

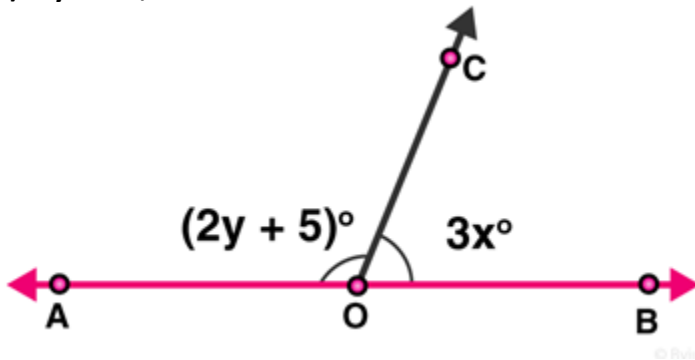
Exercise 8.2

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

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

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



**Solution:**

(i) Given:  $x = 25$

From figure:  $\angle AOC$  and  $\angle BOC$  form a linear pair

Which implies,  $\angle AOC + \angle BOC = 180^\circ$

From the figure,  $\angle AOC = 2y + 5$  and  $\angle BOC = 3x$

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

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

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

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

$$2y + 80 = 180$$

$$2y = 100$$

$$y = 100/2 = 50$$

Therefore,  $y = 50^\circ$ .

(ii) Given:  $y = 35^\circ$

From figure:  $\angle AOC + \angle BOC = 180^\circ$  (Linear pair angles)

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

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

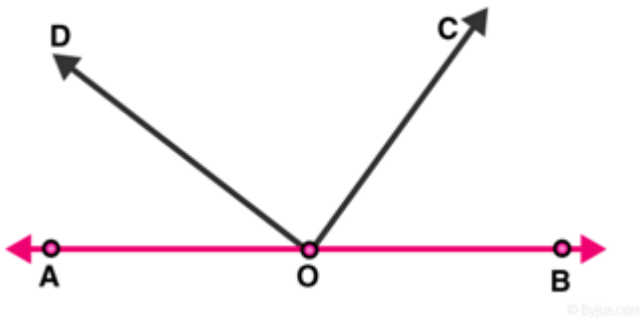
$$75 + 3x = 180$$

$$3x = 105$$

$$x = 35$$

Therefore,  $x = 35^\circ$

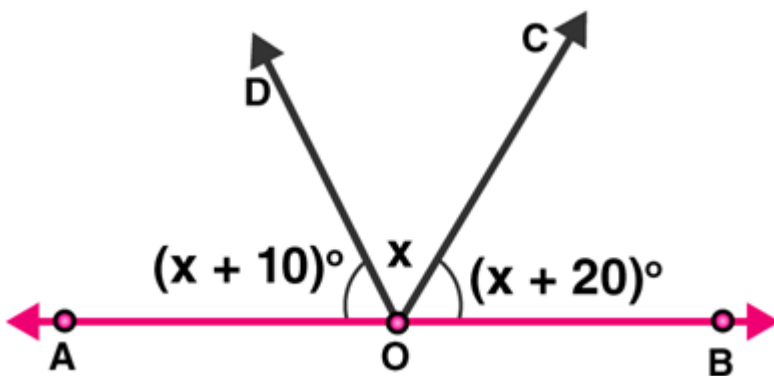
**Question 2:** In the below figure, write all pairs of adjacent angles and all the linear pairs.



**Solution:** From figure, pairs of adjacent angles are :  
 $(\angle AOC, \angle COB)$  ;  $(\angle AOD, \angle BOD)$  ;  $(\angle AOD, \angle COD)$  ;  $(\angle BOC, \angle COD)$

And Linear pair of angles are  $(\angle AOD, \angle BOD)$  and  $(\angle AOC, \angle BOC)$ .  
 [As  $\angle AOD + \angle BOD = 180^\circ$  and  $\angle AOC + \angle BOC = 180^\circ$ .]

