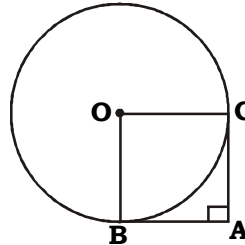
- (iii) Using Euler's formula, find F , if $V = 6$ and $E = 12$.
- (iv) If two circles touch externally then show that the distance between their centres is equal to the sum of their radii.
- (v) Ray YM is the angle bisector of $\angle XYZ$, where $XY = YZ$. Find the relation between XM and MZ .



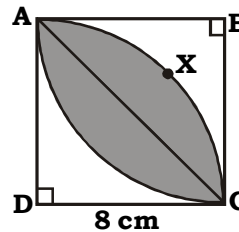
- (vi) The dimensions of a cuboid are $3 \text{ cm} \times 9 \text{ cm} \times x \text{ cm}$. The volume of this cuboid is equal to the volume of a cube with side 6 cm . What is the value of x ?

Q.2. Solve ANY FOUR of the following :

- (i) In the adjoining figure, AB and AC are tangents drawn from an external point A to a circle with center O. Prove that $\square BACO$ is a square.

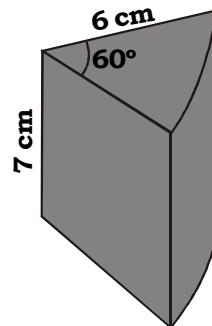


- (ii) Calculate the area of the shaded region in the adjoining figure where $\square ABCD$ is a square with side 8 cm each. ($\pi = 3.14$)

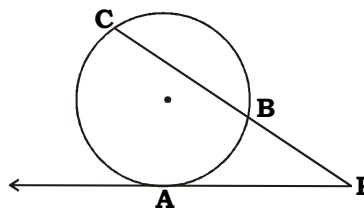


- (iii) Sides of a triangle are 11, 60, 61. Determine whether it is a right angled triangle or not ?

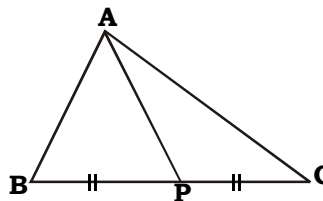
- (iv) A piece of cheese is cut in the shape of the sector of a circle of radius 6 cm. The thickness of the cheese is 7 cm. Find the curved surface area of the cheese.



- (v) In the adjoining figure, a tangent segment PA touching a circle at A and a secant PBC are shown. If $AP = 15$ and $BP = 10$, find BC.



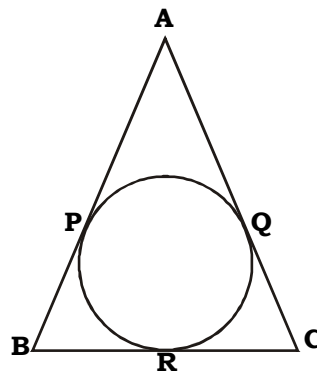
- (vi) In $\triangle ABC$, AP is a median. If $AP = 7$, $AB^2 + AC^2 = 260$ then find BC.



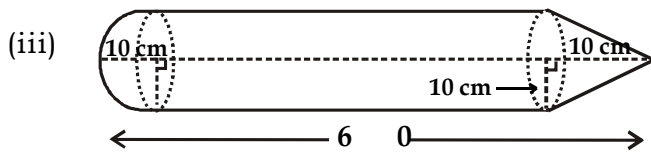
Q.3. Solve ANY THREE of the following :**9**

- (i) $\square ABCD$ is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.
- (ii) A oil funnel of tin sheet consists of a cylindrical portion 10 cm long attached to a frustum of a cone. If radius of the top and bottom of the frustum is 9 cm and 4 cm respectively and the slant height of the frustum of cone is 13 cm. Find the surface area of the tin required to make the funnel. (Express your answer in terms of π)
- (iii) Suppose AB and AC are equal chords of a circle and a line parallel to the tangent at A intersects the chords at D and E. Prove that $AD = AE$.
- (iv) Triangle ABC has sides of length 5, 6 and 7 units while ΔPQR has perimeter of 360 units. If ΔABC is similar to ΔPQR then find the sides of ΔPQR .

- (v) In the adjoining figure, ΔABC is isosceles triangle with perimeter 44 cm. The base BC is of length 12 cm. Sides AB and AC are congruent. A circle touches the three sides as shown. Find the length of a tangent segment from A to the circle.

**Q.4. Solve ANY TWO of the following :****8**

- (i) Prove that : The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
- (ii) Prove that : The opposite angles of a cyclic quadrilateral are supplementary.



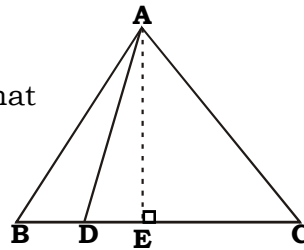
A toy is a combination of a cylinder, hemisphere and a cone, each with radius 10cm. Height of the conical part is 10 cm and total height is 60cm. Find the total surface area of the toy.

$$(\pi = 3.14, \sqrt{2} = 1.41)$$

Q.5. Solve ANY TWO of the following :

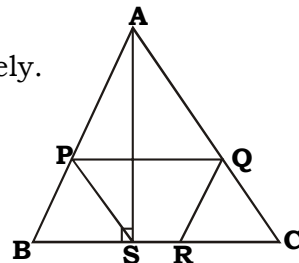
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- (i) In an equilateral triangle ABC, the side BC is trisected at D. Prove that $9AD^2 = 7AB^2$.



- (ii) A cylinder of radius 12 cm contains water upto depth of 20 cm. A spherical iron ball is dropped into the cylinder and thus water level is raised by 6.75 cm. What is the radius of the ball ?

- (iii) In $\triangle ABC$, midpoints of sides AB, AC and BC are P, Q and R respectively. $AS \perp BC$. Prove that $\square PQRS$ is a cyclic quadrilateral.



Best Of Luck 🍀