Assignment 1: Straight Lines

1. Find the equation of the line passing through: a) (– 2, 5) and (8, 7) b) (3, – 1) and (– 4, – 5)
2. Find the equation of the line: a) passing through (3, 2) and having slope – 1/3
   b) making intercepts – 2/3 and – 4/3 on the axes.
   c) passing through (– 1, 6) and making an angle of 150° with the positive x – axis.
3. Find the value of p such that the line passing through (– 4, p) and (1, 3) is _____(*first use a) then use b)*) to the line passing through the points (– 2, 5) and (8, 7) a) parallel b) perpendicular**.**
4. For what values of x, the area of the triangle formed by the points (5, – 1), (x, 4) and (6, 3) is 5.5 sq. units?
5. Show that the points (– 1, 2), (5, 0) and (2, 1) are collinear by using
   a) distance formula b) area formula c) slope formula d) concept of equation of line.
6. Find the value of m and c so that the line with the equation y = mx + c may pass through the points (– 2, 3) and (4, – 3).
7. Find the equation of the line passing through (– 4, – 5) and perpendicular to the line passing through the points (– 2, 3) and (4, – 3).
8. The mid points of the sides of a triangle are (2, 2), (2, 3) and (4, 6). Find the vertices and the equation of the sides of the triangle.
9. Find the equation of the perpendicular bisector of the line segment joining the points (0, 3) and (– 4, 1).
10. Find the angle between the lines joining the points (3, – 1) to (2, 3) and (2, 7) to (5, 12).
11. Find the equation in normal form:
    a) p = 3 ; ω = 315° b) p = √3 ; ω = 240° c) p = 1 ; ω = – 60° d) p = 4; ω = 150°
12. Three consecutive vertices of a parallelogram are (–2, –1), (1, 0) and (4, 3), find the fourth vertex.
13. For what value of k are the points (8, 1), (k, –4) and (2, –5) collinear?
14. The midpoint of the segment joining (a, b) and (–3, 4b) is (2, 3a + 4). Find a and b.
15. Coordinates of centroid of Δ ABC are (1, –1). Vertices of Δ ABC are A(–5, 3), B(p, –1) and C(6, q). Find p and q.
16. In what ratio y-axis divides the line segment joining the points (3,4) and (–2, 1) ?
17. What are the possible slopes of a line which makes equal angle with both axes?
18. Determine x so that slope of line through points (2, 7) and (x, 5) is 2.
19. Write the equation of a line which cuts off equal intercepts on coordinate axes and passes through (2, 5).
20. Find k so that the line 2x + ky – 9 = 0 may be perpendicular to 2x + 3y – 1 = 0
21. Find the acute angle between lines x + y = 0 and y = 0
22. Find the angle which $\sqrt{3}x + y + 5 = 0$ makes with positive direction of x-axis.
23. The line 2x – 3y = 4 is the perpendicular bisector of the line segment AB. If coordinates of A are (–3, 1) find coordinates of B.
24. Find the equation of a line with slope –1 and whose perpendicular distance from the origin is equal to 5.
25. Find the equation of a straight line which passes through the point of intersection of 3x + 4y – 1 = 0 and 2x – 5y + 7 = 0 and which is perpendicular to 4x – 2y + 7 = 0.
26. If the image of the point (2, 1) in a line is (4, 3) then find the equation of line.
27. Find the equations of the medians of the triangle ABC whose vertices are A (2,5), B(-4,9) and C(-2, -1)
28. A quadrilateral has the vertices at the points (– 4 , 2), (2 ,6), (8 ,5) and (9 , –7). Show that the mid points of the sides of the quadrilateral are the vertices of a parallelogram.
29. The points A (0, 0), B (1, 7), C (5, 1) are the vertices of a triangle. Find the length of perpendicular from A to BC and hence the area of triangle ABC.
30. Find the equations of the sides of the triangle whose vertices are (–1, 8), (4, –2) and (–5 , –3).
31. Find the equations of the straight lines, which passes through the point (3 , 4) and have intercepts on the axes such that their sum is 14.
32. For what value of k, lines 3x + y – 2 =0; kx + 2y – 3 = 0 and 2x – y – 3 = 0 are concurrent?
33. Find the angles between the lines x + 2y = 3 and 2x – 3y = 4.
34. A line cuts x axis at A and y axis at B. The point (2, 2) divides AB in the ratio 2:1.Find the equation of the line.
35. Find the ratio in which the line joining the points (2, 3) and (4, 1) divides the line joining (1, 2) and (4,3). Also find the point of intersection.