**Question 3 :** In the given figure, find  $x$ . Further find  $\angle BOC$ ,  $\angle COD$  and  $\angle AOD$ .



**Solution:**

From figure,  $\angle AOD$  and  $\angle BOD$  form a linear pair,  
 Therefore,  $\angle AOD + \angle BOD = 180^\circ$

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

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

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

$$3x + 30 = 180$$

$$3x = 180 - 30$$

$$x = 150/3$$

$$x = 50^\circ$$

Now,

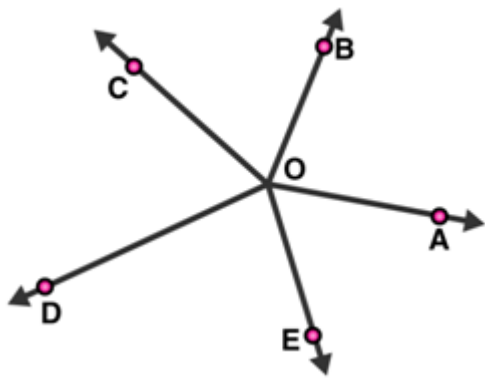
$$\angle AOD = (x+10) = 50 + 10 = 60$$

$$\angle COD = x = 50$$

$$\angle BOC = (x+20) = 50 + 20 = 70$$

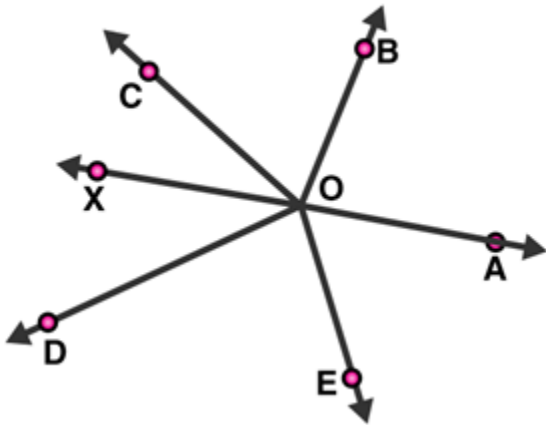
Hence,  $\angle AOD = 60^\circ$ ,  $\angle COD = 50^\circ$  and  $\angle BOC = 70^\circ$

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



**Solution:**

Given: Rays OA, OB, OC, OD and OE have the common endpoint O.  
Draw an opposite ray OX to ray OA, which make a straight line AX.



From figure:

$\angle AOB$  and  $\angle BOX$  are linear pair angles, therefore,

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

$$\text{Or, } \angle AOB + \angle BOC + \angle COX = 180^\circ \text{ -----(1)}$$

Also,

$\angle AOE$  and  $\angle EOX$  are linear pair angles, therefore,

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

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

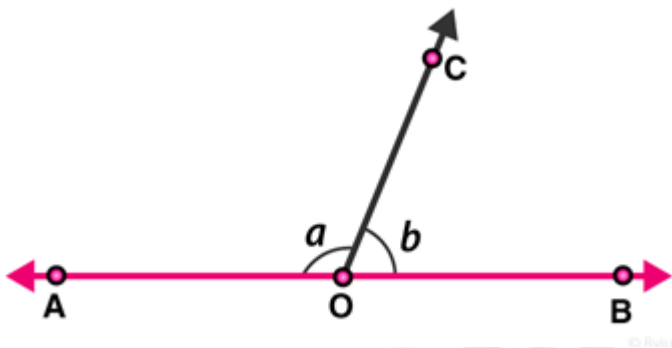
By adding equations, (1) and (2), we get;

$$\angle AOB + \angle BOC + \angle COX + \angle AOE + \angle DOE + \angle DOX = 180^\circ + 180^\circ$$

$$\angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOA = 360^\circ$$

Hence Proved.

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



**Solution:**

Given :  $\angle AOC$  and  $\angle BOC$  form a linear pair.

$$\Rightarrow a + b = 180^\circ \quad \dots(1)$$

$$a - 2b = 30^\circ \quad \dots(2) \text{ (given)}$$

On subtracting equation (2) from (1), we get

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

$$3b = 150$$

$$b = 150/3$$

$$b = 50^\circ$$

Since,  $a - 2b = 30^\circ$

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

$$a = 30 + 100$$

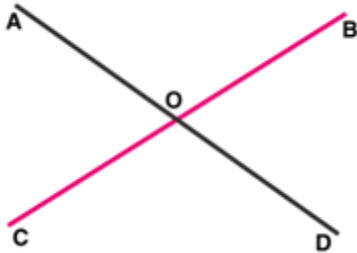
$$a = 130^\circ$$

Therefore, the values of  $a$  and  $b$  are  $130^\circ$  and  $50^\circ$  respectively.

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

**Solution:** Four pairs of adjacent angles are formed when two lines intersect each other at a single point.

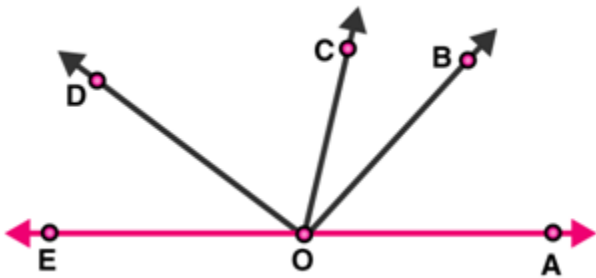
For example, Let two lines AB and CD intersect at point O.



