MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

CARTESIAN SYSTEM OF RECTANGULAR CO-ORDINATES AND STRAIGHT LINES

Multiple Choice Questions Level I

1. The inclination of the line $x - y + 3 = 0$ with the positive direction of x-axis is :

A. 45°

B. 135°

C. -45°

D. -135°

Answer: A

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2. The two lines $ax + by = c$ and $a'x + b'y = c'$ are perpendicular if

A. $aa' + bb' = 0$

B. $ab' = ba'$

C. $ab + a'b' = 0$

D. $ab' + ba' = 0$

Answer: A

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3. The equation of the line passing through (1, 2) and perpendicular to $x + y + 7 = 0$ is :

A. $y - x + 1 = 0$

B. $y - x - 1 = 0$

C. $y - x + 2 = 0$

D. $y - x - 2 = 0$

Answer: B

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4. The distance of the point $P(1, -3)$ from the line $2y - 3x = 4$ is

A. 13

B. $\frac{7}{13}\sqrt{13}$

C. $\sqrt{13}$

D. None of these

Answer: C

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5. The coordinates of the foot of the perpendicular from the point (2,3) on the line $x + y - 11 = 0$ are $(- 6, 5)$ b. $(5, 6)$ c. $(- 5, 6)$ d. $(6, 5)$

A. (-6, 5)

B. (5, 6)

C. (-5, 6)

D. (6, 5)

Answer: B

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6. The intercept cut off from Y-axis is twice that from X-axis by the line and line passes through $(1, 2),$ then its equation is

A. $2x + y = 4$

B. $2x + y + 4 = 0$

C. $2x - y = 4$

D. $2x - y + 4 = 0$

Answer: A

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7. A straight line through $P(1, 2)$ is such that its intercept between the axes is bisected at P its equation :

A. $x + 2y = 5$

B. $x - y + 1 = 0$

C. $x + y - 3 = 0$

D. $2x + y - 4 = 0$

Answer: D

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8. Slope of a line which cuts off intercepts of equal lengths on the axes is

A. -1

B. 0

C. 2

D. $\sqrt{3}$

Answer: A

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9. A point moves such teat its distance from the point $(4, 0)$ is half that of its distance from the line $x = 16,$ find its locus.

A. $3x^2 + 4y^2 = 192$

B. $4x^2 + 3y^2 = 192$

C. $x^2 + y^2 = 192$

D. None of these

Answer: A

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10. A line cutting off intercept -3 from the $Y-$ axis and the tangent at angle to the $X-$ axis is $\frac{3}{5}$, its equation is

A. $5y - 3x + 15 = 0$

B. $3y - 5x + 15 = 0$

C. $5y - 3x - 15 = 0$

D. None of these

Answer: A

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11. Find the tangent of the angel between the lines whose intercepts n the axes are respectively $a, \ -badnb, \ -a.$

A. $\frac{a^2 - b^2}{ab}$

B. $\frac{b^2 - a^2}{2}$

C. $\frac{b^2 - a^2}{2ab}$

D. None of these

Answer: C

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12. If the line $\frac{x}{a} + \frac{y}{b} = 1$ passes through the points a $(2, \ -3)$ and $(4, \ -5)$, then $(a, b) =$

A. (1, 1)

B. (-1, 1)

C. (1, -1)

D. (-1, -1)

Answer: D

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13. The distance of the point of intersection of the lines $2x - 3y + 5 = 0$ and $3x + 4y = 0$ from the line $5x - 2y = 0$ is

A. $\frac{130}{17\sqrt{29}}$

B. $\frac{13}{17\sqrt{29}}$

C. $\frac{130}{7}$

D. None of these

Answer: A

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14. Show that the equations of eth straight lines passing through the point $(3, -2)$ and inclined at 60^0 to the line $\sqrt{3}x + y = 1 are y + 2 = 0 and y - \sqrt{3}x + 2 + 3\sqrt{3} = 0.$

A. $y + 2 = 0, \sqrt{3}x - y - 2 - 3\sqrt{3} = 0$

B. $x - 2 = 0, \sqrt{3}x - y + 2 + 3\sqrt{3} = 0$

C. $\sqrt{3}x - y - 2 - 3\sqrt{3} = 0$

D. None of these

Answer: A

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15. The distance between the lines $y = mx + c_1$ and $y = mx + c_2$ is

