

## **6<sup>th</sup> Standard Maths**

### **Basic Geometrical Ideas**

The term 'Geometry' is the English equivalent of the Greek word 'Geometron'. 'Geo' mean Earth and 'metron' Means Measurement. Geometrical ideas are reflected in all forms of art, measurements, architecture, engineering, etc. We observe and use different objects. These objects have different shapes. The ruler is straight whereas a ball is round. In this chapter, we shall learn some interesting facts which enable us to know more about the shapes around us.

Let us mark a dot on the paper by a sharp tip of the pencil. Sharper the tip, thinner will be the dot. This almost invisible thinner dot gives us an idea of a point. A point determines a location. The following are some models for a point.

#### **A Line Segment**

A line segment is the shortest join of two points. The line segment joining two points A and B is denoted by  $\overline{AB}$  or  $\overline{BA}$ . The points A and B are called the endpoints of the segment.

Note:  $\overline{AB}$  and  $\overline{BA}$  denote the same line segment.

#### **A Line**

A line is obtained when a line segment like  $\overline{AB}$  is extended on both sides indefinitely. It is denoted by  $\overleftrightarrow{AB}$ . Sometimes it is denoted by a single letter like l. Although a line contains a countless number of points, yet two points are enough to determine a line. We say 'two points determine a line.'

### **Intersecting Lines**

Two lines are called intersecting lines if they have one common point.

### **Parallel Lines**

Two lines in a plane are said to be a parallel line if they do not intersect.

### **Ray**

A ray is a portion of a line. It starts at one point (called starting point) and goes endlessly in a direction.

### **Curves**

Any drawing (straight or non-straight) drawn without lifting the pencil from the paper and without the use of a ruler is called a curve. In everyday use curve means 'not straight' but in mathematics, a curve can be a straight line also. A curve is called a simple curve if it does not cross itself. A curve is said to be a closed curve if its ends are joined; otherwise, it is said to be open.

In a closed curve, there are three disjoint parts:

- Interior
- Boundary
- Exterior

The interior of a curve together with its boundary is called its region.

### **Polygons**

A polygon is a closed curve made up entirely of line segments. The line segments forming a polygon are called its sides. The meeting point of a pair of

sides is called its vertex. Any two sides with a common endpoint are called the adjacent sides. The endpoints of the same side are called the adjacent vertices. The join of any two non-adjacent vertices is called a diagonal of the polygon.

### **Angles**

An angle is made up of two rays starting from a common endpoint. Two rays OP and OQ starting from the common endpoint O form  $\angle POQ$  (or also called  $\angle QOP$ ) at O. Point O is called the vertex of  $\angle POQ$ . Rays OP and OQ form two sides of  $\angle POQ$ . Note that in specifying an angle, the vertex is always written as the middle letter.

An angle leads to three divisions of a region:

- On the angle
- The interior of the angle
- The exterior of the angle.

### **Triangles**

A triangle is a three-sided polygon. Actually, it is a polygon with the least number of sides. Triangle ABC is written as  $\Delta ABC$ . There are three sides of a triangle. Thus, sides of  $\Delta ABC$  are  $\overline{AB}$ ,  $\overline{BC}$  and  $\overline{CA}$ . There are three angles in a triangle. Thus, angles of  $\Delta ABC$  are  $\angle BAC$ ,  $\angle ABC$ , and  $\angle BCA$ . The points A, B, and C are called the vertices of the triangle ABC. Like angle, a triangle also has three regions associated with it.

- On the triangle
- The interior of the triangle
- The exterior of the triangle.

## **Quadrilaterals**

A quadrilateral is a four-sided polygon. It has 4 sides and 4 angles. A quadrilateral has 4 vertices which should be named cyclically.

In the quadrilateral ABCD,  $\overline{AB}$ ,  $\overline{BC}$  and  $\overline{CD}$  &  $\overline{DA}$  are the four sides;  $\angle A$ ,  $\angle B$ ,  $\angle C$  &  $\angle D$  are the four angles;

$\overline{AB}$ ,  $\overline{BC}$ ;  $\overline{BC}$ ,  $\overline{CD}$ ;  $\overline{CD}$ ,  $\overline{DA}$ ;  $\overline{DA}$ ,  $\overline{AB}$  are adjacent sides;

$\overline{AB}$  &  $\overline{DC}$ ;  $\overline{AD}$  &  $\overline{BC}$  are pairs of opposite sides;

$\angle A$  &  $\angle C$ ;  $\angle B$  &  $\angle D$  are pairs of opposite angles;

$\angle A$  &  $\angle B$ ;  $\angle B$  &  $\angle C$ ;  $\angle C$  &  $\angle D$ ;  $\angle D$  &  $\angle A$  are adjacent angles.

## **Circle**

A circle is a path of a point moving at the same distance from a fixed point. The fixed point is called the center, the fixed distance is called the radius and the distance around the circle is called the circumference. A chord of a circle is a line segment joining any two points on the circumference. A diameter is a chord passing through the center. A diameter is double the size of a radius. Any diameter of a circle divides it into two semi-circles. Any portion of a circle is called an arc. For two points P and Q on the circle, we get the arc PQ denoted  $\overline{PQ}$ . Like a simple closed curve, there are three regions associated with a circle.

- On the circle
- The interior of the circle
- The exterior of the circle.