

# 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  $BC = \dots\dots\dots$

(A) 7 cm

(B) 6 cm

(C) 8 cm

(D) 9 cm

P.T.O.

## 2/N 185

(ii)  $\angle PRQ$  is inscribed in the arc  $PRQ$  of a circle with centre  $O$ . If

$$\angle PRQ = 75^\circ, \text{ then } m(\text{arc } PRQ) = \dots\dots\dots$$

(A)  $75^\circ$

(B)  $150^\circ$

(C)  $285^\circ$

(D)  $210^\circ$

(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)  $(12, 9, 15)$

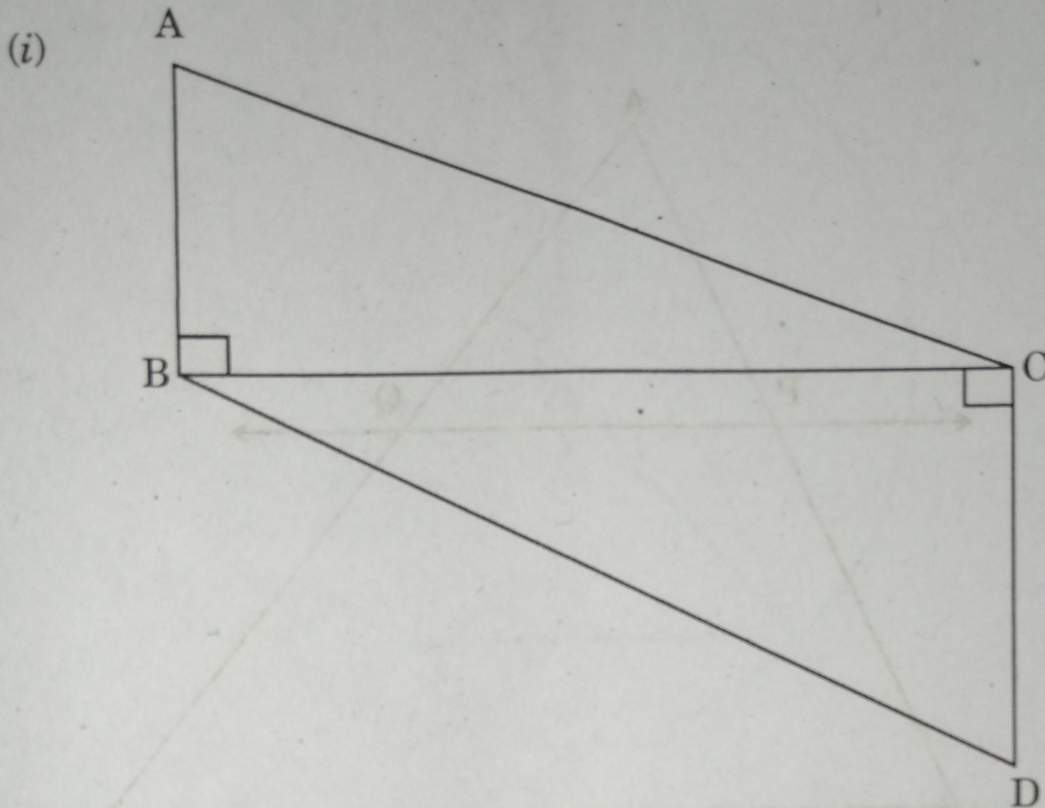
(B)  $(10, 24, 26)$

(C)  $(12, 16, 25)$

(D)  $(15, 17, 8)$

(B) Solve the following sub-questions :

4



In the above figure, seg  $AB \perp$  seg  $BC$ , seg  $DC \perp$  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.

