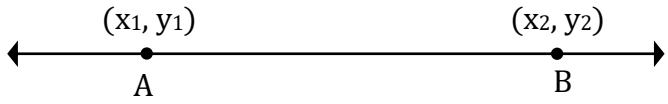
STRAIGHT LINES

INTRODUCTION

Introduction:

A straight line is an endless one-dimensional figure that has no width. It is a combination of endless points joined on both sides of a point. A straight line does not have any curve in it. It can be horizontal, vertical, or slanted. If we draw an angle between any two points on the straight line, we will always get a 180-degree. In this mini-lesson, we will explore the world of straight lines by understanding the equations of straight lines in different formats and how to solve the questions based on straight lines.

A **straight line** is an infinite length line that does not have any curves on it. A straight line can be formed between two points also but both the ends extend to infinity. A straight line is a figure formed when two points A (x_1, y_1) and B (x_2, y_2) are connected with the shortest distance between them, and the line ends are extended to infinity.
In the image shown below, a straight line between two points A and B is shown. A straight line AB is represented by: $\overleftrightarrow{AB}$



While straight lines have no definite beginning or end, they are represented in our day-to-day lives with examples such as railway tracks or the freeway.

Types of Straight Lines

Straight lines can be of various types. Generally, the straight lines are classified based on their alignment. Their alignment refers to the angle they form with the x-axis or the y-axis. According to the alignment of straight lines, they are of the following types:

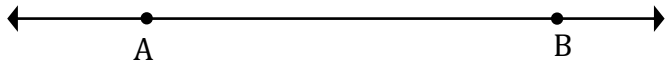
- Horizontal lines
- Vertical lines
- Oblique or Slanted lines

Let us explore them one by one.

Horizontal Lines

The lines which are drawn horizontally and are parallel to the x-axis or perpendicular to the y-axis, are called horizontal lines. They form a 0^o or 180^o angle with the x-axis and a 90^o or 270^o angle with the y-axis.

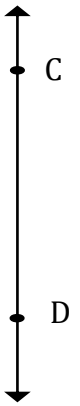
In the given figure, $\overleftrightarrow{AB}$ is a horizontal line.



Vertical Lines

The lines which are drawn vertically and are parallel to the y-axis, or perpendicular to the x-axis, are called vertical lines. They form a 90^o or 270^o angle with the x-axis and a 0^o or 180^o angle with the y-axis.

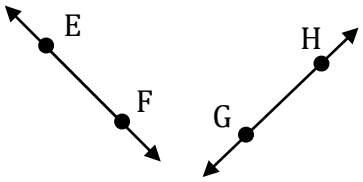
In the given figure, $\overleftrightarrow{CD}$ is a vertical line.



Oblique or Slanted Lines

The lines are drawn in a slanting position or form some angle other than 0^o, 90^o, 180^o, 270^o, 360^o with the horizontal or vertical lines are called oblique or slanting lines.

In the given figure, $\overleftrightarrow{EF}$ and $\overleftrightarrow{GF}$ are slanted lines.



Properties of a Straight Line

The properties of straight lines are written below.

- A straight line has infinite length. We can never calculate the distance between the two extreme points of the line.
- A straight line has zero areas, zero volume. but it has infinite length.
- A straight line is a one-dimensional figure.
- An infinite number of lines can pass through a single point, but there is only one unique line that passes through two points.

1. Equation of straight line

A relation between x and y which is satisfied by co-ordinates of every point lying on a line is called the equation of Straight Line. Every linear equation in two variable x and y always represents a straight line.

eg. $3x + 4y = 5$, $-4x + 9y = 3$ etc.

General form of straight line is given by

$$\mathbf{ax + by + c = 0.}$$

2. Equation of straight line parallel to axes

(i) Equation of **x axis** $\Rightarrow$ $\mathbf{y = 0.}$

Equation a line parallel to x axis (or perpendicular to y axis) at a distance 'a' from it

$\Rightarrow$ $y = a.$

(ii) Equation of **y axis** $\Rightarrow$ $\mathbf{x = 0.}$

Equation of a line parallel to y axis (or perpendicular to x axis) at a distance 'a' from it

$\Rightarrow$ $x = a.$

eg. Equation of a line which is parallel to x-axis and at a distance of 4 units in the negative direction is $y = -4$.