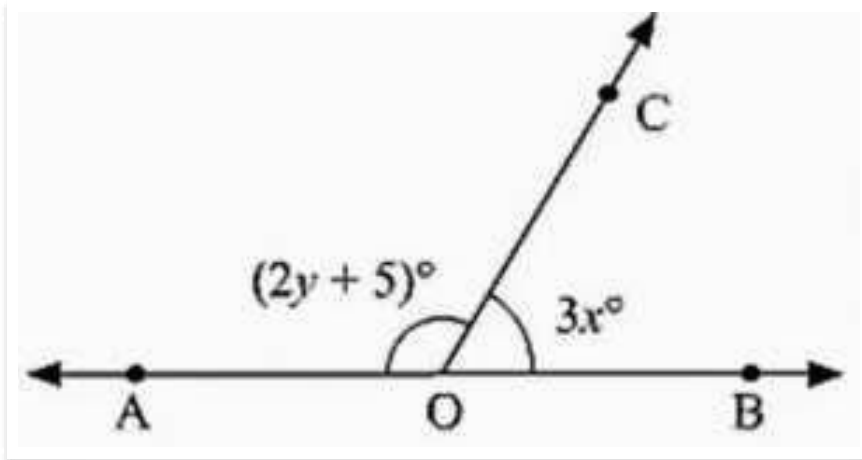


Q 1: In the below Fig. OA and OB are opposite rays:

(i) If $x = 25$, what is the value of y ?

(ii) If $y = 35$, what is the value of x ?



Ans :

(i) Given that,

$$x = 25$$

Since $\angle AOC$ and $\angle BOC$ form a linear pair

$$\angle AOC + \angle BOC = 180^\circ$$

Given that $\angle AOC = 2y + 5$ and $\angle BOC = 3x$

$$\angle AOC + \angle BOC = 180^\circ$$

$$(2y + 5) + 3x = 180$$

$$(2y + 5) + 3(25) = 180$$

$$2y + 5 + 75 = 180$$

$$2y + 80 = 180$$

$$2y = 180 - 80 = 100$$

$$y = 100/2 = 50$$

$$y = 50$$

(ii) Given that,

$$y = 35$$

$$\angle AOC + \angle BOC = 180^\circ$$

$$(2y + 5) + 3x = 180$$

$$(2(35) + 5) + 3x = 180$$

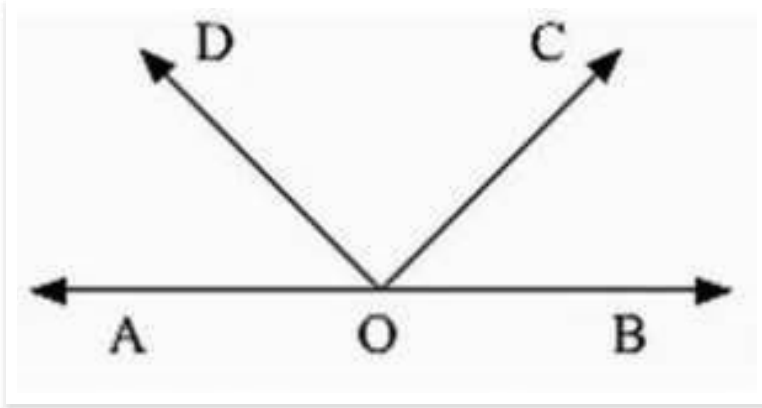
$$(70 + 5) + 3x = 180$$

$$3x = 180 - 75$$

$$3x = 105$$

$$x = 35$$

Q 2 : In the below figure, write all pairs of adjacent angles and all the linear pairs.



Ans : Adjacent angles are :

(i) $\angle AOC$, $\angle COB$

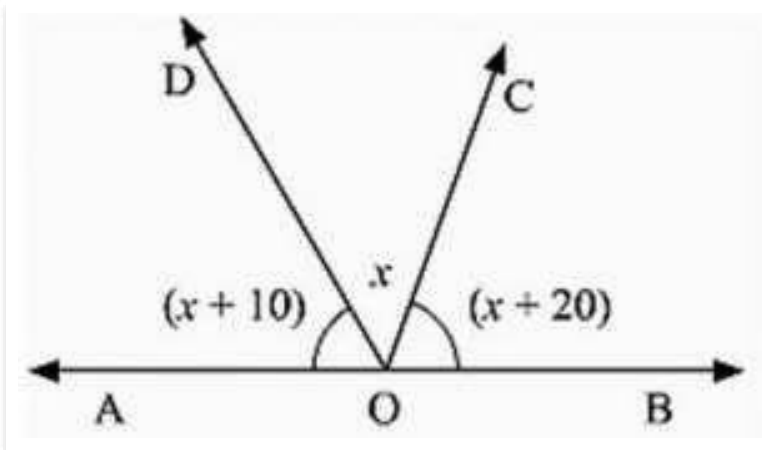
(ii) $\angle AOD$, $\angle BOD$

(i) $\angle AOD$, $\angle COD$

(i) $\angle BOC$, $\angle COD$

Linear pairs : $\angle AOD$, $\angle BOD$, $\angle AOC$, $\angle BOC$

Q 3 : In the given below figure, find x . Further find $\angle COD$, $\angle AOD$, $\angle BOC$



