CLASS 6 -   GEOMETRY – BASIC GEOMETRICAL IDEAS

'*Geo*' means Earth and '*metron*' means Measurement.

POINT
1) The most basic shape in geometry is the Point.

2) A point determines a location.

3) A point has no dimensions (length, breadth or thickness).

4) A point is denoted by a single capital letter like A, B, C.

5) Examples of points are: the tip of a compass, the sharpened end of a pencil, the pointed end of a needle and a star in the sky.

LINE SEGMENT
1) A line segment has two end points.

2) A line segment is made up of unlimited points.

3) Examples of a line segment are: an edge of a box, a tube light, the edge of a post card.

4) A line segment is the shortest route between two points. The points are called the end points.

5) A line segment has a fixed length. It does not have any thickness.

6) The symbol of a line segment is   ‾‾‾

7) A line segment is denoted by AB or BA. Both AB and BA denote the same line.

LINE

1) A line segment is a part of a line. When a line segment from A to B (i.e. AB) is extended beyond A in one direction and beyond B in the other direction without any end you get a model for a line.

2) A line has arrows at both ends as it can extend indefinitely in both directions.

3) The symbol of a line is $\longleftrightarrow$

4) It extends indefinitely in both directions and so it contains countless number of points.

5) A line is named using two capital letters for any two points on the line.

6) Sometimes a line is denoted by a letter like *l, m.*

7) Two lines can either meet at one point only or they will not meet at all.

INTERSECTING LINES

1) If two lines have one common point, they are called *intersecting lines*.

2) Examples of intersecting lines are: two adjacent edges of your notebook, the letter X of the English alphabet, crossing-roads.

3) Two lines can intersect only at one point.

4) More than two lines can also intersect in one point.

PARALLEL LINES

1) Line segments which will not meet, however far they are extended are called parallel lines.

2) If two lines AB and CD are parallel, we write AB **||** CD.

3) If two lines l_1 and l_2 are parallel, we write l_1 **||** l_2.

4) Examples of parallel lines are: the opposite edges of ruler (scale), the cross-bars of a window, the lines on a page of the Hindi notebook, rail lines.

RAY

1) Examples of a ray are: Beam of light from a light house, ray of light from a torch, sun rays.

2) A *ray* is a portion of a line.

3) It starts at one point (called starting point) and goes endlessly in a direction.

4) A ray is named using two capital letters. The first capital letter is the starting point of the ray and the second capital letter tells the direction in which the ray is moving.

5) If PQ is the ray then its starting point is P and the point Q lies on the ray.

6) OB and BO are two different rays.

CURVES

1) A curve is any figure which can be drawn without lifting the pencil from the paper.

2) Even a straight line is considered to be a curve.

3) If a curve does not cross itself, then it is called a **simple curve**.

4) A curve is said to be closed if its ends are joined; otherwise it is said to be open.

5) In a closed curve, thus, there are three parts.
      (i) interior ('inside') of the curve
      (ii) boundary ('on') of the curve and
      (iii) exterior ('outside') of the curve.

6) The interior of a curve together with its boundary is called its "**region**".

POLYGONS

1) A polygon is a simple closed curve made up entirely of line segments. A polygon has at least 3 sides.

2) The line segments forming a polygon are called its *sides*.

3) The sides of polygon ABCDE are AB, BC, CD, DE and EA.

4) The meeting point of a pair of sides is called its *vertex*.

5) Sides AE and ED meet at E, so E is a vertex of the polygon ABCDE.

6) The vertices of polygon ABCDE are A, B, C, D and E.

7) Any two sides with a common end point are called the *adjacent sides* of the polygon.
   The pairs of adjacent sides are AB and BC; BC and CD; CD and DE; DE and EA; EA and AB.

8) The end points of the same side of a polygon are called the *adjacent vertices*.
   The pairs of adjacent vertices are: A and B; B and C; C and D;
   D and E; E and A

9) The joins of pairs of vertices which are not adjacent are called the diagonals of the polygon.
   The diagonals are $\overline{AC}$, $\overline{AD}$, $\overline{BD}$, $\overline{BE}$, $\overline{CE}$.

ANGLES

1) Angles are made when corners are formed.

2) When two rays have a common end point A, then two rays together are said to form an angle.

3) An angle is made up of two rays starting from a common end point.

4) The two rays forming the angle are called the *arms* or *sides* of the angle.

5) The common end point is the *vertex* of the angle.

6) To show an angle we use a small curve at the vertex.

7) Symbol for triangle is ∠.

8) To name an angle two points, one on each side and the vertex are used. Thus, ∠ POQ is a better way of naming the angle instead of ∠ O.

9) **In specifying the angle, the vertex is always written as the middle letter.**

10) The angle also has three parts associated with it, which are the interior, exterior and on the angle.

TRIANGLE

1) A triangle is a three-sided polygon.

2) It is the polygon with the least number of sides.

3) Symbol for triangle is ∆

4) A triangle has three sides, three angles and three vertices.

5) Being a polygon, a triangle has an exterior and an interior.

6) In triangle ABC,

(a) The three sides of the triangle are $\overline{AB}$, $\overline{BC}$ and $\overline{CA}$.
(b) The three angles are ∠BAC, ∠BCA and ∠ABC.
(c) The points A, B and C are called the vertices of the triangle.

QUADRILATERAL

1) A four sided polygon is a *quadrilateral*.

2) It has 4 sides, 4 vertices and 4 angles.

3) The vertices are named in a cyclic manner.

4) Quadrilateral ABCD has four sides $\overline{AB}$, $\overline{BC}$, $\overline{CD}$ and $\overline{DA}$.

   It has four angles ∠A , ∠B, ∠C and ∠D .

5) In any quadrilateral ABCD, *adjacent sides are* - $\overline{AB}$ and $\overline{BC}$; $\overline{BC}$ and $\overline{CD}$; $\overline{CD}$ and $\overline{DA}$; and $\overline{DA}$ and $\overline{AB}$.

6) *Opposite sides* are AB and DC ; and BC and AD.

7) *Opposite angles* are ∠ A and ∠C; and ∠ B and ∠D.

8) *Adjacent angles* are ∠A and ∠B; ∠B and ∠C; ∠C and ∠D; A and ∠D and ∠A.

9) Structures like electric towers make use of triangular shapes and not quadrilaterals as the triangle is very rigid and hence a strong shape. When we push inward at any one vertex of the triangle the triangle does not get distorted.

CIRCLE

1) A circle is a simple closed curve which is not a polygon.

2) Every point on the circle is at equal distance from the centre.

3) The radius is a line segment joining the centre to a point on the circle.

4) The plural of 'radius' is radii.

5) *The chord is a line segment* connecting two points on a circle.

6) A line segment which connects two points on a circle and passes through the centre is called the diameter.

7) Diameter is double the size of a radius.

8) All diameters are chords. The diameter is the longest chord of the circle.

9) An arc is a portion of circle.

10) A circle has three parts - the *interior, exterior and on the* circle.

11) A region in the interior of a circle enclosed by an arc on one side and a pair of radii on the other two sides is called a *sector.*

12) A region in the interior of a circle enclosed by a chord and an arc is called a *segment* of the circle.

13) The distance around a circle is its *circumference.*

14) A diameter of a circle divides it into two equal parts called *semi-circle.*

15) A semi-circle is half of a circle, with the end points of diameter as part of the boundary