MATHS

BOOKS - NAGEEN PRAKASHAN ENGLISH

STRAIGHT LINES

Example

1. At which point should the origin be shifted so that co-ordinates of point $(2, 5)$ become $(1, -4)$?

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2. If origin is shifted to the point $(2, 3)$ then what will be the transformed equation of the straight line $2x - y + 5 = 0$ in the

new XY-axes ?

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3. If origin is shifted to the point $(-1, 2)$ then what will be the transformed equation of the curve $2x^2 + y^2 - 3x + 4y - 1 = 0$ in the new axes ?

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4. If origin is shifted to the point (a, b) then what will be the transformed equation of the curve $(x - a)^2 + (y - b)^2 = r^2$?

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5. Find a point at which origin is shifted such that transformed equation of $x^2 + xy - 3x - y + 2 = 0$ has no first degree term and constant term. Also find the transformed equation.

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6. Find a point at which origin is shifted such that transformed equation of $2x^2 + y^2 - 12xy + 16 = 0$ has no term containing x and constant term.

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7. Prove that the area of a triangle is invariant under the translation of the axes.

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8. Find the slope of a line if its inclination is $(i) 30^{\circ}, (ii) 135^{\circ}$.

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9. Find the angle of inclination of the line whose slope is $(i) \frac{1}{\sqrt{3}}$, $(ii) -\sqrt{3}$.

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10. Find the slope of the lines passing through the following points :

$(i) (0, 3)$ and $(5, 1)$

$(ii) (-1, 2)$ and $(2, 5)$

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11. If the slope of a line passing through the points $(x, 1)$ and $(-3, 5)$ is $\frac{4}{3}$, find the value of x.

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

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13. Show that the line joining the points $(4, 5)$ and $(1, 2)$ is parallel to the line joining the points $(9, -2)$ and $(12, 1)$.

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14. Show that the line joining the points $(2, -6)$ and $(-4, -8)$ is perpendicular to the line joining the points $(4, -2)$ and $(6, -8)$.

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15. If the points $A(1, 3)$, $B(-2, 1)$, $C(x, 2)$ and $D(-1, 5)$ are given and AB is perpendicular to CD, find the value of x.

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16. Without using Pythagoras theorem, show that the points $A(2, 1)$, $B(5, 4)$ and $C(3, 6)$ are the vertices of a right-angled triangle.

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17. If the points $P(1, 5), Q(-1, 1)$ and $R(4, y)$ are collinear, find the value of y.

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18. Using slopes, prove that the points $A(-2, -1)$, $B(1, 0)$, $C(4, 3)$ and $D(1, 2)$ are the vertices of a parallelogram.

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19. If three points $A(h, 0)$, $P(a, b) and\ B(0, k)$ lie on a line, show that: $\frac{a}{h} + \frac{b}{k} = 1$.

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20. The slopes of two lines are $\frac{1}{2}$ and 3. Find the angle between them.

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21. If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$, find the slope of the other line.

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22. In Figure, time and distance graph of a linear motion is given. Two positions of time and distance are recorded as, when T = 0, D = 2 and when T = 3, D = 8. Using die concept of slope, find law of motion, i.e., how distance depends upon time.

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23. Find the equation of a line parallel to X-axis and 5 unit above it.

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24. Find the equation of a line parallel to Y-axis and at a distance of 3 unit on left side of it.

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25. Find the equation of lines drawn parallel to co-ordinate axes and passing through the point $(-1, 4)$.

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26. Find the equation of a line passing through the point $(-1, 3)$ and whose slope is $\frac{1}{3}$.

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27. Find the equation of a line passing through the point $(2, -3)$ and makes an angle of 45° from X-axis.

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28. Find the equation of a line passing through the points $(2, 5)$ and $(-3, 1)$.

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29. Prove that the points $A(4, 1)$, $B(-2, 3)$ and $C(-5, 4)$ are collinear. Also find the equation of the line passing through these points.

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30. Find the equation of the sides of ΔABC whose vertices are $A(2, -3)$, $B(0, 1)$ and $C(4, 2)$.

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31. The co-ordinates of the vertices of ΔABC are $A(-2, 4)$, $B(5, 5)$ and $C(4, -2)$. The equation of the bisector of $\angle A$ is :

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32. Find the equation of the perpendicular bisector of the line joining the points $(1, 3)$ and $(-2, 6)$.

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33. Find the equation of a line whose slope is -2 and whose intercept on Y-axis is 5.

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34. Find the equation of a line which cuts an intercept of 5 units from negative direction of Y-axis and makes an angle of 135^0 from the positive direction of X-axis.

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35. Find the equation of a line whose slope is 3 intersects X-axis on left side at a distance of 2 untis from origin.

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36. Find the equation of a line which cuts an intercept of 3 and -4 units from X-axis and Y-axis respectively.

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37. Find the length of intercepts cuts on axes from the line $4x - 5y = 20$.

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38. Find the equation of a line which passes through the point $(5, 1)$ and cuts, equal in magnitude but opposite in sign, intercepts on axes.

