N 185

Seat No. | | | | | | | |

2021 IX 29 1030 – N 185– 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 proper figures for answers wherever necessary.

(*vii*) The marks of construction should be clear. Do not erase them.

(*viii*) Diagram is essential for writing the proof of the theorem.

1. (A) For each of the following sub-questions four alternative answers are given. Choose the correct alternative and write its alphabet : **4**

(*i*) $\Delta ABC \sim \Delta PQR$; if AB = 4 cm, PQ = 6 cm and QR = 9 cm, then BC = ...

(A) 7 cm (B) 6 cm

(C) 8 cm (D) 9 cm

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(*ii*) $\angle PRQ$ is inscribed in the arc PRQ of a circle with centre O. If $\angle PRQ = 75°$, then m(arc PRQ) = ...

(A) 75°

(B) 150°

(C) 285°

(D) 210°

(*iii*) Seg AB is parallel to Y-axis and co-ordinates of point A are (1, 3), then co-ordinates of point B can be .....

(A) (3, 1)

(B) (5, 3)

(C) (3, 0)

(D) (1, –3)

(*iv*) Which of the following is *not* Pythagorean triplet ?

(A) (12, 9, 15)

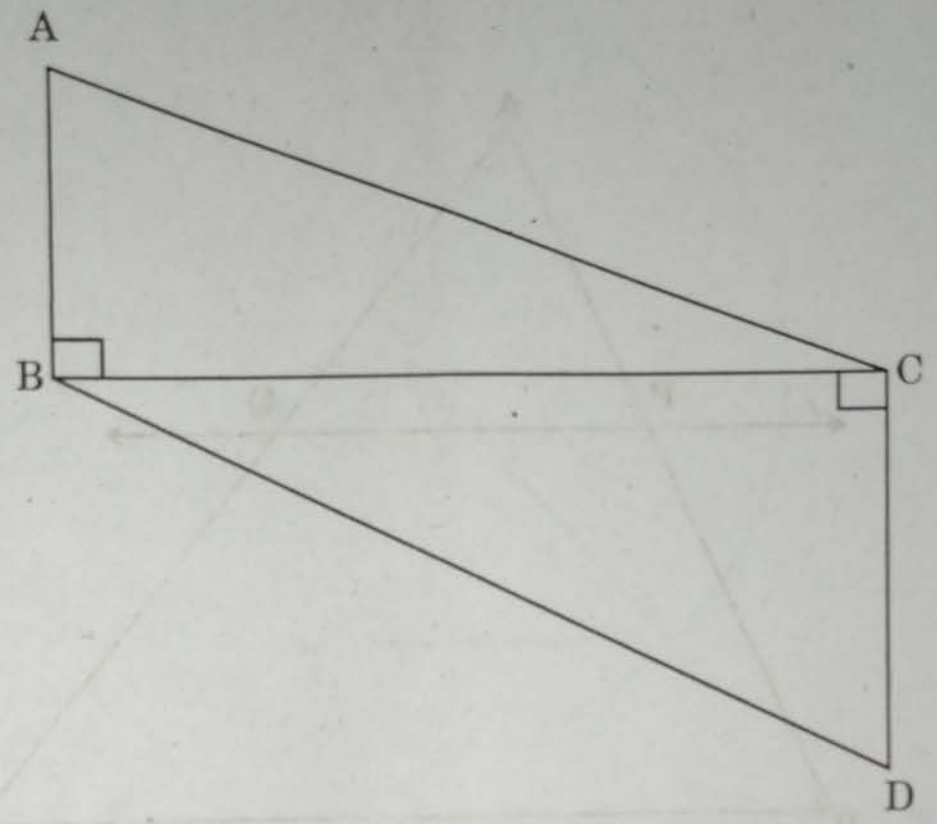
(B) (10, 24, 26)

(C) (12, 16, 25)

(D) (15, 17, 8)

(B) Solve the following sub-questions : 4

(*i*)



In the above figure, seg AB ⊥ seg BC, seg DC ⊥ seg BC. If AB = 3 and DC = 4, then find $\frac{A(\Delta ABC)}{A(\Delta DCB)}$.

(*ii*) Find the side of a square whose diagonal is $12\sqrt{2}$ cm.

(*iii*) If $\tan\theta = \sqrt{3}$, then find the value of θ.

(*iv*) Radius of the circle with centre C is 6 cm. Line AB is a tangent at point A. What is the measure of ∠CAB ?

