

# N 375

Seat No. 

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2020 III 14 1100 - N 375- MATHEMATICS (71) GEOMETRY—PART II (E)

Time : 2 Hours

(Pages 10)

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 MCQ's [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) in front of sub-question number is to be written as an answer.
- (vi) Draw 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.

1. (A) **Four alternative answers are given for every sub-question. Select the correct alternative and write the alphabet of that answer :**

4

(1) Out of the following which is the Pythagorean triplet ?

- |                |               |
|----------------|---------------|
| (A) (1, 5, 10) | (B) (3, 4, 5) |
| (C) (2, 2, 2)  | (D) (5, 5, 2) |

P.T.O.

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- (2) Two circles of radii 5.5 cm and 3.3 cm respectively touch each other externally. What is the distance between their centres ?
- (A) 4.4 cm (B) 2.2 cm  
(C) 8.8 cm (D) 8.9 cm
- (3) Distance of point  $(-3, 4)$  from the origin is .....
- (A) 7 (B) 1  
(C) -5 (D) 5
- (4) Find the volume of a cube of side 3 cm :
- (A)  $27 \text{ cm}^3$  (B)  $9 \text{ cm}^3$   
(C)  $81 \text{ cm}^3$  (D)  $3 \text{ cm}^3$

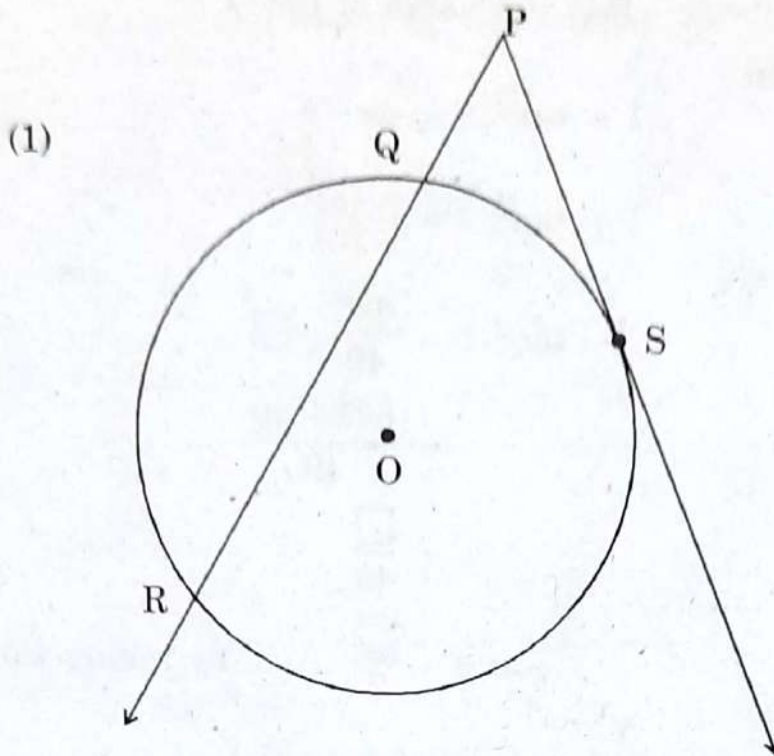
**(B) Solve the following questions :**

4

- (1) The ratio of corresponding sides of similar triangles is 3 : 5, then find the ratio of their areas.
- (2) Find the diagonal of a square whose side is 10 cm.
- (3)  $\square$  ABCD is cyclic. If  $\angle B = 110^\circ$ , then find measure of  $\angle D$ .
- (4) Find the slope of the line passing through the points A(2, 3) and B(4, 7).

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2. (A) Complete and write the following activities (any two) : 4



In the figure given above, 'O' is the centre of the circle, seg PS is a tangent segment and S is the point of contact. Line PR is a secant.

If  $PQ = 3.6$ ,  $QR = 6.4$ , find PS.

Solution :

$$PS^2 = PQ \times \square \dots\dots \text{(tangent secant segments theorem)}$$

$$= PQ \times (PQ + \square)$$

$$= 3.6 \times (3.6 + 6.4)$$

$$= 3.6 \times \square$$

$$= 36$$

$$\therefore PS = \square \dots\dots \text{by taking square roots}$$

P.T.O.

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(2) If  $\sec \theta = \frac{25}{7}$ , find the value of  $\tan \theta$ .

