



MATHS

BOOKS - PSEB

STRAIGHT LINES

Exercise

1. Draw a quadrilateral in the Cartesian plane, whose vertices are $(-4, 5)$, $(0, 7)$, $(5, -5)$ and $(-4, -2)$. Also, find the area.



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2. The base of an equilateral triangle with side $2a$ lies along the y -axis such that the mid-point of the base is at the origin. Find vertices of the triangle.



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3. Find the distance between $P (x_1, y_1)$ and $Q (x_2, y_2)$ when : (i) PQ is parallel to the y -axis,

(ii) PQ is parallel to the x-axis.



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4. Find a point on the x-axis, which is equidistant from the points (7, 6) and (3, 4).



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5. Find the slope of a line, which passes through the origin, and the mid-point of the

line segment joining the points P (0,-4) and B (8, 0).



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6. Without using the Pythagoras theorem, show that the points (4, 4), (3, 5) and (-1,1) are the vertices of a right angled triangle.



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7. Find the slope of the line, which makes an angle of 30° with the positive direction of y-axis measured anticlockwise.



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8. Find the value of x for which the points $(x, -1)$, $(2, 1)$ and $(4, 5)$ are collinear.



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



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10. Find the angle between the x-axis and the line joining the points $(3, -1)$ and $(4, -2)$.



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11. The slope of a line is double of the slope of another line. If tangent of the angle between them is $\frac{1}{3}$, find the slopes of the lines.



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12. A line passes through (x_1, y_1) and (h, k) . If slope of line is m , show that $k - y_1 = m(h - x_1)$.



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13. If three points $(h, 0)$, (a, b) and $(0, k)$ lies on a line, show that $\frac{a}{h} + \frac{b}{k} = 1$



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14. In the following , find the equation of the line which satisfy the given conditions: Passing through the point $(-4,3)$ with slope $\frac{1}{2}$.



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15. In the following , find the equation of the line which satisfy the given conditions: Passing through $(0, 0)$ with slope m .



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16. In the following , find the equation of the line which satisfy the given conditions: Passing through $(2, 2\sqrt{3})$ and inclined with the x-axis at an angle of 75° .



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17. In the following , find the equation of the line which satisfy the given conditions:
Intersecting the x-axis at a distance of 3 units to the left of origin with slope -2.



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18. In the following , find the equation of the line which satisfy the given conditions:
Intersecting the y-axis at a distance of 2 units

above the origin and making an angle of 30° with positive direction of the x-axis.



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19. In the following , find the equation of the line which satisfy the given conditions: Passing through the points $(-1, 1)$ and $(2,-4)$.



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20. In the following , find the equation of the line which satisfy the given conditions:
Perpendicular distance from the origin is 5 units and the angle made by the perpendicular with the positive x-axis is 30° .



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21. The vertices of $\triangle PQR$ are P (2, 1), Q (-2, 3) and R (4, 5). Find equation of the median through the vertex R.





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22. Find the equation of the line passing through $(-3, 5)$ and perpendicular to the line through the points $(2, 5)$ and $(-3, 6)$.



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23. A line perpendicular to the line segment joining the points $(1,0)$ and $(2,3)$ divides it in the ratio $1 : n$. Find the equation of the line.



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24. Find the equation of a line that cuts off equal intercepts on the coordinate axis and passes through the point $(2, 3)$.



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25. Find equation of line passing through the point $(2, 2)$ and cutting off intercepts on the axes whose sum is 9.



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26. Find equation of the line through the point $(0, 2)$ making an angle $\frac{2\pi}{3}$ with the positive x-axis. Also, find the equation of line parallel to it and crossing the y-axis at a distance of 2 units below the origin.



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27. The perpendicular from the origin to a line meets it at the point $(-2, 9)$, find the equation of the line.



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28. The length L (in centimetre) of a copper rod is a linear function of its Celsius temperature C . In an experiment, if $L = 124.942$ when $C = 20$ and $L = 125.134$ when $C = 110$, express L in terms of C .



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29. The owner of a milk store finds that, he can sell 980 litres of milk each week at Rs 14/litre and 1220 litres of milk each week at Rs 16/litre. Assuming a linear relationship between selling price and demand, how many litres could he sell weekly at Rs 17/litre?



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30. P (a, b) is the mid-point of a line segment between axis. Show' that equation of the line

is $\frac{x}{a} + \frac{y}{b} = 2$.



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31. Point R (h, k) divides a line segment between the axes in the ratio 1:2. Find equation of the line.



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32. By using the concept of equation of a line, prove that the three points (3, 0), (- 2, -2) and

(8, 2) are collinear.



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33. Reduce the following equation into slope - intercept form and find their slopes and the y - intercepts.:- $x + 7y = 0$



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34. Reduce the following equation into slope - intercept form and find their slopes and the y -

intercepts:- $6x + 3y - 5 = 0$



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35. Reduce the following equation into slope - intercept form and find their slopes and the y - intercepts:- $y = 0$.



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36. Reduce the following equation into intercept form and find their intercepts on the

axes:- $3x + 2y - 12 = 0$



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37. Reduce the following equation into intercept form and find their intercepts on the

axes:- $4x - 3y = 6$



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38. Reduce the following equation into intercept form and find their intercepts on the

axes:- $3y + 2 = 0$.



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



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40. Reduce the following equation into normal form. Find their perpendicular distances from the origin and angle between perpendicular and the positive x-axis.:- $y - 2 = 0$,



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41. Reduce the following equation into normal form. Find their perpendicular distances from the origin and angle between perpendicular and the positive x-axis.:- $x - y = 4$.





