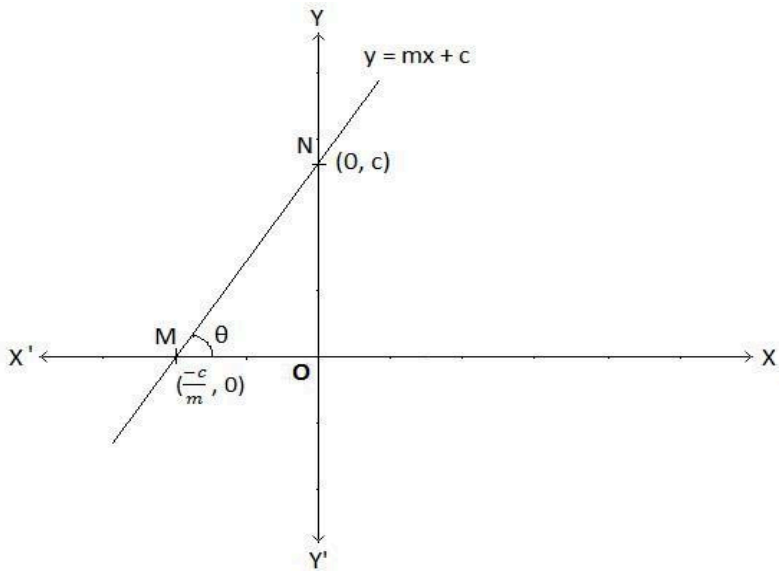
Equations of a straight line:

1. **Slope-intercept form** of a straight line is given as:

$$y = mx + c$$

Where, m is the slope of the line and c is the y-intercept.

And $m = tan\theta$,where θ is the angle that the line makes with the positive x-axis.



2. **Point-slope form:**
   - $y - y_1 = m(x - x_1)$
   - where m is the slope of the line and (x_1, y_1) are the coordinates of a point on the line.

3. **Two-point form:**

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

Where, (x_1, y_1) and (x_2, y_2) are the coordinates of two points on the line.

4. **Intercept form:**
   - $\frac{x}{a} + \frac{y}{b} = 1$
   - Where *a* and *b* are the intercepts of the line on the x-axis and y-axis respectively.

5. **General form:**
   - $ax + by + c = 0$
   - where *a, b,* and *c* are real numbers.

Parallel lines

- Two lines are called **parallel** to each other if the values of the slope are equal.
- Let's consider two lines $y = m_1x + c_1$ and $y = m_2x + c_2$
- The above two lines are parallel if $m_1 = m_2$

Perpendicular lines

- The above two lines are **Perpendicular** to each other if: $m_1 = -\frac{1}{m_2}$

Hyperplane

- A hyperplane is a linear surface in n-dimensions.
- The general equation of a hyperplane is given as:
  - $w_1x_1 + w_2x_2 + w_3x_3 + ... + w_nx_n + w_0 = 0$
- Where, $w_1, w_2, w_3, ..., w_n$ are called the **weights/coefficients** and $x_1, x_2, x_3, ..., x_n$ are the **features**.
- The equation of a **plane** in **3-D** is given as:
  - $w_1x + w_2y + w_3z + w_0 = 0$