

[Aim: 100/100 in Maths]

अभ्यास CLASS 9

LINES AND ANGLES

L-1



Pair of angles :-

1. Complementary angles - two angles are said complementary if their sum is 90°



$$a + b = 30 + 60 \\ = 90^\circ$$

$\therefore a \& b$ are complementary angles



$$a + b = 90^\circ \\ \therefore a \& b \text{ are comp!}$$

Ex 1: Find the complementary of the following angles:-

(i) 45°

$$\text{other} = 90 - 45 = \boxed{45^\circ}$$

(ii) 70°

$$\rightarrow \text{comp.} = 90 - 70 = 20^\circ$$

(iii) p

$$\rightarrow \text{compl.} = (90 - p)^\circ$$

Pair of angles :-

2. Supplementary angles — two angles are said to be suppl. when their sum is 180°



$$a + b = 60 + 120 \\ = \underline{180^\circ}$$

$\therefore a \text{ \& } b \text{ are suppl.}$



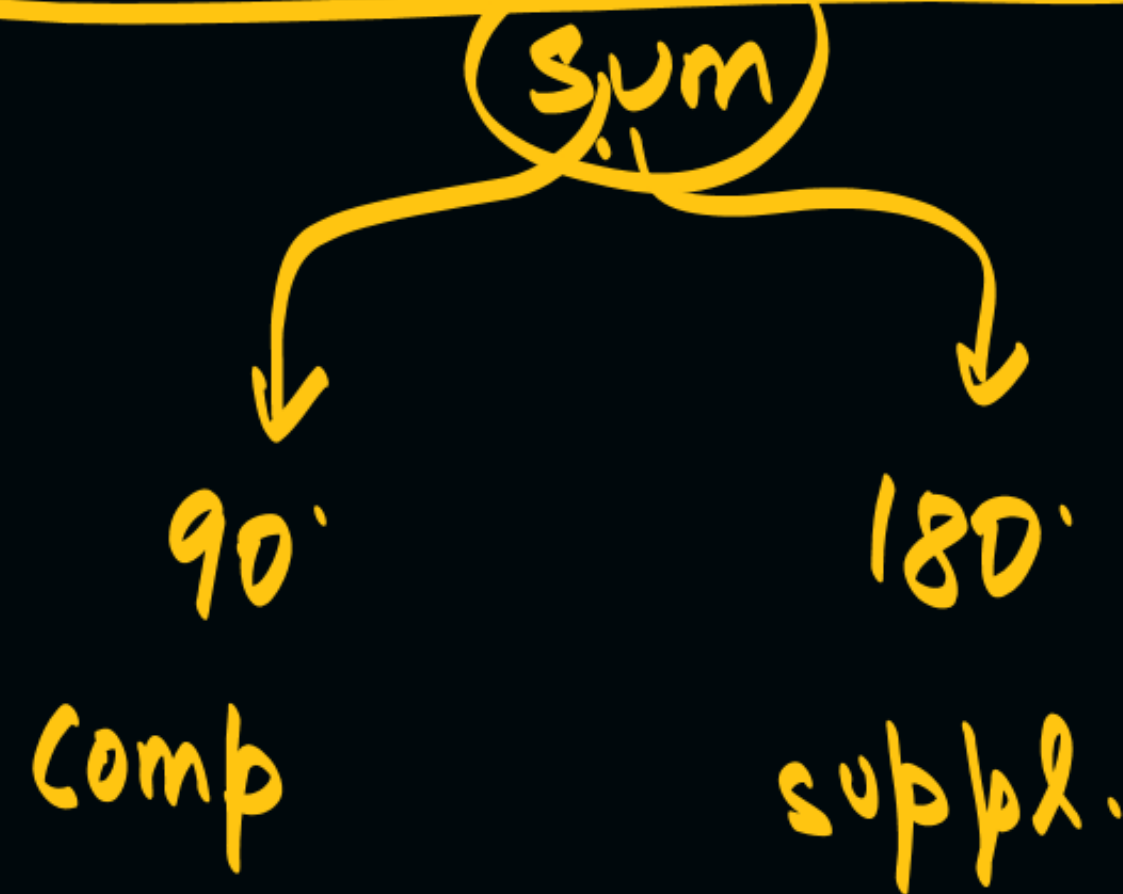
$$a + b = 150 + 30 = 180 \\ a \text{ \& } b \text{ are suppl.}$$

#LP:- Find the supplementary of the following angles:-

(i) 120°
 $\rightarrow \text{supp} = 180 - 120 = 60^\circ$

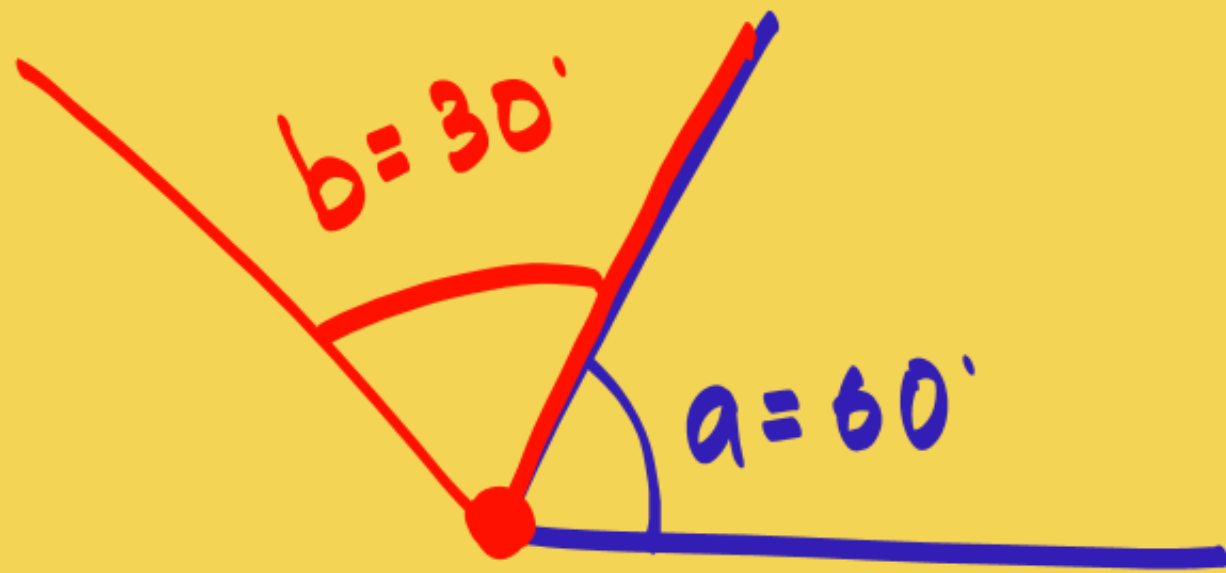
(ii) 110°
 $\rightarrow \text{supp} = 180 - 110 = 70^\circ$