The 4 pair of adjacent angles are :

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

**Question 7:** How many pairs of adjacent angles, in all, can you name in figure given?



**Solution:** Number of Pairs of adjacent angles, from the figure, are :

$\angle EOC$  and  $\angle DOC$

$\angle EOD$  and  $\angle DOB$

$\angle DOC$  and  $\angle COB$

$\angle EOD$  and  $\angle DOA$

$\angle DOC$  and  $\angle COA$

$\angle BOC$  and  $\angle BOA$

$\angle BOA$  and  $\angle BOD$

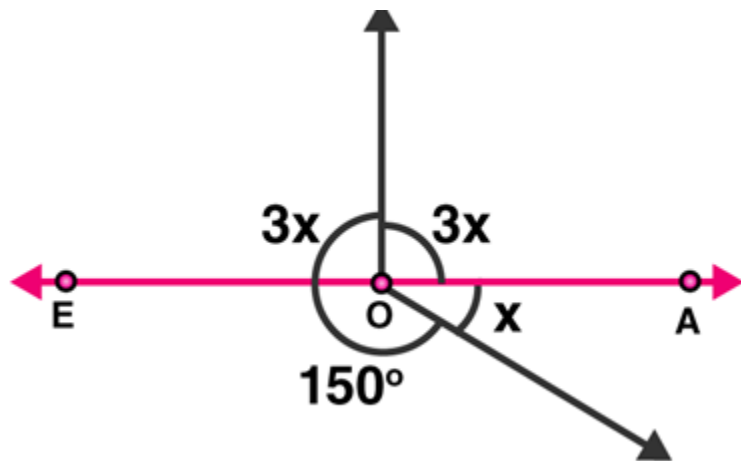
$\angle BOA$  and  $\angle BOE$

$\angle EOC$  and  $\angle COA$

$\angle EOC$  and  $\angle COB$

Hence, there are 10 pairs of adjacent angles.

**Question 8:** In figure, determine the value of x.



**Solution:**

The sum of all the angles around a point O is equal to  $360^\circ$ .

Therefore,

$$3x + 3x + 150 + x = 360^\circ$$

$$7x = 360^\circ - 150^\circ$$

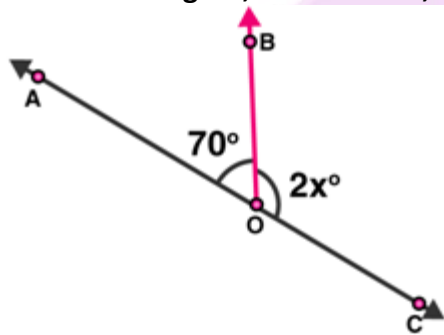
$$7x = 210^\circ$$

$$x = 210/7$$

$$x = 30^\circ$$

Hence, the value of x is  $30^\circ$ .

**Question 9: In figure, AOC is a line, find x.**



**Solution:**

From the figure,  $\angle AOB$  and  $\angle BOC$  are linear pairs,

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

$$70 + 2x = 180$$

$$2x = 180 - 70$$

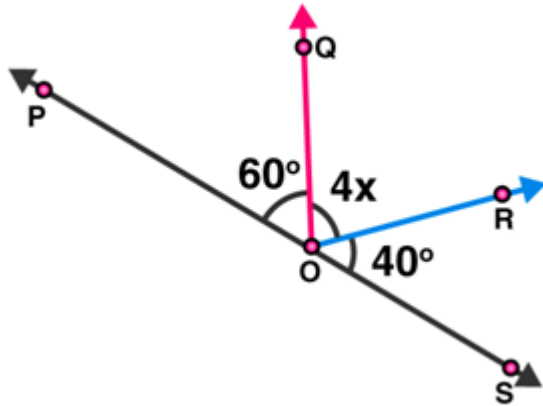
$$2x = 110$$

$$x = 110/2$$

$$x = 55$$

Therefore, the value of x is  $55^\circ$ .

Question 10: In figure, POS is a line, find x.



**Solution:**

From figure,  $\angle POQ$  and  $\angle QOS$  are linear pairs.

Therefore,

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

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

$$60^\circ + 4x + 40^\circ = 180^\circ$$

$$4x = 180^\circ - 100^\circ$$

$$4x = 80^\circ$$

$$x = 20^\circ$$

Hence, the value of x is  $20^\circ$ .