

CHAPTER – 5

LINES AND ANGLES

Class- 7

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-

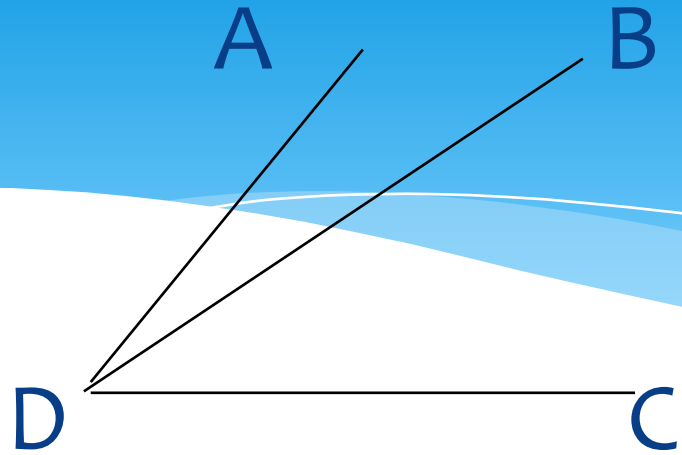
(a) they have a common vertex.

(b) they have a common arm.

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

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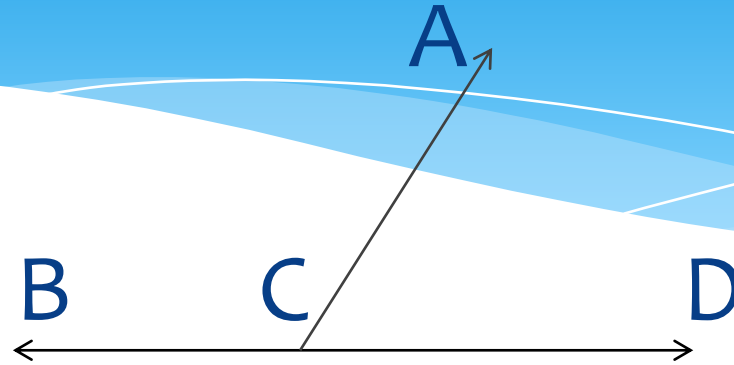
$\angle ADB$ and $\angle BDC$ are adjacent angles, because the common vertex is D , common arm is BD and the non-common arms AD and CD lie on opposite sides of the common arm BD .

$\angle ADB$ and $\angle ADC$ are not adjacent angles, 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.

* **LINEAR PAIR ANGLES –**

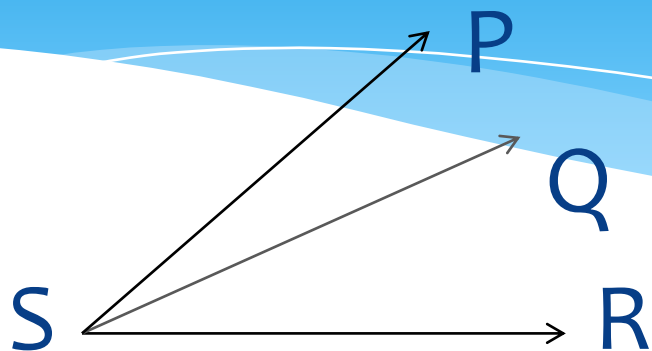
* A pair of adjacent angles are said to be linear pair, if the non- common arms form opposite rays.