Solution :

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$\therefore 1 + \tan^2 \theta = \left(\frac{25}{7}\right)^2$$

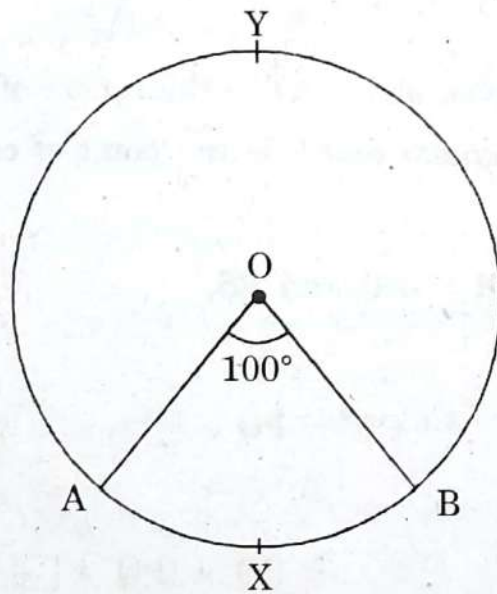
$$\therefore \tan^2 \theta = \frac{625}{49} - 1$$

$$= \frac{625 - 49}{49}$$

$$= \frac{576}{49}$$

$$\therefore \tan \theta = \frac{24}{7} \text{ ..... by taking square roots}$$

(3)



In the figure given above, O is the centre of the circle. Using given information complete the following table :

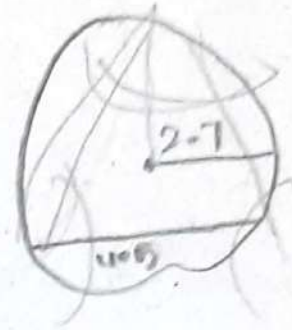
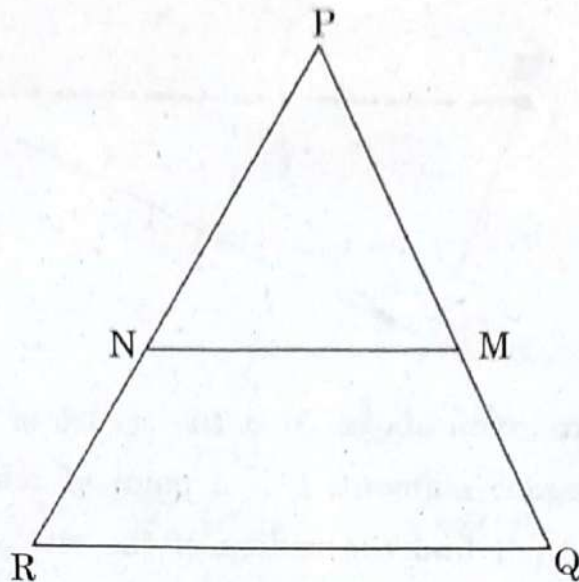
Type of arc	Name of the arc	Measure of the arc
Minor arc	<input type="text"/>	<input type="text"/>
Major arc	<input type="text"/>	<input type="text"/>

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

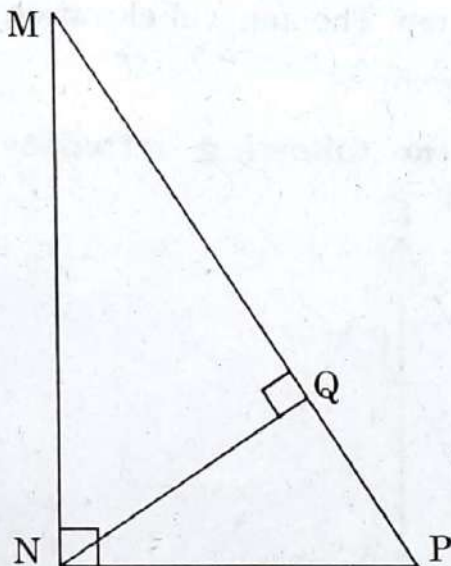
8

(1)



In  $\Delta PQR$ ,  $NM \parallel RQ$ . If  $PM = 15$ ,  $MQ = 10$ ,  $NR = 8$ , then find  $PN$ .