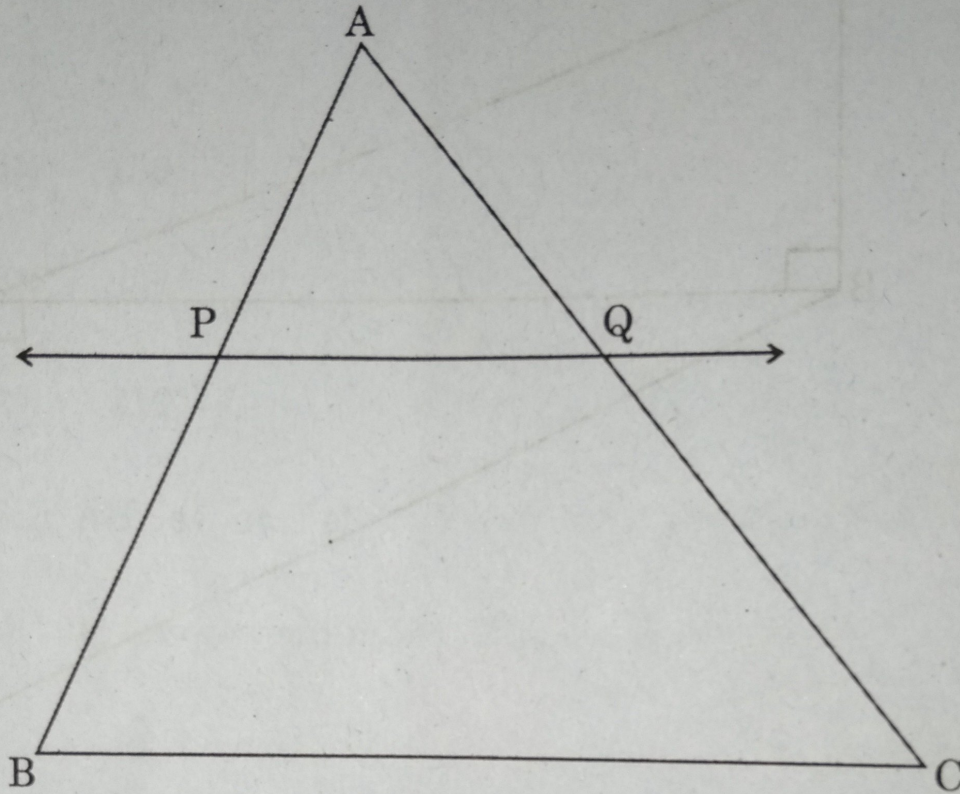
(iii) If  $\tan \theta = \sqrt{3}$ , then find the value of  $\theta$ .

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

# 4/N 185

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

(i)



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

**Activity :** In  $\Delta ABC$ , line  $PQ \parallel$  side  $BC$  ..... (given)

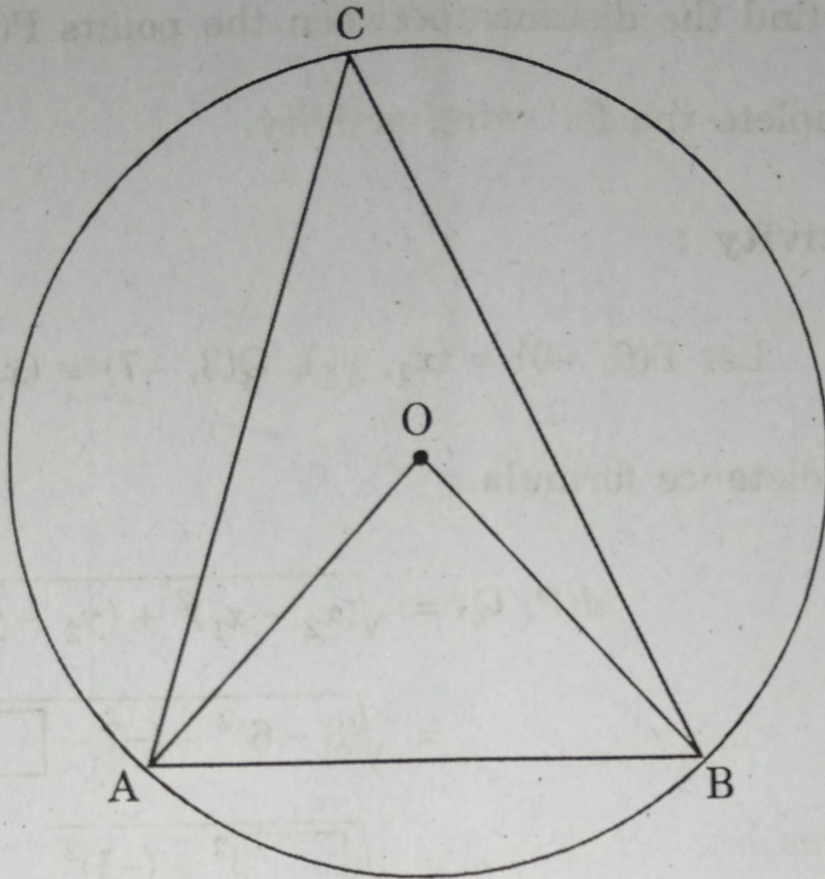
$$\therefore \frac{AP}{PB} = \frac{AQ}{QC} \dots\dots \square$$