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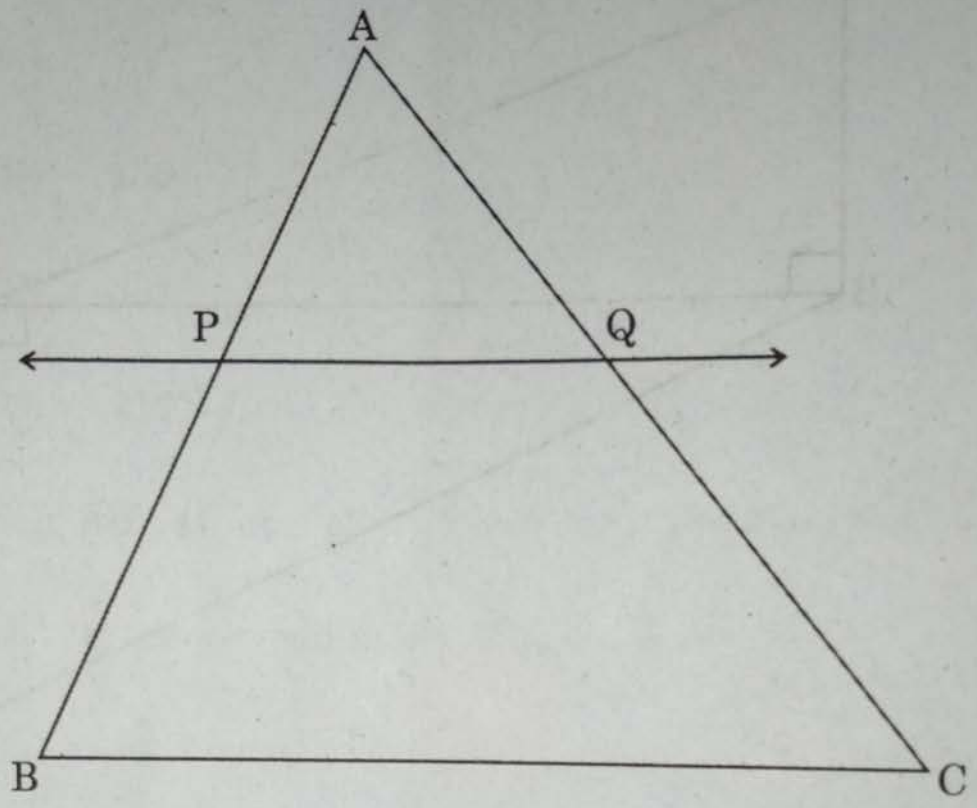
(A) Complete the following activities and rewrite it (any *two*) : 4

(*i*)



In Δ ABC, line PQ ∥ side BC. If AP = 10, PB = 12, AQ = 15, then complete the following activity to find the value of QC.

Activity : In Δ ABC, line PQ ∥ side BC ..... (given)

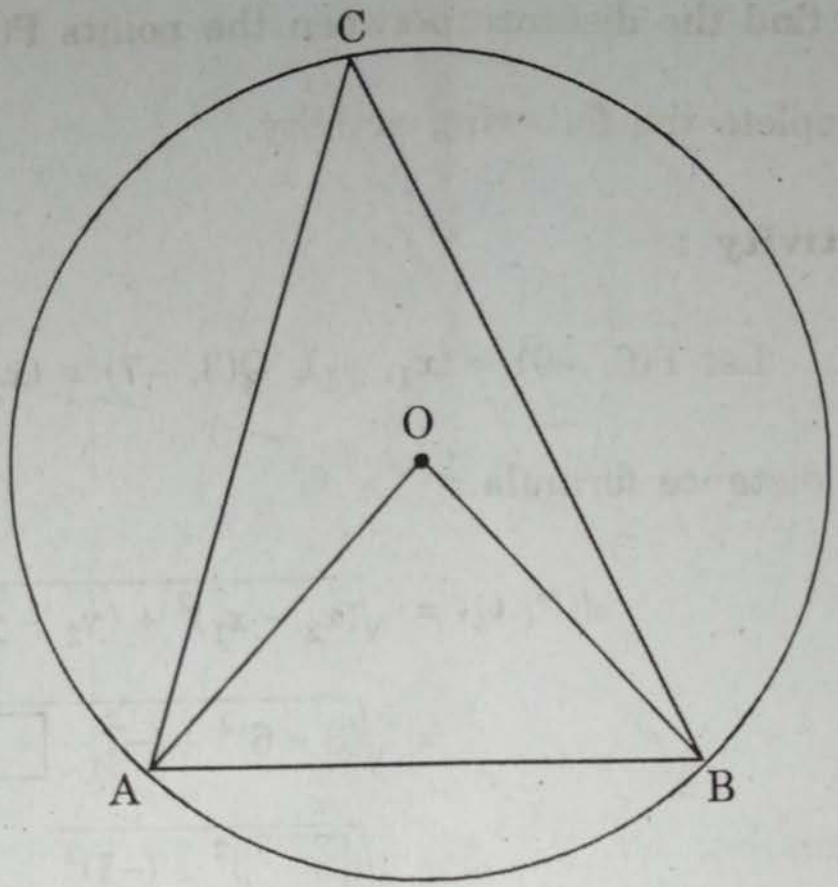
$\therefore \quad \frac{AP}{PB} = \frac{AQ}{QC}$ ..... $\square$

