DEPARTMENT OF EDUCATION (S)
Government of Manipur

Chapter 4: Basic Geometrical Ideas

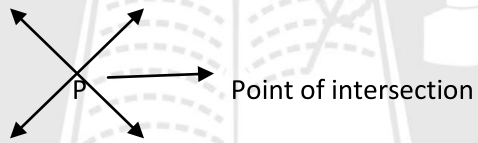
The term 'Geometry' is the English equivalent of the Greek word 'Geometron'. 'Geo' means Earth and 'metron' means Measurement.

Point: Point determines location.

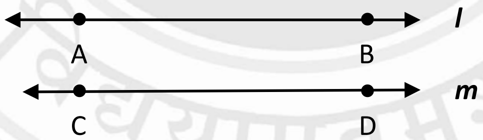
Shortest distance between point A and point B is a line segment and denoted by $\overline{AB}$.

A line through two points A and B can be extended in both directions. It can be denoted by letter like l,m ....

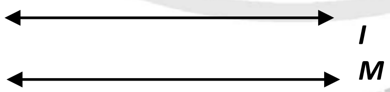
Intersecting Lines:



Parallel lines: Parallel lines are the lines which do not meet at any point if extended indefinitely on both sides.



We write $\overline{AB} || \overline{CD}$

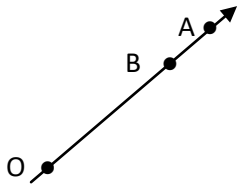


We write $\overline{l} || \overline{m}$

Example: The opposite edges of ruler.

Ray: A ray is a portion of a line, starting at one point and goes endlessly in a direction.

Here, A is the starting point and P is a point on the path of the ray $\overrightarrow{AP}$

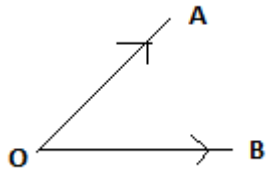


Here, $\overrightarrow{OA}$ passes through point B also. So it can be named $\overrightarrow{OB}$ also. $\overrightarrow{OA}$ and $\overrightarrow{OB}$ are the same as A and B lie on the same ray.

Curve: It is a drawing which is done without lifting the pencil.

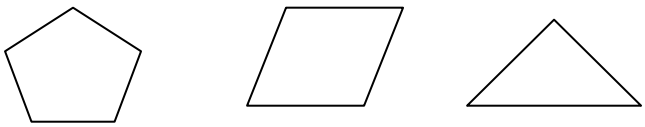
Closed and open curves: A curve is closed if its ends are joined. Otherwise, it is an open curve.

Angle: It is made up of two rays which are starting from a common point.



Two rays starting from a common initial point form an angle. Here, $\overrightarrow{OA}$ and $\overrightarrow{OB}$ with common initial point O form an angle $\angle AOB$. $\overline{OA}$ and $\overline{OB}$ are called the arms. O is the vertex of the angle.

Polygons: A polygon can be defined as a closed curve which is made up of line segments.



Remark: Any two line segments cannot form a closed figure.

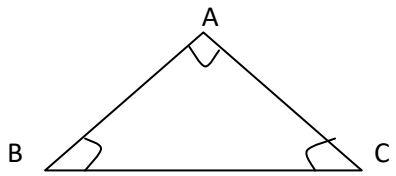
Sides of a polygon: The line segments are known as the sides of the polygon.

Vertex: Vertex is the meeting or intersecting point of a pair of sides.

Adjacent sides: Two sides having the same endpoint are called adjacent sides.

Diagonal: Diagonal is obtained by joining any two non-adjacent vertices of a polygon.

Triangle: A triangle is a three sided polygon. A simple closed figure made up of three line segments is called a triangle.

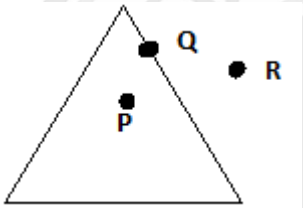


Here, ABC is a triangle and we write it as $\triangle$ ABC.

It has three sides AB, BC and CA.

Three vertices A,B and C and three angles namely $\angle$ABC, $\angle$BCA and $\angle$CAB.

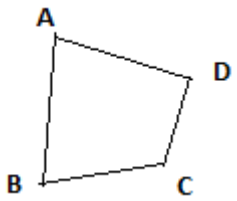
A triangle has an exterior and interior.



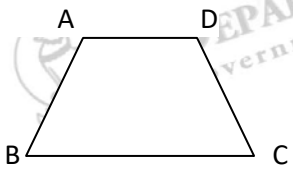
In the figure, we have P is in the interior of the triangle. R is in the exterior of the triangle and Q is on the triangle.

Quadrilateral:

A four sided polygon is called a quadrilateral. It has four sides and four angles.



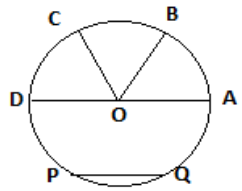
The four sides are AB, BC, CD and DA and 4 angles are $\angle$A, $\angle$B, $\angle$C and $\angle$D. A quadrilateral has 2 pairs of adjacent sides and 2 pairs of opposite sides. It has 2 pairs of opposite angles and 2 pair of adjacent angles.



$\overline{AD}$ and $\overline{BC}$ are opposite sides. Also, $\overline{AB}$ and $\overline{DC}$ are opposite sides. $\angle$A and $\angle$C are opposite angles and also, $\angle$B and $\angle$D are opposite angles. $\angle$B and $\angle$C are adjacent angles.

Circle:

A circle is a simple curve which is not a polygon. Every point on a circle is at equal distance from a fixed point called a centre.



In the above figure, O is the centre of the circle. A, B, C D are points on the circle and OA = OB = OC =OD. Each of the line segments $\overline{OA}$, $\overline{OB}$, $\overline{OC}$, $\overline{OD}$ is called radius of the circle. $\overline{DA}$ is known as diameter of the circle. $\overline{PQ}$ is chord connecting two points on a circle. The longest chord of a circle is its diameter. The distance around a circle is its circumference. A semi circle is half of a circle.
