

# APTITUDE - GEOMETRY

## Advertisements

### Point

A point is an exact location

### Line Segment

The straight path between two points A and B is called a line segment AB. A line segment has two end points.



### Ray

On extending a line segment AB indefinitely in one direction we get the ray AB. Ray AB has one end point, namely A.



### LINE

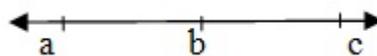
A line segment AB extended indefinitely in both directions is called line AB.



1. A line contains infinitely many points.
2. Through a given points , infinitely many lines can be drawn.
3. One and only one line can be drawn to pass through two given points A and B.
4. Two line meet in a point.
5. Two planes meet in a line.

### Collinear

In the given figure, the points A,B,C are collinear.

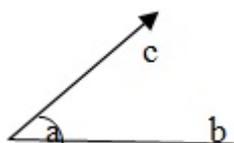


### Concurrent Lines

Three or more lines intersecting at the same points are called concurrent lines.

### Angle

Two rays OA and OB having a common end points O form angle AOB, written as  $\angle AOB$



### Measure of an Angle

The amount of turning from OA to OB is called the measure of  $\angle AOB$  written as  $m(\angle AOB)$ .

## An angle of $360^\circ$

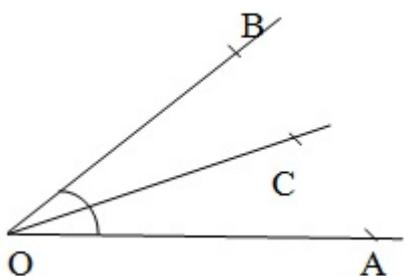
If a ray OA starting from its original position OA, rotates about O in anticlockwise direction and after a complete rotation comes back to its original position, then we say that it has rotated through 360. This complete rotation is divided into  $360^\circ$  equal parts. Then, each part is called 1 degree, written as  $1^\circ$

$1^\circ = 60$  minutes, written as  $60'$

1 minute = 60 seconds, written as  $60''$

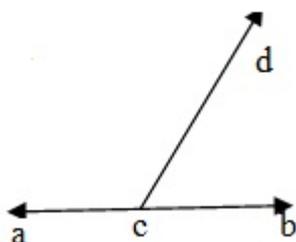
## Types of Angle

1. **Right angle** - An angle whose measure is  $90^\circ$  is called a right angle.
2. **Acute angle** - An angle whose measure is less than  $90^\circ$  is called an acute angle.
3. **Obtuse angle** - An angle whose measure is more than  $90^\circ$  but less than  $180^\circ$ , is called an obtuse angle.
4. **Straight angle** - An angle whose measure is  $180^\circ$  is called a Straight angle.
5. **Reflex angle** - An angle whose measure is more than  $180^\circ$  but less than  $360^\circ$ , is called a Reflex angle.
6. **Complete angle** - An angle whose measure is  $360^\circ$ , is called a complete angle.
7. **Equal angle** - Two angles are said to be equal, if they have the same measure.
8. **Complementary angle** - Two angles are said to be complementary if the sum of their measures is 90. For example, angles measuring  $65^\circ$  and  $25^\circ$  are complementary angle.
9. **Supplementary angle** - Two angles are said to be supplementary if the sum of their measures is  $180^\circ$ . For example, angles measuring  $70^\circ$  and  $110^\circ$  are supplementary.
10. **Adjacent angle** - Two angles are called adjacent angle if they have the same vertex and a common arm such that non-common arms are on either side of the common arm. In the given figure,  $\angle AOC$  and  $\angle BOC$  are adjacent angle.



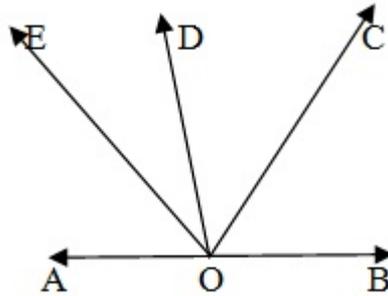
## Important Results

If a ray stands on a line, then the sum of two adjacent angles so formed is  $180^\circ$ . In the given figure, ray CP stands on line AB.