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42. Find the distance of the point $(-1, 1)$ from the line $12(x + 6) = 5(y - 2)$.



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43. Find the points on the x -axis, whose distances from the line $\frac{x}{3} + \frac{y}{4} = 1$ are 4 units.



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44. Find the distance between parallel lines:-

$$15x + 8y - 34 = 0 \text{ and } 15x + 8y + 31 = 0$$



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45. Find the distance between parallel lines:-

$$l(x + y) + p = 0 \text{ and } l(x + y) - r = 0.$$



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46. Find equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through the point $(-2, 3)$.



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47. Find equation of the line perpendicular to the line $x - 7y + 5 = 0$ and having x intercept 3.



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48. Find angles between the lines

$$\sqrt{3}x + y = 1 \text{ and } x + \sqrt{3}y = 1.$$



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49. The line through the points $(h,3)$ and $(4, 1)$ intersects the line $7x - 9y - 19 = 0$ at right angle. Find the value of h .



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50. Prove that the line through the point (x_1, y_1) and parallel to the line

$$Ax + By + C = 0 \quad \text{is}$$

$$A(x - x_1) + B(y - y_1) = 0.$$



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51. Two lines passing through the point $(2, 3)$ intersects each other at an angle of 60° . If slope of one line is 2, find equation of the other line.





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52. Find the equation of the right bisector of the line segment joining the points $(3, 4)$ and $(-1, 2)$.



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53. Find the coordinates of the foot of perpendicular from the point $(-1, 3)$ to the line $3x - 4y - 16 = 0$.



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54. The perpendicular from the origin to the line $y = mx + c$ meets it at the point $(-1, 2)$. Find the values of m and c .



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55. If p and q are the lengths of perpendiculars from the origin to the lines $x \cos \theta - y \sin \theta = k \cos 2\theta$ and

$x \sec \theta + y \cos ec \theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$.



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56. In the triangle ABC with vertices A (2, 3), B (4,-1) and C (1, 2), find the equation and length of altitude from the vertex A.



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57. If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b , then show that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.



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58. Find the values of k for which the line $(k - 3)x - (4 - k^2)y + k^2 - 7k + 6 = 0$ is Parallel to the x-axis.



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59. Find the values of k for which the line $(k - 3)x - (4 - k^2)y + k^2 - 7k + 6 = 0$ is Parallel to the y -axis.



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60. Find the values of k for which the line $(k - 3)x - (4 - k^2)y + k^2 - 7k + 6 = 0$ is Passing through the origin.



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61. Find the values of θ and p , if the equation $x \cos \theta + y \sin \theta = p$ is the normal form of the line $\sqrt{3}x + y + 2 = 0$.



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62. Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and -6, respectively.



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63. What are the points on the y-axis whose distance from the line $\frac{x}{3} + \frac{y}{4} = 1$ is 4 units.



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64. Find perpendicular distance from the origin to the line joining the points $(\cos \theta, \sin \theta)$ and $(\cos \phi, \sin \phi)$.



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65. Find the equation of the line parallel to y -axis and drawn through the point of intersection of the lines $x - 7y + 5 = 0$ and $3x + y = 0$.



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66. Find the equation of a line drawn perpendicular to the line $\frac{x}{4} + \frac{y}{6} = 1$ through the point, where it meets the y -axis.



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67. Find the area of the triangle formed by the lines $y-x = 0$, $x + y = 0$ and $x-k = 0$.



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68. Find the value of p so that the three lines $3x + y - 2 = 0$, $px + 2y - 3 = 0$ and $2x - y - 3 = 0$ may intersect at one point.



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69. If three lines whose equations are

$$y = m_1x + c_1, \quad y = m_2x + c_2 \quad \text{and}$$

$y = m_3x + c_3$ are concurrent, then show that

$$m_1(c_2 - c_3) + m_2(c_3 - c_1) + m_3(c_1 - c_2) = 0$$

.



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70. Find the equation of the lines through the point (3,2) which make an angle of 45° with the line $x-2y=3$.



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71. 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.



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72. Show that the equation of the line passing through the origin and making an angle θ with the line $y = mx + c$ is $\frac{y}{x} = \frac{m \pm \tan \theta}{1 \pm m \tan \theta}$.





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73. In what ratio, the line joining $(-1, 1)$ and $(5, 7)$ is divided by the line $x+y= 4$?



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74. Find the distance of the line $4x + 7y + 5 = 0$ from the point $(1, 2)$ along the line $2x - y = 0$.



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75. Find the direction in which a straight line must be drawn through the point $(-1, 2)$ so that its point of intersection with the line $x+y=4$ may be at a distance of 3 units from this point.



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76. The hypotenuse of a right angled triangle has its ends at the points $(1, 3)$ and $(-4, 1)$. Find

an equation of the legs (perpendicular sides) of the triangle.



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77. Find the image of the point $(3, 8)$ with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.



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78. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$, find the value of m .



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79. If sum of the perpendicular distances of a variable point $P(x, y)$ from the lines $x + y - 5 = 0$ and $3x - 2y + 7 = 0$ is always 10. Show that P must move on a line.



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80. Find equation of the line which is equidistant from parallel lines $9x + 6y - 7 = 0$ and $3x + 2y + 6 = 0$.



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81. 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 coordinates of A.



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82. Prove that the product of the lengths of the perpendiculars drawn from the points $(\sqrt{a^2 - b^2}, 0)$ and $(-\sqrt{a^2 - b^2}, 0)$ to the line $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ is b^2 .



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83. A person standing at the junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and

$3x + 4y - 5 = 0$ wants to reach the path whose equation is $6x - 7y + 8 = 0$ in the least time. Find equation of the path that he should follow.



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