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39. Find the equation of line which passes through the point $(2, 3)$ and the sum of whose intercepts on axes is 10.

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40. If the mid-point of the line segment between the axes of a line is (p, q) then find the equation of the line.

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41. Find the area of triangle formed by the line $ax + by = 2ab$ and the co-ordinate axes.

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42. Find the equation of a line which is at a distance of 5 units from origin and the perpendicular from origin to this line makes an angle α from the positive direction of X-axis where $\tan\alpha = \frac{4}{3}$.

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43. Find the equation of a line which is at a distance of 5 units from origin and the perpendicular from origin to this line makes an angle of 30° from the positive direction of X-axis.

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44. Find the length of intercepts cuts on axes from the line $x \sin \alpha + y \cos \alpha = \sin 2\alpha$ and the co-ordinates of the mid-point of the line segment lies between the axes.

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45. Prove that the equation of a line passes through the point $(a \cos^3 \alpha, \quad a \sin^3 \alpha)$ and perpendicular to the line $x \tan \alpha + y = a \sin \alpha$ is $x \cos \alpha - y \sin \alpha - a \cos 2\alpha$.

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46. Find the co-ordinates of the foot of perpendicular drawn from the point $(3, \ -3)$ to the line $x - 2y = 4$.

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47. The fahrenheit $'F'$ and Kelvin $'K'$ temperatures show a linear relation. If at $F = 32$, $K = 273$ and at $F = 212$, $K = 373$, then find K in terms of F. Also find the value of F when $K = 0$.

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48. Assuming that straight lines work as the plane mirror for a point, find the image of the point (1, 2) in the line $x - 3y + 4 = 0$.

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49. The equation of a line is $3x + 4y - 10 = 0$. Convert this equation into :

(i) slope-intercept

(ii) intercept

(iii) perpendicular form

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50. Convert the equation $4x + 5y + 7 = 0$ into perpendicular form and find the length of perpendicular from origin.

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51. Find the condition for two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ to be

(i) parallel

(ii) perpendicular

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52. Find the angle between the following pairs of lines :

$(i) x + 2y - 1 = 0$ and $2x - y + 3 = 0$

$(ii) y = 5x + 1$ and $y = -3x + 2$

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53. Find the angle between the following pairs of lines :

$(i) x + 2y - 1 = 0$ and $2x - y + 3 = 0$

$(ii) y = 5x + 1$ and $y = -3x + 2$

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54. Find the equation of a line passing through the intersection of the lines $x + 3y = 4$ and $2x - y = 1$ and $(0, 0)$ lies on this line.

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55. If the lines $y = x + 1, y = 2x$ and $y = kx + 3$ are concurrent find the value of $'k'$.

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56. Find the equation of a line passing through the intersection of the lines $3x + 2y = 5$ and $2x - y = 1$ and cuts equal intercepts on the axes.

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57. Find the equation of a line passes through the point $(1, 3)$ and parallel to the line $3x - 5y + 7 = 0$.

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58. Find the equation of a line, passes through $(-1, 2)$ and perependicular to the line $2x + 3y = 1$.

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59. Find the equation of a line perpendicular to the line $\frac{x}{a} + \frac{y}{b} - 1$ and passes through the mid-point of the line segment lying between the axes of the given line.

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60. Two lines pass through the point $(3, 1)$ meet an angle of 60°. If the slope of one line is 2, find the equation of second line.

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61. Find the length of perpendicular from point $(3, -2)$ to the line $3x - 4y - 2 = 0$.

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62. Find the equation of a line passes through the points $(4, 3)$ and $(3, 2)$. Also find the length of perpendicular from point $(-1, 5)$ to this line.

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63. Find the distance between the parallel lines $3x + 4y - 7 = 0$ and $3x + 4y + 8 = 0$.

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64. If the lines $3x + by - 1 = 0$ and $ax - 5y + 2 = 0$ are parallel, then find the relation between a and b.

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65. Prove that the line passing through the points (x_1, y_1) and (x_2, y_2) is at a distance of $\left| \frac{x_1 y_2 - x_2 y_1}{\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}} \right|$ from origin.

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66. Find perpendicular distance from the origin of the line joining the points $(\cos\theta, \sin\theta)$and $(\cos\varphi, \sin\varphi)$.

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67. Find the equation of a line passing through the intersection of the lines $y = 2(x - 1)$ and $y = 3x - 5$ and which is at a distance of $\frac{7}{\sqrt{2}}$ units from origin.

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68. Find the area of the triangle formed by the lines $y = x, y = 2x, y = 3x + 4$

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69. If p is the length of perpendicular from point $(1, 1)$ to the straight line $ax + by + a + b = 0$, then prove that :

$p^2 = 4 + \frac{8ab}{a^2 + b^2}$

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70. Prove that the locus of a moving point, which is equidistant from the lines $3x - 2y = 5$ and $3x + 2y = 5$, is a straight line.