Ans : Since $\angle AOD$ and $\angle BOD$ form a line pair,

$$\angle AOD + \angle BOD = 180^\circ$$

$$\angle AOD + \angle BOC + \angle COD = 180^\circ$$

Given that,

$$\angle AOD = (x + 10)^\circ, \angle COD = x^\circ, \angle BOC = (x + 20)^\circ$$

$$(x + 10) + x + (x + 20) = 180$$

$$3x + 30 = 180$$

$$3x = 180 - 30$$

$$3x = 150/3$$

$$x = 50$$

Therefore, $\angle AOD = (x + 10)$

$$= 50 + 10 = 60$$

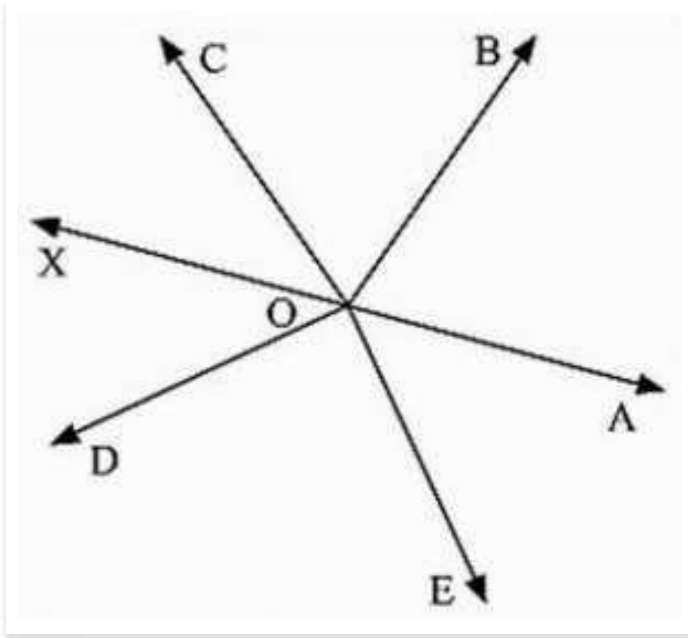
$$\angle COD = x = 50^\circ$$

$$\angle COD = (x + 20)$$

$$= 50 + 20 = 70$$

$$\angle AOD = 60^\circ \quad \angle COD = 50^\circ \quad \angle BOC = 70^\circ$$

Q 4 : In the Given below figure rays OA, OB, OC, OD and OE have the common end point O. Show that $\angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOA = 360^\circ$



Ans : Given that OA, OB, OD and OE have the common end point O.

A ray opposite to OA is drawn

Since $\angle AOB$, $\angle BOF$ are linear pairs,

$$\angle AOB + \angle BOF = 180^\circ$$

$$\angle AOB + \angle BOC + \angle COF = 180^\circ \quad \text{--(1)}$$

Also,

$\angle AOE$ and $\angle EOF$ are linear pairs

$$\angle AOE + \angle EOF = 180^\circ$$

$$\angle AOE + \angle DOF + \angle DOE = 180^\circ \quad \text{--(2)}$$

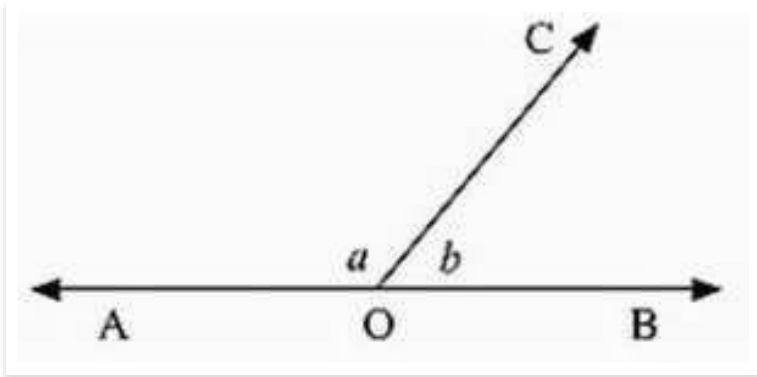
By adding (1) and (2) equations we get

$$\angle AOB + \angle BOC + \angle COF + \angle AOE + \angle DOF + \angle DOE = 180^\circ$$

$$\angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOA = 180^\circ$$

Hence proved.

