RD SHARMA

Solutions

Class 9 Maths

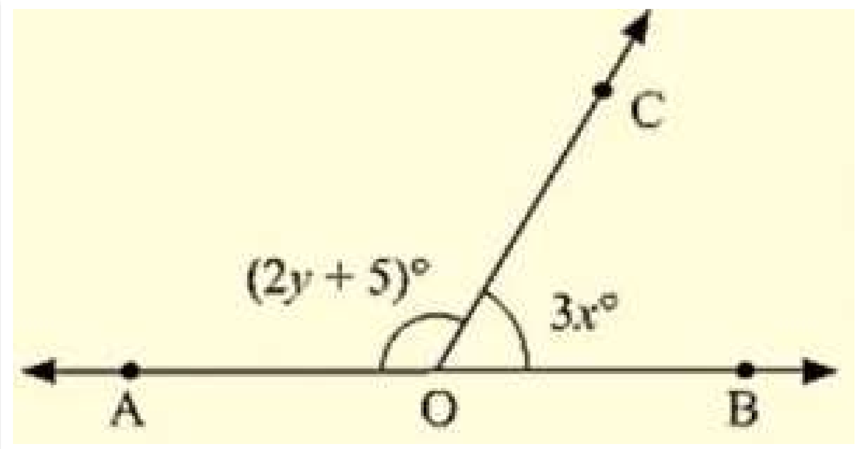
Chapter 8

Ex 8.2

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

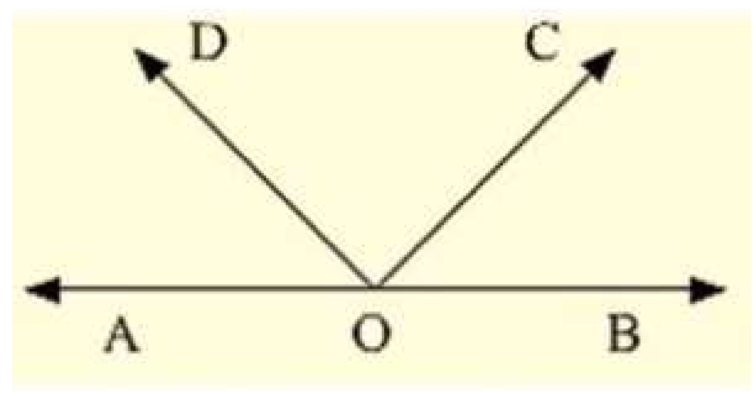
(70+5) + 3x = 180

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)$\angle AOC, \angle COB$

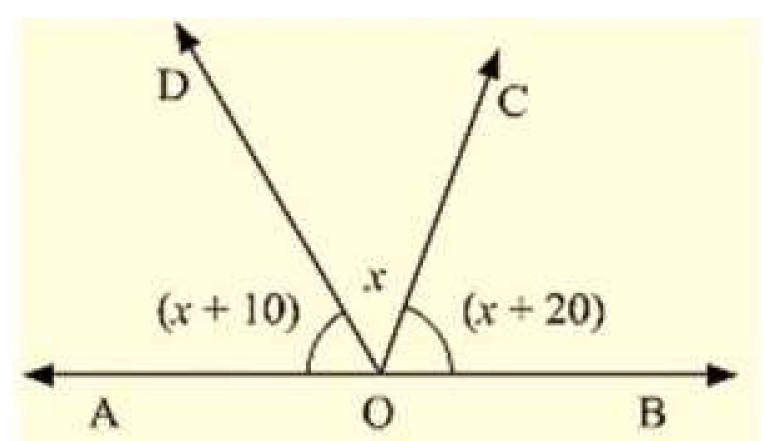
(ii)$\angle AOD \angle BOD$

(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,

$\angle AOD + \angle BOD = 180°$

$\angle AOD + \angle BOC + \angle COD = 180°$

Given that,

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

(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

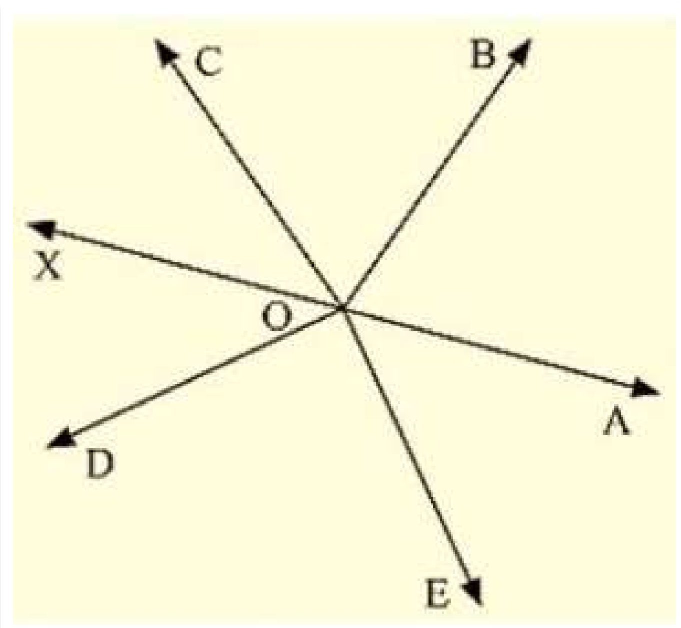
$\angle COD = x = 50^\circ$

$\angle COD = (x + 20)$

= 50 + 20 = 70

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

Q 4 : In the Given below figure rays OA, OB, OC, OP 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,