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71. Find the equation of a line which passes through the point $(1, 1)$ and through the intersection of lines $x + y - 1 = 0$ and $3x + 2y + 1 = 0$.

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72. Find the equation of a line which passes through the intersection of lines $2x + y - 1 = 0$ and $x - 3y + 1 = 0$ and parallel to x-axis.

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73. Find the equation of a line which passes through the intersection of the lines $3x + y - 2 = 0$ and $x - y + 1 = 0$ and parallel to Y-axis.

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74. Find the equation of a line passing through the point of intersection of the lines $x + 3y + 1 = 0$ and $2x - y + 3 = 0$ and parallel to the line $3x - 2y + 1 = 0$.

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75. Find the equation of a line passing through the point of intersection of lines $x - y - 1 = 0$ and $2x - 3y + 1 = 0$ and perpendicular to the line $x - 2y + 5 = 0$.

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76. Show that the lines represented by $x(a+3b)+y(2a-b)=5a+b$ pass through a fixed point for different values of a and b.

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77. 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 intercept to axes.

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78. Find the equation of the line through the point of intersection of, the lines $x-3y+1=0$ and $2x+5y-9-0$ and whose distance from the origin is $\sqrt{5}$

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Exercise

1. Find the new co-ordinates of the following points when origin is shifted to the point $(-1, 4)$:

$(i)(2, 5)$

$(ii)(-3, -2)$

$(iii)(1, -4)$

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2. At which point the origin should be shifted such that the new co-ordinates of the $(-2, 3)$ becomes $(2, 6)$?

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3. If the origin is shifted to the point $(1, 2)$ then what will be the transform equation of the following equations, it is given that the new and old axes are parallel : $(i)x^2 + y^2 - 2x - 4y = 0$

$(ii)2x^2 - y^2 - 4x + 4y - 3 = 0$

$(iii)x^2 + xy - 2y^2 - 4x + 7y - 5 = 0$ $(iv)3x + y = 6$

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4. Find the point at which origin is shifted such that the transformed equation of $x^2 + 2y^2 - 4x + 4y - 2 = 0$ has no first degree term. Also find the transformed equation .

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5. Find the point at which is shifted such that the transformed equations of the following equations has no first degree term :

$(i) 2x^2 + 3y^2 + 4x - 12y + 10 = 0$

$(ii) x^2 + y^2 - xy - 5x + 4y + 5 = 0$

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6. Shift the origin to a suitable point so that the equation $y^2 + 4y + 8x - 2 = 0$ will not contain term n y and the constant term.

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7. Show that the area of triangle whose vertices are $(1, 0)$, $(2, 4)$ and $(3, 3)$ will not change on shifting the origin to the point $(-2, 3)$.

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8. Find the slope of the lines whose iclination is given :

$(i) 45^\circ \ (ii) 60^\circ \ (iii) 120^\circ$

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9. Find the inclination of the lines whose slopes are as follows :

$(i) \sqrt{3} \ (ii) 1$ (iii) $-\frac{1}{\sqrt{3}}$

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10. Find the slopes of the lines passing through the following points :

$(i) (1, 5)$ and $(3, 2)$

$(ii) (-4, 3)$ and $(-6, 3)$

$(iii) (1, 3)$ and $(1, 4)$

$(iv) (2, -1)$ and $(3, 2)$

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11. If the slope of a line passing through the points $(1, 4)$ and $(x, 2)$ is 2, find the value of x.

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12. If the angle of inclination of line joining the points $(x, 3)$ and $(-2, 5)$ is 45°, find the value of x.

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13. If the slop of line joining the points $(6, -3)$ and $(x, 7)$ is 2, find the values of x.

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14. Show that the line joining the points $(4, -1)$ and $(-3, 3)$ is parallel to the line joining the points $(8, 0)$ and $(1, 4)$.

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15. If the line joining the points $(5, y)$ and $(4, 9)$ is parallel to the line joining the points $(0, 5)$ and $(1, 7)$, find the value of y.

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16. Show that the line joining the points $(4, -3)$ and $(0, 7)$ is perpendicular to the line joining the points $(5, 2)$ and $(0, 0)$.

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17. If the line joining the points $(6, -2)$ and $(8, 4)$ is perpendicular to the line joining the points $(12, 8)$ and $(24, y)$, find the value of y.

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18. Without using Pythagoras theorem, show that $A(4, 4)$, $B(3, 5) and\, C(-1, -1)$ are the vertices of a right angled triangle.

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19. Using slopes, show that the points $A(0, 5)$, $B(3, 2)$ and $C(-1, 6)$ are collinear.

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20. Using the slope of line, show that the points $(-1, -2)$, $(0, 4)$, $(3, 3)$ and $(2, -3)$ are the vertices of a parallelogram.

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21. Using slopes, show that the points $(4, 11)$, $(1, 5)$ and $(-1, 1)$ are collinear.

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22. If the points $(-1, y)$, $(1, 2)$ and $(5, 4)$ are collinear, find the value of y.