$\therefore \quad \frac{10}{12} = \frac{\square}{QC}$

$\therefore \quad QC = \frac{\square \times 12}{10}$

$\therefore \quad QC = \square$

(*ii*)



In the circle with centre O, length of chord AB is equal to radius of the circle. Complete the following activity to find measure of ∠AOB and ∠ACB.

Activity :

$\angle AOB = \square^\circ$ ..... (∵ Δ AOB is an equilateral triangle)

$\angle ACB = \frac{1}{2} m(\text{arc AB})$ ..... $\square$

$\therefore \quad \angle ACB = \frac{1}{2} \times \square^\circ$

$\therefore \quad \angle ACB = \square^\circ$

(*iii*) To find the distance between the points P(6, –6) and Q(3, –7) complete the following activity.

Activity :

Let P(6, –6) ≡ (x_1, y_1), Q(3, –7) ≡ (x_2, y_2)

By distance formula,

$$d(P, Q) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(3 - 6)^2 + (-7 - \square)^2}$$

$$= \sqrt{(\square)^2 + (-1)^2}$$

$$= \sqrt{\square + 1}$$

$$\therefore \quad d(P, Q) = \sqrt{\square}$$

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

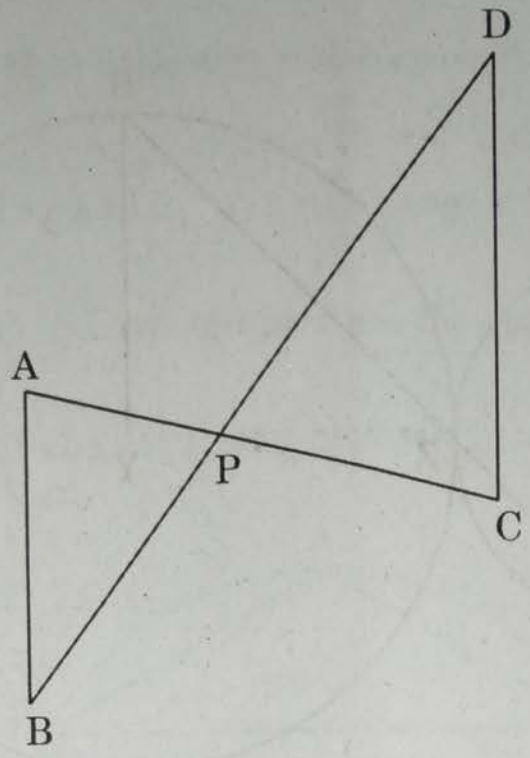
(*i*) In Δ DEF, ∠E = 90°. If DE = 33 cm, DF = 65 cm, then find EF.

(*ii*) Measure of two arcs formed by a chord of a circle are $2x°$ and $7x°$. Find the measure of minor arc.

(*iii*) If A(–7, 6), B(2, –2) and C(8, 5) are the co-ordinates of vertices of a triangle, then find the co-ordinates of centroid.

(*iv*) If $\sin\theta = \frac{7}{25}$, then find the value of $\cos\theta$.

(v)



In the above figure, seg AC and seg BD intersect each other in point P and $\frac{AP}{CP} = \frac{BP}{DP}$, then prove that :

Δ ABP ~ Δ CDP.

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

(i) If Δ ABC ~ Δ PQR, A(Δ ABC) = 81 cm^2, A(Δ PQR) = 121 cm^2, BC = 6.3 cm, then complete the following activity to find QR.