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

$\angle AOB + \angle BOC + \angle COF = 180^\circ$ --(1)

Also,

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

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

$\angle AOE + \angle DOF + \angle DOE = 180^\circ$ --(2)

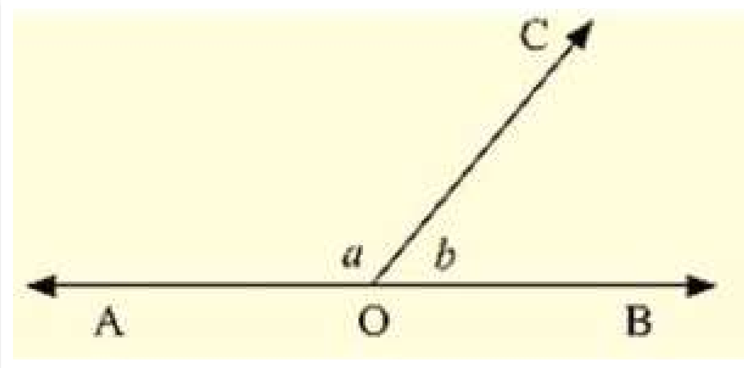
By adding (1) and (2) equations we get

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

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

Hence proved.

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



Ans : Given that,

$\angle AOC \text{and} \angle BOC$ form a linear pair

If a − b = 30

$\angle AOC = a°, \angle BOC = b°$

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 $130° \text{and } 50°$ 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.

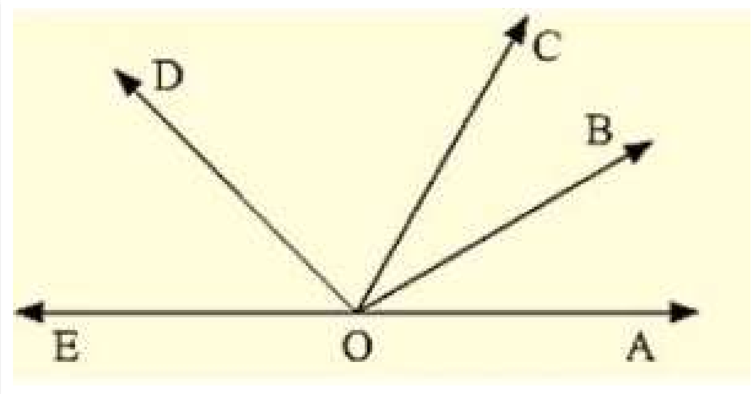
Considering two lines AB and CD intersecting at O

