

CHAPTER – 5

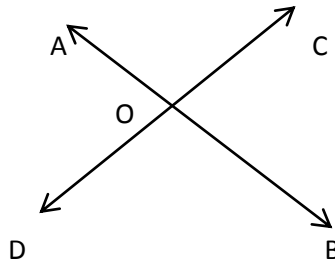
LINES AND ANGLES (HAND OUT)

Module- $\frac{3}{3}$

INTRODUCTION:

In the previous module we learnt about different angles. In this module we learn more about the pair of lines and the angles formed.

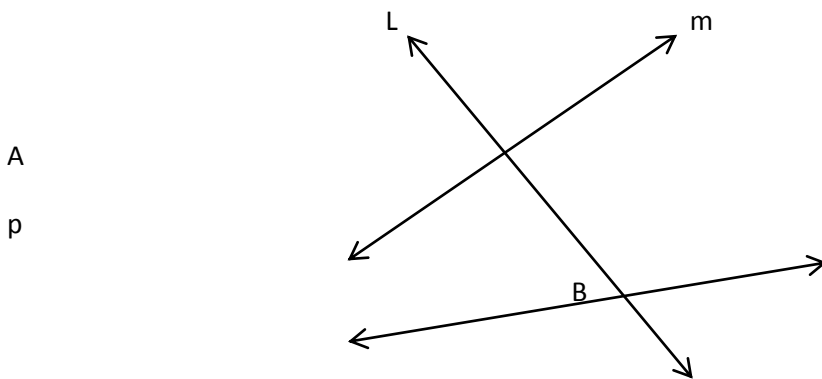
INTERSECTING LINES- If two lines or line segments meet together at a common point are called intersecting lines. The common point is called **point of intersection**.



In the fig.lines AB and CD are intersecting lines and point O is called point of intersection.

TRANSVERSAL -

If a line intersects two or more lines at distinct points, then the line is called a transversal.



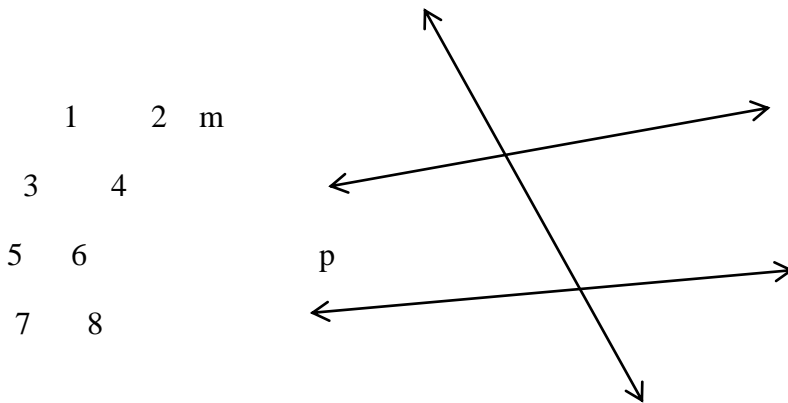
In the fig.line l intersects line m and p at distinct points A and B. Line l is called transversal.

The length of AB is called the intercept made by the transversal l of the lines m and p.

ANGLES MADE BY THE TRANSVERSAL –

If a transversal intersects two lines or line segments, then different pairs of angles are formed.

1



Here the transversal 1 intersects the lines m and p. The pairs of angles formed are as follows-

(a) **CORRESPONDING ANGLES** – A pair of angles having no common vertex and no common arm and remain on the same side of the transversal are called corresponding angles.

$\angle 1$ and $\angle 5$; $\angle 3$ and $\angle 7$; $\angle 2$ and $\angle 6$; $\angle 4$ and $\angle 8$.

(b) **ALTERNATE INTERIOR ANGLES**- A pair of angles having no common vertex and have a common arm and remain on the opposite interior side of the transversal are called alternate interior angles. It is also called alternate angles.

$\angle 3$ and $\angle 6$; $\angle 4$ and $\angle 5$.

(c) **ALTERNATE EXTERIOR ANGLES**- A pair of angles having no common vertex and no common arm and remain on the opposite exterior side of the transversal are called alternate exterior angles.

