CHAPTER-5

TOPIC: LINES AND ANGLES

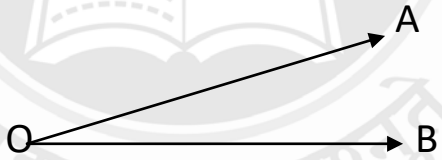
NOTES:

LINE : A line has a sense of length but has neither breadth nor thickness. It has no end points.

LINE SEGMENT: A line segment is a part of a line with two end points . PQ is the line segment.

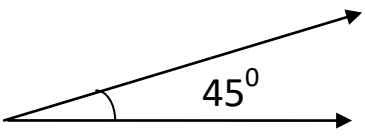
RAY : A portion of a line extended in one direction from a fixed point is called a ray . Here $\overrightarrow{OP}$ is the ray.

ANGLE: An angle is formed by two rays with a common initial point called the vertex and the rays forming an angle are called arms or sides of an angle.

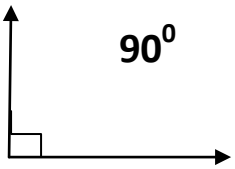


TYPES OF ANGLES:

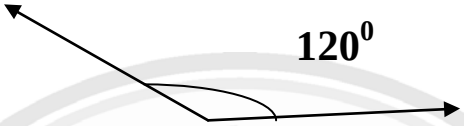
(i) **Acute Angle**: An angle whose measure is greater than 0^o but less than 90^0 is called an acute angle.



(ii) **Right Angle**: An angle whose measure is 90^o is called right angle.



(iii) **Obtuse Angle**: An angle whose measure is greater than 90^o but less than 180^o is called an Obtuse angle**.**



RELATED ANGLES:

Complementary Angles: When the sum of the measures of two angles is 90^o, then it is called **complementary angles**.

Supplementary Angles: When the sum of the measures of two angles is 180^o then it is called **supplementary angles**

THINK, DISCUSS AND WRITE:

1. **Can two acute angles be complement to each other?**

Ans: Yes, two acute angles complement as under :

(i)45^0, 45^0	**(ii)$50^0$$40^0$**	**(iii)40^0 ,50^0**
(iv)60^0,30^0	(v)30^0 ,60^0	(vi)70^0 ,20^0
(vii)20^0,70^0	(viii)80^0 ,10^0	(ix)10^0 ,80^0

2. **Can two obtuse angles be complement to each other**?
   Ans: No, two obtuse angles cannot be complement because their sum is greater than 90^0.
3. **Can two right angles be complement to each other?**
   Ans: No, two right angles cannot be complement to each other because their sum is greater than 90^0.

1. **Which pair of the following angles are complementary**?

Ans:

(i)	**$70^0+20^0 = 90^0$**	**Yes, the pair is complementary.**
(ii)	**$75^0+25^0=100^0$**	It is not complementary.
(iii)	**$48^0+52^0=100^0$**	It is not complementary.
(iv)	**$35^0+55^0=90^0$**	**Yes, the pair is complementary**.

2. What is the measure of the complement of each of the following angles?

Ans: Let x be the complement of the given angle, then..

(i). 45^0

$45^0+x^0 = 90^0$

$x^0=90^0-45^0$

$= 45^0$.

ii). 65^0

Soln: $65^0+x^0 = 90^0$

$x^0 =90^0-65^0$

$= 25^0$.

iii). 41^0

Soln : $41^0+x^0 = 90^0$

$x^0 =90^0-41^0$

$= 49^0$.

iv). 54^0

Soln: $54^0+x^0 = 90^0$

$x^0 =90^0-54^0$

$= 36^0$.

THINK, DISCUSS AND WRITE:

1. **Can two obtuse angles be supplementary?**

Ans: No, it does not happen so, because $90^0 <$ obtuse angle $< 180^0$.

2. **Can two acute angles can be supplementary?**

Ans: No, it does not happen because $0^0 <$ acute angle $< 90^0$.

3. **Can two right angles be supplementary?**

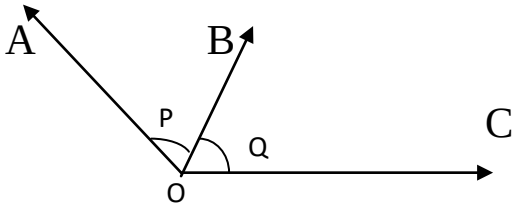
Ans: Yes, the sum of two right angles is supplementary

i.e. $90^0 + 90^0 = 180^0$.

TRY THESE:

1. **Find the pairs of supplementary angles in fig 5.7:**
   (i). $110^0 + 50^0 = 160^0$, it is not supplementary.
   (ii). $105^0 + 65^0 = 170^0$, it is not supplementary.
   (iii). $50^0 + 130^0 = 180^0$ it is supplementary.
   (iv). $45^0 + 45^0 = 90^0$, it is not supplementary.
2. **What will be the measure of the supplementary of each of the following angles?**
   Ans: Let x^0 be the one of the supplementary angles
   Then,
   (i) $100^0 + x^0 = 180^0$
   $\Rightarrow x^0 = 180^0 - 100^0$
   $\Rightarrow x^0 = 80^0$
   (ii) $90^0 + x^0 = 180^0$
   $\Rightarrow x^0 = 180^0 - 90^0$
   $\Rightarrow x^0 = 90^0$
   (iii) $55^0 + x^0 = 180^0$
   $\Rightarrow x^0 = 180^0 - 55^0$
   $\Rightarrow x^0 = 125^0$
   (iv) $125^0 + x^0 = 180^0$
   $\Rightarrow x^0 = 180^0 - 125^0$
   $\Rightarrow x^0 = 55^0$

ADJACENT ANGLES: Two angles are said to be adjacent if



(I) They have a common vertex.
(II) They have a common arm &
(III) The non – common arm are on either side of the common arm or they do not overlap.

