# Lines and Angle

## Introduction

Line: A straight path that goes on forever in opposite directions.



Line Segments: A line segment is a Part of a line with two endpoints.



**Ray:** A ray is a part of a line that has one endpoint and goes on forever in only one direction.



**Related Angles** 

## **Complementary Angles**

If the sum of measures of angle is 90°, then the two angles said to be complementary to each other or a pair of complementary angles.





### **Supplementary Angles**

If the sum of measures of angle is 180°, then the two angles said to be supplementary to each other or a pair of supplement angles.



## **Adjacent Angles**

Angles that share a common side, have the same vertex, and do not overlap.



Conditions for adjacent angles are:

- (i) They have a common vertex
- (ii) They have a common arm
- (iii) The non-common arms are on either side of the common arm.



### Linear Pair

A linear pair is a pair of adjacent angles whose non-common sides are opposite rays.



### **Vertically Opposite Angles**

A pair of non-adjacent angles formed by the intersection of two straight lines is known as the pair of vertically opposite angle.



 $\angle$ JKL =  $\angle$ MKN and  $\angle$ JKM =  $\angle$ LKN are pairs of vertical angles

## **Pairs of Lines**

## **Intersecting Lines**

Lines that have one and only one point in common are known as intersecting lines.



Intersecting Lines



### Transversal

A line that intersects two or more lines at **distinct** points is called a **transversal**.



## Angles Made By a Transversal

From these figure, you can see lines I and m cut by transversal p. The eight angles marked 1 to 8 have their special names:



Interior angles	$\angle 3$ , $\angle 4$ , $\angle 5$ , $\angle 6$
Exterior angles	$\angle 1 \angle 2 \angle 7 \angle 8$
Pairs of corresponding angles	$\angle$ 1 and $\angle$ 5, $\angle$ 2 and $\angle$ 6, $\angle$ 3 and $\angle$ 7, $\angle$ 4 and $\angle$ 8
Pairs of Alternate interior angles	$\angle 3$ and $\angle 6$ , $\angle 4$ and $\angle 5$
Pairs of Alternate exterior angles	$\angle$ 1 and $\angle$ 8, $\angle$ 2 and $\angle$ 7
Pair of interior angles on the same side of the transversal	$\angle$ 3 and $\angle$ 5, $\angle$ 4 and $\angle$ 6



#### **Transversal of Parallel Lines**

- If two parallel lines are cut by a transversal each pair of corresponding angles are equal in measure.
- If two parallel lines are cut by a transversal each pair of alternate interior angles are equal.
- If two parallel lines are cut by a transversal, then each pair of interior angles on the same side of the transversal are supplementary.



## **Checking For Parallel Lines**

When a transversal cuts two lines, such that pairs of corresponding angles are equal, then the lines have to be parallel.





When a transversal cuts two lines, such that pairs of alternate interior angles are equal, the lines have to be parallel.



When a transversal cuts two lines, such that pairs of interior angles on the same side of the transversal are supplementary, the lines have to be parallel.