The 4 pairs are :

$(\angle AOD, \angle DOB), (\angle DOB, \angle BOC), (\angle COA, \angle AOD) \text{and } (\angle BOC, \angle COA)$

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 :

$\angle EOC, \angle DOC$

$\angle EOD, \angle DOB$

$\angle DOC, \angle COB$

$\angle EOD, \angle DOA$

$\angle DOC, \angle COA$

$\angle BOC, \angle BOA$

$\angle BOA, \angle BOD$

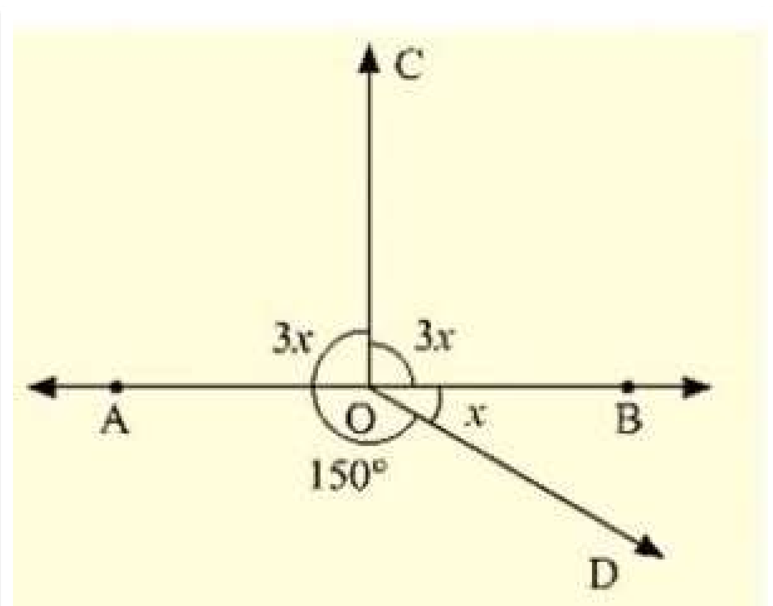
$\angle BOA, \angle BOE$

$\angle EOC, \angle COA$

$\angle EOC, \angle COB$

Hence, 10 pair of adjacent angles.

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



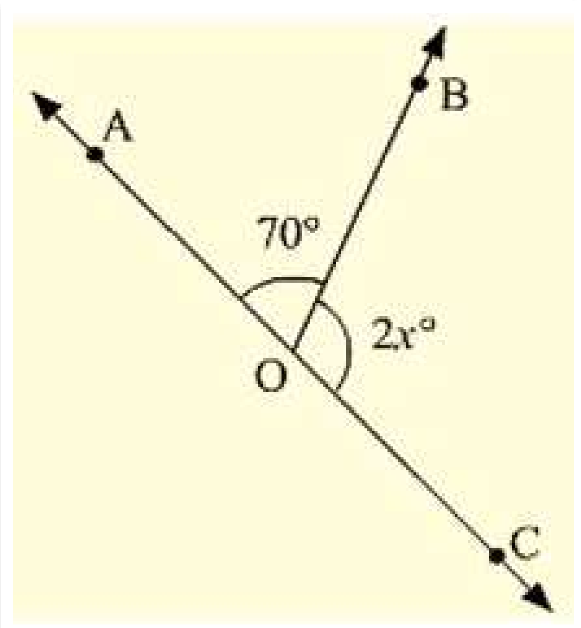
Ans : Since the sum of all the angles round a point is equal to $360°$

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.