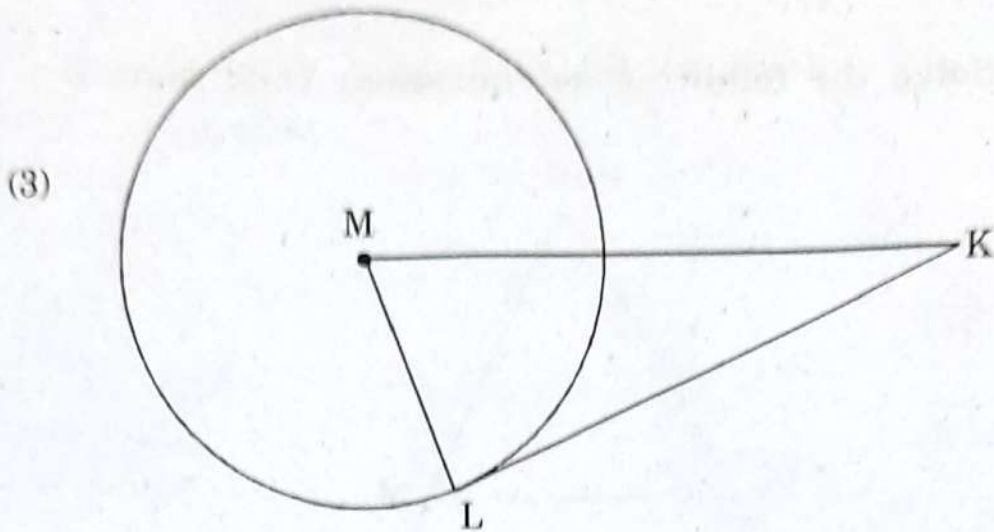
(2)



In  $\Delta MNP$ ,  $\angle MNP = 90^\circ$ ,  $\text{seg } NQ \perp \text{seg } MP$ . If  $MQ = 9$ ,  $QP = 4$ , then find  $NQ$ .

P.T.O.

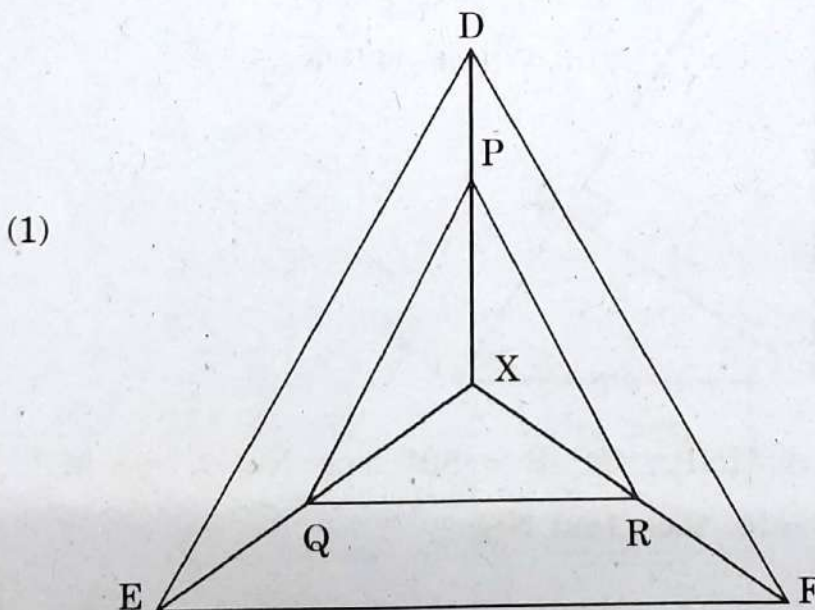
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In the figure given above, M is the centre of the circle and seg KL is a tangent segment. L is a point of contact. If  $MK = 12$ ,  $KL = 6\sqrt{3}$ , then find the radius of the circle.

- (4) Find the co-ordinates of midpoint of the segment joining the points (22, 20) and (0, 16).
- (5) A person is standing at a distance of 80 metres from a Church and looking at its top. The angle of elevation is of  $45^\circ$ . Find the height of the Church.

3. (A) Complete and write the following activities (Any one) : 3



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In the given figure, X is any point in the interior of the triangle. Point X is joined to the vertices of triangle. seg PQ  $\parallel$  seg DE, seg QR  $\parallel$  seg EF. Complete the activity and prove that seg PR  $\parallel$  seg DF.

Proof :

In  $\Delta$  XDE,

PQ  $\parallel$  DE ..... (Given)

$$\therefore \frac{XP}{PD} = \frac{XQ}{QE} \text{ ..... (Basic proportionality theorem) .... (I)}$$

In  $\Delta$  XEF,

QR  $\parallel$  EF ..... (Given)

$$\therefore \frac{XQ}{QE} = \frac{XR}{RF} \text{ ..... (□) .... (II)}$$

$$\therefore \frac{XP}{PD} = \frac{XR}{RF} \text{ ..... from (I) and (II)}$$

$\therefore$  seg PR  $\parallel$  seg DF ..... (By converse of basic proportionality theorem)

- (2) If A(6, 1), B(8, 2), C(9, 4) and D(7, 3) are the vertices of  $\square$  ABCD, show that  $\square$  ABCD is a parallelogram.

