## CHAPTER – 5

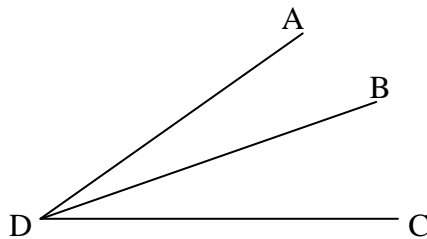**LINES AND ANGLES (HAND OUT)**          **Module-$\frac{2}{3}$**

### INTRODUCTION:

In the previous module we learnt about the angle. In this module we learn more about the angles.

### ADJACENT ANGLES –

A pair of angles are called adjacent angles if-

(a) they have a common vertex.

(b) they have a common arm.

(c) the non-common arms are on either side of the common arm.



∟ADB and ∟BDC are adjacent angles, because the common vertex is D,common arm is BD and the non-common arms AD and CD lie on opposite sides of the common arm.

∟ADB and ∟ADC are not adjacentangles, because the common vertex is D,common arm is AD and the non-common arms BD and CD lie on same sides of the common arm AD.

### LINEAR PAIR ANGLES –

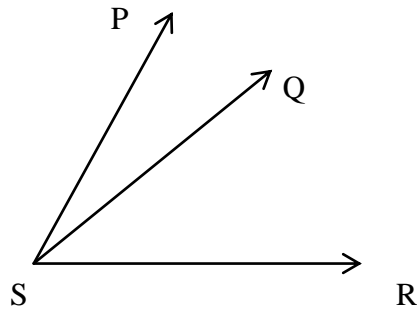A pair of adjacent angles are said to be linear pair, if the non- common arms form opposite rays.

Example-1 A
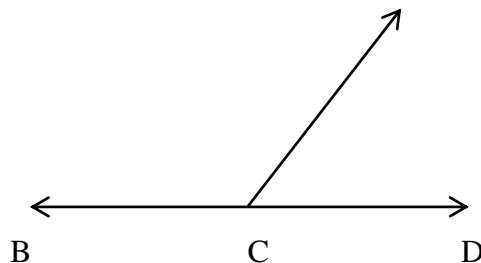


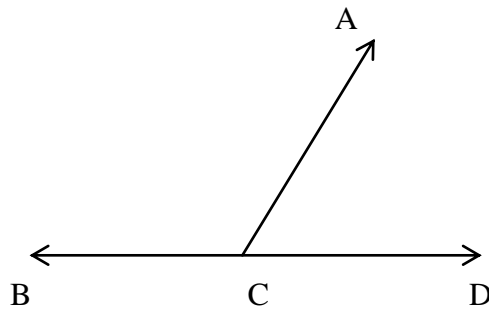∟ACBand ∟ACD are linear pair, as the non-common arms form opposite rays.

Linear pair angles are supplementary. (Their sum is $180^{0}$)

Example-2



∟PSQ and ∟QSR are not linear pair, as the non-common arms do not form opposite rays.

Example-3



∟ACB and ∟ACD are linear pair, ∟ACB= $(2x+8)^0$ and ∟ACD =$(x-2)^0$.Find x

∟ACB+ ∟ACD = $180^0$ (Linear pair )

Or, $2x +8^0 + x- 2 = 180^0$

Or, $3x +6^0 = 180^0$

Or, $3x = 180^0 - 6^0 = 174^0$

Or, $x = \frac{174}{3} = 58^0$

∟ACB= 2x+8= 2x58 + 8 = 116 + 8= $124^0$

∟ACD = x − 2 = 58 − 2 = $56^0$

**VERTICALLY OPPOSITE ANGLES -**

If two line segments or lines intersect with each other, then a pair of angles are said to be vertically opposite angles, if they have a common vertex and no common arm.
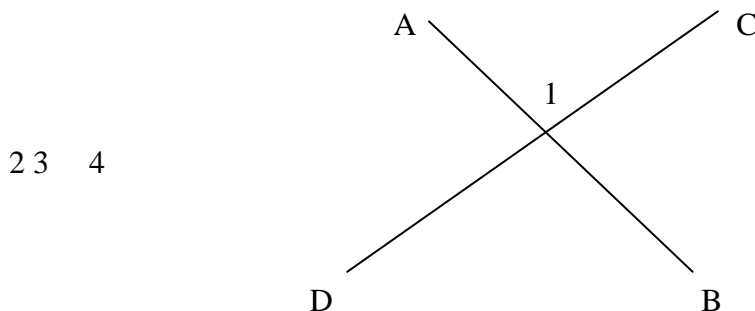


∟1 and ∟3. ∟2 and ∟4 are vertically opposite angles.

If two lines intersect with each other, then the vertically opposite angles are equal.so, $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$

Proof- $\angle 1 + \angle 4 = 180^0$ (linear pair)

   Or, $\angle 1 = 180^0 - \angle 4$     (i)

   $\angle 4 + \angle 3 = 180^0$ (linear pair)

 Or, $\angle 3 = 180^0 - \angle 4$   (ii)

 By (i) and (ii)

   $\angle 1 = \angle 3$

   Similarly $\angle 2 = \angle 4$

Example-1.
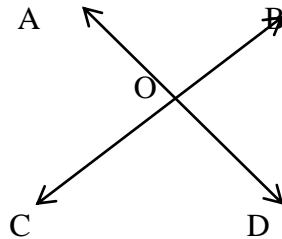


If $\angle AOC = 30^0$ find the other angles.