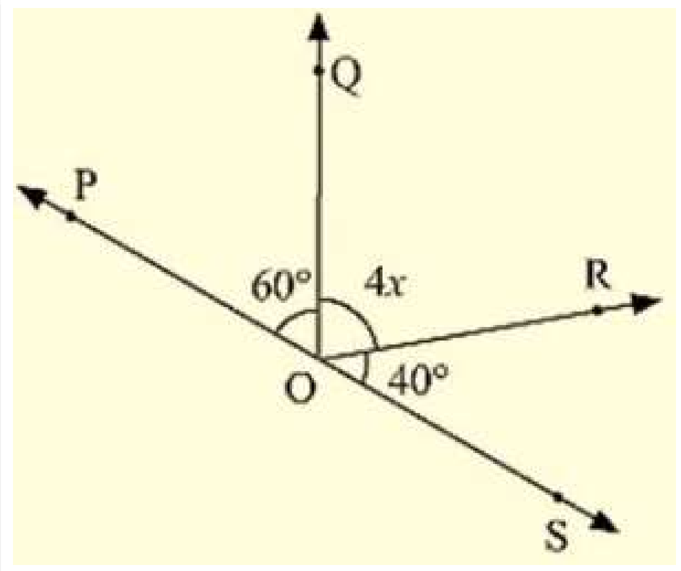
Ans : Since $\angle AOB$ and $\angle BOC$ are linear pairs,

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

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

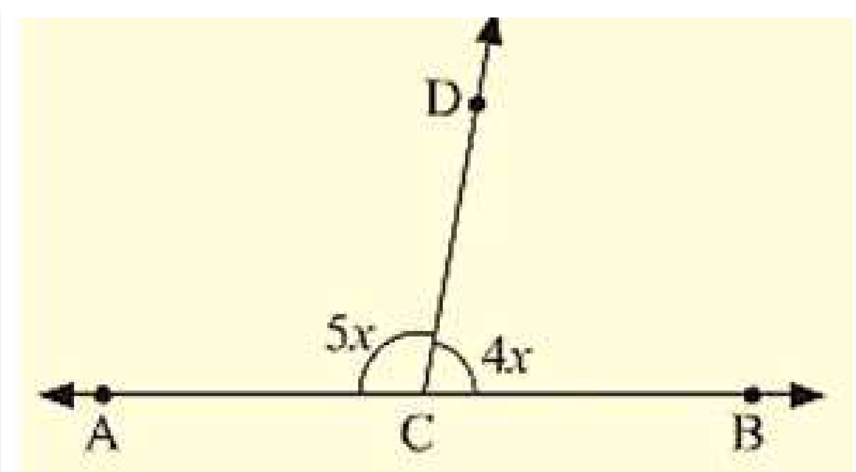
$\angle POQ + \angle QOS = 180^\circ$

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

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, $\angle ACD + \angle BCD = 180^\circ$

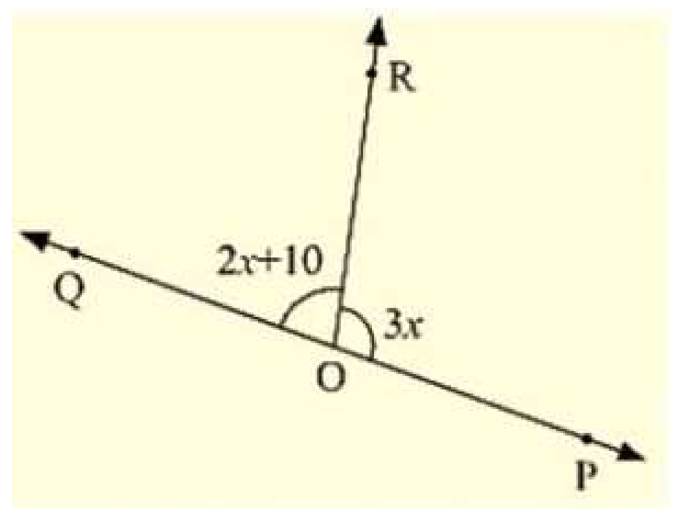
[Since they are linear pairs]

$\angle DCA = 5x$ 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 $\angle QOR are linear parts$