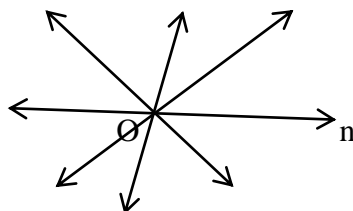
$\angle 1$ and $\angle 8$; $\angle 2$ and $\angle 7$.

(d) **INTERIOR ANGLES ON THE SAME SIDE OF THE TRANSVERSAL** – A pair of angles having no common vertex and have a common arm and remain on the same interior side of the transversal are called interior angles on the same side of the transversal.

$\angle 5$ and $\angle 3$; $\angle 6$ and $\angle 4$.

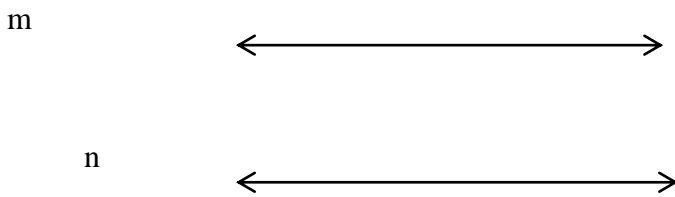
CONCURRENT LINES- If three or more lines meet at a common point are called concurrent lines and the common point is called point of concurrence.

L m p



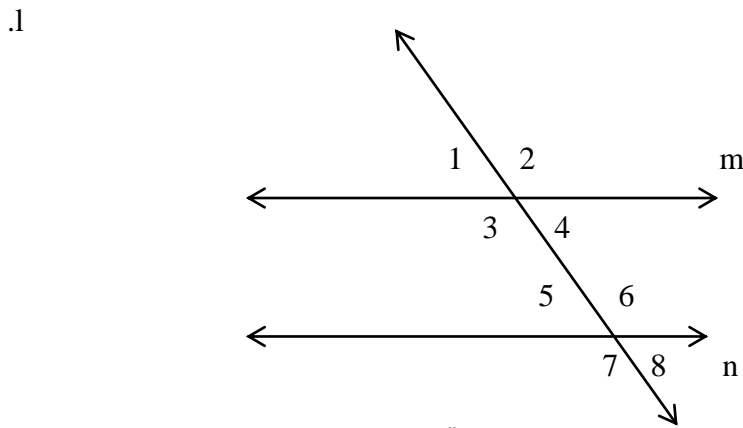
Here lines l,m,p and n are concurrent lines and O is called point of concurrence.

PARALLEL LINES – Two lines are said to be parallel lines if they never intersect anywhere even produce to infinity in both the directions. The perpendicular distance between two parallel lines is always equal.



$m \parallel n$, line m is parallel to line n or vice versa

TRANSVERSAL OF PARALLEL LINES -



In the given fig. 1 is a transversal and $m \parallel n$

1.If two parallel lines are intersected by a transversal, then the corresponding angles are equal.

$$\angle 1 = \angle 5, \angle 2 = \angle 6, \angle 3 = \angle 7 \text{ and } \angle 4 = \angle 8$$

2. If two parallel lines are intersected by a transversal, then the alternate interior angles are equal.

Proof- $\angle 1 = \angle 4$ --- (i) (vertically opposite angles)

$$\angle 1 = \angle 5 \text{ ----- (ii)(corresponding angles)}$$

By (i) and (ii)

$$\angle 4 = \angle 5$$

Similarly, $\angle 3 = \angle 6$.

3. If two parallel lines are intersected by a transversal, then the interior angles on the same side of the transversal are supplementary.