A. $\frac{c_1 - c_2}{\sqrt{m^2 + 1}}$

B. $\frac{|c_1 - c_2|}{\sqrt{1 + m^2}}$

C. $\frac{c_2 - c_1}{\sqrt{1 + m^2}}$

D. 0

Answer: B

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16. If the co-ordinates of the middle point of the portion of the line intercepted between the co-ordinate axes is (3, 2), then the equation of the line will be:

A. $2x + 3y = 12$

B. $3x + 2y = 12$

C. $4x - 3y = 6$

D. $5x - 2y = 10$

Answer: A

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17. Equation of the line passing through (1, 2) and parallel to the line $y = 3x - 1$ is :

A. $y + 2 = x + 1$

B. $y + 2 = 3(x + 1)$

C. $y - 2 = 3(x - 1)$

D. $y - 2 = x - 1$

Answer: C

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18. Equation of diagonals of the square formed by the lines:

$x = 0, y = 0, x = 1$ and $y = 1$ are:

A. $y = x, y + x = 1$

B. $y = x, x + y = 2$

C. $2y = x, y + x = 1/3$

D. $y = 2x, y + 2x = 1$

Answer: A

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19. For specifying a straight line, how many geometrical parameters should be known?

A. 1

B. 2

C. 4

D. 3

Answer: B

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20. The co-ordinates of the foot of perpendicular from the point (2, 3) on the line $y = 3x + 4$ are given by:

A. $\left(\frac{37}{10}, \frac{-1}{10}\right)$

B. $\left(\frac{-1}{10}, \frac{37}{10}\right)$

C. $\left(\frac{10}{37}, -10\right)$

D. $\left(\frac{2}{3}, \frac{-1}{3}\right)$

Answer: B

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21. The ratio in which the line $3x + 4y + 2 = 0$ divides the distance between the lines $3x + 4y + 5 = 0$ and $3x + 4y - 5 = 0$ is :

A. $1:2$

B. $3:7$

C. $2:3$

D. $2:5$

Answer: B

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22. One vertex of the equilateral triangle with centroid at the origin and one side as $x + y - 2 = 0$ is :

A. (-1, -1)

B. (2, 2)

C. (-2, -2)

D. (2, -2)

Answer: B

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23. Given the four lines with equations $x + 2y - 3 = 0, 3x + 4y - 7 = 0, 2x + 3y - 4 = 0$ and $4x + 5y - 6 = 0$, then:

A. They are all concurrent

B. They are the sides of a quadrilateral

C. They are all parallel

D. None of these

Answer: D

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24. The point (4, 1) undergoes the following three transformations successively:

(i) reflection about the line y = x (ii) translation through a distance of 2 units along the positive direction of x-axis (ii) rotation through an angle

of $\frac{\pi}{4}$ about the origin in the counter-clockwise direction. The final position of the point is given by:

A. $\left(\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

B. $\left(-\sqrt{2}, 7\sqrt{2}\right)$

C. $\left(-\frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}}\right)$

D. $\left(\sqrt{2}, 7\sqrt{2}\right)$

Answer: C

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25. The point (4, 1) undergoes the following transformations:

(i) reflection about the line y = x (ii) translation through a distance of 2 units along the positive x-axis. Then the final co-ordinates of the point are :

A. (4, 3)

B. (3, 4)

C. (1, 4)

D. $(7/2, 7/2)$

Answer: B

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26. If a, b, c are in A. P., then st. line $ax + by + c = 0$ will always pass through a fixed point whose co-ordinates are:

A. (1, -2)

B. (-1, 2)

C. (1, 2)

D. (-1, -2)

Answer: A

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27. The vertices of a triangle are (0, 0), (3, 0) and (0, 4). Its orthocentre is at:

A. (0, 0)

B. $\left(1, \frac{4}{3}\right)$

C. $\left(\frac{3}{2}, 2\right)$

D. None of these

Answer: A

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28. One of the equations of the lines passing through the point (3, -2) and inclined at 60° to the line $\sqrt{3}x + y = 1$ is :

A. $y + 2 = 0$

B. $x + 2 = 0$

C. $x + y = 2$

D. $x - y = \sqrt{3}$

Answer: A

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29. If three lines $3x - y = 2, 5x + ay = 3$ and $2x + y = 3$ are concurrent, then a is equal to :

