# CBSE Test Paper 05
## CH-10 Straight Lines

1. The equations of the lines through ( 1 , 1 ) and making angles of $45^0$ with the line x + y = 0
   a. x – y = 0 , y – 1 = 0
   b. none of these
   c. x – 1 = 0 , y – 1 = 0
   d. x – 1 = 0 , x – y = 0
2. The straight lines x + y - 4 = 0 , 3x + y – 4 = 0 , x - 3y – 4 = 0 form a triangle which is
   a. right angled triangle
   b. equilateral
   c. obtuse angled triangle
   d. none of these
3. Given the 4 lines with equations x + 2y – 3 = 0, 2x + 3y – 4 = 0, 3x + 4y – 5 = 0, 4x + 5y – 6 = 0 , then these lines are
   a. concurrent
   b. the sides of a quadrilateral
   c. sides of a parallelogram
   d. none of these
4. The distance of the point ( x , y ) from Y axis is
   a. x
   b. $|y|$
   c. y
   d. $|x|$
5. A line passes through (2,2) and is perpendicular to the line 3x+y=3, then its y intercept is
   a. 4/3
   b. 1
   c. 2/3
   d. 1/3
6. Fill in the blanks:

Equations of the lines through the point (3, 2) and making an angle of $45^0$ with the line x - 2y = 3 are ________.

7. Fill in the blanks:

   If the line is parallel to x-axis, then slope is equal to ________.

8. Find the equation of the line through the point (3, 8) and having slope 2.

9. Find the slope and inclination of line through pair of points (1, 2) and (5, 6).

10. A straight line moves so that the sum of the reciprocals of its intercepts made on axes is constant. Show that the line passes through a fixed point.

11. Without using distance formula, show that the points (-2, -1), (4, 0), (3, 3) and (-3, 2) are the vertices of a parallelogram.

12. Find the new coordinates in the following cases if the origin is shifted to the point (-3, -2) by a translation of axes.
    (3, -5)

13. Reduce the following equation $x-\sqrt{3}y+8=0$ into normal form. Find the perpendicular distances from the origin and angle between perpendicular and the positive X-axis.

14. A person standing at the junction (crossing ) of two straight points represented by the equations 2x - 3y + 4 = 0 and 3x - 4y - 5 = 0wants to reach the path whose equation is 6x - 7y + 8 = 0 in the least time. Find equation of the path that he should follow.

15. Find the equations of the medians of a triangle formed by the lines x + y - 6 = 0, x - 3y - 2 = 0 and 5x - 3y + 2 = 0

## CBSE Test Paper 05
## CH-10 Straight Lines

### Solution

1. (c) $x - 1 = 0$ , $y - 1 = 0$

   **Explanation:** If the lines make equal angles of $45^0$ with the given line, $x+y=0$.

   Then these lines must be perpendicular with each other.

   This is possible only when the two lines are parallel to X axis and Y axis.

   That is the equations should be x = a constant and y = a constant.

   Since it passes through (1,1)

   The equations should be $x = 1$ or $x-1=0$ and $y=1$ or $y-1=0$
2. (a) right angled triangle

   **Explanation:** The triangle formed by these lines is a right angled triangle

   If the lines are perpendicular to each other, then the product of their slopes is -1

   The slope of lines $3x + y - 4 = 0$ , $x - 3y - 4 = 0$ are -3 and 1/3 respectively.

