N 375

Seat No. | | | | | | | |

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) infront 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.

(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 cm^3 (B) 9 cm^3

(C) 81 cm^3 (D) 3 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.

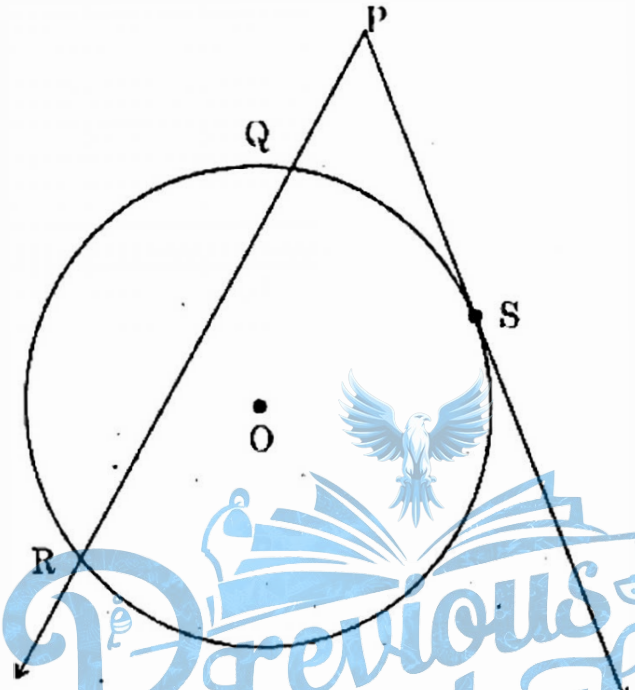
(2) Find the diagonal of a square whose side is 10 cm.

(3) $\square$ ABCD is cyclic. If $\angle B = 110°$, then find measure of $\angle D$.

(4) Find the slope of the line passing through the points A(2, 3) and B(4, 7).

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

(1)



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 :

$PS^2 = PQ \times \square$ ..... (tangent secant segments theorem)

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

$= 3.6 \times (3.6 + 6.4)$

$= 3.6 \times \square$

$= 36$

$\therefore PS = \square$ ..... by taking square roots

P.T.O.

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

Solution :

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

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

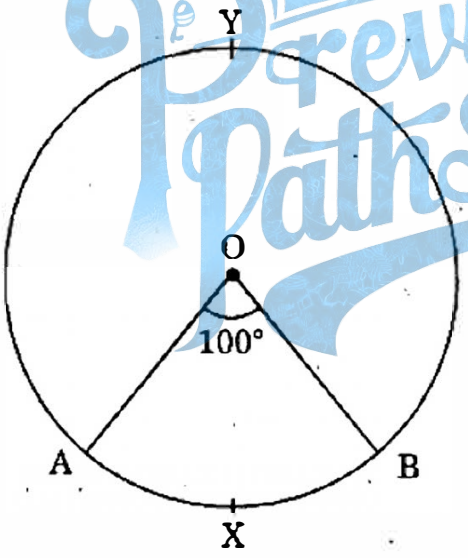
$$\therefore \quad \tan^2 \theta = \frac{625}{49} - \square$$

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

$$= \frac{\square}{49}$$

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

(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		
Major arc		

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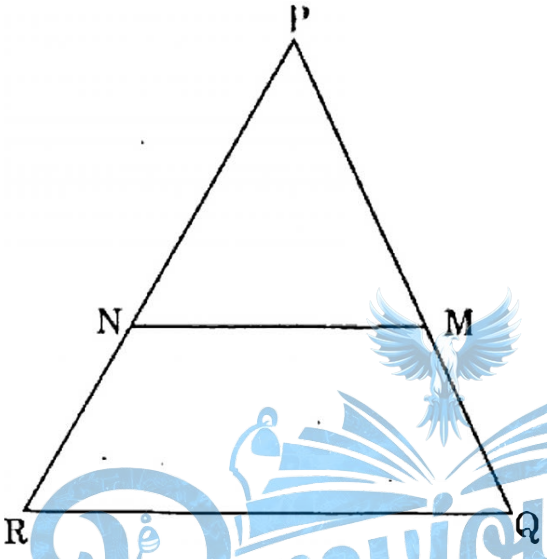
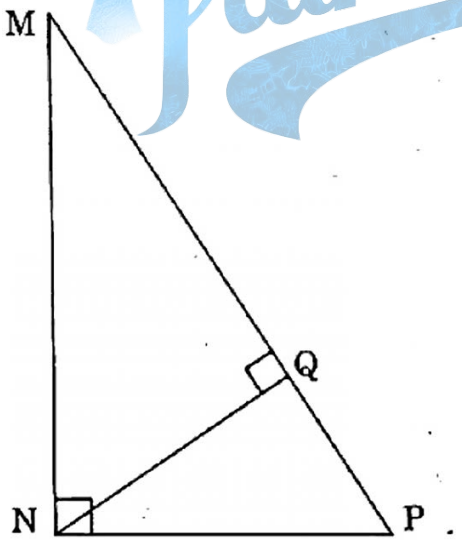
(B) Solve the following sub-questions (Any *four*) : **8**

(1)



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

(2)



In Δ MNP, $\angle$MNP = 90°, seg NQ $\perp$ seg MP. If MQ = 9, QP = 4, then find NQ.

P.T.O.