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

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

$$\therefore QC = \square$$

(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  $\angle AOB$  and  $\angle ACB$ .

**Activity :**

$\angle AOB = \square^\circ$  ..... ( $\because \Delta AOB$  is an  
equilateral triangle)

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

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

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

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

**Activity :**

$$\text{Let } P(6, -6) \equiv (x_1, y_1), Q(3, -7) \equiv (x_2, y_2)$$

By distance formula,

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

$$= \sqrt{(3 - 6)^2 + (-7 - \boxed{\phantom{00}})^2}$$

$$= \sqrt{(\boxed{\phantom{00}})^2 + (-1)^2}$$

$$= \sqrt{\boxed{\phantom{00}} + 1}$$

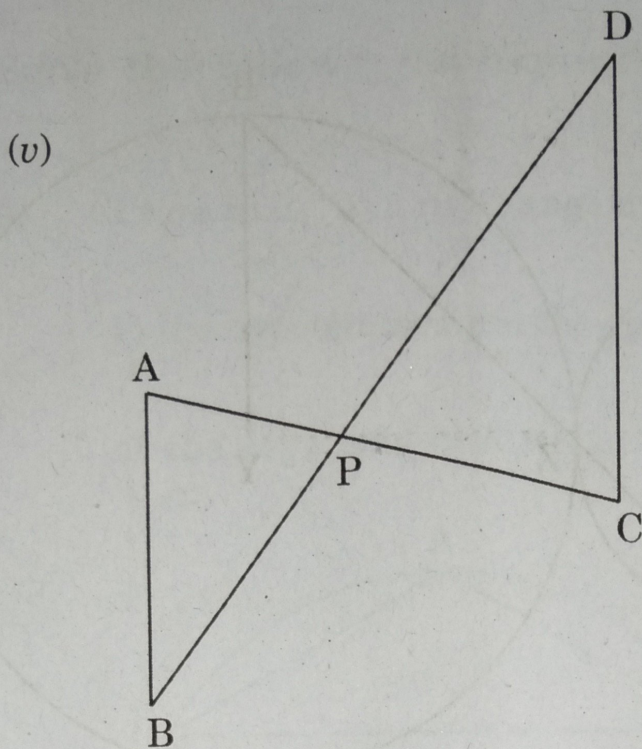
$\therefore$

$$d(P, Q) = \sqrt{\boxed{\phantom{00}}}$$

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

8

- (i) In  $\triangle DEF$ ,  $\angle E = 90^\circ$ . If  $DE = 33$  cm,  $DF = 65$  cm, then find  $EF$ .
- (ii) Measure of two arcs formed by a chord of a circle are  $2x^\circ$  and  $7x^\circ$ . 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  $\cos \theta$ .



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 :

$$\Delta ABP \sim \Delta CDP.$$

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

- (i) If  $\Delta ABC \sim \Delta PQR$ ,  $A(\Delta ABC) = 81 \text{ cm}^2$ ,  $A(\Delta PQR) = 121 \text{ cm}^2$ ,  $BC = 6.3 \text{ cm}$ , then complete the following activity to find QR.