(iii) $(110 - x)^\circ$
 $\rightarrow \text{supp} = 180 - (110 - x)$
 $\Rightarrow 180 - 110 + x$
 $\Rightarrow (70 + x)^\circ$



Pair of angles :-

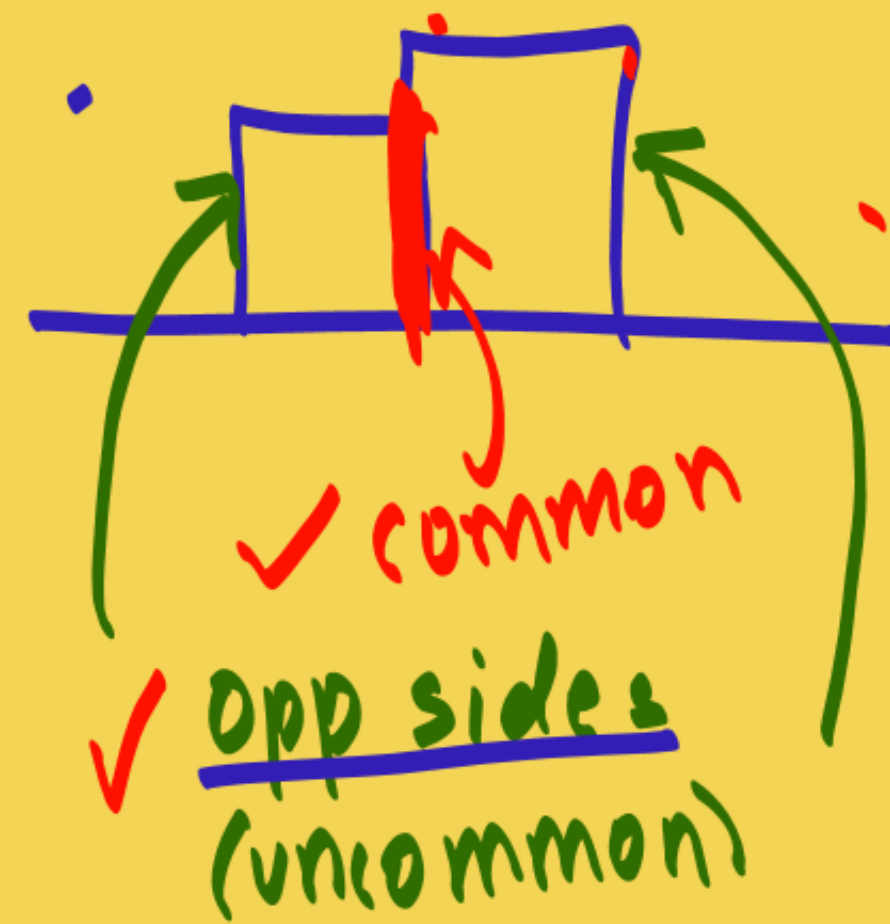
3. Adjacent angles - पड़ोसी angles



✓ common

✓ 2 uncommon opp. sides

a & b are adjacent



✓ common

✓ opp sides
(uncommon)

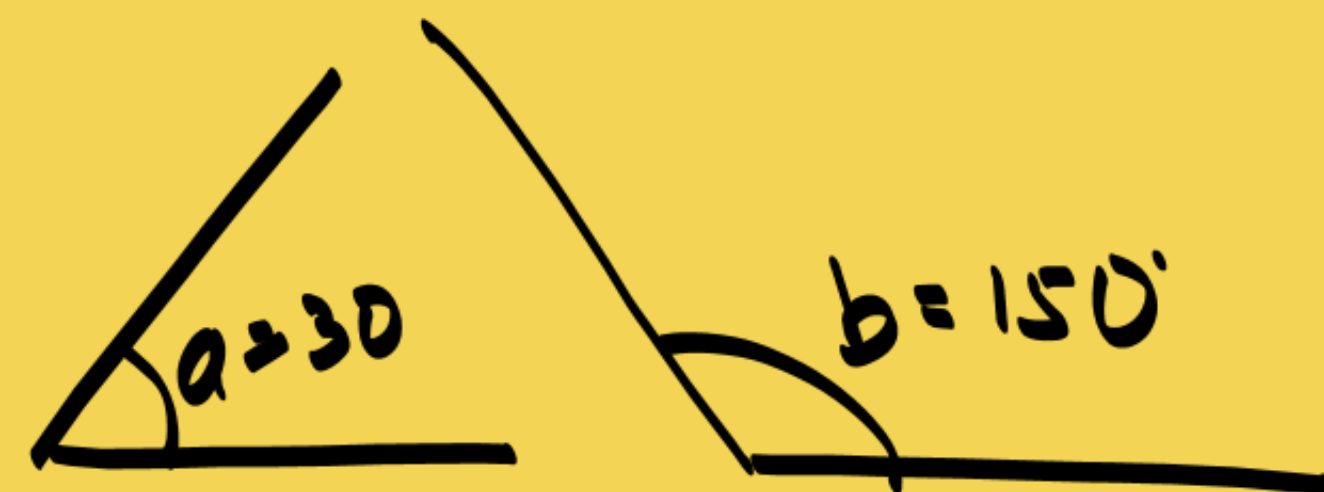
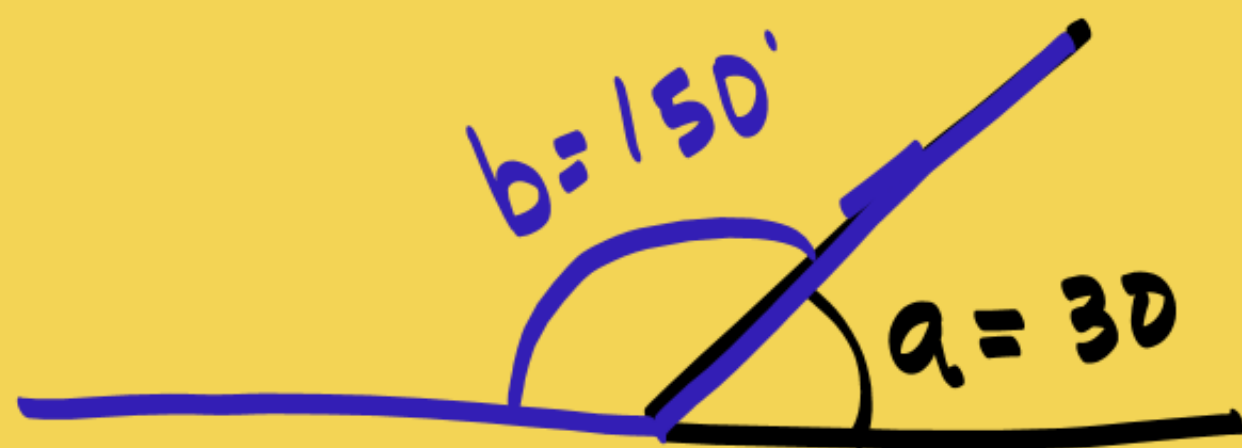


a & b are adjacent?