36. Find the equation of a line perpendicular to $5x - 2y = 7$ and passing through the midpoint of the line joining (4, -1) and (2, 5).
37. Find the equation of a line passing through the point of intersection of the lines $5x - 3y = 1$ and $2x + 3y = 23$ and perpendicular to the line $x - 2y = 3$.
38. Find the equation of the line passing through the point of intersection of the lines $4x + 7y – 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.
39. Find out the angle between the following pair of lines
    a. $y – \sqrt{3}x – 5 = 0$ and $\sqrt{3}y – x + 6 = 0$ b) $y = (2 – \sqrt{3})x + 5$ and $y = (2 + \sqrt{3})x – 2$
40. In what ratio the line joining (-1, 1) and (5, 7) is divided by the line $x + y = 4$?
41. Find the equation of the line that has y intercept 4 and is parallel to the line $2x – 3y = 7$
42. Find the equation of the line that has x intercept - 3 and is perpendicular to the line $3x + 5y = 4$.
43. Prove that the lines $7x – 2y + 5 = 0$ and $14x – 4y – 8 = 0$ are parallel to each other.
44. Prove that the lines $3x – 2y + 5 = 0$ and $4x + 6y – 23 = 0$ are perpendicular.
45. Determine the equation of a line passing through (4, 5) and making equal angles with the lines $5x - 12y + 6 = 0$ and $3x = 4y + 7$.
46. Find the equation of a line passing through (3, - 2) and inclined at an angle 60^0 to the line $\sqrt{3}\,x + y = 1$

ANSWERS

1. a) $x – 5y + 27 = 0$ b) $4x – 7y – 19 = 0$
2. a) $x + 3y – 9 = 0$ b) $6x + 3y + 4 = 0$ c) $x + \sqrt{3}y – 6\sqrt{3} + 1 = 0$
3. a) $p = 2$ b) $p = 28$
4. $x = 9$ or $7/2$
5. Find AB, BC and AC…..sum of any two distances should be equal to third distance.
6. Substitute the coordinates for x and y to form two equations . solve to get $m = – 1$ and $c = 1$.
7. $x – y – 1 = 0$
8. vertices are (4, 5), (4, 7) and (0, - 1).
   Equation of the sides are $x = 4$, $3x – 2y – 2 = 0$ and $2x – y – 1 = 0$
9. perpendicular bisector passes thru the mid- point, then use $m_1.m_2 = – 1$ **ans**: $2x + y + 2 = 0$.
10. 45^o
11. a) $x – y = 3\sqrt{2}$ b) $x + \sqrt{3}y + 2\sqrt{3} = 0$ c) $x – \sqrt{3}y – 2 = 0$ d) $\sqrt{3}x – y + 8 = 0$

ANSWERS

12. (1, 2)
13. k = 3
14. a = 7, b = 10
15. p = 2, q = –5
16. 3 : 2 (internally)
17. ± 1
18. 1
19. x + y = 7
20. - 4/3
21. pi/4 [hint: y = 0 is the x – axis, find slope of other line and equate to tanθ]
22. 2pi/3
23. (1, –5) [hint: find slope of given line say m_1 then slope of AB = $- 1/m_1$; find eqn of AB and solve the two eqns we have to find the point of intersection. Use mid point formula to find B.]
24. $x + y + 5\sqrt{2} = 0$, $x + y – 5\sqrt{2} = 0$
25. $x + 2y = 1$ [hint: to find point of intersection solve the two eqns]
26. $x + y – 5 = 0$ [hint: line joining object and image is bisected perpendicularly by the mirror line]
27. $x – 5y + 23 = 0$; $7x + 4y – 8 = 0$; $8x – y + 15 = 0$
28. to be proved
29. $17/\sqrt{13}$ units, 17 sq. units
30. $2x + y – 6 = 0$; $x – 9y – 22 = 0$; $11x – 4y + 43 = 0$
31. $x + y = 7$; $4x + 3y = 24$

32. $k = 5$ [hint: solve eqns 1 and 3 and then sub values of x and y in eqn 2]
33. $\tan^{-1}(7/4)$