* Example-1



- * $\angle ACB$ and $\angle ACD$ are linear pair, as the non-common arms form opposite rays.
- * Linear pair angles are supplementary. (Their sum is 180°)

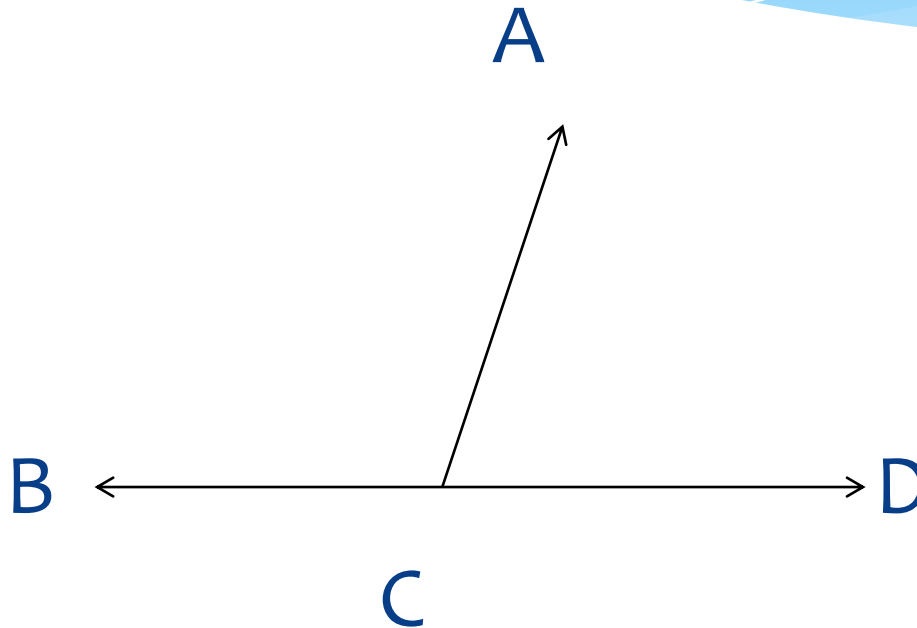
* Example-2



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

* Example -3. In the fig. $\angle ACB$ and $\angle ACD$ are linear pair, $\angle ACB = 2x + 8$ and $\angle ACD = x - 2$. Find x .

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$$* \angle ACB + \angle ACD = 180^\circ$$

(Linear pair)

$$* \text{ Or, } 2x + 8^\circ + x - 2 = 180^\circ$$

$$* \text{ Or, } 3x + 6^\circ = 180^\circ$$

$$* \text{ Or, } 3x = 180^\circ - 6^\circ = 174^\circ$$

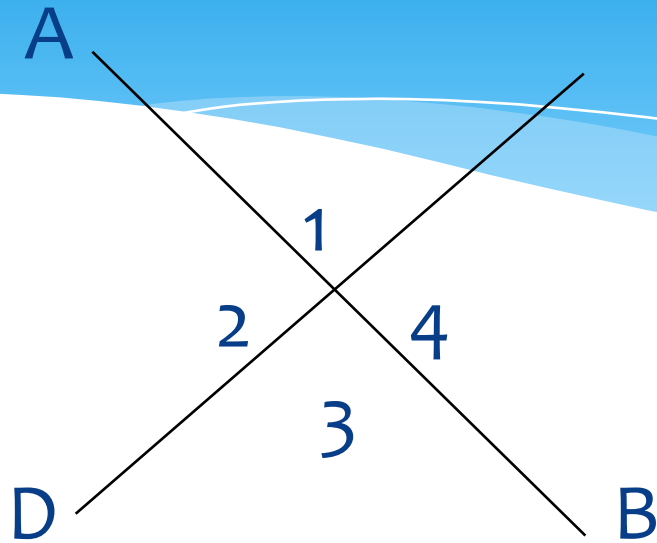
$$* \text{ Or, } x = \frac{174}{3} = 58^{\circ}$$

$$* \quad \angle ACB = 2x + 8 = 2 \times 58 + 8 \\ = 116 + 8 = 124^{\circ}$$

$$* \quad \angle ACD = x - 2 = 58 - 2 \\ = 56^{\circ}$$

* **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 arms.