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23. If the points $P(h, k)$, $Q(x_1, y_1) and\ R(x_2, y_2)$ lie on a line. Show that: $(h - x_1)(y_2 - y_1) = (k - y_1)(x_2 - x_1)$.

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24. If $A(1, 2), B(-3, 2)$ and $C(3, -2)$ are the vertices of ΔABC, show that :

$(i) \tan A = 2$

$(ii) \tan B = \frac{2}{3}$

$(iii) \tan C = \frac{4}{7}$

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25. 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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26. Show that the diagonals of a rhombus bisect each other at right angles.

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27. Using the concept of slope, prove that medians of an equilateral triangle are perpendicular to the corresponding sides.

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28. Prove that the line joining the mid-points of the two sides of a triangle is parallel to the third side.

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29. Find the equation of the following lines :

(i) parallel to X-axis and 2 units above it.

(ii) parallel to X-axis and 3 units below it.

(iii) parallel to Y-axis and 6 units left of it.

(i) parallel to Y-axis and 4 units right of it.

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30. Find the equation of a line which pasess through the point $(1, -1)$ and parallel to

$(i) X - \text{axis}\ (ii) Y - \text{axis}$

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31. Find the equation of line passing through the point $(2, 6)$ and perpendicular to

$(i) X-$ axis $(ii) Y-$ axis

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32. Find the equation of a line passing through the point $(1, -2)$ and whose slope is 4.

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33. Find the equation of a line passing through the point $(-2, 0)$ and makes an angle of $\frac{2\pi}{3}$ from the positive direction of $X-$ axis.

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34. Find the equation of a line passing through the point $(0, -2)$ and makes an angle of 75° from the positive direction of X-axis.

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35. (i)Find the equation of a line passing through origin and makes an angle of 60° from the positive direction of X-axis.

(ii) Find the equation of a line for which $\tan\theta = 2$ and the length of intercept on X-axis is 3 units.

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36. (i) Find the equation of line passing through $(2, 2)$ and makes an angle of 135° from positive direction of X-axis.

(ii) Find the equation of a line passing through the point $(2, 1)$ and makes an angle $'\theta'$ from the positive direction of X-axis where $\cos\theta = -\frac{1}{3}$.

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37. Find the equation of the line passing through the following points :

$(i)(1, 2)$ and $(4, 7)$

$(ii)(-3, 1)$ and $(0, 3)$

(iii) origin and $(1, 4)$

$(iv)(-2, -3)$ and $(1, 2)$

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38. (i) Find the equation of a line passing through the points (a, b) and (ab, b^2).

(ii) The vertices of ΔABC are $A(2, 5)$, $B(3, 2)$ and $C(5, 6)$. Find the equation of the bisector of $\angle A$.

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39. If the point (p, q) lies on the line joining the points $(-4, 5)$ and $(-5, 7)$, then show that $2p + q + 3 = 0$.

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40. Find the equation of the medians of ΔABC whose vertices are $A(1, 0), B(2, 4)$ and $C(3, 2)$.

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41. The vertices of ΔABC are $A(-3, 2), B(0, 3)$ and $C(1, 0)$. Find the equation of the median through B.

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42. Find the equation of the perpendicular bisector of the line segment joining the points $(1, 0)$ and $(3, 5)$.

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43. Show that the points $(0, 3)$, $(-2, -2)$ and $(2, 8)$ are collinear. Also find the equation of line through these points.

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44. Find the equation of a line whose

(i) Slope $= -1$ and $Y-$ intercept $= 3$.

(ii) Slope $= \frac{2}{5}$ and $Y-$ intercept $= -2$.

(iii) Slope $= \frac{1}{3}$ and $Y-$ intercept $= \frac{2}{3}$.

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45. Find the equation of a line which intersects Y-axis at a distance of 4 units above origin and makes an angle of 45° from positive direction of X-axis.

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46. Find the $Y-$ intercept of the line $2y = 4x - 3$.

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47. Find the equation of a line which intersects X-axis at a distance of 2 units on right of origin and makes an angle of 30^0 from positive direction of X-axis.

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48. Find the equation of lines whose X and Y-intercepts are as follows :

$(i)2$ and 3 (ii)-2 and -5(iii) 3 and -5(iv) 4 and -2`

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49. Find the intercepts cuts on X-axis and Y -axis from the following lines :

$(i)3x + 4y = 12$ $(ii)2x - 5y = 8$

$(iii)x + 2y + 3 = 0$ $(iv)2x - y + 3 = 0$

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50. Find the equation of a line which passes through the point $(1, 3)$ and makes equal intercepts on X and Y-axis.

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51. Find the equation of a line which passes through $(-3, 2)$ and makes intercepts equal in magnitude but opposite in sign on X and Y-axis.

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52. Find the equation of a line passes through $(3, 4)$ and the ratio of its intercepts on X and Y-axis is $3:2$.

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

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54. (i) Find the intercepts made by line $5x - 2y = 10$ on both axes. Also find the length of segment between the axes made by lines.