~~T/F~~ F

Pair of angles :-

4. Linear pair angles :- adjacent angles जिनका sum = 180° हो।
(पड़ोसी)



$a, b \rightarrow \text{supp. } \checkmark$
 $\text{L.P. } \times$

(i) adj $\checkmark$
(ii) sum = 180 $\checkmark$
 $= 150 + 30$
 $= 180$

L.P. $\checkmark$
SP $\checkmark$

K3B All L.P. are supp.
but all supp are not L.P. angles.

LP : Find the angle which is :

- 20° more than its complement
- 36° less than its supplement

(i) let angle is x .
 its compl $\Rightarrow (90 - x)$

ATQ Angle = $20 + (\text{comp})$

$$x = 20 + (90 - x)$$

$$2x = 110$$

$$x = \frac{110}{2}$$

$$x = 55^\circ$$

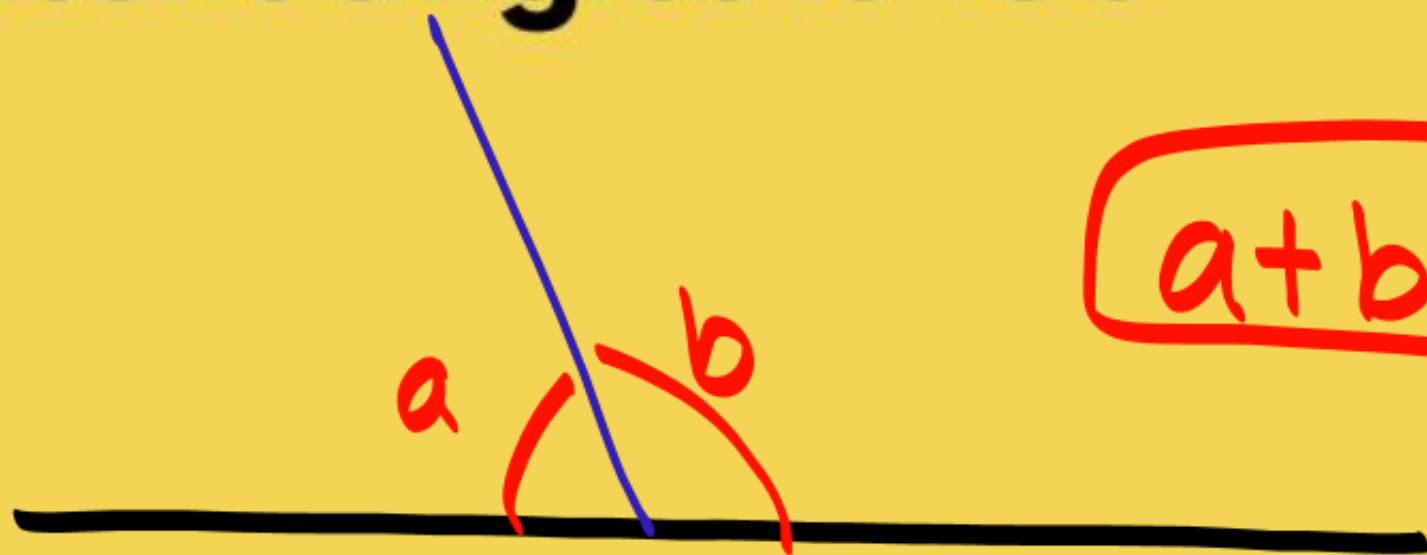
(ii) let angle is ' x '
 its supp = $(180 - x)$

ATQ, Angle = Suppl - 36

$$x = (180 - x) - 36$$

$$x = 72^\circ$$

Axiom 1 : If a ray stand on a line, then the sum of adjacent angles is 180°



$$a + b = 180$$

4th line पर Ray
[Linear Pair Axiom]

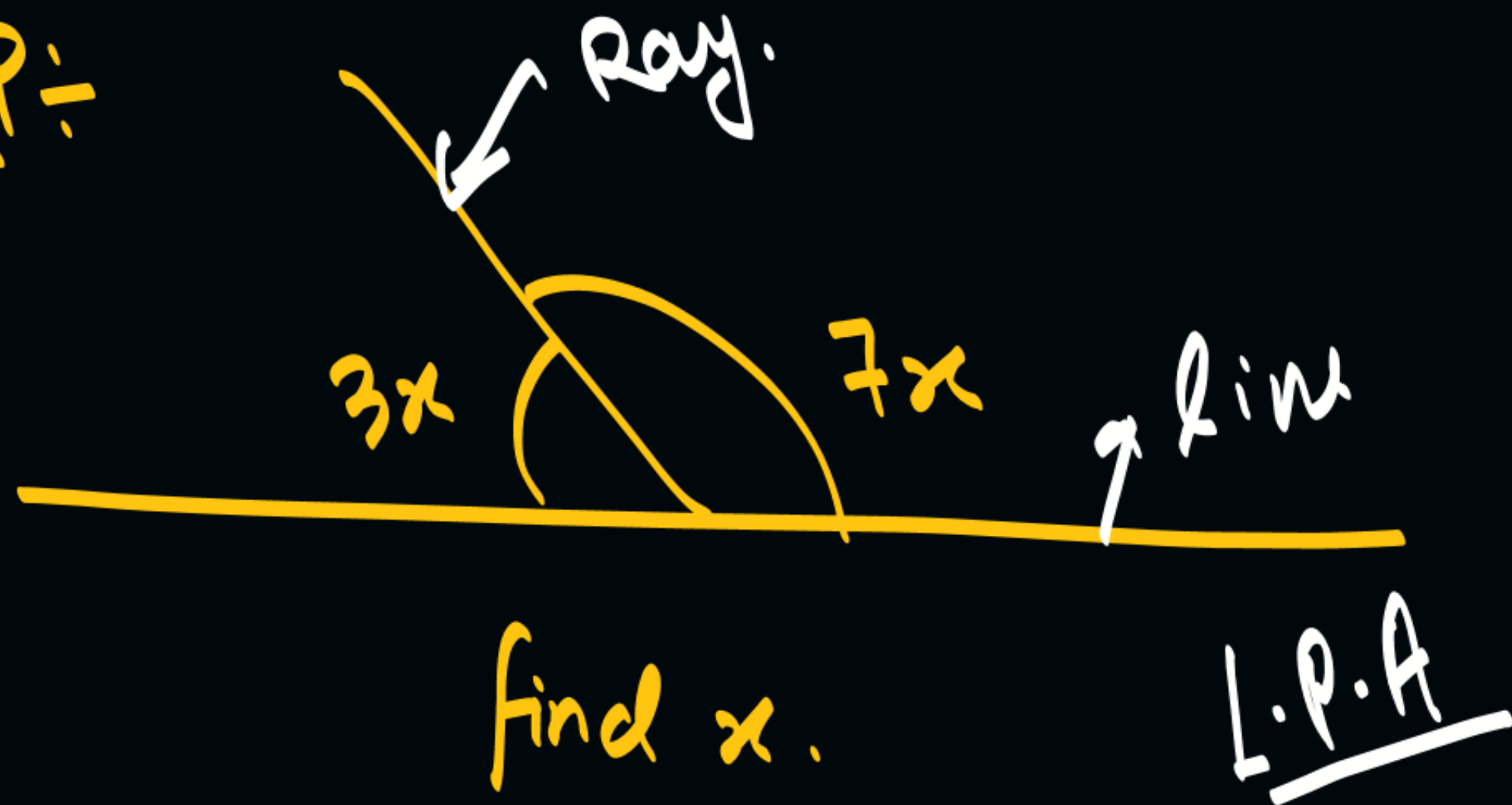
Axiom 2 : If sum of adjacent angle is 180° then , non - common arms forms line.