Activity :

Δ ABC ~ Δ PQR ..... (given)

$\therefore \quad \frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{\square}{QR^2}$ ..... $\square$

$\therefore \quad \frac{\square}{121} = \frac{(6.3)^2}{QR^2}$

$\therefore \quad \frac{\square}{11} = \frac{6.3}{QR}$ ..... (Taking square root of both sides)

$\therefore \quad QR = \frac{6.3 \times 11}{\square}$

$\therefore \quad QR = \square$ cm

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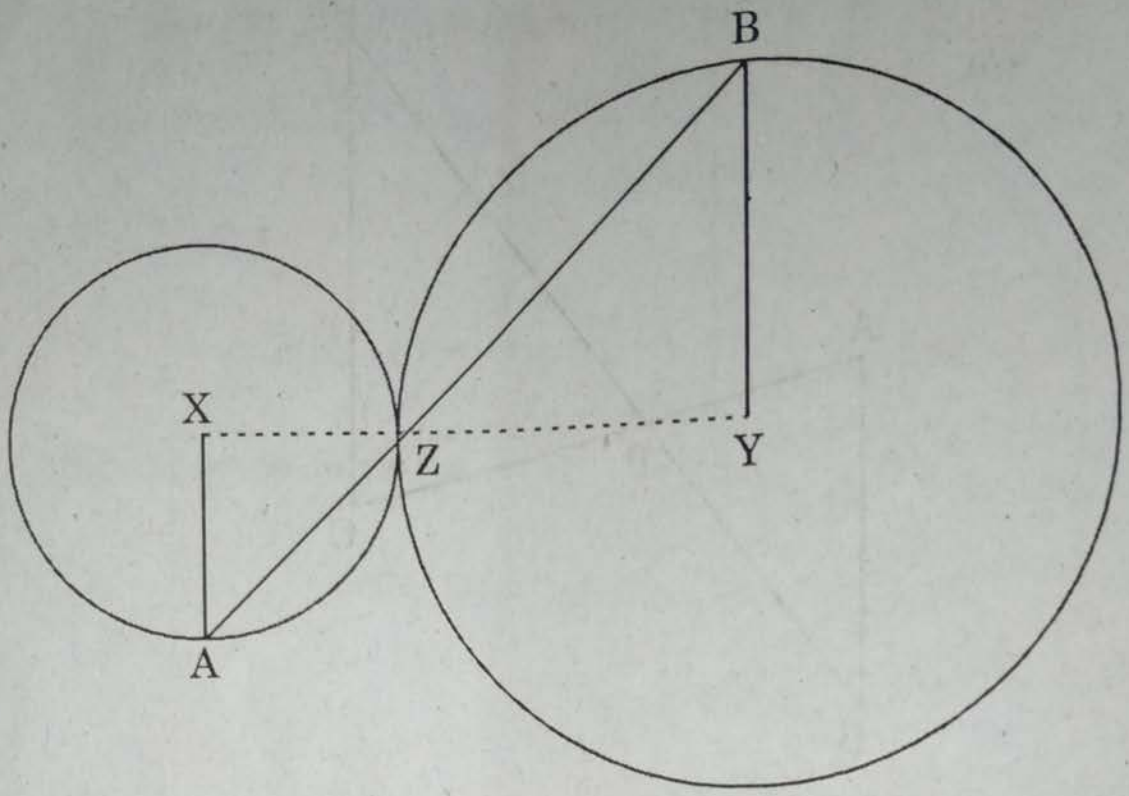
(*ii*)



In the above figure circles with centres X and Y touch each other at point Z. A secant passing through Z intersects the circles at points A and B respectively. Then complete the following activity to prove radius XA ‖ radius YB.

Activity : Draw segments XZ and seg ZY.

∴ By theorem of touching circles points X, Z, Y are ☐

∴ ∠XZA ≅ ☐ ..... (I) (Vertically opposite angles)

Now seg XA ≅ seg XZ ..... ☐

∴ ∠XAZ ≅ ☐ ..... (II) (isosceles triangle theorem)

Similarly seg YB ≅ seg YZ

∴ ∠BZY ≅ ∠YBZ ..... (III)

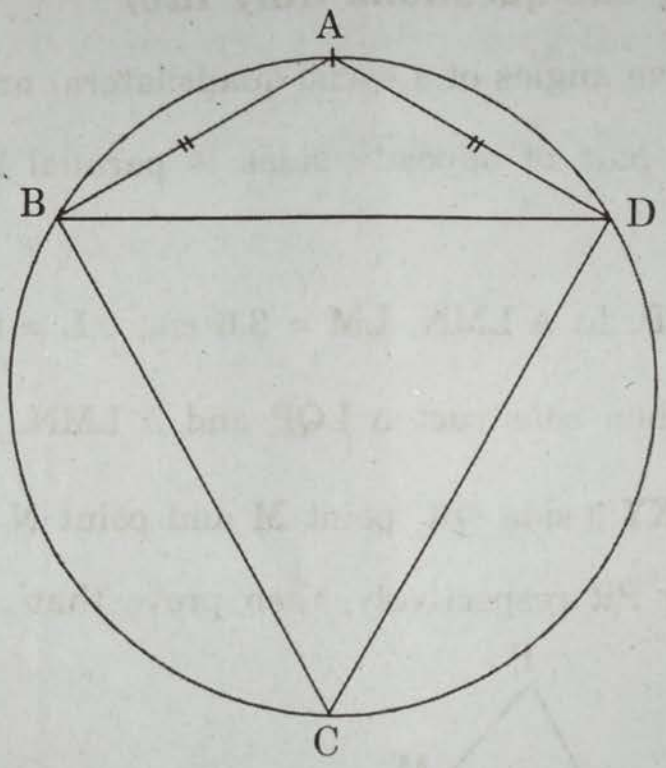
∴ ∠XAZ = ☐ ..... [from (I), (II) and (III)]

