

N 926

Seat No.

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2023 III 15 1100 - N 926- MATHEMATICS (71) GEOMETRY—PART II (E)

(REVISED COURSE)

Time : 2 Hours

(Pages 11)

Max. Marks : 40

Note :—

- (i) All questions are compulsory.
- (ii) Use of calculator is not allowed.
- (iii) The numbers to the right of the questions indicate full marks.
- (iv) In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.
- (v) For every MCQ, the correct alternative (A), (B), (C) or (D) with sub-question number is to be written as an answer.
- (vi) Draw the proper figures for answers wherever necessary.
- (vii) The marks of construction should be clear and distinct. Do not erase them.
- (viii) Diagram is essential for writing the proof of the theorem.

P.T.O.

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1. (A) Four alternative answers are given for every subquestion.

Select the correct alternative and write the alphabet of that answer :

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- (1) If a, b, c are sides of a triangle and $a^2 + b^2 = c^2$, name the type of triangle :

- (A) Obtuse angled triangle
- (B) Acute angled triangle
- (C) Right angled triangle
- (D) Equilateral triangle

- (2) Chords AB and CD of a circle intersect inside the circle at point

E. If $AE = 4$, $EB = 10$, $CE = 8$, then find ED :

- (A) 7
- (B) 5
- (C) 8
- (D) 9

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(3) Co-ordinates of origin are

(A) (0, 0)

(B) (0, 1)

(C) (1, 0)

(D) (1, 1)

(4) If radius of the base of cone is 7 cm and height is 24 cm, then find its slant height :

(A) 23 cm

(B) 26 cm

(C) 31 cm

(D) 25 cm

(B) Solve the following sub-questions :

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(1) If $\triangle ABC \sim \triangle PQR$ and $\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{16}{25}$, then find AB : PQ.

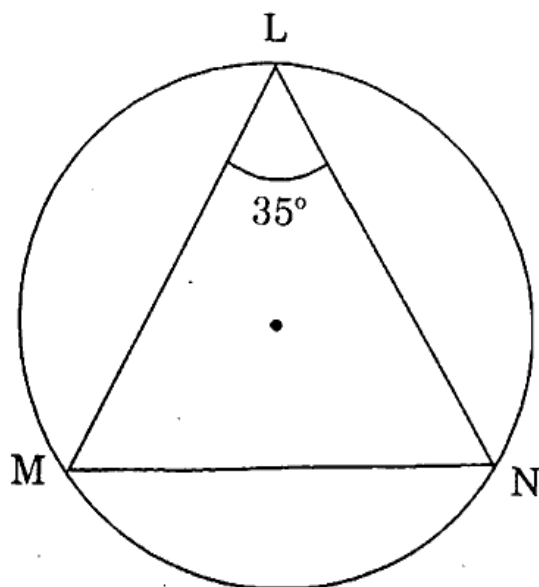
(2) In $\triangle RST$, $\angle S = 90^\circ$, $\angle T = 30^\circ$, $RT = 12$ cm, then find RS.

(3) If radius of a circle is 5 cm, then find the length of longest chord of a circle.

(4) Find the distance between the points O (0, 0) and P (3, 4).

2. (A) Complete the following activities (any *two*) :

(1)



In the above figure, $\angle L = 35^\circ$, find :

- (i) $m(\text{arc MN})$
- (ii) $m(\text{arc MLN})$

Solution :

(i) $\angle L = \frac{1}{2} m(\text{arc MN}) \dots\dots\dots$ (By inscribed angle theorem)

$$\therefore \square = \frac{1}{2} m(\text{arc MN})$$

$$\therefore 2 \times 35 = m(\text{arc MN})$$

$$\therefore m(\text{arc MN}) = \square$$

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$$(ii) \quad m(\text{arc MLN}) = \boxed{} - m(\text{arc MN}) \dots\dots$$

[Definition of measure of arc]

$$= 360^\circ - 70^\circ$$

$$\therefore m(\text{arc MLN}) = \boxed{}$$

(2) Show that, $\cot \theta + \tan \theta = \operatorname{cosec} \theta \times \sec \theta$

Solution :

$$\text{L.H.S.} = \cot \theta + \tan \theta$$

$$= \frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta}$$

$$= \frac{\boxed{} + \boxed{}}{\sin \theta \times \cos \theta}$$

$$= \frac{1}{\sin \theta \times \cos \theta} \dots\dots\dots \boxed{}$$

$$= \frac{1}{\sin \theta} \times \frac{1}{\boxed{}}$$

$$= \operatorname{cosec} \theta \times \sec \theta$$

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\therefore \cot \theta + \tan \theta = \operatorname{cosec} \theta \times \sec \theta.$$

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- (3) Find the surface area of a sphere of radius 7 cm.