⊗ अगर adj का $sum = 180$ है
तो st. line होगी

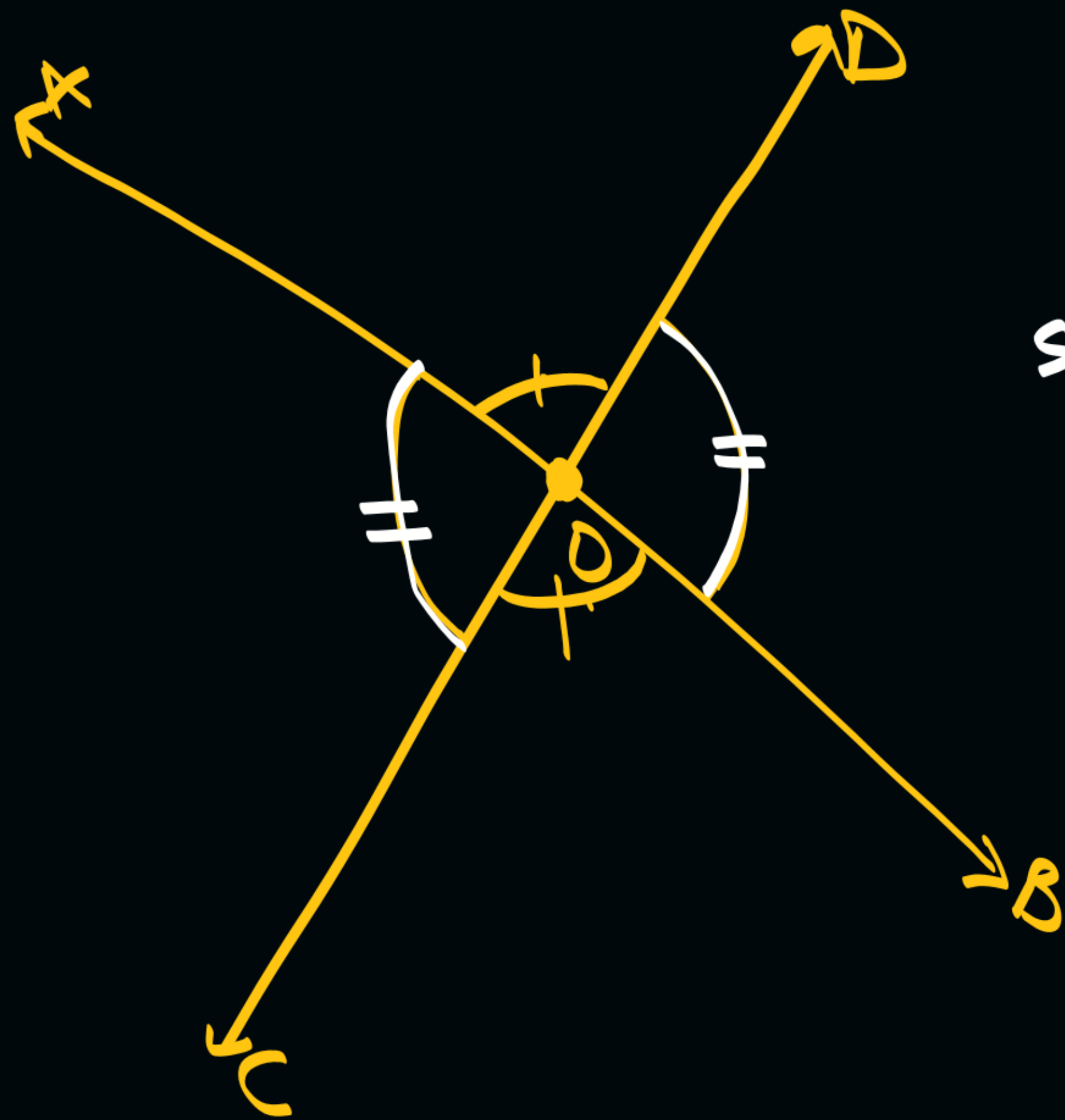


$$a + b = 180$$

#LP:



$$\begin{aligned} 3x + 7x &= 180 \\ 10x &= 180 \\ \boxed{x} &= 18 \end{aligned}$$



$\angle AOD = \angle BOC \rightarrow$ vertically opp. angles

slly. $\angle AOC = \angle DOB \rightarrow$ v.o.a.