$\angle 1$ and $\angle 3$. $\angle 2$ and $\angle 4$ 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- $\angle 1 + \angle 4 = 180^\circ$ (linear pair)

* or, $\angle 1 = 180^\circ - \angle 4$ (i)

* or, $\angle 4 + \angle 3 = 180^\circ$ (linear pair)

* or, $\angle 3 = 180^\circ - \angle 4$ (ii)

* By (i) and (ii)

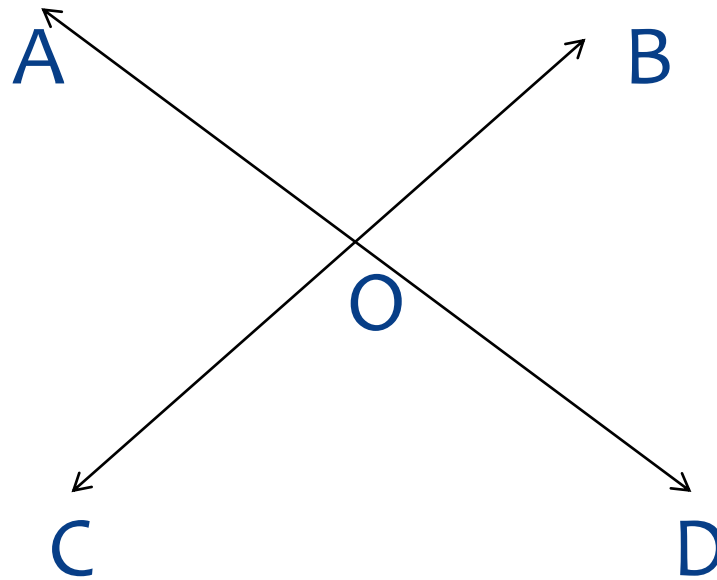
* $\angle 1 = \angle 3$

* Similarly $\angle 2 = \angle 4$

* Example-1

* If in the fig. $\angle AOC = 30^\circ$ find the other angles.

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

* $30^\circ = \angle COD$

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

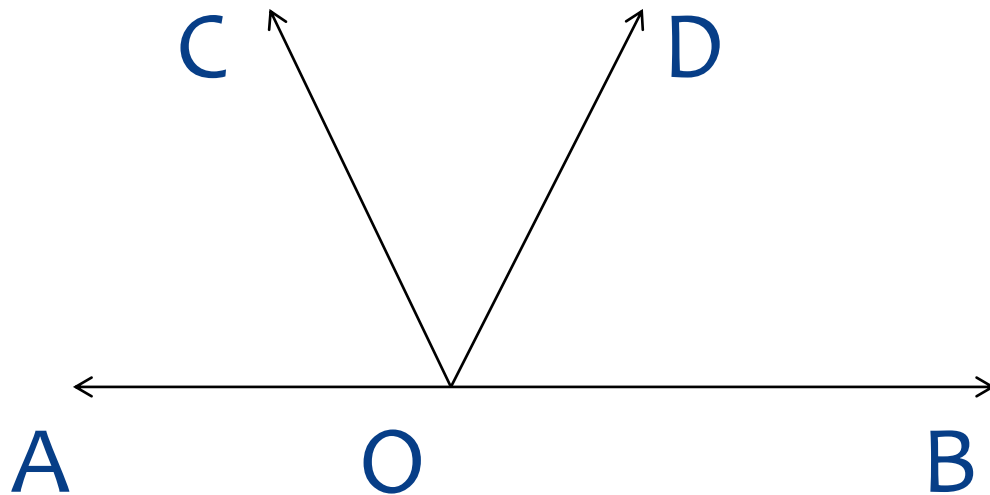
* $\angle AOC + 30^\circ = 180^\circ$

* $\angle AOC = 180^\circ - 30^\circ = 50^\circ$

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

* $50^\circ = \angle BOD$

* Example 2-If in the fig. $\angle AOC = 68^\circ$ and $\angle BOD = 70^\circ$, then find $\angle COD$.