Q 5 : In the Below figure, $\angle AOC$ and $\angle BOC$ form a linear pair. If $a - 2b = 30^\circ$, find a and b ?



Ans : Given that,

$\angle AOC$ and $\angle BOC$ form a linear pair

If $a - b = 30$

$\angle AOC = a^\circ$, $\angle BOC = b^\circ$

Therefore, $a + b = 180$ --(1)

Given $a - 2b = 30$ --(2)

By subtracting (1) and (2)

$$a + b - a + 2b = 180 - 30$$

$$3b = 150$$

$$b = 150/3$$

$$b = 50$$

Since $a - 2b = 30$

$$a - 2(50) = 30$$

$$a = 30 + 100$$

$$a = 130$$

Hence, the values of a and b are 130° and 50° respectively.

Q 6 : How many pairs of adjacent angles are formed when two lines intersect at a point ?

Ans : Four pairs of adjacent angles will be formed when two lines intersect at a point.

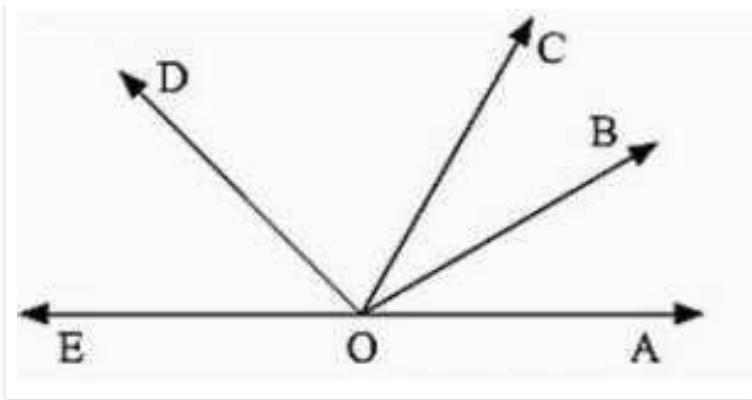
Considering two lines AB and CD intersecting at O

The 4 pairs are :

$(\angle AOD, \angle DOB)$, $(\angle DOB, \angle BOC)$, $(\angle COA, \angle AOD)$ and $(\angle BOC, \angle COA)$

Hence, 4 pairs of adjacent angles are formed when two lines intersect at a point.

Q 7 : How many pairs of adjacent angles , in all, can you name in the figure below ?



Ans : Pairs of adjacent angles are :

$\angle EOC, \angle DOC$

$\angle EOD, \angle DOB$

$\angle DOC, \angle COB$

$\angle EOD, \angle DOA$

$\angle DOC, \angle COA$

$\angle BOC, \angle BOA$

$\angle BOA, \angle BOD$

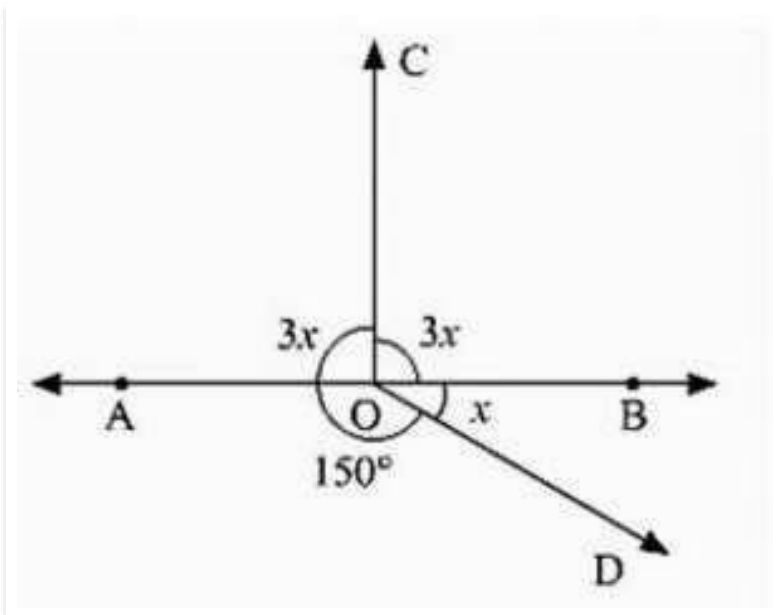
$\angle BOA, \angle BOE$

$\angle EOC, \angle COA$

$\angle EOC, \angle COB$

Hence, 10 pair of adjacent angles.

Q 8 : In the below figure, find value of x ?