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

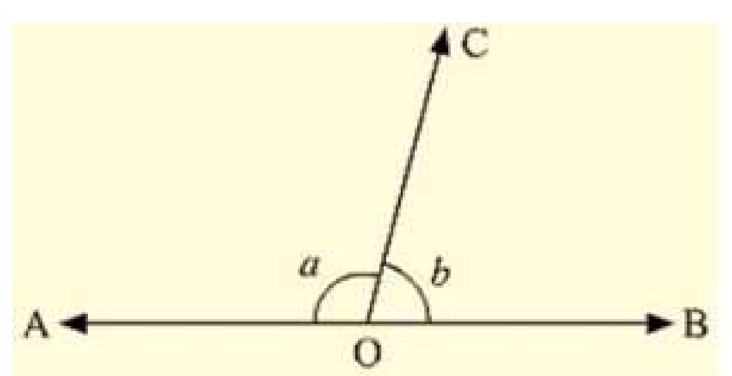
Also, given that,

$\angle POR = 3x$ 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 −−(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 −−(2)

Equating (1) and (2)

180 − b = b + 30

180 − 30 = 2b
b = 150 / 2
b = 75

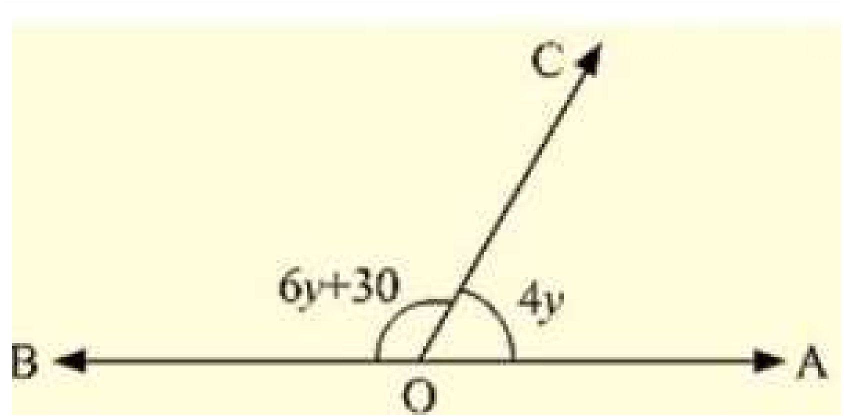
From (1)

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

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

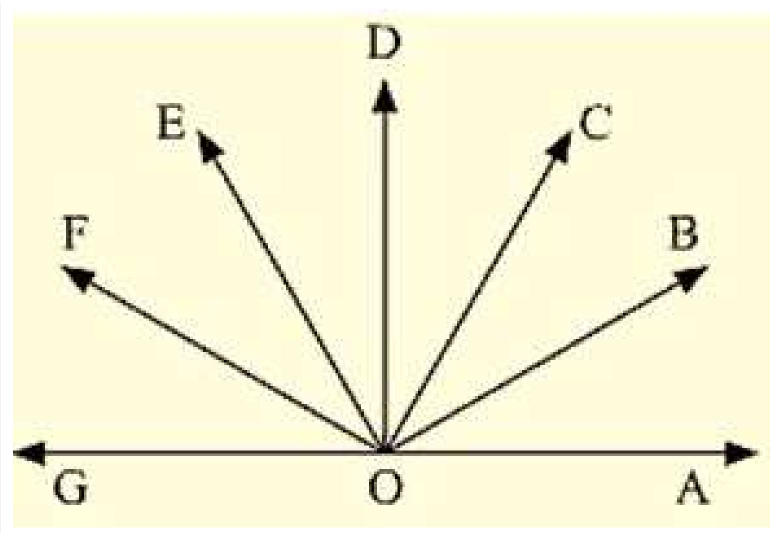
6y + 30 + 4y = 180
10y + 30 = 180
10y = 180 − 30
10y = 150
y = 150/10
y = 15

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

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

$\angle EOB = \angle FOC = 90$ 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 −−(1)

