

DPP-02

SLOPE OF LINE & ANGLE BETWEEN TWO LINES

1. The line joining the points  $(x, 2x)$  and  $(3, 5)$  makes an obtuse angle with the positive direction of the x-axis. Then find the values of  $x$ .
2. If the line passing through  $(4, 3)$  and  $(2, k)$  is parallel to the line  $y = 2x + 3$ , then find the value of  $k$ .
3. Triangle ABC lies in the cartesian plane and has an area of 70 sq. units. The coordinates of B and C are  $(12, 19)$  and  $(23, 20)$ , respectively. The line containing the median to the side BC has slope -5. Find the possible coordinates of point A.
4. ABCD is a rhombus of side 10 units where slope of AB is  $4/3$  and slope of AD is  $3/4$ . If coordinates of A are  $(0, 0)$ , then find the coordinates of B, C and D.
5. The line joining the points  $A(2, 1)$ , and  $B(3, 2)$  is perpendicular to the line  $(a^2)x + (a + 2)y + 2 = 0$ . Find the values of  $a$ .
6. Find the angle between the line joining the points  $(1, -2)$ ,  $(3, 2)$  and the line  $x + 2y - 7 = 0$ .
7. The orthocenter of  $\triangle ABC$  with vertices  $B(1, -2)$  and  $C(-2, 0)$  is  $H(3, -1)$ . Find the vertex A.
8. The medians AD and BE of the triangle with vertices  $A(0, b)$ ,  $B(0, 0)$  and  $C(a, 0)$  are mutually perpendicular. Prove that  $a^2 = 2b^2$ .

LOCUS

9. Find the locus of a point whose distance from  $(a, 0)$  is equal to its distance from the y-axis.
10. The coordinates of the points A and B are  $(a, 0)$  and  $(-a, 0)$ , respectively. If a point P moves so that  $PA^2 - PB^2 = 2k^2$ , when  $k$  is constant, then find the equation to the locus of the point P.
11. Let  $A(2, -3)$  and  $B(-2, 1)$  be the vertices of  $\triangle ABC$ . If the centroid of the triangle moves on the line  $2x + 3y = 1$ . then find the locus of the vertex C.
12. Q is a variable point whose locus is  $2x - 3y - 4 = 0$ ; corresponding to a particular position of Q, P is the point of section of OQ, O being the origin, such that  $OP : PQ = 3 : 1$ . Find the locus of P.
13. Find the locus of the middle point of the portion of the line  $x \cos \alpha + y \sin \alpha = p$  which is intercepted between the axes, given that  $p$  remains constant.
14. Find the locus of the point of intersection of lines  $x \cos \alpha + y \sin \alpha = a$  and  $x \sin \alpha - y \cos \alpha = b$  ( $a$  is a variable).
15. A point moves such that the area of the triangle formed by it with the points  $(1, 5)$  and  $(3, -7)$  is 21 sq. units. Then, find the locus of the point.
16. A variable line through point  $P(2, 1)$  meets the axes at A and B. Find the locus of the circumcenter of triangle OAB (where O is the origin).
17. A straight line is drawn through  $P(3, 4)$  to meet the axis of  $x$  and  $y$  at A and B, respectively. If the rectangle OACB is completed, then find the locus of C.

## ANSWER KEY

1.  $x \in (5/2, 3)$
2.  $-1$
3.  $(15, 32)$  or  $(20, 7)$
4.  $B(6, 8), C(14, 14), D(8, 6)$
5.  $a = 2, -1$
6.  $\pi/2$
7.  $(3/7, -34/7)$
9.  $y^2 - 2ax + a^2 = 0$
10.  $2ax + k^2 = 0$
11.  $2x + 3y = 9$
12.  $2x + 3y + 3 = 0$
13.  $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$
14.  $x^2 + y^2 = a^2 + b^2$
15.  $6x + y = 32$  or  $6x + y = -10$
16.  $x + 2y - 2xy = 0$
17.  $\frac{3}{x} + \frac{4}{y} = 1$