Ans : Since the sum of all the angles round a point is equal to 360°

$$3x + 3x + 150 + x = 360$$

$$7x = 360 - 150$$

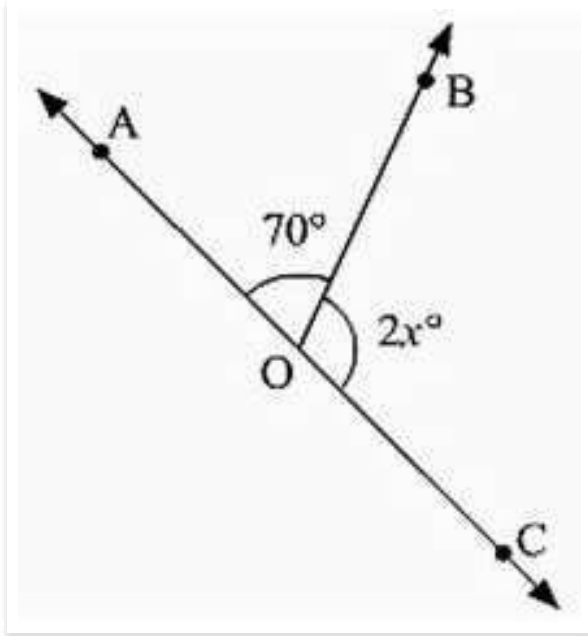
$$7x = 210$$

$$x = 210/7$$

$$x = 30$$

Value of x is 30°

Q 9 : In the below figure, AOC is a line, find x.



Ans : Since $\angle AOB$ and $\angle BOC$ are linear pairs,

$$\angle AOB + \angle BOC = 180^\circ$$

$$70 + 2x = 180$$

$$2x = 180 - 70$$

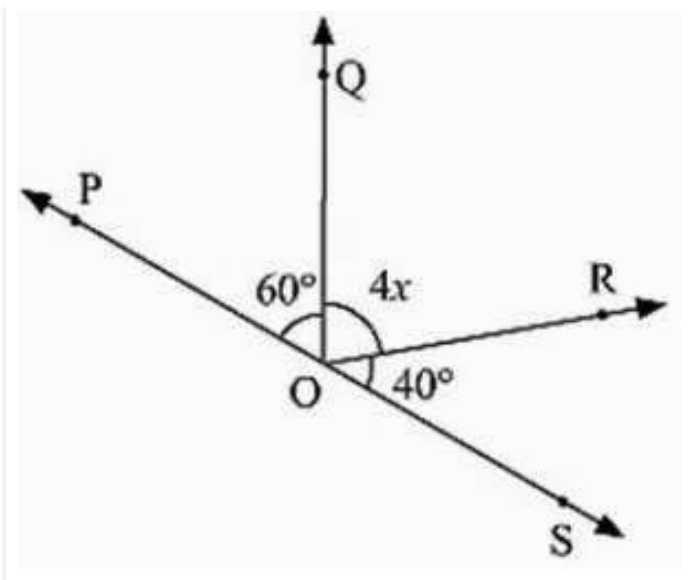
$$2x = 110$$

$$x = 110/2$$

$$x = 55$$

Hence, the value of x is 55°

Q 10 : In the below figure, POS is a line, Find x ?



Ans : Since $\angle POQ$ and $\angle QOS$ are linear pairs

$$\angle POQ + \angle QOS = 180^\circ$$

$$\angle POQ + \angle QOR + \angle SOR = 180^\circ$$

$$60 + 4x + 40 = 180$$

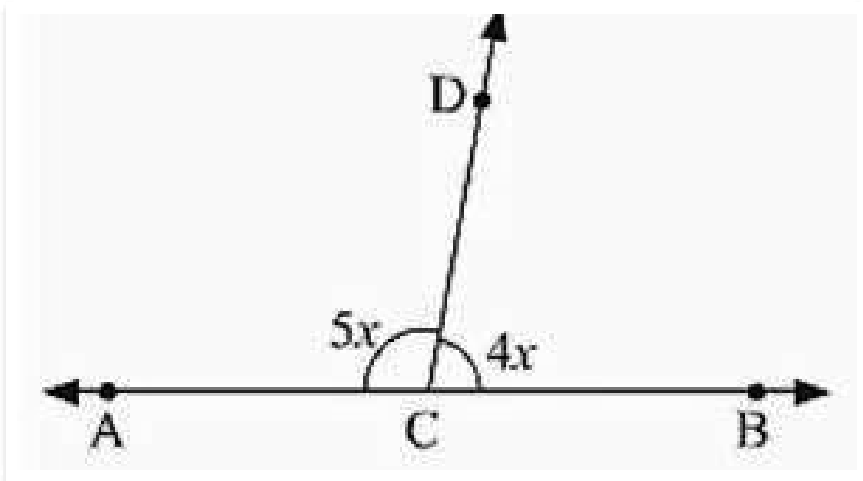
$$4x = 180 - 100$$

$$4x = 80$$

$$x = 20$$

Hence, Value of $x = 20$

Q 11: In the below figure, ACB is a line such that $\angle DCA = 5x$ and $\angle DCB = 4x$. Find the value of x ?