Proof - $\angle 1 + \angle 3 = 180^\circ$ ----- (i) (linear pair)

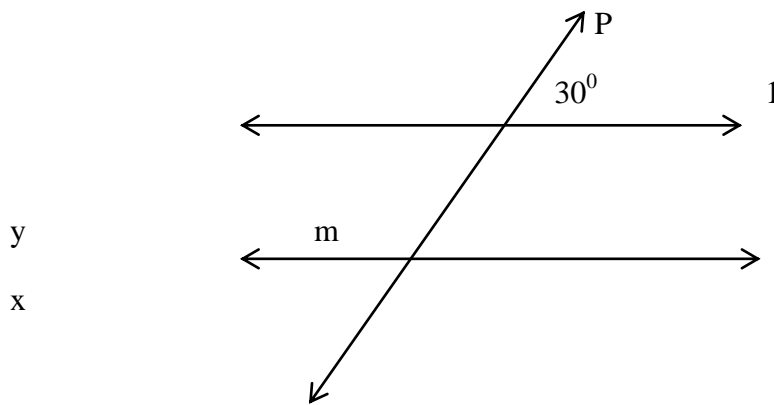
$$\angle 1 = \angle 5 \text{ ---- (ii) (corresponding angles)}$$

By (i) and (ii)

$$\angle 5 + \angle 3 = 180^\circ$$

Similarly $\angle 4 + \angle 6 = 180^\circ$

Example-1. If l and m are parallel lines and p is a transversal then find the measure of x and y .



$$y = 30^\circ \text{ (corresponding angle)}$$

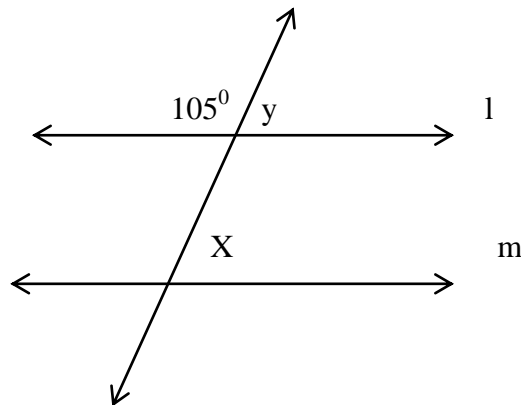
$$x + y = 180^\circ \text{ (linear pair)}$$

$$x + 30^\circ = 180^\circ$$

$$x = 180^\circ - 30^\circ = 150^\circ.$$

Example-2. If l and m are parallel lines and p is a transversal then find the measure of x and y .

p



$$105^\circ + y = 180^\circ \text{ (linear pair)}$$

$$y = 180^\circ - 105^\circ = 75^\circ$$

$$x = y \text{ (corresponding angles)}$$

$$x = 75^\circ$$

CHECKING FOR PARALLEL LINES-

1. If two lines are intersected by a transversal such that one pair of corresponding angles are equal, then the lines are parallel.

2. If two lines are intersected by a transversal such that one pair of alternate angles are equal, then the lines are parallel.

3. If two lines are intersected by a transversal such that one pair of interior angles on the same side of transversal are, then the lines are parallel.

What we have learnt?

(a) Intersecting lines- Two lines having a common point.

(b) Transversal – a line which intersects two or more lines at distinct points.

(c) Parallel lines – Two lines which never intersect anywhere even on produced in both sides.

(d) If two parallel lines are intersected by a transversal then –

i. corresponding angles are equal.

ii. alternate interior (exterior) angles are equal.

iii. interior angles on the same side of transversal are supplementary.

ASSIGNMENTS-

Q1.Fill in the blanks –

(i). The parallel lines are ----- from any point.

(ii).If two parallel lines are intersected by a transversal then alternate interior angles are -----.

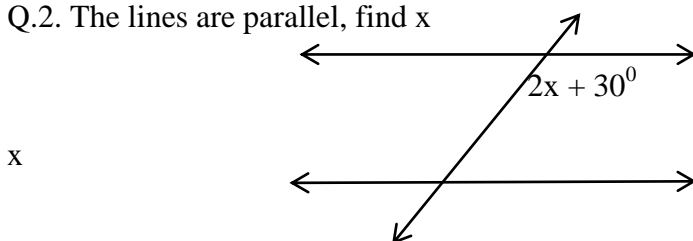
(iii).If two parallel lines are intersected by a transversal then corresponding angles are -----.

(iv). If two parallel lines are intersected by a transversal then the interior angles on the same side of the transversal are -----.

(v).If two lines meet together at a common point, they are called ----- and the common point is called -----.

(vi)If three or more lines meet together at a common point, they are called ----- and the common point is called -----.

Q.2. The lines are parallel, find x



Q.3.The lines are parallel, find x