Activity :

$$\Delta ABC \sim \Delta PQR \dots\dots\dots \text{(given)}$$

$$\therefore \frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{\boxed{\phantom{000}}}{QR^2} \dots\dots\dots \boxed{\phantom{000}}$$

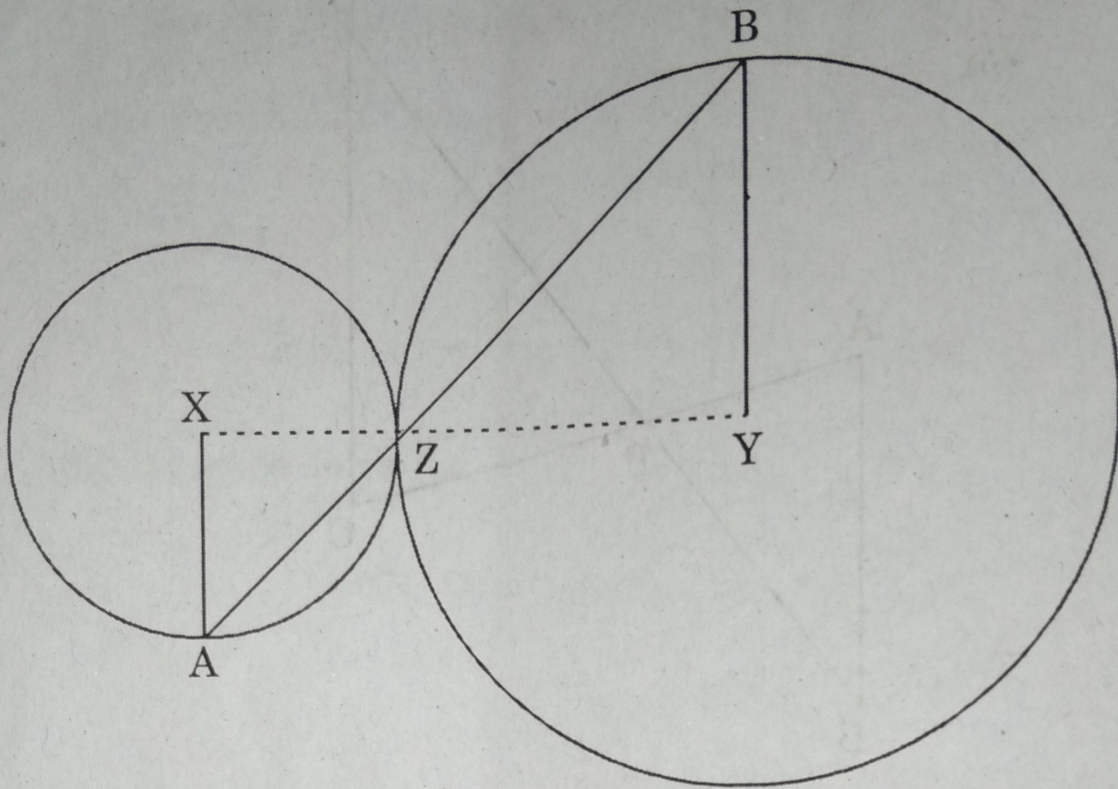
$$\therefore \frac{\boxed{\phantom{000}}}{121} = \frac{(6.3)^2}{QR^2}$$

$$\therefore \frac{\boxed{\phantom{000}}}{11} = \frac{6.3}{QR} \dots\dots \text{(Taking square root of both sides)}$$

$$\therefore QR = \frac{6.3 \times 11}{\boxed{\phantom{000}}}$$

$$\therefore QR = \boxed{\phantom{000}} \text{ cm}$$

(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  $XA \parallel$  radius  $YB$ .

**Activity :** Draw segments  $XZ$  and seg  $ZY$ .

$\therefore$  By theorem of touching circles points X, Z, Y are

$\therefore \angle XZA \cong$   ..... (I) (Vertically opposite angles)

Now seg  $XA \cong$  seg  $XZ$  .....

$\therefore \angle XAZ \cong$   ..... (II) (isosceles triangle theorem)

Similarly seg  $YB \cong$  seg  $YZ$

$\therefore \angle BZY \cong \angle YBZ$  ..... (III)

$\therefore \angle XAZ =$   ..... [from (I), (II) and (III)]

$\therefore$  Radius  $XA \parallel$  radius  $YB$  .....