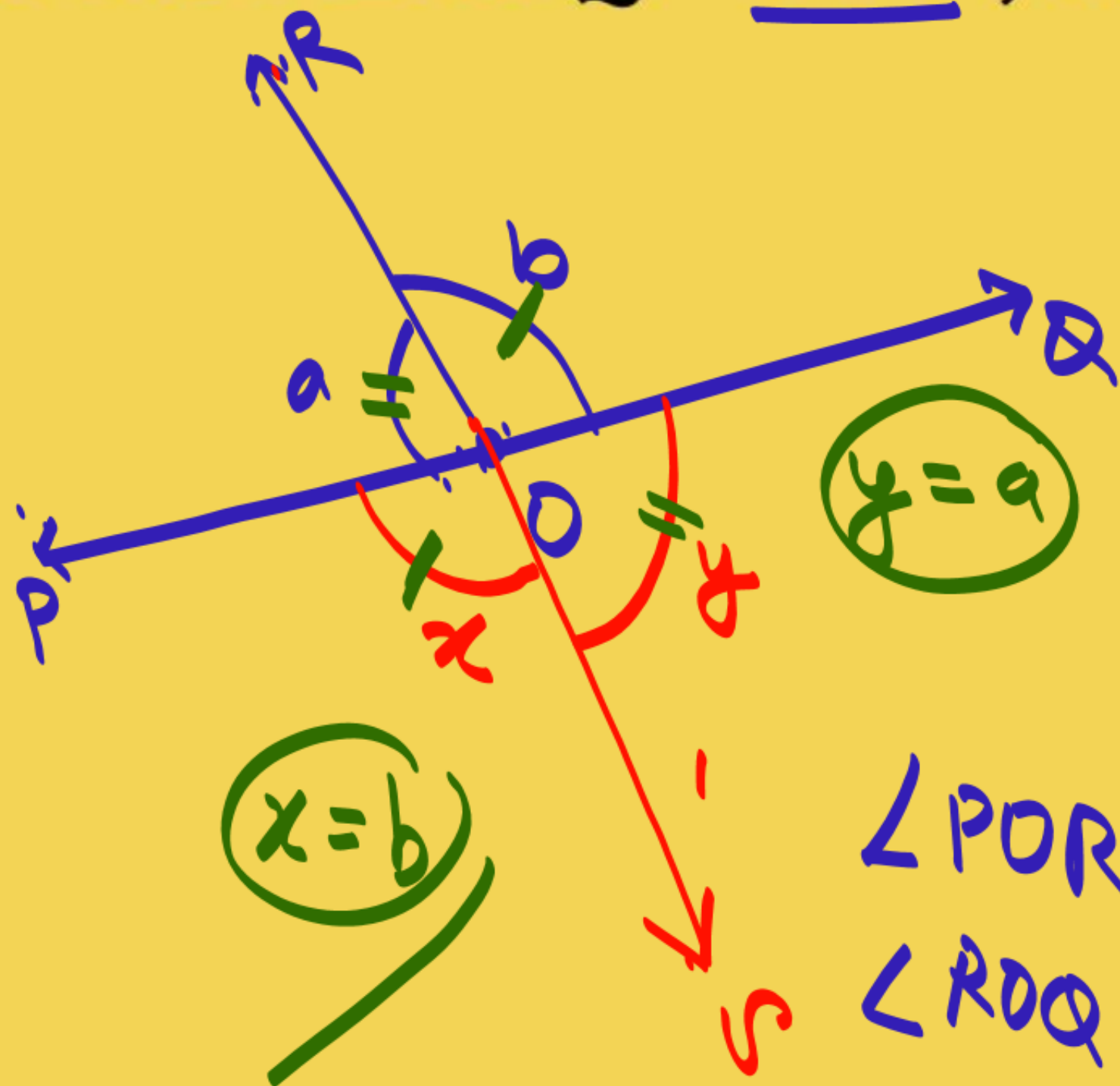
Kat

अभ्यास

Theorem : If two lines intersect each other then vertical opposite angles are equal.

LP : Ray OR intersects line PQ at O .

If $\angle POR : \angle ROQ = \underline{5 : 7}$, then find $\angle POR$ & $\angle ROQ$.



$$\frac{a}{b} = \frac{5}{7}$$

let $a = 5x$ & $b = 7x$

by L.P.A

$$5x + 7x = 180$$

$$12x = 180$$

$$x = \frac{180}{12}$$

$$x = 15$$

$$\angle POR = a = 5x = 5 \times 15 = 75^\circ$$

$$\angle ROQ = b = 7x = 15 \times 7 = 105^\circ$$

LP : If $\angle PQR = \angle PRQ$, prove that $\angle PQS = \angle PRT$.

Given:- $\angle PQR = \angle PRQ$

To prove:- $\angle PQS = \angle PRT$

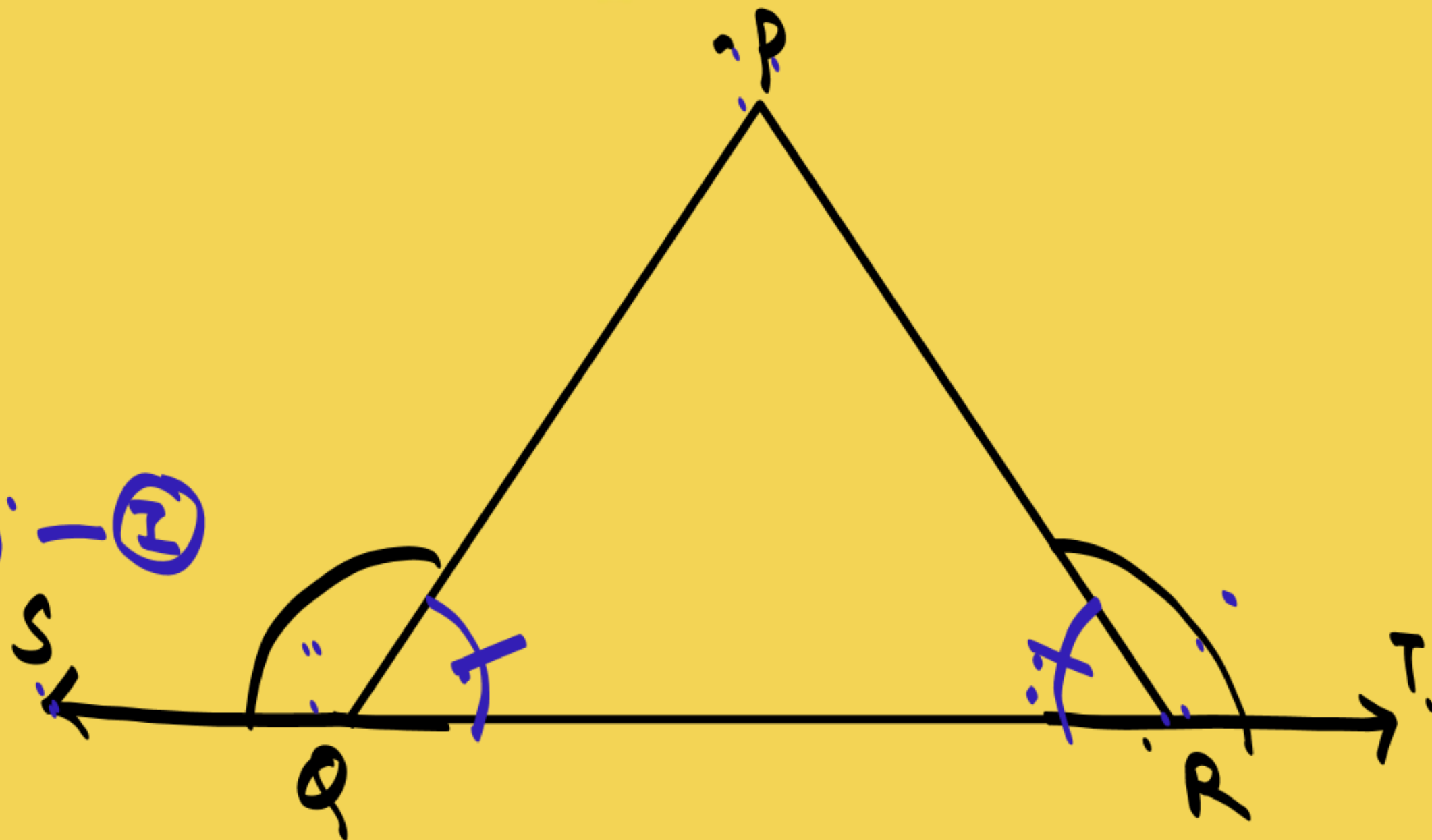
Proof:- QP is a ray on SR

by LPA $\Rightarrow \angle PQS + \angle PQR = 180^\circ$ — (I)

Similarly, PR is ray on QT.

by LPA $\Rightarrow \angle PRQ + \angle PRT = 180^\circ$ — (II)

$$\textcircled{I} \text{ and } \textcircled{II} \quad \cancel{\angle PQS + \angle PQR} = \cancel{\angle PRQ + \angle PRT} \Rightarrow \angle PQS = \angle PRT \quad \text{H.P.}$$



Q3B

→ आवी Rays given थी 9 line वही given थी इसलिए
अभय
construction करी

LP : OP , OQ , OR and OS are four rays .