Ans: Here, $\angle ACD + \angle BCD = 180^\circ$

[Since they are linear pairs]

$$\angle DCA = 5x \text{ and } \angle DCB = 4x$$

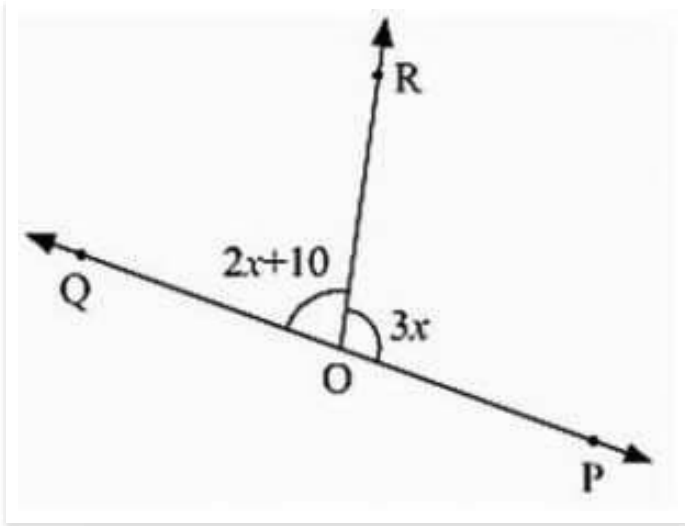
$$5x + 4x = 180$$

$$9x = 180$$

$$x = 20$$

Hence, the value of x is 20°

Q 12 : In the given figure, Given $\angle POR = 3x$ and $\angle QOR = 2x + 10$, Find the value of x for which POQ will be a line ?



Ans : For the case that POR is a line

$\angle POR$ and $\angle QOR$ are linear parts

$$\angle POR + \angle QOR = 180^\circ$$

Also, given that,

$$\angle POR = 3x \text{ and } \angle QOR = 2x + 10$$

$$2x + 10 + 3x = 180$$

$$5x + 10 = 180$$

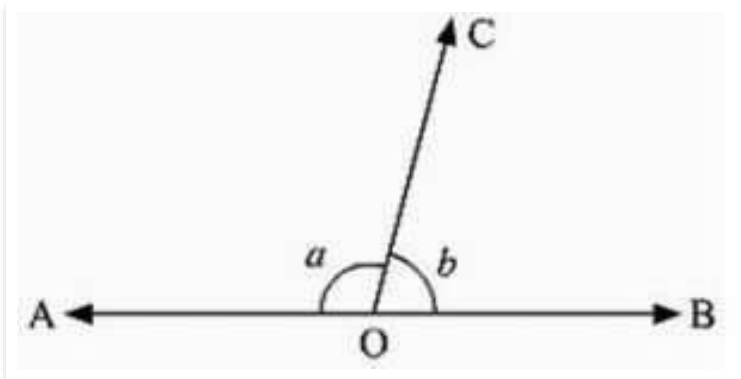
$$5x = 180 - 10$$

$$5x = 170$$

$$x = 34$$

Hence the value of x is 34°

Q 13 : In Fig : a is greater than b by one third of a right angle. Find the value of a and b ?



Ans : Since a and b are linear

$$a + b = 180$$

$$a = 180 - b \text{ ---(1)}$$

From given data, a is greater than b by one third of a right angle

$$a = b + 90/3$$

$$a = b + 30$$

$$a - b = 30 \text{ ---(2)}$$

Equating (1) and (2)

$$180 - b = b + 30$$

$$180 - 30 = 2b$$

$$b = 150 / 2$$

$$b = 75$$

From (1)

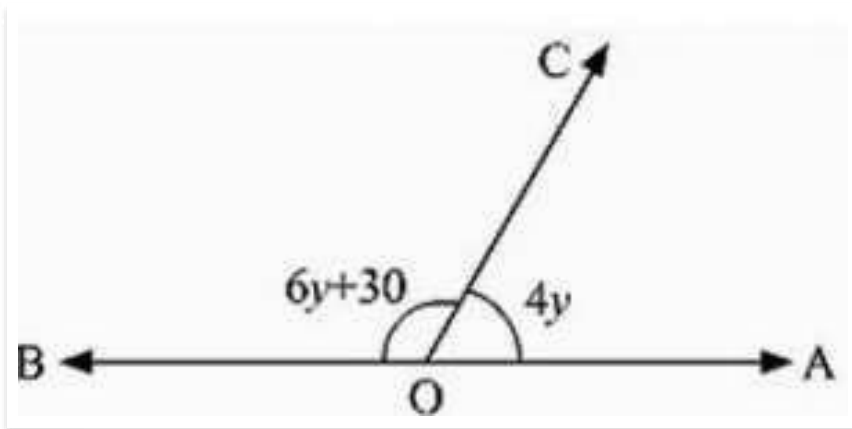
$$a = 180 - b$$

$$a = 180 - 75$$

$$a = 105$$

Hence the values of a and b are 105° and 75° respectively.