(ii) Find the equation of a line whose X and Y intercepts are respectively 3 and 4 times of the intercepts of the line $2x + 3y = 6$.

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55. (i) Find the equation of a line, in which the mid- point of the line segment between the axes is $(-3, 2)$.

(ii) Find the area of triangle formed by the line $4x + 3y = 24$ and the co-ordinate axes.

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56. Find the equation of a line whose segment between the axes is divided in the ratio $2:3$ by the point (h, k).

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57. Find the equation of a line which is at a perpendicular distance of $\sqrt{2}$ units from origin and the perpendicular from origin to this line makes an angle of 135° from positive direction of X-axis.

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58. Find the equation of a line which is at a distance of 2 units from origin and the perpendicular from origin to this line makes an angle $\tan^{-1}\frac{12}{5}$ from positive direction of X-axis.

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59. Find the equation of a line which is at a distance of 4 units from origin and the slope of perpendicular from origin to this line is $\frac{1}{\sqrt{3}}$.

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60. Find the equation of a line which makes a triangle of area $96\sqrt{3}$ square from co-ordinate axes and the perpendicular drawn from origin to this line makes an angle 60° from X-axis.

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61. Convert the line $3x - 4y + 5 = 0$ into perpendicular form and find the length of perpendicular from origin to this line.

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62. Convert the following equations into slope-intercept form and find their slope and y-intercepts.

$(i)5x + 12y = 26\ (ii)6x - 8y + 5 = 0$

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63. Convert the following equations into intercept form and find the intercepts cuts from axes from these lines :

$(i)4x + 3y = 24\ (ii)2x - 7y = 14$

$(iii)2x + 3y = 6\ (iv)3x - y = 4$

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64. Convert the following equations into perpendicular form and find the length of perpendicular from origin and the angle

between x-axis and the perpendicular from origin :

$(i)\sqrt{3}x - y = 8\ (ii)2x + y\sqrt{5} = 6$

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65. Find the angle formed by the line $\sqrt{3}x + y - 5 = 0$ from the positive direction of x-axis.

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66. Find angles between the lines $\sqrt{3}x + y = 1$and $x + \sqrt{3}y = 1$.

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67. Find the equation of a line passes through the points $(3, 4)$ and parallel to the line $x + 5y = 1$.

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68. Find the equation of a line passes through the point $(-2, 1)$ and perpendicular to the line $3x + y = 5$.

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69. Prove that the lines $2x + 5y = 8$ and $4x + 10y - 1 = 0$ are parallel.

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70. Prove that the lines $x + 3y + 2 = 0$ and $3x - y = 0$ are perpendicular.

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71. Find the angle between the following pairs of lines :

$(i) y = \sqrt{3}x + 1$ and $y = \frac{1}{\sqrt{3}}x + 2$

$(ii) y = x$ and $y = 1 - x$

$(iii) 2x + 3y = 2$ and $3x - 2y = 1.$

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72. Find the slope of a line perpendicular to the line $3x + 5y = 8.$

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73. If a line passes through the points $(a, 1)$ and $(3, -5)$, meets the line $3x + y - 1 = 0$ at right angle, then find the value of $'a'$.

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74. Find the point of intersection of the following pair of lines :

$(i) 9x - 10y = 12$ and $2x - 5 = 0$

$(ii) y = m_1 x + c_1$ and $y = m_2 x + c_2$

$(iii) x + y = 8$ and $x - y = 2$

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75. (i) Find the value of $'a'$ if the lines $3x - 2y + 8 = 0$, $2x + y + 3 = 0$ and $ax + 3y + 11 = 0$ are concurrent.

(ii) If the lines $y = m_1 x + c_1$, $y = m_2 x + c_2$ and $y = m_3 x + c_3$ meet at point then shown that :

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

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76. Find the equation of line joining origin to the point of intersection of the pair of lines $3x + y = 10$ and $x - y = 2$.

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77. Find the equation of a line passing through origin and parallel to the line $3x - 5y + 2 = 0$.

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78. Find the equation of a line passing through origin and parallel to the line joining the points $(1, 3)$ and $(2, -1)$.

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79. Find the equation of a line passing through the point $(-1, -2)$ and parallel to the line joining the points $(2, -3)$ and $(3, -2)$

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80. Find the equation of a line passing through the intersection of the lines $3x - y = 1$ and $5x + 2y = 9$ and parallel to the line $3x + 5y = 8$.

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81. Find the equation of a line parallel to the line $x\cos\alpha + y\sin\alpha = p$ and passing through the mid-point of the line segment joining the points $(1, 5)$ and $(3, -3)$.

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82. Find the equation of a line passing through the point $(-1, 0)$ and perpendicular to the line $x + 5y = 4$.

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83. Find the equation of perpendicular bisector of line segment joining the points $(1, 5)$ and $(3, -1)$

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84. Find the equation of a line passing through the point of intersection of the lines $3x + 5y = -2$ and $5x - 2y = 7$ and perpendicular to the line $4x - 5y + 1 = 0$.