A. 2

B. 3

C. -1

D. -2

Answer: D

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30. The equations $ax + by + c = 0$ and $dx + ey + f = 0$ represent the same st. line if and only if :

A. $a = d, b = e, c = f$

B. $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$

C. $\frac{a}{d} = \frac{b}{e}$

D. $c = f$

Answer: B

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31. If p and p' be perpendiculars from the origin upon the straight lines $x \sec\theta + y\text{cosec}\theta = a$ and $x\cos\theta - y\sin\theta = a\cos 2\theta$, then the value of the expression $4p^2 + p'^2$ is :

A. a^2

B. $3a^2$

C. $2a^2$

D. $4a^2$

Answer: A

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32. The sum of squares of intercepts on the axes cut off by the tangents to the curve $x^{2/3} + y^{2/3} = a^{2/3}(a > 0)$ at $\left(\frac{a}{8}, \frac{a}{8}\right)$ is 2. Thus a has the value:

A. 1

B. 2

C. 4

D. 8

Answer: C

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33. A line passes through (2,2) and is perpendicular to the line $3x + y = 3$ Its y - intercept is _____

A. $\frac{1}{3}$

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

C. 1

D. $\frac{4}{3}$

Answer: D

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34. For the triangle whose sides are $x + y - 6 = 0, 7x + y - 6 = 0$ and $x - 7y = 6$, the co-ordinates of the incentre are:

A. $\left(\frac{12}{5}, \frac{6}{5}\right)$

B. $\left(\frac{3}{4}, -\frac{1}{7}\right)$

C. $(-1, 5)$

D. None of these

Answer: A

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35. The equation of a line through the point (1, 2) whose distance from the point (3, 1) has the greatest possible value is :

A. $y = x$

B. $y = 2x$

C. $y = -2x$

D. $y = -x$

Answer: B

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36. If the lines $x + 2ay + a = 0, x + 3by + b = 0$ and $x + 4cy + c = 0$ are concurrent, then a, b, c are in:

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: C

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37. If the algebraic sum of the perpendicular distances from the points (2, 0), (0, 2) and (1, 1) to a variable st. line be zero, then the line passes thro' the point :

A. (-1, 1)

B. (1, 1)

C. (1, -1)

D. (-1, -1)

Answer: B

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38. A point equidistant from the lines $4x + 3y + 10 = 0, 5x - 12y + 26 = 0$ and $7x + 24y - 50 = 0$ is :

A. (1, -1)

B. (1, 1)

C. (0, 0)

D. (0, 1)

Answer: C

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39. If t_1, t_2 and t_3 are distinct, then the points: $\left(t_1, 2at_1, at_1^3\right), \left(t_2, 2at_2 + at_2^3\right)$ and $\left(t_3, 2at_3 + at_3^3\right)$ are colinear if :

A. $t_1 + t_2 + t_3 = 0$

B. $t_1 t_2 t_3 = 1$

C. $t_1 + t_2 + t_3 = 1$

D. $t_1 + t_2 + t_3 = t_1 t_2 t_3$

Answer: A

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40. The locus of the mid-point of the portion of the line $x\cos\alpha + y\sin\alpha = p$, which is intercepted between the axes is :

A. $p^2\left(x^2 + y^2\right) = 4xy$

B. $p\left(x^2 + y^2\right) = 4x^2y^2$

C. $p^2(x+y) = x^2y^2$

D. $p^2\left(x^2+y^2\right) = 4x^2y^2$

Answer: D

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41. The centroid of a triangle formed by the points (0, 0), $(\cos\theta, \sin\theta)$ and $(\sin\theta, -\cos\theta)$ lies on the line $y = 2x$. Then θ is :

A. $\tan^{-1}2$

B. $\tan^{-1}\frac{1}{3}$

C. $\tan^{-1}\frac{1}{2}$

D. $\tan^{-1}(-3)$

Answer: D

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42. The co-ordinates of the image of the origin O. w.r.t. st. line $x + y + 1 = 0$ are :

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

B. $(-2, -2)$

C. $(1, 1)$

D. $(-1, -1)$

Answer: D

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43. A variable line intersects the co-ordinate axes at A and B and passes through a fixed point (a, b), then the locus of the vertex C of the rectangle OACB where O is the origin is :

