

Chapter 10

STRAIGHT LINES

SLOPE OF A LINE : $m = \tan\theta$ if θ is the angle of inclination.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{if } (x_1, y_1) \text{ and } (x_2, y_2) \text{ are two points on the line.}$$

SLOPE of a horizontal line is 0 and vertical line is not defined.

If m_1 and m_2 are slopes of L_1 and L_2 respectively.

$$L_1 \parallel L_2 \rightarrow m_1 = m_2$$

$$L_1 \perp L_2 \rightarrow m_1 \times m_2 = -1$$

Acute angle between L_1 and L_2

$$\tan\theta = \left| \frac{m_2 - m_1}{1 + m_1 m_2} \right| \text{ as } 1 + m_1 m_2 \neq 0 \text{ and the obtuse angle}$$

$$\phi = 180 - \theta.$$

EQUATION OF STRAIGHT LINE

$$\text{x-axis} \rightarrow y = 0$$

$$\text{y-axis} \rightarrow x = 0$$

$$\parallel \text{ to x-axis} \rightarrow y = b$$

$$\parallel \text{ to y-axis} \rightarrow x = a$$

Having slope m and making an intercept c on y-axis $\rightarrow y = mx + c$

Making intercepts a and b on the x-axis and y-axis $\rightarrow \frac{x}{a} + \frac{y}{b} = 1$

passing through (x_1, y_1) and $(x_2, y_2) \rightarrow y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

Having normal distance from origin P and angle between the normal and positive x-axis $\omega \rightarrow x \cos \omega + y \sin \omega = P.$

General form $\rightarrow Ax + By + C = 0$

Distance of a point (x_1, y_1) from a line $ax + by + c = 0$ is $\left| \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right|$

TEXT BOOK QUESTIONS

- * → Exercise 10.1 → Qns 5,8,9
- * → Exercise 10.2 → Qns 7,8,9,10,11,16
- * → Exercise 10.3 → Qns 3,4,5,7,8,9,10,12,16
- * → MiscExercise → Qns 1,6,7,8,9,12,14,15,23
- ** → Exercise 10.1 → Qns 11,13
- ** → Exercise 10.2 → Qns 12,13,15,18,20
- ** → Exercise 10.3 → Qns 13,14,17,18
- ** → Misc Exercise → Qns 3,4,11,18,19
- ** → Example → 2,3,13,14,15,17,19,20,23
- Misc Example → 23

EXTRA/ HOT QUESTIONS

1. Find the equation of the line through (4,-5) and parallel to the line joining the points (3,7) & (-2,4).

(Ans. $3x-5y-37=0$)
2. If A(1,4) , B(2,-3) and C(-1,-2) are the vertices of a triangle ABC . find
 - a) The equation of the median through A
 - b) The equation of the altitude through A
 - c) The right bisector of side BC
3. Find the equation of the straight line which passes through (3,-2) and cuts off positive intercepts on the x axis and y axis which are in the ratio 4:3
4. Reduce the equation $3x-2y+4=0$ to intercept form. Hence find the length of the segment intercepted between the axes.
5. Find the image of the point (1,2) in the line $x-3y+4=0$
6. If the image of the point (2,1) in a line is (4,3) .Find the equation of the line.
7. Find the equation of a line passing through the point (-3,7) and the point of intersection of the lines $2x-3y+5=0$ and $4x+9y=7$.

(Ans. $8x+3y+3=0$)

8. Find the equation of straight lines which are perpendicular to the line

$12x+5y = 17$ and at a distance of 2 units from the point $(-4,1)$

(ans. $5x-12y+6=0$ & $5x-12y+58=0$)

9. The points $A(2,3)$ $B(4,-1)$ & $C(-1,2)$ are the vertices of a triangle. Find the length of perpendicular from A to BC and hence the area of ABC (Ans. $\frac{14}{\sqrt{34}}$ units & 7 sq.units)

10. Find the equation of straight line whose intercepts on the axes are thrice as long as those made by $2x + 11y = 6$

(Ans. $2x+11y = 18$)