Solution :

$$\text{Surface area of sphere} = 4\pi r^2$$

$$= 4 \times \frac{22}{7} \times \square^2$$

$$= 4 \times \frac{22}{7} \times \square$$

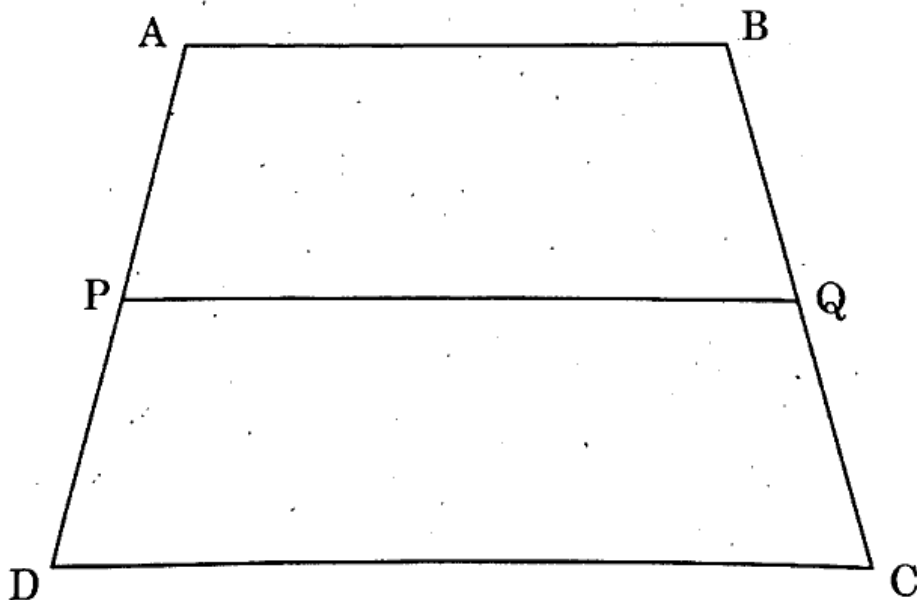
$$= \square \times 7$$

$$\therefore \text{Surface area of sphere} = \square \text{ sq.cm.}$$

- (B) Solve the following sub-questions (Any four) :

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(1)

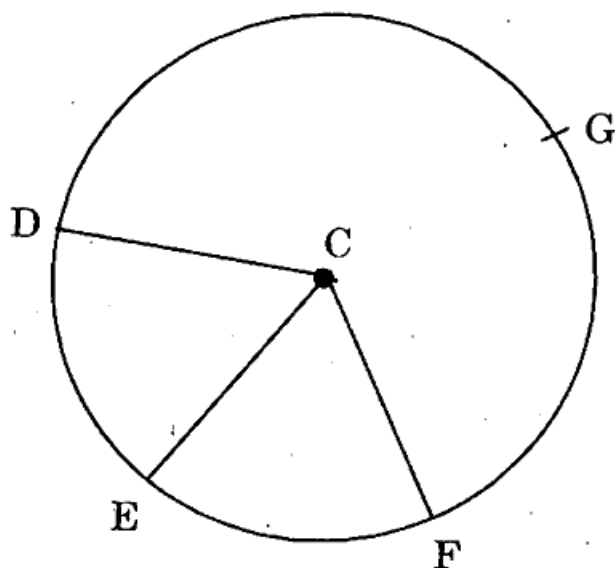


In trapezium ABCD side $AB \parallel$ side $PQ \parallel$ side DC . $AP =$

$PD = 12$, $QC = 14$, find BQ .

- (2) Find the length of the diagonal of a rectangle whose length is 35 cm and breadth is 12 cm.

(3)



In the given figure points G, D, E, F are points of a circle with centre C, $\angle ECF = 70^\circ$, $m(\text{arc DGF}) = 200^\circ$.