   The product of the slopes is -1

   Hence these two lines are perpendicular to each other

   This infers that the triangle formed by these lines is a right angled triangle.
3. (a) concurrent

   **Explanation:** The lines are concurrent

   On solving the lies 1 and 2 we get the point of intersection as (-1,2)

   Similarly on solving lines 2 and 3, the point of intersection is (-1,2)

   Similarly solving the lines 3 and 4, the point of intersection is (-1,2)

   on solving lines 1 and 4 the point of intersection is (-1,2)

   Since the point of intersection is the same for all the lines, the lines are concurrent.
4. (a) x

   **Explanation:** The abscissa or the x co ordiate of a point is the distance from the y-axis.

   Hence the distance is x

   (d) $|x|$

5. (a) 4/3

   **Explanation:** The line which is perpendicular to the given line is x-3y+k=0

   This passes through the point (2,2)

   Substituting the values,

   2-3(2)+k=0

   k = 4

   Hence the equation of the line is x-3y+4=0

   This can be written as $\frac{x}{-4}+\frac{y}{4/3}=1$

   Hence the y intercept is 4/3

6. 3x - y - 7 = 0, x + 3y - 9 = 0

7. zero

8. We know that, equation of line passing through the point ($x_0$, $y_0$) and having slope m is given by

   $y - y_0 = m(x - x_0)$

   $\therefore$ Equation of line passing through the point (3, 8) and having slope 2 is

   y - 8 = 2(x - 3) $\Rightarrow$ y - 8 = 2x - 6 $\Rightarrow$ 2x - y + 2 = 0.

9. The slope of the line through the points (1, 2) and (5, 6) is

   $m=\frac{y_2-y_1}{x_2-x_1}=\frac{6-2}{5-1}=\frac{4}{4}=1$

   We know, m = tan$\theta$

   $\Rightarrow \quad \tan\theta=1$

   $\therefore \quad \theta=45^\circ$

10. Let intercept form of line is

    $\frac{x}{a}+\frac{y}{b}=1$ ...(i)

    where, a and b are intercept on the axes.

    Also, given the sum of the reciprocals of its intercepts made on axes is constant.

    $\frac{1}{a}+\frac{1}{b}=\frac{1}{k}$ [where, k is constant]

    $\Rightarrow \quad \frac{k}{a}+\frac{k}{b}=1$ ...(ii)

    On comparing the coefficients of x and y in Eqs. (i) and (ii),

    we get,

    x = k, y = k

LIne passes  through the fixed point (k, k).

**Hence proved.**

11. Let A(-2, -1), B (4, 0), C (3, 3) and D(-3, 2) be vertices of a quadrilateral ABCD.

$\therefore$ Slope of AB $= \frac{0-(-1)}{4-(-2)} = \frac{1}{6}$

Slope of BC $= \frac{3-0}{3-4} = \frac{3}{-1} = -3$

Slope of DC $= \frac{3-2}{3-(-3)} = \frac{1}{6}$

Slope of AD $= \frac{2-(-1)}{-3-(-2)} = \frac{3}{-1} = -3$

$\therefore$ Slope of AB = Slope of DC $\Rightarrow$ AB|| DC

And Slope of BC = Slope of AD $\Rightarrow$ BC || AD

Thus ABCD is a parallelogram

12. Here h = -3 and k = -2

x = 3 and y = -5

$\therefore$ x' = x - h

= 3 + 3 = 6

and y' = y - k

= -5 + 2 = -3

Hence he new coordinates of the point are (6 - 3)

13. Any equation of the form ax + by + c = 0 can be converted into normal form (x cos$\alpha$ + y sin$\alpha$ = p) dividing each term by $\sqrt{a^2+b^2}$ i.e.,

$\frac{a}{\sqrt{a^2+b^2}}x + \frac{b}{\sqrt{a^2+b^2}}y = \frac{c}{\sqrt{a^2+b^2}}$

Given equation of line is

$x - \sqrt{3}y + 8 = 0$

$\Rightarrow \quad x - \sqrt{3}y = -8$

$\Rightarrow \quad -x + \sqrt{3}y = 8$ ...(ii)

Now, divide by $\sqrt{(\text{ coefficient of } x)^2 + (\text{ coefficient of } y)^2}$ =