Q 14 :What value of y would make AOB a line in the below figure, If $\angle AOB = 4y$ and $\angle BOC = (6y + 30)$?



Ans : Since, $\angle AOC$ and $\angle BOC$ are linear pairs

$$\angle AOC + \angle BOC = 180^\circ$$

$$6y + 30 + 4y = 180$$

$$10y + 30 = 180$$

$$10y = 180 - 30$$

$$10y = 150$$

$$y = 150/10$$

$$y = 15$$

Hence value of y that will make AOB a line is 15°

Q 15 : If the figure below forms a linear pair,

$$\angle EOB = \angle FOC = 90 \text{ and } \angle DOC = \angle FOG = \angle AOB = 30$$

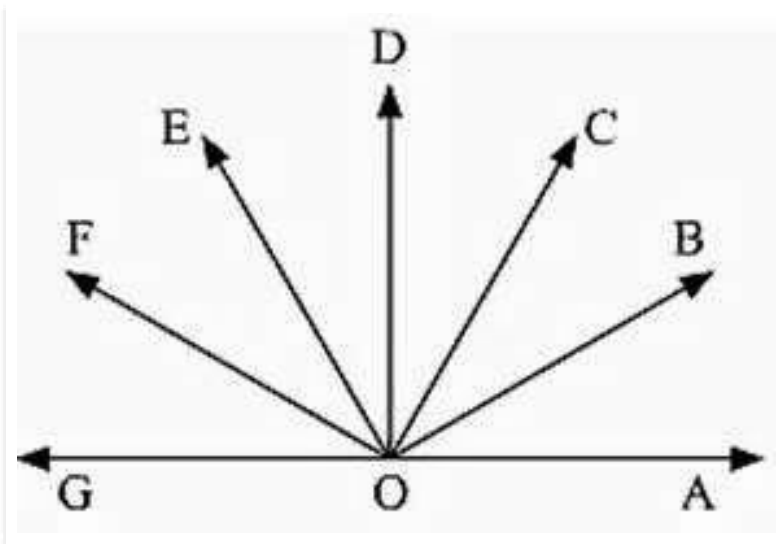
Find the measure of $\angle FOE$, $\angle COB$ and $\angle DOE$

Name all the right angles

Name three pairs of adjacent complementary angles

Name three pairs of adjacent supplementary angles

Name three pairs of adjacent angles



Ans : (i) $\angle FOE = x$, $\angle DOE = y$ and $\angle BOC = z$

Since $\angle AOF$, $\angle FOG$ is a linear pair

$$\angle AOF + 30 = 180$$

$$\angle AOF = 180 - 30$$

$$\angle AOF = 150$$

$$\angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOF = 150$$

$$30 + z + 30 + y + x = 150$$

$$x + y + z = 150 - 30 - 30$$

$$x + y + z = 90 \text{ ---(1)}$$

$$\angle FOC = 90^\circ$$

$$\angle FOE + \angle EOD + \angle DOC = 90^\circ$$

$$x + y + 30 = 90$$

$$x + y = 90 - 30$$

$$x + y = 60 \text{ ---(2)}$$

Substituting (2) in (1)