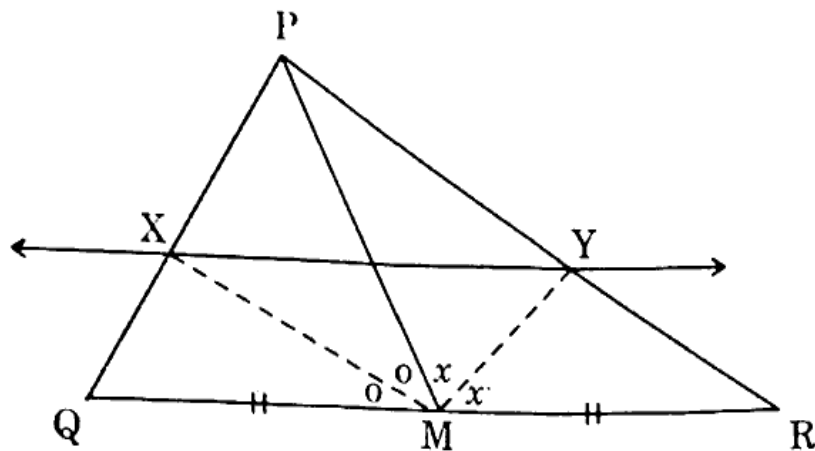
Find :

- (i) $m(\text{arc DE})$
- (ii) $m(\text{arc DEF})$.
- (4) Show that points A(-1, -1), B(0, 1), C(1, 3) are collinear.
- (5) A person is standing at a distance of 50 m from a temple looking at its top. The angle of elevation is of 45° . Find the height of the temple.

3. (A) Complete the following activities (any one) :

3

(1)



In $\triangle PQR$, seg PM is a median. Angle bisectors of $\angle PMQ$ and $\angle PMR$ intersect side PQ and side PR in points X and Y respectively. Prove that $XY \parallel QR$.

Complete the proof by filling in the boxes.

Solution :

In $\triangle PMQ$,

Ray MX is the bisector of $\angle PMQ$

$$\therefore \frac{MP}{MQ} = \frac{\boxed{}}{\boxed{}} \dots\dots\dots \text{(I)} \quad [\text{Theorem of angle bisector}]$$

Similarly, in $\triangle PMR$, Ray MY is bisector of $\angle PMR$

$$\therefore \frac{MP}{MR} = \frac{\boxed{}}{\boxed{}} \dots\dots\dots \text{(II)} \quad [\text{Theorem of angle bisector}]$$

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But $\frac{MP}{MQ} = \frac{MP}{MR}$ (III) [As M is the midpoint of QR]

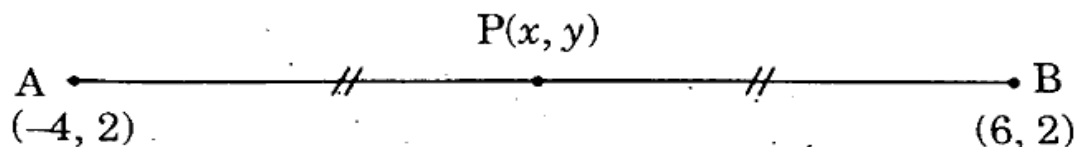
Hence $MQ = MR$

$\therefore \frac{PX}{\square} = \frac{\square}{YR}$ [From (I), (II) and (III)]

$\therefore XY \parallel QR$ [Converse of basic proportionality theorem]

- (2) Find the co-ordinates of point P where P is the midpoint of a line segment AB with A(-4, 2) and B(6, 2).

Solution :



Suppose, $(-4, 2) = (x_1, y_1)$ and $(6, 2) = (x_2, y_2)$ and co-ordinates of P are (x, y)

$\therefore$ According to midpoint theorem,

$$x = \frac{x_1 + x_2}{2} = \frac{\square + 6}{2} = \frac{\square}{2} = \square$$

$$y = \frac{y_1 + y_2}{2} = \frac{2 + \square}{2} = \frac{4}{2} = \square$$

$\therefore$ Co-ordinates of midpoint P are $\square$

(B) Solve the following sub-questions (any two) :