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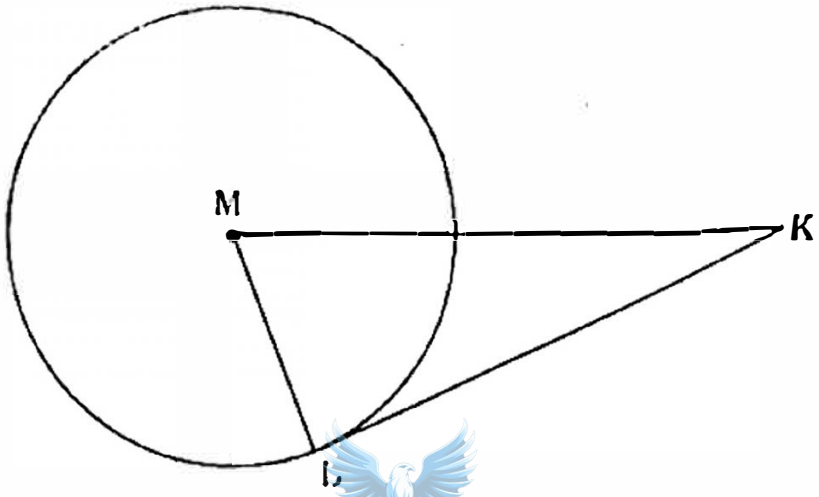
(3)



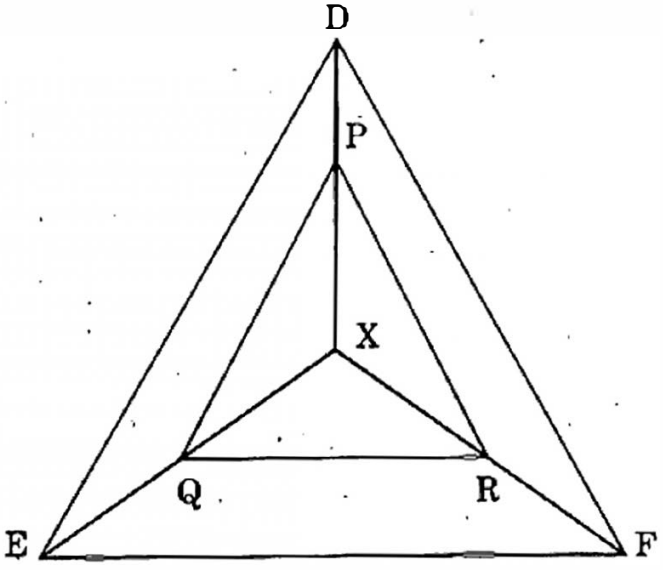
In the figure given above, M is the centre of the circle and seg KL is a tangent segment. L is a point of contact. If MK = 12, KL = $6\sqrt{3}$, then find the radius of the circle.

(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°. Find the height of the Church.

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

(1)



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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 ∥ seg DE, seg QR ∥ seg EF. Complete the activity and prove that seg PR ∥ seg DF.

Proof :

In Δ XDE,

PQ ∥ DE ..... (Given)

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

In Δ XEF,

QR ∥ EF ..... (Given)

$\frac{XQ}{\square} = \frac{XR}{\square}$ ..... ( ) .... (II)

∴ $\frac{XP}{PD} = \frac{\square}{\square}$ ..... from (I) and (II)

∴ seg PR ∥ 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 □ ABCD, show that □ ABCD is a parallelogram.

Solution

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

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

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

P.T.O.

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

Slope of line DA $= \frac{3-1}{7-6} = \square$ .....(IV)

Slope of line AB = $\square$ ..... from (I) and (III)

$\therefore$ line AB $\parallel$ line CD

Slope of line BC = $\square$ ..... from (II) and (IV)

line BC $\parallel$ 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 Δ 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 × 11 cm × 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 ?

($\pi \doteq 3.14$)

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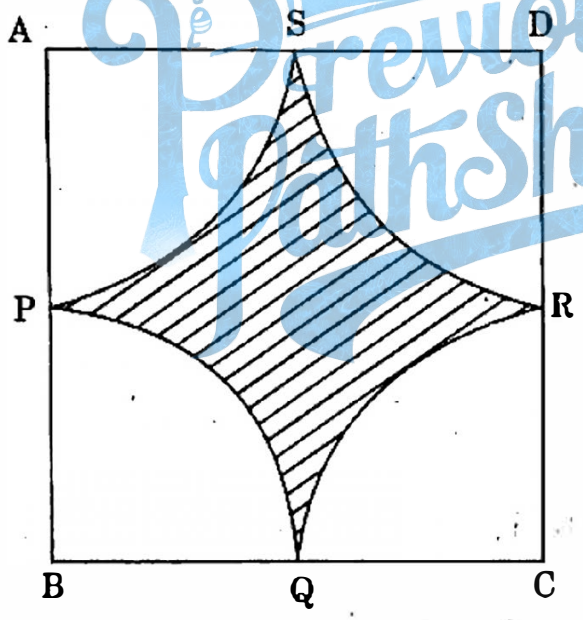
4. Solve the following sub-questions (Any *two*) : **8**

(1) In Δ ABC, PQ is a line segment intersecting AB at P and AC at Q such that seg PQ ∥ seg BC. If PQ divides Δ 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 □ 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 :

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