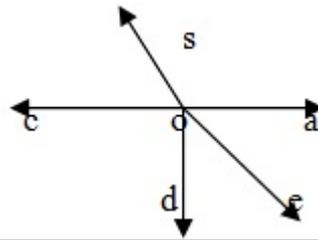
$$\therefore \angle ACD + \angle BCD = 180^\circ.$$

The sum of all angle formed on the same side of a line at a given point on the line is  $180^\circ$ . In the given figure four angle are formed on the same side of AOB.



$$\therefore \angle AOE + \angle EOD + \angle DOC + \angle COB = 180^\circ.$$

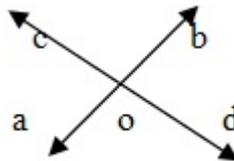
The sum of all angle around a point is  $360^\circ$  In the given figure five angle are formed around a point O.



$$\therefore \angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOA = 360^\circ.$$

### Vertically Opposite Angles

If two lines A and CD intersect at a point O, then AOC, BOD and BOC, AOD are two pair of vertically opposite angles. Vertically opposite angles are always equal.



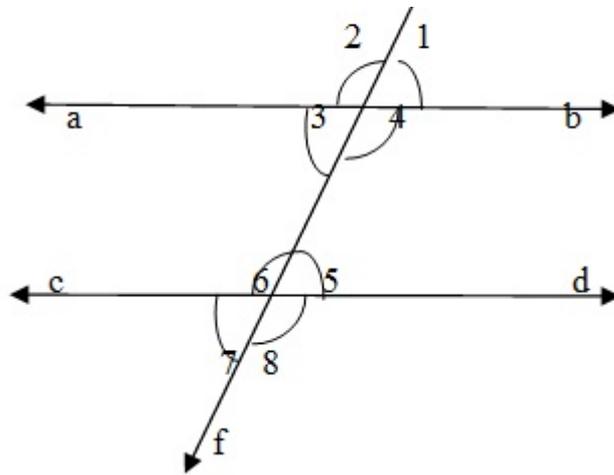
$$\therefore \angle AOC = \angle BOD \text{ and } \angle AOD = \angle BOC$$

### Parallel Lines

If two lines lie in the same plane and do not intersect when produced on either side then such lines are said to be parallel and we write,  $l \parallel m$ .

### Traversal line cutting parallel lines





Let two parallel lines AB and CD be cut by a transversal EF. Then

Corresponding angle are equal

$$(\angle 1 = \angle 5), (\angle 4 = \angle 8), (\angle 2 = \angle 6), (\angle 3 = \angle 7)$$

Alternate interior angles are equal.

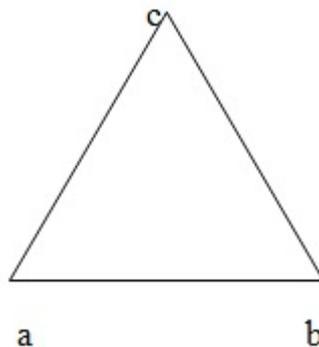
$$(\angle 3 = \angle 5) \text{ and } (\angle 4 = \angle 6)$$

Consecutive interior angles are supplementary

$$\angle 4 + \angle 5 = 180^\circ \text{ and } \angle 3 + \angle 6 = 180^\circ.$$

## Triangle

A figure bounded by three straight lines is called a triangle. In the given figure, we have  $\triangle ABC$ ;  $\triangle ABC$  having three vertices A, B, C. It has three angles, namely  $\angle A$ ,  $\angle B$  and  $\angle C$ . It has three sides, namely AB, AC and BC.



## Types of Triangle

1. A triangle having all sides equal is called an equilateral triangle.
2. A triangle having two sides equal, is called an isosceles triangle.
3. A triangle having all sides of different lengths, is called a scalene triangle.
4. A triangle one of whose angles measures  $90^\circ$ , is called a right triangle.
5. A triangle one of whose angle lies between  $90^\circ$  and  $180^\circ$  is called an obtuse triangle.
6. A triangle each of whose angle is acute, is called an acute triangle.
7. The sum of all sides of a triangle is called the perimeter of the triangle.