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- (1) In $\triangle ABC$, seg AP is a median. If $BC = 18$, $AB^2 + AC^2 = 260$, find AP.
- (2) Prove that, "Angles inscribed in the same arc are congruent."
- (3) Draw a circle of radius 3.3 cm. Draw a chord PQ of length 6.6 cm. Draw tangents to the circle at points P and Q.
- (4) The radii of circular ends of a frustum are 14 cm and 6 cm respectively and its height is 6 cm. Find its curved surface area. <https://www.maharashtrastudy.com> ($\pi = 3.14$)

4. Solve the following sub-questions (any two) :

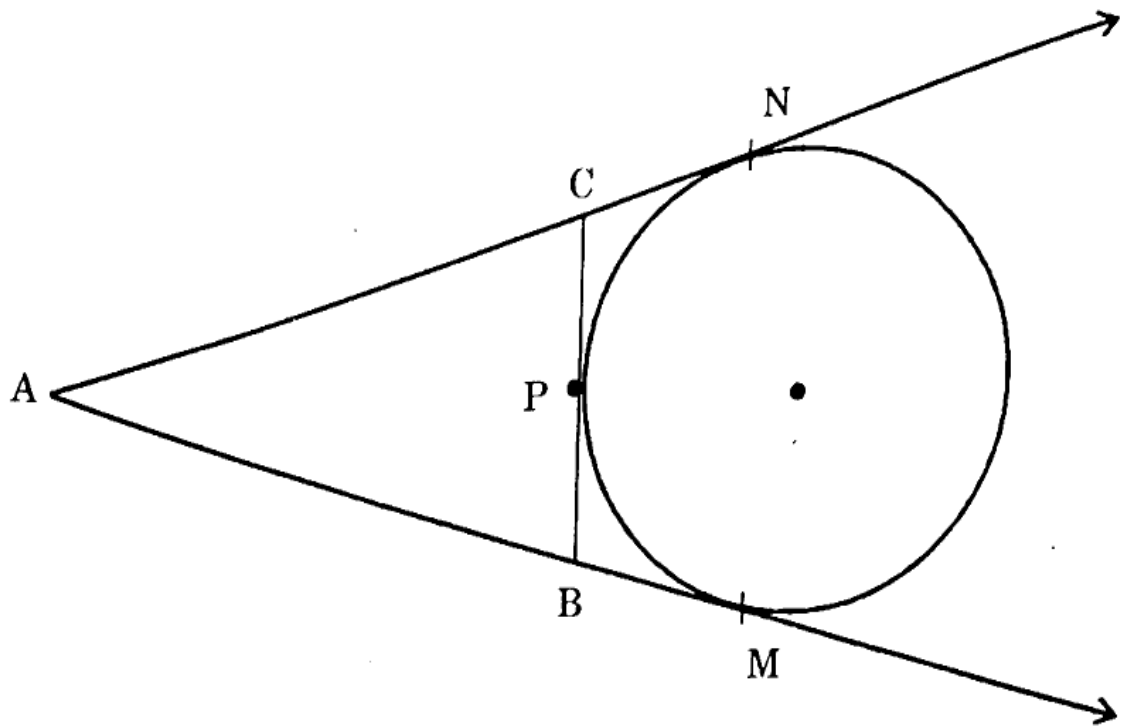
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- (1) In $\triangle ABC$, seg DE $\parallel$ side BC. If $2A(\triangle ADE) = A(\square DBCE)$, find AB : AD and show that $BC = \sqrt{3} DE$.
- (2) $\triangle SHR \sim \triangle SVU$. In $\triangle SHR$, $SH = 4.5$ cm, $HR = 5.2$ cm, $SR = 5.8$ cm and $\frac{SH}{SV} = \frac{3}{5}$, construct $\triangle SVU$.
- (3) An ice-cream pot has a right circular cylindrical shape. The radius of the base is 12 cm and height is 7 cm. This pot is completely filled with ice-cream. The entire ice-cream is given to the students in the form of right circular ice-cream cones, having diameter 4 cm and height is 3.5 cm. If each student is given one cone, how many students can be served ?

5. Solve the following sub-questions (Any one) :

3

(1)



A circle touches side BC at point P of the $\triangle ABC$, from out-side of the triangle. Further extended lines AC and AB are tangents to the circle at N and M respectively. Prove that :

$$AM = \frac{1}{2} (\text{Perimeter of } \triangle ABC)$$

(2) Eliminate θ if $x = r \cos \theta$ and $y = r \sin \theta$.