Solution :

$$\text{Slope of line} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\therefore \text{Slope of line AB} = \frac{2 - 1}{8 - 6} = \square \text{ .....(I)}$$

$$\therefore \text{Slope of line BC} = \frac{4 - 2}{9 - 8} = \square \text{ .....(II)}$$

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$$\therefore \text{Slope of line CD} = \frac{3-4}{7-9} = \square \quad \dots\dots\text{(III)}$$

$$\therefore \text{Slope of line DA} = \frac{3-1}{7-6} = \square \quad \dots\dots\text{(IV)}$$

$$\therefore \text{Slope of line AB} = \square \quad \dots\dots \text{from (I) and (III)}$$

$$\therefore \text{line AB} \parallel \text{line CD}$$

$$\therefore \text{Slope of line BC} = \square \quad \dots\dots \text{from (II) and (IV)}$$

$$\therefore \text{line BC} \parallel \text{line DA}$$

Both the pairs of opposite sides of the quadrilateral are parallel.

$\therefore$   $\square$  ABCD is a parallelogram.

**(B) Solve the following sub-questions (Any two) :**

**6**

- (1) In  $\Delta$  PQR, point S is the mid-point of side QR. If PQ = 11, PR = 17, PS = 13, find QR.
- (2) Prove that, tangent segments drawn from an external point to the circle are congruent.
- (3) Draw a circle with radius 4.1 cm. Construct tangents to the circle from a point at a distance 7.3 cm from the centre.
- (4) A metal cuboid of measures 16 cm  $\times$  11 cm  $\times$  10 cm was melted to make coins. How many coins were made, if the thickness and diameter of each coin was 2 mm and 2 cm respectively ?

( $\pi = 3.14$ )



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

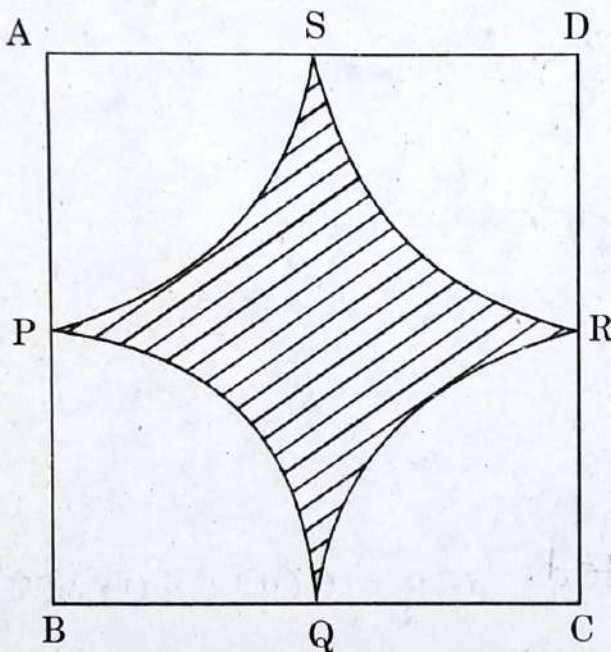
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(1) In  $\Delta ABC$ ,  $PQ$  is a line segment intersecting  $AB$  at  $P$  and  $AC$  at  $Q$  such that  $seg PQ \parallel seg BC$ . If  $PQ$  divides  $\Delta ABC$  into two equal parts having equal areas, find  $\frac{BP}{AB}$ .

(2) Draw a circle of radius 2.7 cm and draw a chord  $PQ$  of length 4.5 cm.

Draw tangents at points  $P$  and  $Q$  without using centre.

(3)



In the figure given above  $\square ABCD$  is a square of side 50 m. Points  $P, Q, R, S$  are midpoints of side  $AB$ , side  $BC$ , side  $CD$ , side  $AD$  respectively. Find area of shaded region.

P.T.O.

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5. Solve the following sub-questions (Any one) : 3

(1) Circles with centres A, B and C touch each other externally. If  $AB = 3$  cm,  $BC = 3$  cm,  $CA = 4$  cm, then find the radii of each circle.

(2) If

$$\sin \theta + \sin^2 \theta = 1,$$

show that :

1.6 0.4 0

$$\cos^2 \theta + \cos^4 \theta = 1.$$