Prove that $\angle POQ + \angle QOR + \angle SOR + \angle POS = 360^\circ$

* Const $\Rightarrow$ extend OQ backwards to form a line

Proof:- QQ' line & OP ray

$$\angle 1 + \angle 5 = 180^\circ \text{ --- (I)}$$

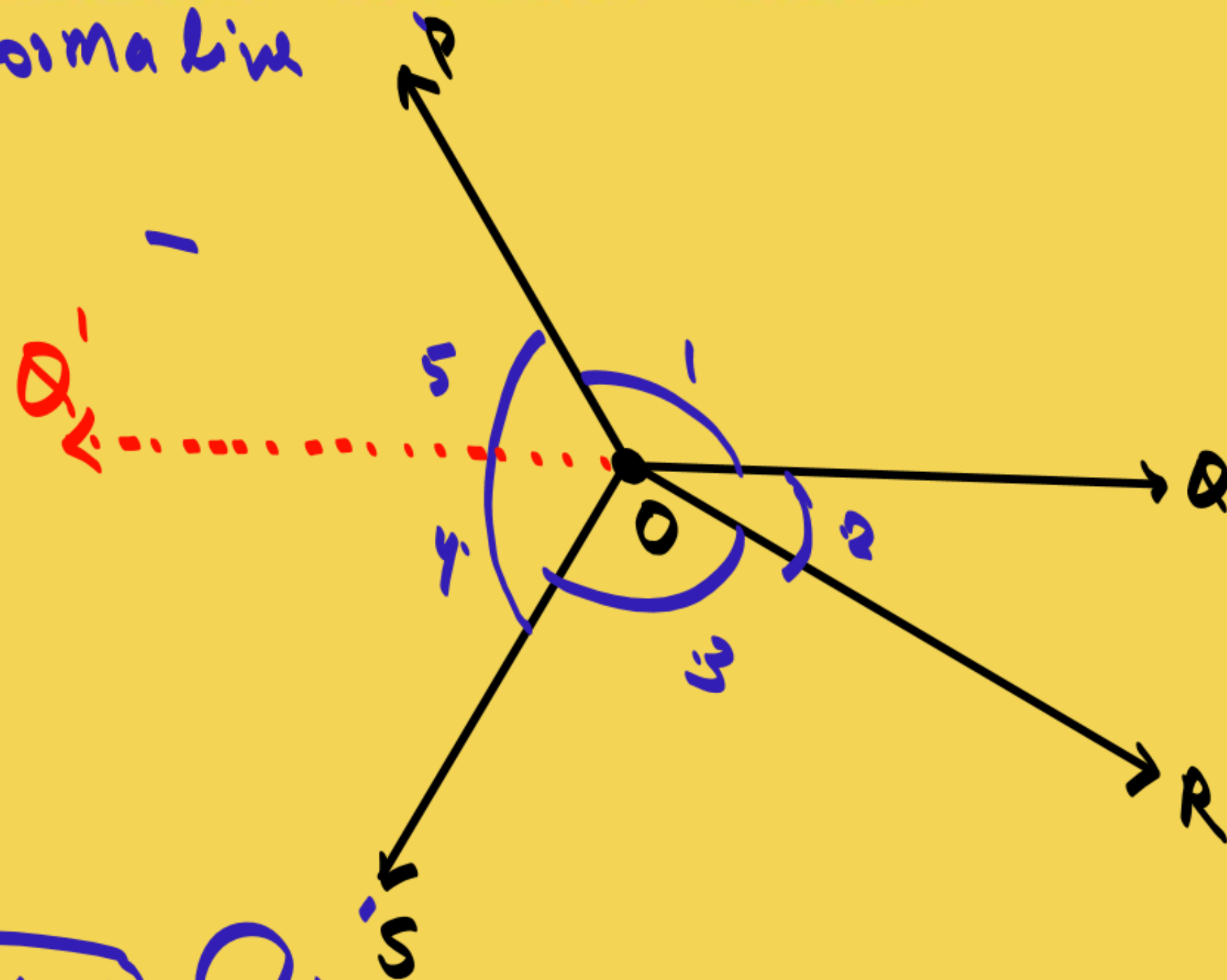
QQ' line & OR & OS are rays

$$\angle 2 + \angle 3 + \angle 4 = 180^\circ \text{ --- (II)}$$

Add (I) & (II)

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 = 180 + 180$$

$$\angle POQ + \angle QOR + \angle ROS + \angle POS = 360^\circ \quad \text{HP}$$



LP : In the figure , AOB is a straight line . Ray OC is perpendicular to line AB . OD is another ray lying between OA and OC . Prove that :

$$\angle COD = \frac{1}{2} (\angle BOD - \angle AOD)$$

Q.P.A $\Rightarrow \angle AOD + \angle COD + \angle BOC = 180$ (Q.P.)