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85. Find the length of perpendicular drawn from point $(2, -1)$ to the line $3x + 4y - 11 = 0$.

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86. Find the length of perpendicular drawn from origin to the line $12x - 5y = 26$.

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87. Find the length of perpendicular from the point $(-1, -2)$ to the line $x = 2y - 15$.

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88. Find the length of perpendicular from origin to the line $x + 7y + 4\sqrt{2} = 0$.

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89. Find the distance between the parallel lines $5x + 12y - 20 = 0$ and $5x + 12y + 6 = 0$.

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90. The co-ordinates of the foot of perpendicular drawn from origin to a line are $(2, 3)$. Find the equation of the line.

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91. Find the length of perpendicular from the point $(a\cos\alpha, a\sin\alpha)$ to the line $x\cos\alpha + y\sin\alpha = p$.

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92. Find the distance between the parallel lines $x + 4\sqrt{3}y + 10 = 0$ and $x + 4\sqrt{3}y - 18 = 0$.

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93. Find the relation between a and b if the lines $3x - by + 5 = 0$ and $ax + y = 2$ parallel.

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94. 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 $x\sec\theta + ycosec\theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$.

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95. Show that the distance between the parallel lines $ax + by + c = 0$ and $k(ax + by) + d = 0$ is $\left|\frac{c - \frac{d}{k}}{\sqrt{a^2 + b^2}}\right|$

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96. If the length of perpendicular from origin to the line $ax + by + a + b = 0$ is p, then show that :

$$p^2 - 1 = \frac{2ab}{a^2 + b^2}$$

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97. The equations of sides AB, BC and AC of ΔABC are respectively $y = x, y = 0$ and $4x + 3y = 12$, then find :

(i) length of perpendicular from B to AC

$(ii) \angle BAC.$

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98. 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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99. Find the coordinates of the incentre and centroid of the triangle whose sides have the equations

$3x - 4y = 0, 5x + 12y = 0$ and $y - 15 = 0$.

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100. Find the co-ordinates of the circumcentre of a triangle whose vertices are $(7, 5), (6, 6)$ and $(-2, 2)$.

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101. Find the co-ordinates of the orthocentre of a triangle whose vertices are $(3, -1), (-1, 2)$ and $(0, 0)$.

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102. The equation of one diagonal of a square is $2x + y = 6$ and its one vertex is $(4, 3)$. Find the equation of other diagonal.

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103. The co-ordinates of the vertex of an equilateral triangle are $(2, -1)$ and equation of its base is $x + y - 1 = 0$. Find the equations of its other two sides.

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104. A ray of light is rent along the line x-2y-3 = 0. Upon reaching the line 3x-2y-5=0, the ray is reflected from it.

Find the equation of the containing the reflected ray.

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105. Find the equation of the straight line through the origin making angle α with the line $y = mx + b$.

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106. Show that the straight lines given by $(2+k)x+(1+k)y=5+7k$ for different values of k pass through a fixed point. Also, find that point.

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107. Find the equation of a line passing through the point of intersection of the lines $2x-7y+11=0$ and $x+3y=8$ and passes through the point $(2,\ -3)$.

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108. Find the equation of a line passing through the point of intersection of the lines $4x+3y-1=0$ and $x+2y+3=0$ and

(i) parallel to X-axis.

(ii) parallel to Y-axis.

parallel to line $2x + y - 1 = 0$.

(iv) perpendicular to line $3x - y + 1 = 0$.

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109. Find the equation of line passing through the point of intersection of the lines $2x + 3y + 1 = 0$ and $3x - 5y - 5 = 0$

(i) perpendicular to X-axis.

(ii) perpendicular to Y-axis.

(iii) perpendicular to line $x - 2y + 1 = 0$

(iv) parallel to line $x + 2y - 1 = 0$.

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110. Find the equation of a line passing through the point of intersection of the lines $x + y = 4$ and $2x - 3y - 1 = 0$ and parallel to a line whose intercepts on the axes are 4 and 6 units.

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111. Find the equation of a line passing through the point of intersection of the lines $5x + y - 3 = 0$ and $x + 3y + 1 = 0$ and made equal intercept from the co-ordinates axes.

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

A. -4

B. -6

C. 4

D. 6

Answer: B

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113. The co-ordinates of the vertices of ΔABC are $A(-2, 4)$, $B(5, 5)$ and $C(4, -2)$. The equation of the bisector of $\angle A$ is :

A. $x + 3y = 10$

B. $x - 3y = 10$

C. $3x + y = 10$

D. $3x - y = 10$

Answer: A

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114. Find the equation of a line which passes through the point $(5, 1)$ and cuts, equal in magnitude but opposite in sign, intercepts on axes.