$\angle FOC = 90^\circ$

$\angle FOE + \angle EOD + \angle DOC = 90^\circ$
x + y +30 = 90
x + y = 90 − 30
x + y =60 −−(2)

Substituting (2) in (1)

x + y + z = 90

60 + z = 90
z = 90 − 60 = 30

Given BOE = 90

$\angle BOC + \angle COD + \angle DOE = 90^\circ$
30 + 30 +DOE = 90
DOE = 90 − 60 = 30
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 $\angle DOE = 30$

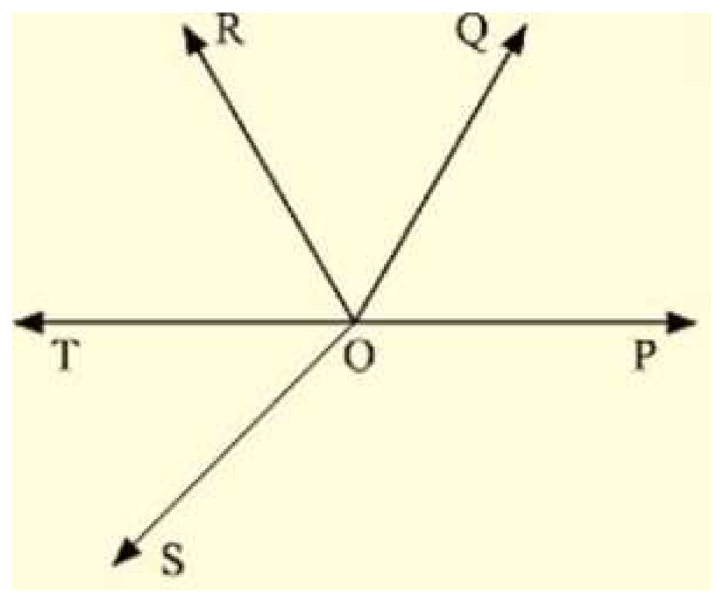
(ii) Right angles are $\angle DOG, \angle COF, \angle BOF, \angle AOD$

(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, 0Q, OR and OS are four rays. Prove that:***
$\angle POQ + \angle QOR + \angle SOR + \angle POS = 360^\circ$



Ans: Given that

OP, 0Q, OR and OS are four rays

You need to produce any of the ray OP, 0Q, OR and OS backwards to a point in the figure.

Let us produce ray 0Q 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

$\angle TOP + \angle POQ = 180^\circ$ --(1)

Similarly,

Ray OS stands on the line TOQ

$\angle TOS + \angle SOQ = 180^\circ$ --(2)

But $\angle SOQ = \angle SOR + \angle QOR$ --(3)

So, eqn (2) becomes

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

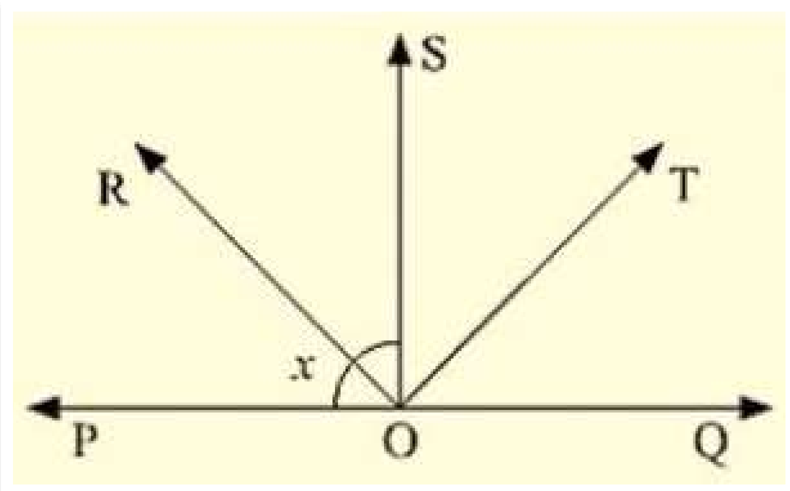
Now, adding (1) and (3) you get $\angle TOP + \angle POQ + \angle TOS + \angle SOR + \angle QOR = 360^\circ$ --(4)