$$x + y + z = 90$$

$$60 + z = 90$$

$$z = 90 - 60 = 30$$

Given $\angle BOE = 90$

$$\angle BOC + \angle COD + \angle DOE = 90^\circ$$

$$30 + 30 + \angle DOE = 90$$

$$\angle DOE = 90 - 60 = 30$$

$$\angle DOE = x = 30$$

We also know that,

$$x + y = 60$$

$$y = 60 - x$$

$$y = 60 - 30$$

$$y = 30$$

Thus we have $\angle FOE = 30$, $\angle COB = 30$ and $\angle DOE = 30$

(ii) Right angles are $\angle DOG$, $\angle COF$, $\angle BOF$, $\angle AOD$

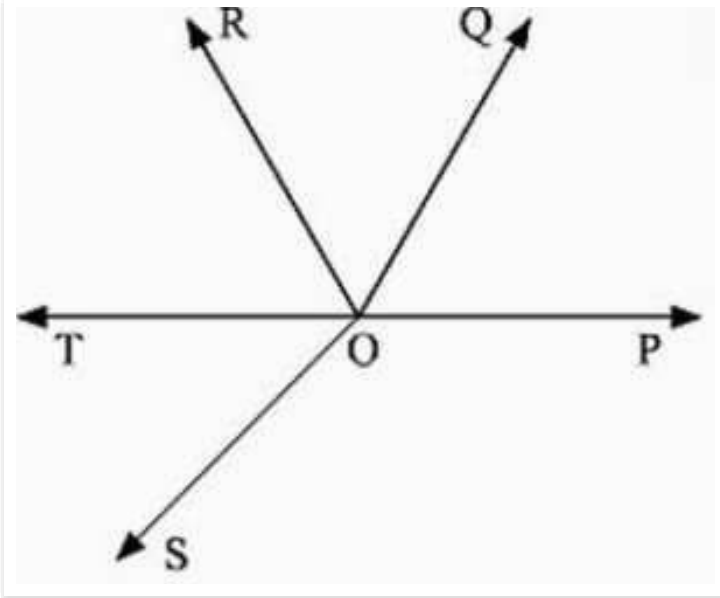
(iii) Adjacent complementary angles are $(\angle AOB, \angle BOD)$; $(\angle AOC, \angle COD)$; $(\angle BOC, \angle COE)$;

(iv) Adjacent supplementary angles are $(\angle AOB, \angle BOG)$; $(\angle AOC, \angle COG)$; $(\angle AOD, \angle DOG)$;

(v) Adjacent angles are $(\angle BOC, \angle COD)$; $(\angle COD, \angle DOE)$; $(\angle DOE, \angle EOF)$;

Q16: In below fig. OP , OQ , OR and OS are four rays. Prove that:

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



Ans: Given that

OP , OQ , OR and OS are four rays

You need to produce any of the ray OP , OQ , OR and OS backwards to a point in the figure.

Let us produce ray OQ backwards to a point T

So that TOQ is a line

Ray OP stands on the TOQ

Since $\angle TOP$, $\angle POQ$ is a linear pair

$$\angle TOP + \angle POQ = 180^\circ \quad \text{--(1)}$$

Similarly,

Ray OS stands on the line TOQ

$$\angle TOS + \angle SOQ = 180^\circ \quad \text{--(2)}$$

$$\text{But } \angle SOQ = \angle SOR + \angle QOR \quad \text{--(3)}$$

So, eqn (2) becomes

$$\angle TOS + \angle SOR + \angle OQR = 180^\circ$$

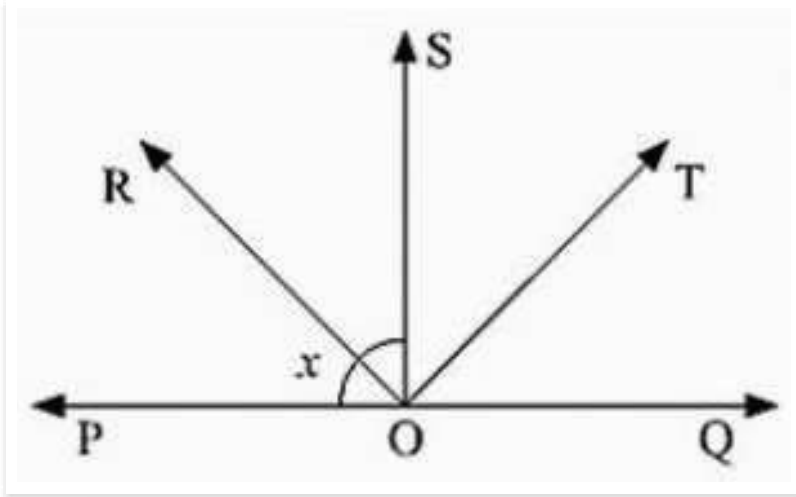
$$\text{Now, adding (1) and (3) you get } \angle TOP + \angle POQ + \angle TOS + \angle SOR + \angle QOR = 360^\circ \quad \text{--(4)}$$

$$\angle TOP + \angle TOS = \angle POS$$

Eqn: (4) becomes

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

Q 17 : In below fig, ray OS stand on a line POQ. Ray OR and ray OT are angle bisectors of $\angle POS$ and $\angle SOQ$ respectively. If $\angle POS = x$, find $\angle ROT$?