$$\angle AOD + \angle COD + 90 = 180$$

$$\angle AOD + \angle COD = 90$$

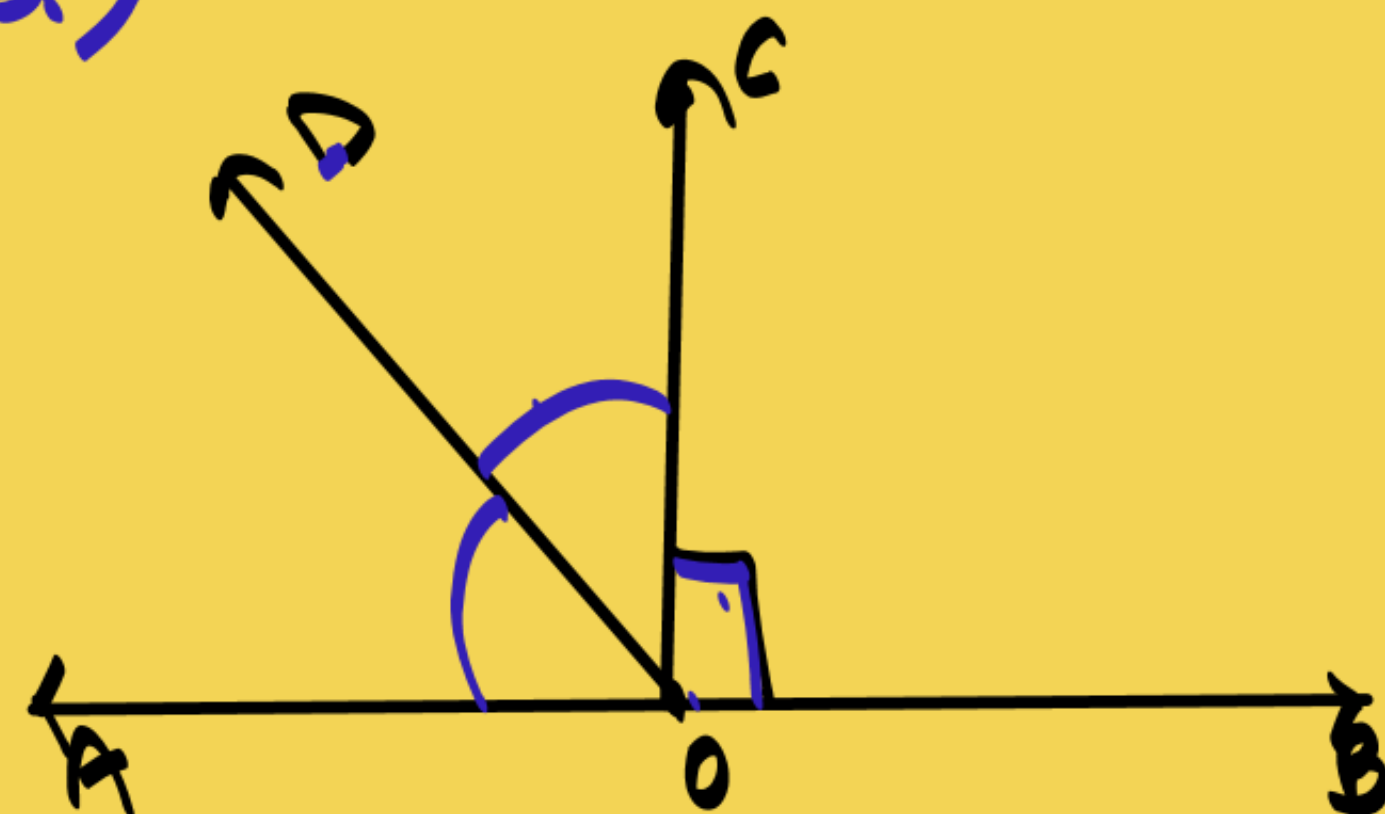
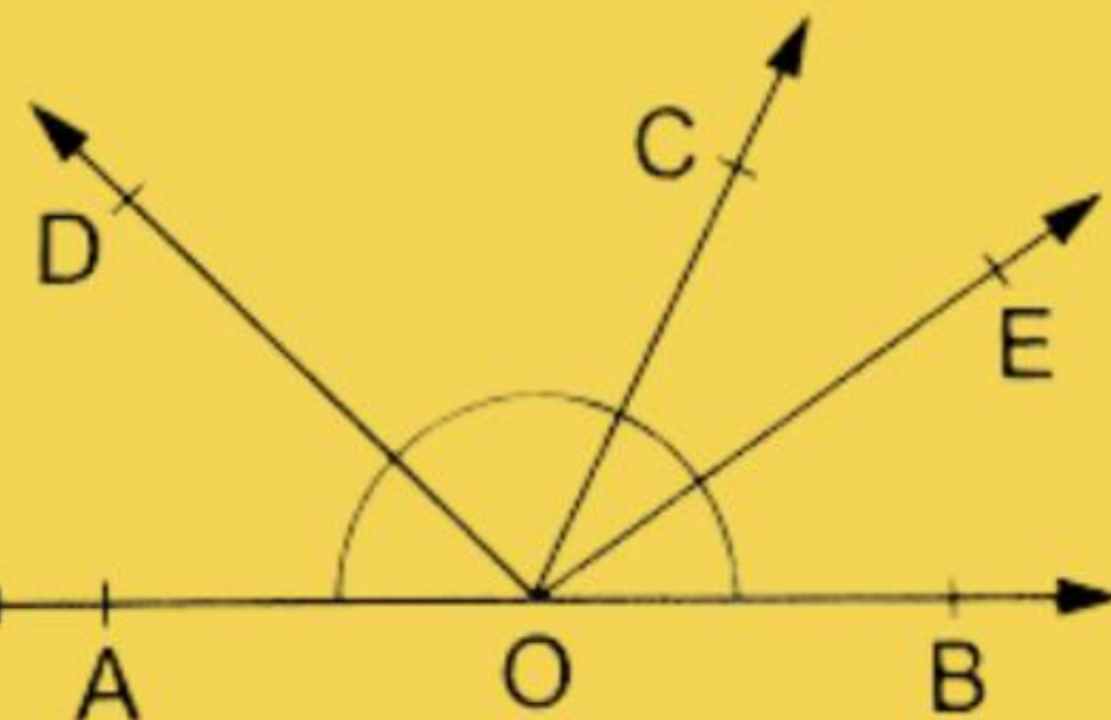
$$\angle BOD + \angle COD = 90 - \angle AOD + \angle BOD \quad (\text{adding BOD both sides})$$