$\sqrt{(-1)^2 + (\sqrt{3})^2} = \sqrt{1+3} = 2,$ we get

$-\frac{1}{2}x + \frac{\sqrt{3}}{2}y = \frac{8}{2}$

$\Rightarrow$ - cos $60^0$ x + sin $60^0$ y = 4 [$\because$ convert in form of x cos$\alpha$ + y sin$\alpha$ = p]

[$\because$ cos x is negative and sin x is positive, it is possible in second quadrant]

$\Rightarrow$ x cos($180^o$ - $60^o$) + y sin ($180^o$ - $60^o$) = 4

$\Rightarrow$ x cos $120^o$ + y sin $120^o$ = 4

$[\because \cos(180^\circ - \theta) = -\sin\theta \text{ and } \sin(180^\circ - \theta) = \cos\theta]$

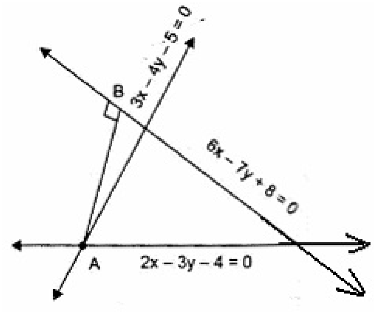
On comparing with x cos $\alpha$ + y sin$\alpha$ = p, we get

$\alpha$ = $120^o$, p = 4

14. The point of intersection of lines 2x - 3y + 4 = 0 and 3x - 4y - 5 = 0 is given by (31, 22) .

Since the shortest path through point A is perpendicular line AB.

$\therefore$ Slope of line 6x - 7y + 8 = 0 is $\frac{6}{7}$




So the slope of required line is $\frac{-7}{6}$

Thus equation of required line is

$y - 22 = \frac{-7}{6}(x - 31)$

$\Rightarrow$ 6y -132= -7x +217 $\Rightarrow$ 7x + 6y -349= 0

15. The equations of lines AB, BC and AC are

x + y - 6 = 0. . . (i)

x - 3y - 2 = 0 . . . (ii)

5x - 3y + 2 = 0. . . (iii)

On solving the equation (i) and (ii), we have coordinates of point B(5, 1)

On solving the equation (ii) and (iii), we have coordinates of point C(-1, -1)

On solving the equation (iii) and (i), we have coordinates of point A (2, 4).

Let D, E , F are mid points of BC, AC and AB respectively.

Coordinates of D are $\left(\frac{5-1}{2}, \frac{1-1}{2}\right)$ i.e. (2, 0)

Coordinates of E are $\left(\frac{2-1}{2}, \frac{4-1}{2}\right)$ i.e. $\left(\frac{1}{2}, \frac{3}{2}\right)$

Coordinates of F are $\left(\frac{2+5}{2}, \frac{4+1}{2}\right)$ i.e. $\left(\frac{7}{2}, \frac{5}{2}\right)$

Equation of median AD is

$$y-4=\frac{(0-4)}{(2-2)}(x-2)$$

$\Rightarrow$ x - 2 = 0

Equation of median BE is

$$y-1=\frac{\left(\frac{3}{2}-1\right)}{\left(\frac{1}{2}-5\right)}(x-5)$$

$$\Rightarrow y-1=\frac{\frac{1}{2}}{-\frac{9}{2}}(x-5) \Rightarrow y-1=-\frac{1}{9}(x-5)$$

$\Rightarrow$ 9y - 9 = -x + 5 $\Rightarrow$ x + 9y - 14 = 0

Equation of CF is

$$y+1=\frac{\left(\frac{5}{2}+1\right)}{\left(\frac{7}{2}+1\right)}(x+1)$$

$$\Rightarrow y+1=\frac{\frac{7}{2}}{\frac{9}{2}}(x+1) \Rightarrow y+1=\frac{7}{9}(x+1)$$

$\Rightarrow$ 9y + 9 = 7x + 7 $\Rightarrow$ 7x - 9y - 2 = 0

Thus equations of medians are x - 2 = 0, x + 9y - 14 = 0 and 7x - 9y - 2 = 0