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

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 [Since POS = x]

Similarly ray OT bisector QOS

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

= (180 − x)/2 [QOS = 180 − x]

= 90 − x/2

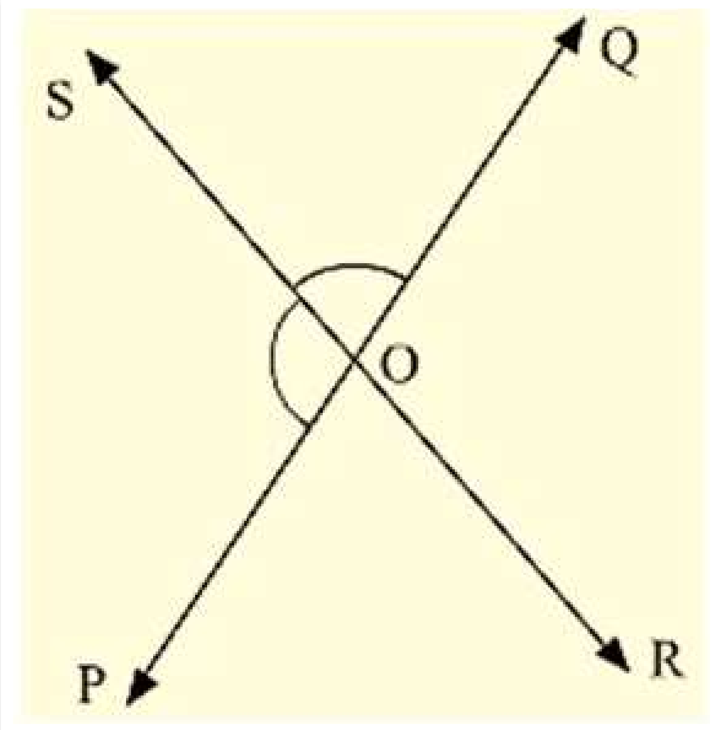
Hence, $\angle ROT = \angle ROS + \angle ROT$

= 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 $\angle ROP$ is linear pair

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

Given that

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

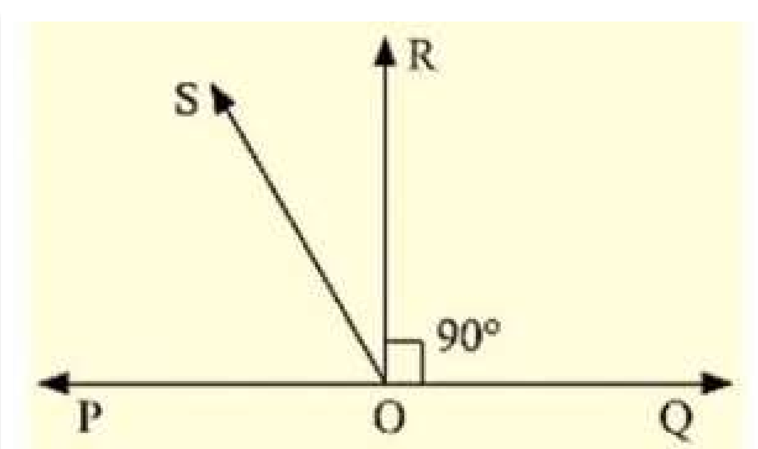
Hence, POR =(5/12)x180=75

Similarly ROQ=(7/7+5) 180 = 105

Now POS = ROQ = 105° [Vertically opposite angles]

Also, SOQ = POR = 75° [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

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

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

$\angle ROS = 90^\circ - \angle POS \qquad --(1)$

$\angle QOR$ = 90 ($\because$ OR ⊥ PQ)

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

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

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

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

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