$$\angle BOC + \angle COD + \angle COD = 90 - \angle AOD + \angle BOD$$

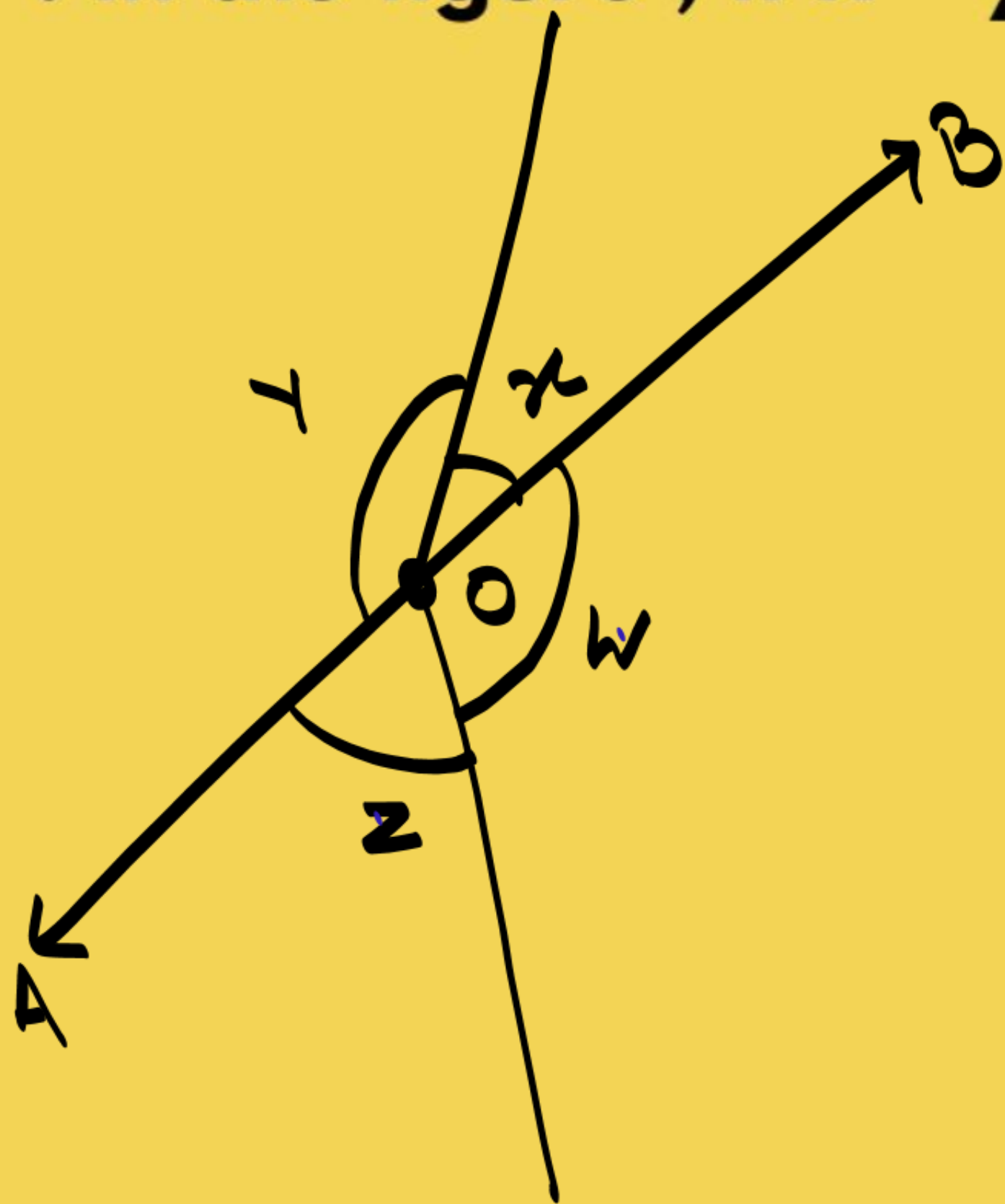
$$90 + 2\angle COD = 90 - \angle AOD + \angle BOD$$

$$2\angle COD = \angle BOD - \angle AOD$$

$$\angle COD = \frac{1}{2} (\angle BOD - \angle AOD) \quad \text{HP}$$



LP : In the figure , if $x + y = w + z$, then prove that AOB is a line.



given:- $x + y = w + z$ — (1)
 To prove:- AOB is st. line.

or

$$x + y = 180^\circ / w + z = 180^\circ$$

Proof:-

from (1)

$$x + y + w + z = 360^\circ$$

$$w + z + w + z = 360$$

$$2(w + z) = 360 / 180$$

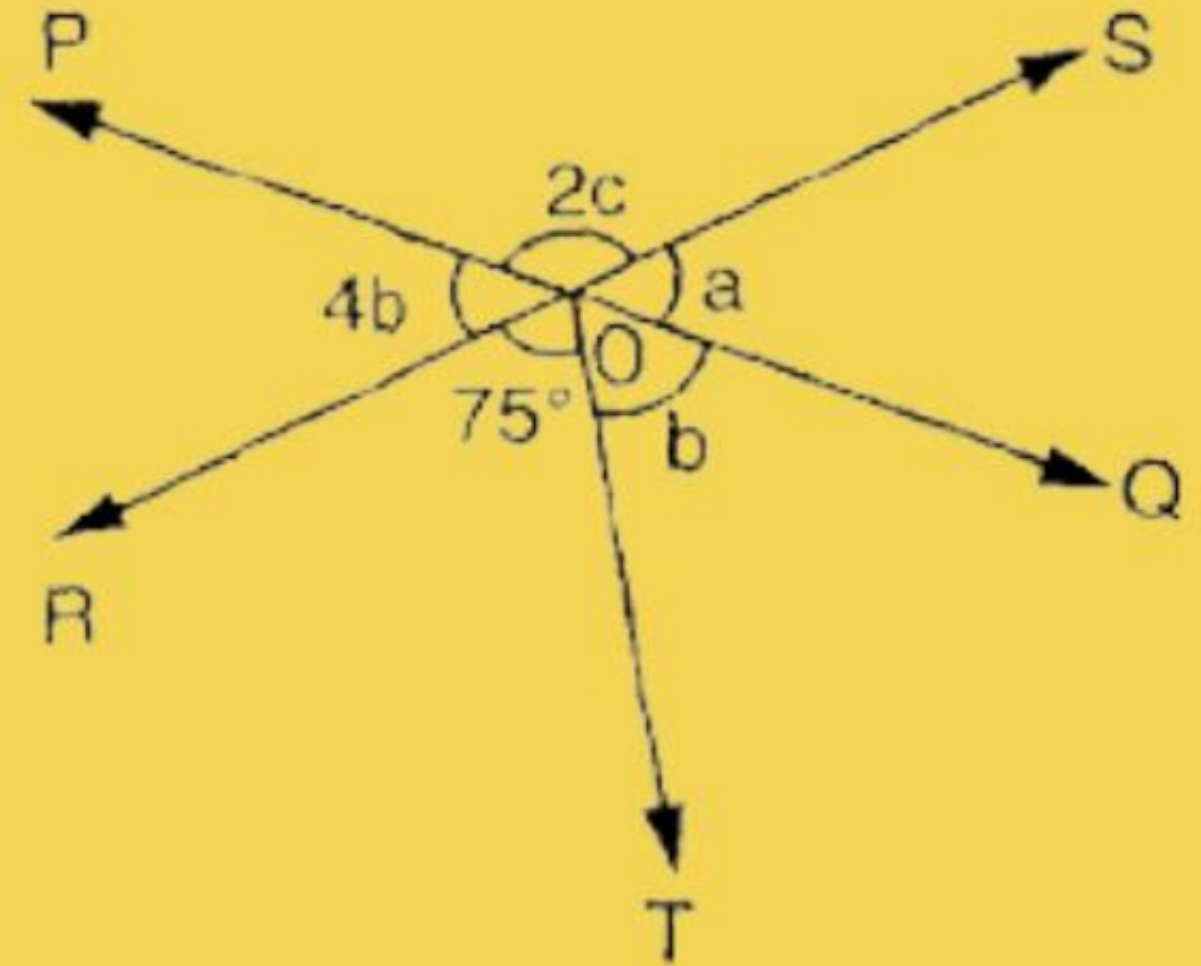
$$(w + z = 180^\circ) \text{ L.P.}$$

by conv. of L.P.A

AOB is st. line.



~~LP~~ : In the figure , if two straight line PQ and RS intersects each other at O . If $\angle POT = 75^\circ$, find the values of a , b and c .





THANK YOU
COODIES