A. $x + y = 6$

B. $2x + y = 11$

C. $2x - y = 9$

D. $x - y = 4$

Answer: D

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115. The co-ordinates of three vertices of a parallelogram $ABCD$ are $A(1, 0)$, $B(3, 4)$ and $C(1, 2)$. The co-ordinates of fourth vertex D are :

A. $(-1, 2)$

B. $(-5, -4)$

C. $(-1, -2)$

D. $(2, 0)$

Answer: C

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116. The perpendicular drawn from origin to the line $y = mx + c$ meets the line at point $(-1, -2), (c, m) = ?$

A. $\left(\frac{-5}{2}, \frac{-1}{2}\right)$

B. $\left(\frac{1}{2}, \frac{5}{2}\right)$

C. $\left(-\frac{1}{2}, \frac{-5}{2}\right)$

D. None of these

Answer: A

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117. The perpendicular distance between the lines $3x + 4y = 6$ and $3x + 4y + 4 = 0$ is :

A. 1 unit

B. 2 units

C. 3 units

D. None of these

Answer: B

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118. The equation of the perpendicular bisector of line AB is $x + 2y = 8$ and the co-ordinates of point A are $(1, 1)$. Co-ordinates of B are :

A. $(0, 2)$

B. $(1, 3)$

C. $(3, 5)$

D. $(2, 5)$

Answer: C

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119. Equation of a line passing through the point $(2, 3)$ and perpendicular to the line $x + y + 1 = 0$ is :

A. $y - x + 1 = 0$

B. $x - y + 1 = 0$

C. $x + y - 1 = 0$

D. None of these

Answer: B

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

A. $3 : 2$

B. $2:3$

C. $1:2$

D. $2:1$

Answer: C

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

A. $(1,4)$

B. $(-1,-4)$

C. $(1,-4)$

D. $(-1,4)$

Answer: B

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122. The locus of the points of intersection of the lines $x\cos\theta + y\sin\theta = a$ and $x\sin\theta - y\cos\theta = b, (\theta =$ variable) is :

A. $x^2 + y^2 = a^2 + b^2$

B. $x^2 + y^2 = a^2 - b^2$

C. $x^2 + y^2 = 2(a^2 + b^2)$

D. None of the above

Answer: A

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123. A straight line through the point (2,2) intersects the lines $\sqrt{3}x + y = 0$ and $\sqrt{3}x - y = 0$ at thep points A and B,

respectively. Then find the equation of the line AB so that triangle OAB is equilateral.

A. $x = 2$

B. $x + y = 4$

C. $y = 2$

D. None of these

Answer: C

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124. The triangle formed by the straight lines $x = y$, $x + y = 4$ and $x + 3y = 4$ is :

A. isosceles

B. equilateral

C. right-angled

D. None of these

Answer: c

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125. The lines $px + qy + r = 0, qx + ry + p = 0, rx + py + q = 0,$ are concurrant then

A. $p + q + r = pqr$

B. $p^3 + q^3 + r^3 = 3pqr$

C. $p^2 + q^2 + r^2 = 2(pq + qr + rp)$

D. None of these

Answer: B

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126. Find the point of intersection of the following pairs of lines:

$bx + ay = ab \, and \, bx + ay = ab$.

A. $x = y + 4$

B. $(lx + my)(a + b) = (l + m)ab$

C. $(x + y)(a + b) = 2ab + 2$

D. $(lx - my)(a - b) = (l - m)ab$

Answer: B

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127. The area of triangle formed by the straight lies $y = 1$, $2x + y = 2$ and $2x - y + 2 = 0$ is ,

A. $\frac{1}{2}$ sq. units

B. 4 sq. units

C. 2 sq. units

D. None of these

Answer: A

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128. If the equation of the base of an equilateral triangle is $x + y = 2$ and the vertex is $(2, -1)$ then find the length of the side of the triangle.

A. $\sqrt{\frac{3}{2}}$

B. $\sqrt{\frac{2}{3}}$

C. $\frac{3}{2}$

D. None of these

Answer: B

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129. A line passes through the point $(2, 2)$ and is perpendicular to the line $3x + y = 3,$ then its y-intercept is

A. $1/3$

B. $2/3$

C. $4/3$

D. None of these

Answer: C

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130. Write the coordinates of the orthocentre of the triangle formed by points (8,0), (4,6) and (0,0)

A. $(0, 1)$

B. $(0, 0)$

C. $(1, 1)$

D. $(1, -1)$

Answer: D

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131. If the line $y = mx$, meets the lines $x + 2y = 1$ and $2x - y + 3 = 0$ at one point only then $m = ?$

A. 1

B. -1

C. -2

D. None of these

Answer: B

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

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

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

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136. 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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137. Without using Pythagoras theorem, show that $A(4, 4),\ B(3, 5) and\ C(-1, -1)$ are the vertices of a right angled triangle.

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

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

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140. Without using distance formula, show that points $(-2, -1), (4, 0), (3, 3), \text{and } (-3, 2)$` are the vertices of a parallelogram.

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

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142. The slope of a line is double of the slope of another line. If tangents of the angle between the is find the slopes of the other line.

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

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144. If three points $A(h, 0)$, $P(a, b)and\, B(0, k)$ lie on a line, show that: $\frac{a}{h} + \frac{b}{k} = 1$.