- * $\angle AOC + \angle COD + \angle BOD = 180^\circ$
(Straight angle)

- * $68^\circ + \angle COD + 70^\circ = 180^\circ$

- * $\angle COD + 138^\circ = 180^\circ$

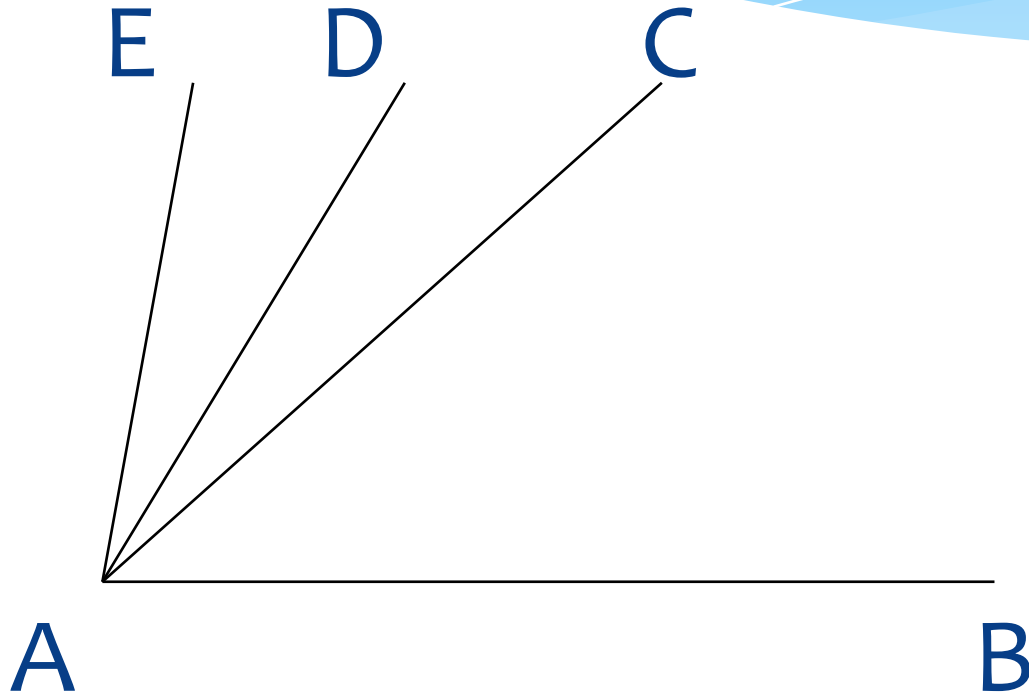
- * $\angle COD = 180^\circ - 138^\circ = 42^\circ$