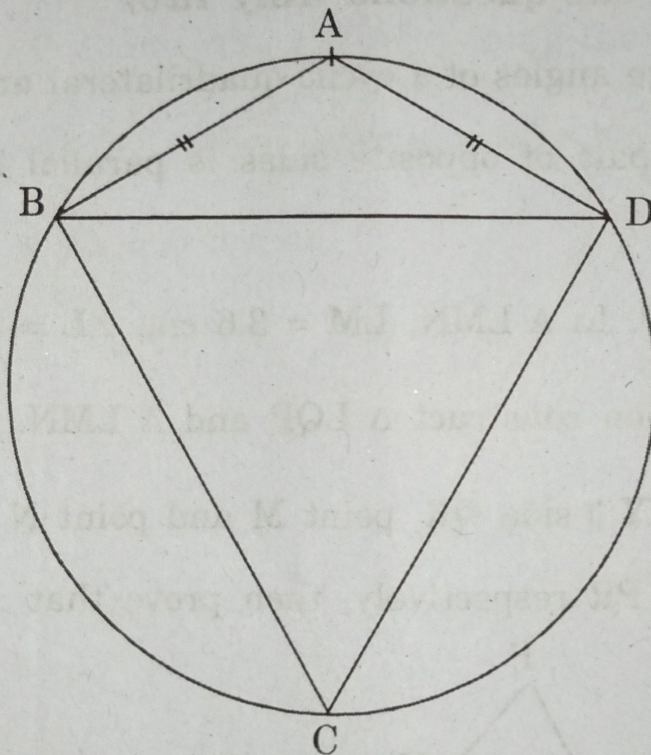
# 9/N 185

(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,  $AB = AD$ ,  $\angle BCD = 70^\circ$ , then find :

(a)  $m(\text{arc } BCD)$

(b)  $m(\text{arc } BAD)$

(c)  $\angle ABD$ .

# 10/N 185

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

(iv) Prove that :

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

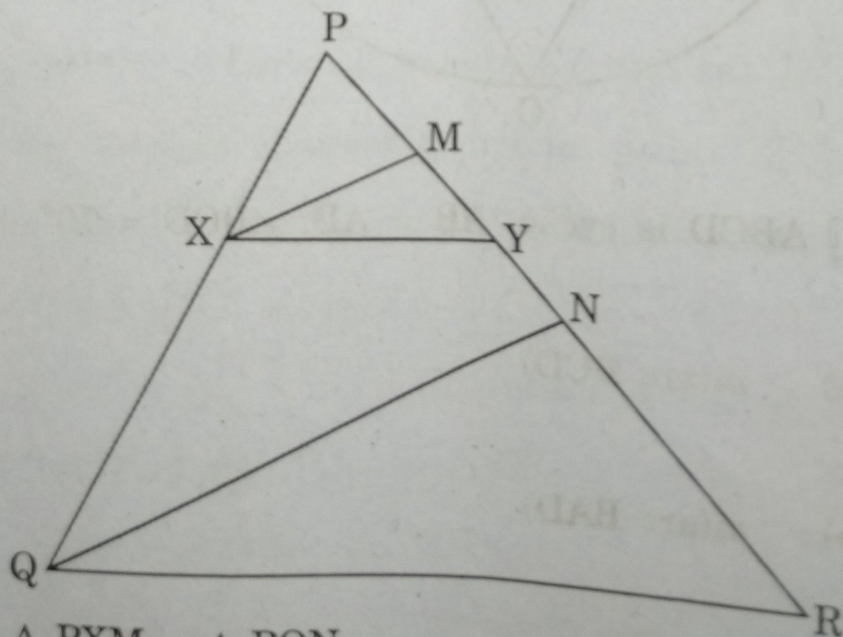
Solve the following sub-questions (Any two) :

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)  $\Delta LMN \sim \Delta LQP$ . In  $\Delta LMN$ ,  $LM = 3.6$  cm,  $\angle L = 50^\circ$ ,  $LN = 4.2$  cm and  $\frac{LM}{LQ} = \frac{4}{7}$ , then construct  $\Delta LQP$  and  $\Delta LMN$ .

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



(a)  $\Delta PXM \sim \Delta PQN$

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

# 11/N 185

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

3

- (i) Draw the  $\angle ABC$  of measure  $65^\circ$ . 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.