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145. Consider the following population and year graph: find the slope of the line AB and using it find what will be the population in the year 2010.

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146. Find the equation of the line which satisfy the given conditions : Write the equations for the x and y-axes.

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147. Find the equation of the line which satisfy the given conditions : Passing through the point $(\quad 4, \quad 3)$ with slope $\frac{1}{2}$.

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148. Find the equation of the line passing through (0,0) with slope m.

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149. Find the equation of the line passing through $(2, 2\sqrt{3})$ and inclined with x-axis at an angle of 75^0 .

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150. Find the equation of a straight line: with slope -2 and intersecting the x-axis at a distance of 3 units to the left of origin.

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151. Find the equation of the line which satisfy the given conditions : Intersecting the yaxis at a distance of 2 units above the origin and making an angle of $30o$ with positive direction of the xaxis.

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152. Find the equation of the line Passing through the points $(-1, 1)$, and $(2, -4)$.

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153. 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 xaxis is $30o$.

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154. The vertices of ΔPQR are $P(2, 1)$, $Q(-2, 3)$, $R(4, 5)$. Find equation of the median through the vertex R.

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155. 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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156. 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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157. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point (2, 3).

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

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

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160. 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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161. 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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162. The owner of a milk store finds that, he can sell 980 litres of milk each week a $Rs.\ 14/\text{litre}$ and 1220 litres of milk each week at $Rs16/\text{litre}$. Assuming a linear relationship between selling price and demand, how many lire could he sell weekly at $Rs17/litres$?

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163. P (a, b) is the midpoint of a line segment between axes. Show that equation of the line is $\frac{x}{a} + \frac{y}{b} = 2$.

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164. 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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165. 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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166. Reduce the following equations into slope intercept form and find their slopes and the y intercepts.(i) $x + 7y = 0$, (ii) $6x + 3y - 5 = 0$, (iii) $y = 0$.

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167. Reduce the following equations into intercept form and find their intercepts on the axes.(i) $3x + 2y - 12 = 0$, (ii) $4x - 3y = 6$, (iii) $3y + 2 = 0$.

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168. Reduce the following equations into normal form. Find their perpendicular distances from the origin and angle between perpendicular and the positive xaxis.(i) $x - \sqrt{3}y + 8 = 0$, (ii) $y - 2 = 0$, (iii) $x - y = 4$.

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

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170. Find the points of the x-axis, whose distances from the line $\frac{x}{3}+\frac{y}{4}=1$are 4 unit is.

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171. Find the distance between parallel lines (i) $15x+8y-34=0$ and $15x+8y+31=0$ (ii) l $(x+y)+p=0$ and $l(x+y)-r=0$.

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

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

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174. Find angles between the lines $\sqrt{3}x + y = 1$and $x + \sqrt{3}y = 1$.

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

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176. Prow that the line through the point $(x_1 > y_1)$ and parallel to the line $Ax + By + C = 0$ is $A(x - x_1) + B(y - y_1) = 0$.

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

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178. Find the equation of the perpendicular bisector of the line segment joining the points (3,4) and (-1,2).

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

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180. 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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181. If p and q are the lengths of perpendicular from the origin to the line $x\cos(\theta) - y\sin(\theta) = k\cos(2\theta)$ and $x\sec(\theta) + y\operatorname{cosec}(\theta) = k$ respectively , then prove that $p^2 + 4q^2 = k^2$

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182. 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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183. 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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184. Find the values of k for which the line $(k-3)x - (4-k^2)y + k^2 - 7k + 6 = 0$ is (a) Parallel to the x-axis, (b) Parallel to the y-axis, (c) Passing through the origin.

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185. Find the values of 6 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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186. 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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187. What are the points on the yaxis whose distance from the line $\frac{x}{3} + \frac{y}{4} = 1$is 4 units.

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188. Find perpendicular distance from the origin of the line joining the points $(\cos\theta, \sin\theta)$and $(\cos\varphi, \sin\varphi)$.

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189. 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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190. 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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191. Find the area of the triangle formed by the lines $y - x = 0, x + y = 0$and $x - k = 0.$

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192. 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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193. If three lines whose equations are $y = m_1x + c_1, y = m_2x + c_2$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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194. Find the equation of the lines through the point (3, 2) which make an angle of 45^o with the line $x - 2y = 3$.

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195. 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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196. Show that the equation of the straight line through the origin angle φ with the line $y = mx + b\, is \frac{y}{x} = \frac{m \pm tan\varphi}{1 \pm m\, tan\varphi}$

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

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198. 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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199. 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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200. The hypotenuse of a right angled triangle has its ends at the points $(1, \quad 3)$ and $(\quad -4, \quad 1)$. Find the equation of the legs (perpendicular sides) of the triangle.

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

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

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

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205. A ray of light passing through the point (1, 2) reflects on the xaxis at point A and the reflected ray passes through the point (5, 3). Find the coordinates of A.

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

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207. 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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