   $\angle AOB = \angle COD$ (Vertically opposite angles)

   $30^0 = \angle COD$

 $\angle AOC + \angle AOB = 180^0$   (Linear pair)

 $\angle AOC + 30^0 = 180^0$

 $\angle AOC = 180^0 - 30^0 = 50^0$

 $\angle AOC = \angle BOD$    (Vertically opposite angles)

 $50^0 = \angle BOD$

Example2-
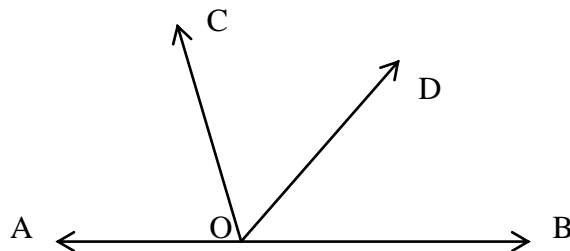


If $\angle AOC = 68^0$ and $\angle BOD = 70^0$, then find $\angle COD$.

$\angle AOC + \angle COD + \angle BOD = 180^0$ (Straight angle)

   $68^0 + \angle COD + 70^0 = 180^0$

$\llcorner COD + 138^0 = 180^0$

$\llcorner COD = 180^0 - 138^0 = 42^0$

**What we have learnt –**

(a) Adjacent angles- A pair of angles having a common vertex, a common arm and non-common arms lie on opposite sides of common arm.

(b) Linear pair- A pair of adjacent angles in which the non-common arms form opposite rays.

(c) Vertically opposite angles - If two line segments or lines intersect with each other, then a pair of angles are said to be vertically opposite angles, if they have a common vertex and no common arm.

**ASSIGNMENTS -**

**Q1.Name all the adjacent angles-**
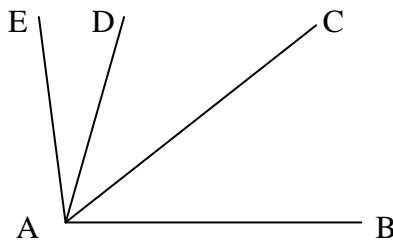


**Q2Fill in the blanks-**

(a) The measure of a linear pair angles is --------------.

(b) An adjacent pair of angles have a common -------------- and a common --------.

(c) In a linear pair angles, the non-common arms form opposite --------.

(d)One of the angles of a linear pair is $45^0$, and then the measure of other angle is -------.

( e) A ---------- is common in vertically opposite angles.

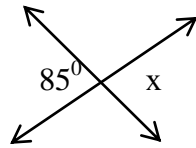**Q3**.If $(5x – 1)^0$ and $(5x – 19)^0$ form a linear pair, then find the value of x.

**Q4**.In the fig. BO is perpendicular to CD, thenname-

(i)two linear pairs.  (ii) two pairs of vertically opposite angles (iii) three pairs of adjacent angles

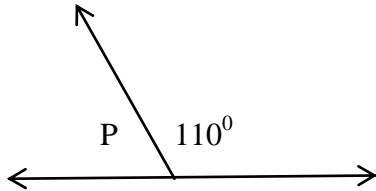(iv) one pair of complementary angles (vi)one pair of supplementary angles.
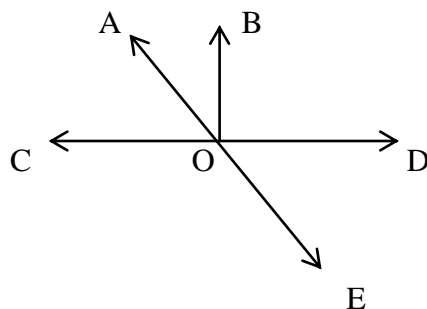
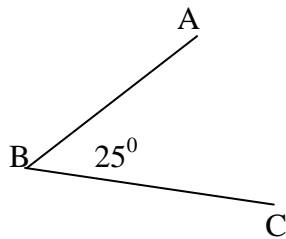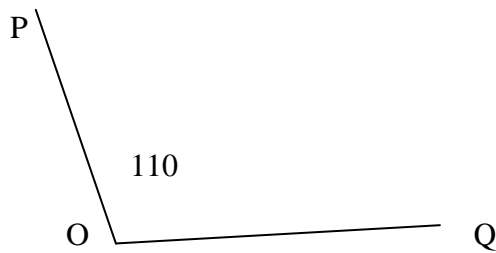**Q5**.Look at the following figures and fill in the blanks –

(i)



$85^0$   x

$\llcorner$ x = -----------

(ii)



P   $110^0$

$\llcorner$ p $^{= ----------------.}$

(iii)

A

B   $25^0$

C

Complement of $\llcorner$ ABC = ------------

(IV)

P

110

O          Q

Supplement of $\llcorner$ POQ = ------------

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