

## Straight Lines

- **Straight line parallel to an Axis**
- The equation of any line parallel to x-axis is  $y = b$
- The equation of any line parallel to y-axis is  $x = c$

### Equation of straight line in various standard forms

- (i) Slope intercept form

$$y = mx + c$$

- (ii) Point - Slope form

$$m = \frac{y - y_1}{x - x_1}$$

Hence equation of straight line

$$y - y_1 = m(x - x_1)$$

- (iii) Two- Point Form

Here  $m = \frac{y_2 - y_1}{x_2 - x_1}$

The equation of straight line in two point form as

$$y - y_1 = m(x - x_1)$$

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

- (iv) Intercept form

$$\frac{x}{a} + \frac{y}{b} = 1$$

- (v) Normal Form

$$x \cos \alpha + y \sin \alpha = p$$

Where 'p' is the length of perpendicular from origin and ' $\alpha$ ' be the angle between positive direction.

### General Equation of Straight line

The general form of equation

$$Ax + By + C = 0$$

- (i) Slope of line =  $-\frac{A}{B}$   
 (ii) x – intercept =  $-\frac{C}{A}$   
 (iii) y – intercept =  $-\frac{C}{B}$   
 (iv) Length of perpendicular from the origin to the line

$$= \frac{|C|}{\sqrt{A^2+B^2}}$$

Distance of a given point  $(x_1 + y_1)$  from a given line  $Ax + By + C = 0$  is

$$d = \left| \frac{Ax_1 + By_1 + C}{\sqrt{A^2 + B^2}} \right|$$

### Check Your Progress

1. The equation of the line which passes through the point (3, 4) and the sum of its intercept on the axes is 14, is -

- (A)  $4x - 3y = 24, x - y = 7$   
 (B)  $4x + 3y = 24, x + y = 7$   
 (C)  $4x + 3y + 24 = 0, x + y + 7 = 0$   
 (D)  $4x - 3y + 24 = 0, x - y + 7 = 0$

2. If the intercept made by the line between the axes is bisected at the point  $(x_1, y_1)$ , then its equation is -

- (A)  $\frac{x}{x_1} + \frac{y}{y_1} = 2$   
 (B)  $\frac{x}{x_1} + \frac{y}{y_1} = 1$

(A)(C)  $\frac{x}{x_1} + \frac{y}{y_1} = \frac{1}{2}$

(D) None of these

3. If  $x + 2y = 3$  is a line and  $A(-1, 3)$ ;  $B(2, -3)$ ;  $C(4, 9)$  are three points, then -

(A)(A) A is on one side and B, C are on other side of the line

(B)(B) A, B are on one side and C is on other side of the line

(C)(C) A, C on one side and B is no other side of the line

(D) All three points are on one side of the line

4. If  $A(-2,1)$ ,  $B(2,3)$  and  $C(-2,-4)$  are three points, then the angle between BA and BC is -

(A)  $\tan^{-1} \left( \frac{3}{2} \right)$

(B)  $\tan^{-1} \left( \frac{2}{3} \right)$

(C)  $\tan^{-1} \left( \frac{7}{4} \right)$

(D) None of these

5. The equation of a line parallel to  $ax + by + c = 0$  and passing through the point  $(c, d)$  is -

(A)  $a(x + c) - b(y + d) = 0$

(B)  $a(x + c) + b(y + d) = 0$

(C)  $a(x - c) + b(y - d) = 0$

(D) None of these

6. If the point  $(5, 2)$  bisects the intercept of a line between the axes, then its equation is-
- (A)  $5x + 2y = 20$  (B)  $2x + 5y = 20$   
(C)  $5x - 2y = 20$   
(D)  $2x - 5y = 20$
7. If the point  $(3, -4)$  divides the line between the x-axis and y-axis in the ratio  $2 : 3$  then the equation of the line will be -
- (A)  $2x + y = 10$  (B)  $2x - y = 10$   
(C)  $x + 2y = 10$  (D)  $x - 2y = 10$
8. The angle made by the line joining the points  $(1, 0)$  and  $(-2, \sqrt{3})$  with x axis is -
- (A)  $120^\circ$  (B)  $60^\circ$   
(C)  $150^\circ$  (D)  $135^\circ$
9. If  $A(2,3)$ ,  $B(3,1)$  and  $C(5,3)$  are three points, then the slope of the line passing through A and bisecting BC is -
- (A)  $1/2$  (B)  $-2$   
(C)  $-1/2$  (D)  $2$
10. If the vertices of a triangle have integral coordinates, then the triangle is -
- (A) Isosceles  
(B) Never equilateral  
(C) Equilateral  
(D) None of these
11. The equation of a line passing through the point  $(-3, 2)$  and parallel to x-axis is -
- (A)  $x - 3 = 0$  (B)  $x + 3 = 0$   
(C)  $y - 2 = 0$  (D)  $y + 2 = 0$
12. If the slope of a line is 2 and it cuts an intercept  $-4$  on y-axis, then its equation will be -
- (A)  $y - 2x = 4$  (B)  $x = 2y - 4$   
(C)  $y = 2x - 4$  (D) None of these
13. The equation of the line cutting of an intercept  $-3$  from the y-axis and inclined at an angle  $\tan^{-1} 3/5$  to the x axis is -
- (A)  $5y - 3x + 15 = 0$   
(B)  $5y - 3x = 15$   
(C)  $3y - 5x + 15 = 0$   
(D) None of these

### Stretch Yourself

1. Find the equation of the line which passes through the point (3, 4) and the sum of its intercept on the axes is 14
2. Calculate the distance of the point (2, 3) from the line  $2x - 3y + 9 = 0$  measured along a line  $x - y + 1 = 0$
3. Find the equation of a line through the point of intersection of the lines  $x - 3y + 1 = 0$  and  $2x + 5y - 9 = 0$  and whose distance from the origin is  $\sqrt{5}$ .
4. Find the value of  $4P_1^2 + P_2^2$   
If  $P_1$  and  $P_2$  be perpendicular from the origin upon the straight lines  $x \sec \theta + y \operatorname{cosec} \theta = a$  and  $x \cos \theta - y \sin \theta = a \cos 2\theta$  respectively
5. What is the angle between the lines  $y - x + 5 = 0$  and  $\sqrt{3}x - y + 7 = 0$

### Answer to check your progress

1 B, 2 A, 3C, 4B,  
5C, 6B 7B 8B