

STRAIGHT LINES

CM110901

1. A ray of light passing through the point (1,2) reflects on the x-axis at point A and the reflected ray passes through the point (5,3). Find the coordinate of A.
2. If points (a,0), (0,b) and (x,y) are collinear, using concept of slope prove that $\frac{x}{a} + \frac{y}{b} = 1$.
3. Find the equation of a straight line which makes an angle of $\tan^{-1}\sqrt{2}$ with the x-axis and cuts off an intercept of $-\frac{3}{\sqrt{2}}$ with the y-axis.
4. The perpendicular from origin to a line meets it at point (-2,9), find the equation of the line.
5. A line passing through the point A(3,0) makes 30° angle with the positive direction of x-axis. If this line is rotated through an angle of 15° in clockwise direction, find its equation in new position.
6. The vertices of a triangle are A(10,4), B(-4,9) & C(-2, -1). Find orthocentre.
7. Find the equation of right bisector of line segment joining (3,4) & (-1,2).
8. Find the coordinates of the vertices of a square inscribed in the triangle with vertices A(0,0), B(2,1) & C(3,0); given that two of its vertices are on the side AC.
9. A line is such that its segment between the lines $5x - y + 4 = 0$ & $3x + 4y - 4 = 0$ is bisected at point (1,5). Obtain its equation.
10. In what ratio is the line joining the points (2,3) & (4, -5) divide by the line passing through the points (6,8) & (-3, -2).
11. Find the equation of a line which cut-off intercepts on the axes whose sum and product are 1 and - 6 respectively.
12. Find the equation of the straight lines which pass through the origin and trisect the intercept of the line $3x + 4y = 12$ between the axes.
13. A line forms a triangle of area $54\sqrt{3}$ square units with the coordinates axes. Find equation of line if the perpendicular drawn from the origin to the line makes an angle of 60° with x-axis.
14. Find distance of the point (2,3) from the line $2x - 3y + 9 = 0$ measured along a line making an angle of 45° with the x-axis.
15. Find value of k for which the line $(k - 3)x - (4 - k^2)y + k^2 - 7k + 6 = 0$ is
(i) parallel to x-axis (ii) parallel to y-axis (iii) passing through origin.
16. Find the area of the triangle formed by the lines $y = x$, $y = 2x$ and $y = 3x + 4$.

17. If the straight line $\frac{x}{a} + \frac{y}{b} = 1$ passes through the point of intersection of the lines $x + y = 3$ and $2x - 3y = 1$ and is parallel to $x - y = 6$, find a and b.
18. If a,b,c are in A.P., prove that the straight lines $ax + 2y + 1 = 0$, $bx + 3y + 1 = 0$ and $cx + 4y + 1 = 0$ are concurrent.
19. Show that the equation of a line passing through $(a \cos^3 \theta, a \sin^3 \theta)$ and perpendicular to the line $x \sec \theta + y \operatorname{cosec} \theta = a$ is $x \cos \theta - y \sin \theta = a \cos 2 \theta$.
20. Find the centroid, incentre, circumcentre and orthocentre of the triangle whose sides have the equations $3x - 4y = 0$, $12y + 5x = 0$ and $y - 15 = 0$.
21. Find the image of the point (2,1) with respect to the line mirror $x + y = 5$.
22. The hypotenuse of a right isosceles triangle has its ends at the points (1,3) and (-4,1). Find the equation of the legs(perpendicular sides) of the triangle.
23. Find the values of parameter a so that the point $(a, 2)$ is an interior point of the triangle formed by the lines $x + y - 4 = 0$, $3x - 7y - 8 = 0$ and $4x - y - 31 = 0$.
24. If p and p' be the perpendicular from the origin upon the straight lines $x \sec \theta + y \operatorname{cosec} \theta = a$ and $x \cos \theta - y \sin \theta = a \cos 2 \theta$. Prove that $4p^2 + p'^2 = a^2$.
25. Show that the product of perpendiculars on the line $\frac{x}{a} \cos \theta + \frac{y}{b} \sin \theta = 1$ from the points $(\pm \sqrt{a^2 - b^2}, 0)$ is b^2 .
26. Two sides of a square lie on the lines $x + y = 1$ and $x + y + 2 = 0$. what is its area?
27. Find the equation of the line mid-way between parallel lines $9x + 6y - 7 = 0$ & $3x + 2y + 6 = 0$.
28. Prove that the four straight lines $\frac{x}{a} + \frac{y}{b} = 1$, $\frac{x}{b} + \frac{y}{a} = 1$, $\frac{x}{a} + \frac{y}{b} = 2$ and $\frac{x}{b} + \frac{y}{a} = 2$ form a rhombus. Find its area.
29. A vertex of an equilateral triangle is (2,3) and the opposite side is $x + y = 2$. Find the equations of other sides.
30. One side of a rectangle lies along the line $4x + 7y + 5 = 0$. Two of its vertices are (-3,1) & (1,1). Find the equation of the other three sides.