∴ Radius XA ‖ radius YB ..... ☐

(B) Solve the following sub-questions (Any *two*) : 6

(*i*) Prove that, "In a right-angled triangle, the perpendicular segment to the hypotenuse from the opposite vertex, is the geometric mean of the segments into which the hypotenuse is divided."

(*ii*)



□ ABCD is cyclic, AB = AD, ∠BCD = 70°, then find :

(*a*) *m*(arc BCD)

(*b*) *m*(arc BAD)

(*c*) ∠ABD.

(*iii*) Draw a circle with centre P and radius 3.5 cm. Draw an arc AB of 120° measure. Draw tangents to the circle at point A and point B.

(*iv*) Prove that :

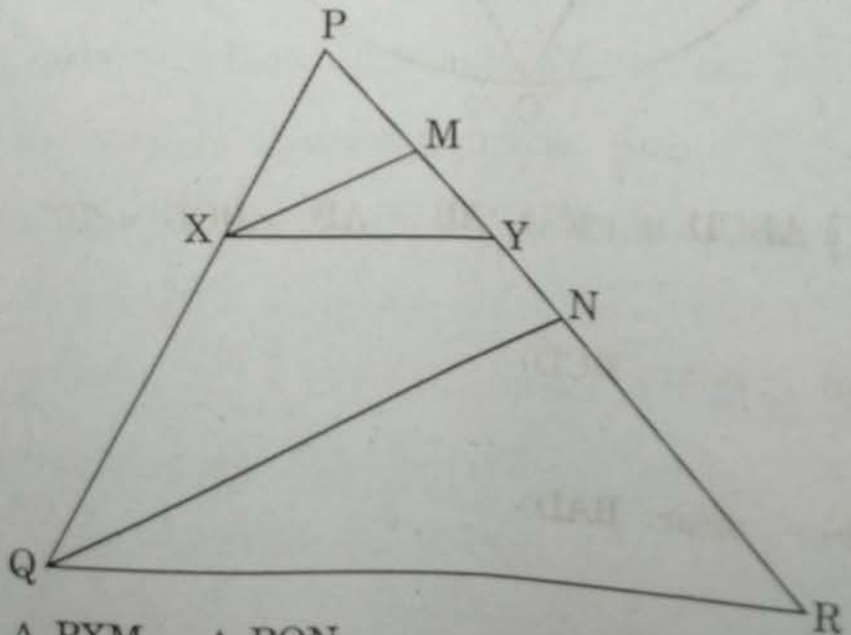
$$\sqrt{\frac{1-\cos A}{1+\cos A}} = \text{cosec } A - \cot A .$$

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

(*i*) If two consecutive angles of a cyclic quadrilateral are congruent, then prove that one pair of opposite sides is parallel and other pair is congruent.

(*ii*) Δ LMN ~ Δ LQP. In Δ LMN, LM = 3.6 cm, $\angle$L = 50°, LN = 4.2 cm and $\frac{LM}{LQ} = \frac{4}{7}$, then construct Δ LQP and Δ LMN.

(*iii*) In Δ PQR, seg XY $\parallel$ side QR, point M and point N are mid-points of seg PY and seg PR respectively, then prove that :



(*a*) Δ PXM ~ Δ PQN

(*b*) seg XM $\parallel$ seg QN.

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

(*i*) Draw the $\angle ABC$ of measure 65°. Draw ray BM which is a bisector of $\angle B$. Take point P on ray BM such that BP = 4 cm. Draw perpendicular on arm BC through the point P. Draw a circle with centre P and length of perpendicular as a radius. Write the measure of radius. Observe the figure and write the relation between circle and arms of the angle.

(*ii*) If point P divides the seg AB joining the points A(2, 1) and B(–3, 6) in the ratio 2 : 3, then determine whether the point P lies on the line $x - 5y + 15 = 0$ or not.