Ans : Given,

Ray OS stand on a line POQ

Ray OR and Ray OT are angle bisectors of $\angle POS$ and $\angle SOQ$ respectively

$$\angle POS = x$$

$\angle POS$ and $\angle SOQ$ is linear pair

$$\angle POS + \angle QOS = 180^\circ$$

$$x + QOS = 180$$

$$QOS = 180 - x$$

Now, ray or bisector POS

$$\angle ROS = \frac{1}{2} \angle POS$$

$$x/2$$

$$ROS = x/2 \quad [\text{Since } POS = x]$$

Similarly ray OT bisector QOS

$$\angle TOS = \frac{1}{2} \angle QOS$$

$$= (180 - x)/2 \quad [QOS = 180 - x]$$

$$= 90 - x/2$$

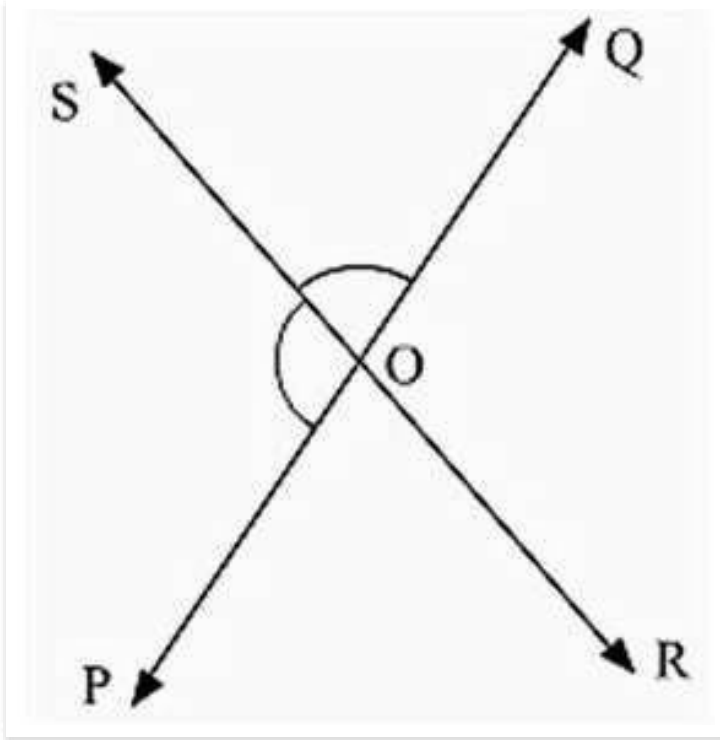
$$\text{Hence, } \angle ROT = \angle ROS + \angle ROT$$

$$= x/2 + 90 - x/2$$

$$= 90$$

$$\angle ROT = 180^\circ$$

Q 18 : In the below fig, lines PQ and RS intersect each other at point O. If $\angle POR : \angle ROQ = 5 : 7$. Find all the angles.



Ans : Given

$\angle POR$ and $\angle ROQ$ is linear pair

$$\angle POR + \angle ROQ = 180^\circ$$

Given that

$$\angle POR : \angle ROQ = 5 : 7$$

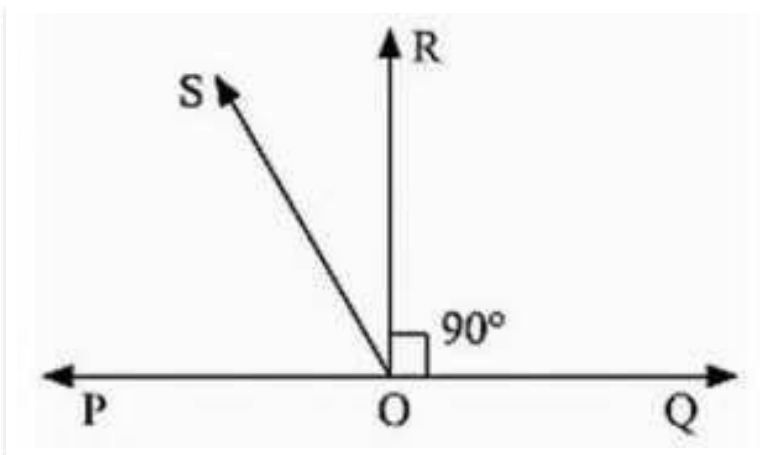
$$\text{Hence, } \angle POR = \frac{5}{5+7} \times 180 = 75$$

$$\text{Similarly } \angle ROQ = \frac{7}{5+7} \times 180 = 105$$

Now $\angle POS = \angle ROQ = 105^\circ$ [Vertically opposite angles]

Also, $\angle SOQ = \angle POR = 75^\circ$ [Vertically opposite angles]

Q 19 : In the below fig. POQ is a line. Ray OR is perpendicular to line PQ . OS is another ray lying between rays OP and OR . Prove that $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$.



Ans : Given that

OR perpendicular

$$\therefore \angle POR = 90^\circ$$

$$\angle POS + \angle SOR = 90 \quad [\because \angle POR = \angle POS + \angle SOR]$$

$$\angle ROS = 90^\circ - \angle POS \quad \text{---(1)}$$

$$\angle QOR = 90 \quad (\because OR \perp PQ)$$

$$\angle QOS - \angle ROS = 90^\circ$$

$$\angle ROS = \angle QOS - 90^\circ$$

By adding (1) and (2) equations, we get

$$2\angle ROS = \angle QOS - \angle POS$$

$$\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$$