- * **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-

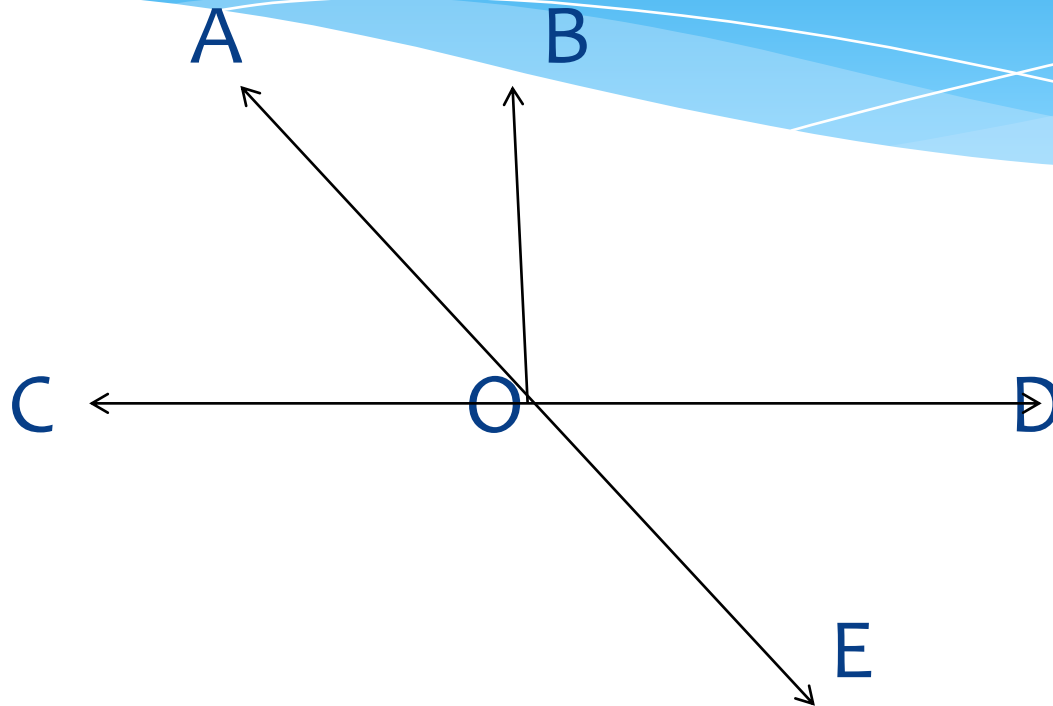


* **Q2 Fill in the blanks-**

- * (a) The measure of a linear pair angles is ----.
- * (b) An adjacent pair of angles have a common ----- and common -----.
- * (c) In a linear pair angles ,the non-common arms form opposite -----.
- * (d) One of the angles of a linear pair is 45° ,then the measure of other angle is -----.
- * (e) A ----- is common in vertically opposite angles.

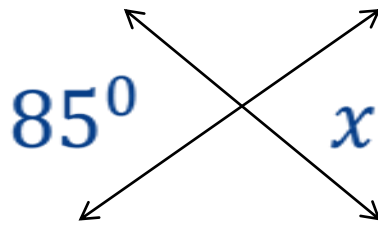
* Q3. In the fig. BO is perpendicular to CD, then name-

- (i) two linear pairs.
- (ii) two pairs of vertically opposite angles
- (iii) three pairs of adjacent angles
- (iv) one pair of complementary angles
- (v) one pair of supplementary angles.



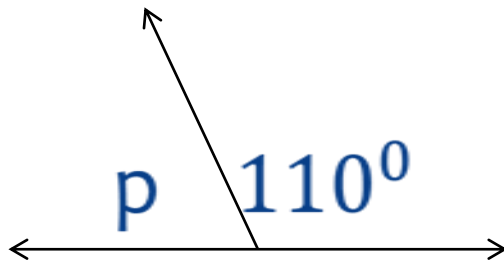
* Q4. Look at the following figures and fill in the blanks –

* (I)



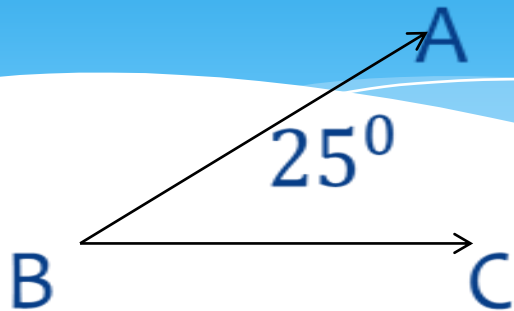
$$x = \text{-----}.$$

(II)



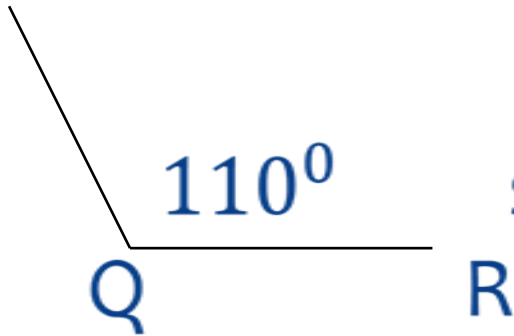
$$p = \text{-----}.$$

* (iii)



Complement of $\angle ABC = \text{-----}$

(iv) P



supplement of $\angle PQR = \text{-----}$

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