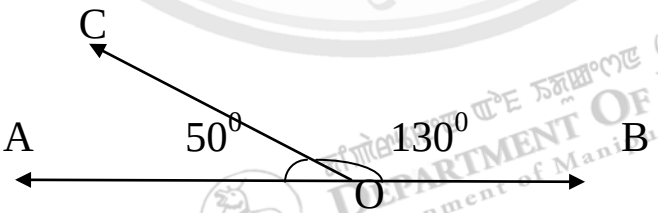
From the above figure, O is the common vertex OB is the common arm and OA & OC are non – common arms *L*P &*L*Q are adjacent angles.

TRY THESE:

1. **Are the angles marked 1 and 2 adjacent? If they are not adjacent, say "why"?**
   (i). Ans : *L*1 & *L2* are adjacent .
   (ii). *L*1 & *L2* are adjacent.
   (iii). *L*1 & *L2* are not adjacent, because they do not have the common vertex.
2. **In the given Fig 5.10 are the following adjacent angles?**
   (a) Ans: *L*AOB and *L*BOC are adjacent angles because they have common vertex and common arm.
   (b) Ans: *L*BOD and *L*BOC are not adjacent because OC and OP are not on opposite side of OB.

THINK, DISCUSS,AND WRITE:

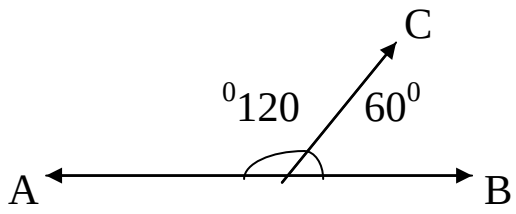
1. **Can two adjacent angles be supplementary**?
   Ans :Yes, two adjacent angles be supplementary.



2. **Can two adjacent angles be complementary?**
   Ans:Yes, two adjacent angle be complementary.
3. **Can two obtuse angle be adjacent angle?**
   Ans : Yes, two obtuse angle be adjacent angles because of the fact that their sum is less than 360^0.

4. **Can an acute angle be adjacent to an obtuse angle?**

   Ans : Yes, an acute angle be adjacent to an obtuse angle**.**



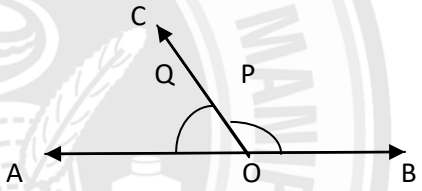
LINEAR PAIR OF ANGLES:

Two adjacent angles are said to form a linear pair of angles if their non- common arms are two opposite rays.

[**NOTE: Linear Pair of angles are always supplementary**.]

LP &*LQ* are linear pair

i.e. $LP + LQ = 180^0$.



THINK, DISCUSS AND WRITE :

1.**Can two acute angles form a linear pair?**

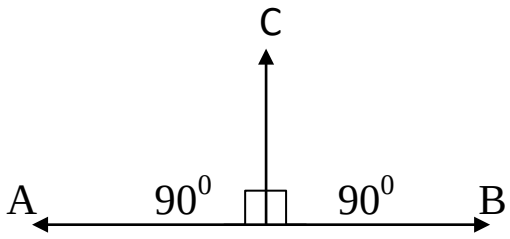
Ans: No, two acute angles cannot form a linear pair because an acute angles is less than 90^0 and their sum cannot reach 180^0.

2.**Can two obtuse angles form a linear pair?**

Ans: No, it cannot happen because their sum will be more than 180^0.

3.**Can two right angles form a linear pair?**

Ans: Yes, two right angles can form a linear pair because their sum is 180^0.



TRY THESE:

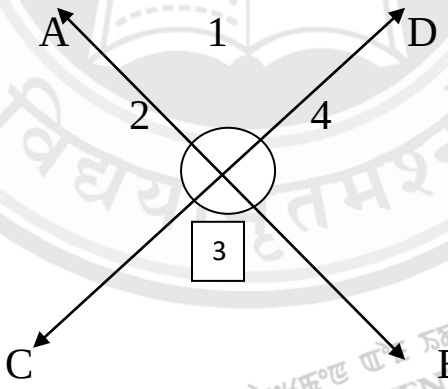
Check which of the following pair of angles form a linear pair because the sum of two angles is

Ans : (i) & (ii) are the pair angles form a linear pair because the sum of two angles is 180^0.

i.e. (i). $40^0 + 140^0 = 180^0$

ii). $65^0 + 115^0 = 180^0$.

VERTICALLY OPPOSITE ANGLES:



When two lines are intersect at a point then vertically opposite angles so formed are equal.

Here, *L*1 and *L*3

*L*2 and *L*4 are vertically opposite angles , then

*L*1 =*L*3 &

*L*2 =*L*4.