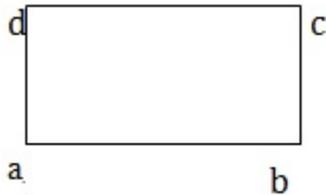
8. The sum of two sides of a triangle is greater than the third side.

9. In a right angled ABC in which  $\angle B = 90^\circ$ , we have  $AC^2 = AB^2 + BC^2$ . This is called Pythagoras Theorem.

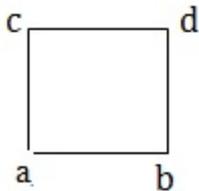
## Quadrilateral

A figure bounded by four straight line is called a quadrilateral. The sum of all angles of a quadrilateral is  $360^\circ$ .

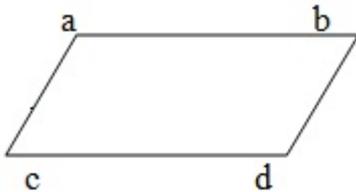
1. **Rectangle** - A quadrilateral is called a rectangle, if its opposite side are equal and each of its angle is  $90^\circ$ . In given fig. ABCD is a rectangle.



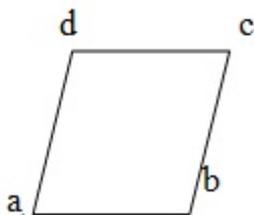
2. **Square** - A quadrilateral is called a square, if all of its sides are equal and each of its angles measures  $90^\circ$ . In given fig. ABCD is square in which  $AB = BC = CD = DA$ .



3. **Parallelogram** - A quadrilateral is called a parallelogram, if its opposite sides are parallel. In given fig. ABCD is a parallelogram in which  $AB = DC$  &  $AD = BC$ .



4. **Rhombus** - A parallelogram having all sides equal is called a rhombus. In given fig. ABCD is a rhombus in which  $AB = BC = CD = DA$ ,  $AB \parallel DC$  and  $AD \parallel BC$ .



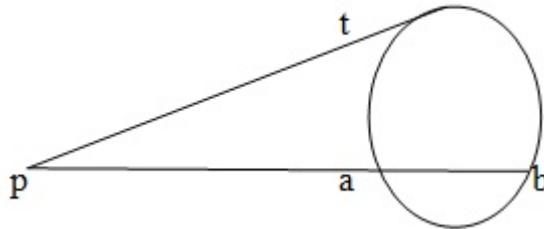
## Important Facts

1. A quadrilateral is a rectangle if opposite sides are equal and its diagonals are equal.
2. A quadrilateral is a Square if all sides are equal and the diagonal are equal.
3. A quadrilateral is a parallelogram, if opposite sides are equal.
4. A quadrilateral is a parallelogram but not a rectangle, if opposite sides are equal but the diagonals are not equal.
5. A quadrilateral is a rhombus but not a square if all their sides are equal and the diagonals are not equal.

## Results on Quadrilateral

1. In a parallelogram, we have
  1. Opposite sides are equal.
  2. Opposite angles are equal.
  3. Each diagonal bisects the parallelogram.
  4. Diagonals of a parallelogram bisect each other.
2. Diagonals of a rectangle are equal.
3. Diagonals of a rhombus bisect each other at right angles.

## Results on Circle



1. The perpendicular from the center to a chord bisects the chord.
2. There is one and only one circle passing through three non collinear points.
3. Angle in a semi circle is a right angle.
4. Opposite angles of a cyclic quadrilateral are supplementary.
5. Angle in the same segment of a circle is equal.
6. The tangent at any point of a circle is perpendicular to the radius through the point of contact.
7. Two tangent to a circle from a point outside it are equal.
8. If PT is a tangent to a circle and PAB is a secant, Then  $PA \times PB = PT^2$

## Solved Examples

[Solved Examples](#)