A. $\frac{x}{a} + \frac{y}{b} = 1$

B. $\frac{a}{x} + \frac{b}{y} = 1$

C. $x + y = \frac{1}{a} + \frac{1}{b}$

D. $ax + by = 1.$

Answer: B

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44. The reflection of the point (4, -13) in the line $5x + y + 6 = 0$ is :

A. (-1, -14)

B. (3, 4)

C. (0, 0)

D. (1, 2)

Answer: A

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45. A line passing through P(4, 2) meets the x and y-axis at A and B respectively. If O is the origin, then locus of the centre of the circumcircle of ΔOAB is :

A. $x^{-1} + y^{-1} = 2$

B. $2x^{-1} + y^{-1} = 1$

C. $x^{-1} + 2y^{-1} = 1$

D. $2x^{-1} + 2y^{-1} = 1.$

Answer: B

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46. If the point (a, a) falls between the lines $|x + y| = 2$, then :

A. $|a| = 2$

B. $|a| = 1$

C. $|a| < 1$

D. $|a| < \frac{1}{2}$

Answer: C

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47. ABC is an equilateral triangle such that the vertices B and C lie on two parallel lines at a distance 6. If A lies between the parallel lines at a distance 4 from one of them, then the length of a side of the equilateral triangle is :

A. 8

B. $\sqrt{\frac{88}{3}}$

C. $\frac{4\sqrt{7}}{\sqrt{3}}$

D. None of these

Answer: C

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48. The limiting position of the point of intersection of the lines $3x + 4y = 1$ and $(1 + c)x + 3c^2y = 2$ as c tends to 1 is :

A. (4, -5)

B. (-5, 4)

C. (5, -4)

D. (-4, 5)

Answer: B

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49. Let the vertex of an equilateral triangle be the origin and the side opposite to it have the equaiton $x + y = 1$. Then the co-ordinates of the orthocentre of the triangle are:

A. $\left(\frac{1}{3}, \frac{1}{3}\right)$

B. $\left(\frac{2}{3}, \frac{2}{3}\right)$

C. $\left(\frac{\sqrt{2}}{3}, \frac{\sqrt{2}}{3}\right)$

D. None of these

Answer: A

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50. If the lines $x + 2ay + a = 0, x + 3by + b = 0$ and $x + 4cy + c = 0$ are concurrent, then a, b, c are in :

A. A.P.

B. H.P.

C. G.P.

D. None of these

Answer: B

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51. Area enclosed by $2|x| + 3|y| \leq 6$ is :

A. 4 sq. units

B. 6 sq. units

C. 12 sq. units

D. 16 sq. units

Answer: C

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52. If a, b, c are in A.P., a, x, b are in G.P., and b, y, c are in G.P., then (x, y) lies on :

A. a st. line

B. a circle

C. a parabola

D. an ellipse

Answer: B

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53. Area bounded by the curves :

$y = |x| - 1$ and $y = -|x| + 1$ is :

A. 1

B. 2

C. 4

D. $2\sqrt{2}$

Answer: B

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54. Distance between the lines $5x + 12y - 1 = 0$ and $10x + 24y + k = 0$ is 2, then the value of k is :

A. -54

B. 50

C. $-54, 50$

D. 53

Answer: C

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55. Foot of perpendicular drawn from (0, 5) on the line $3x - 4y - 5 = 0$ is :

A. (3, 2)

B. (3, 1)

C. (1, 3)

D. (2, 3)

Answer: B

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56. A line passes through (2,2) and is perpendicular to the line $3x + y = 3$ Its y - intercept is _____

A. 1

B. $\frac{1}{3}$

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

D. $\frac{4}{3}$

Answer: D

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57. The points (-1, 1) and (1, -1) are symmetrical about the line :

A. $y = x$

B. $y + x = 0$

C. $x + y = 1$

D. None of these

Answer: A

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58. Let PS be the median of the triangle with vertices P(2, 2), Q(6, -1) and R(7, 3). The equation of the line passing through (1, -1) and parallel to PS is :

A. $2x - 9y - 7 = 0$

B. $2x - 9y - 11 = 0$

C. $2x + 9y - 11 = 0$

D. $2x + 9y + 7 = 0$

Answer: D

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59. The number of integer values of m for which the x-co-ordinates of the point of intersection of the lines $3x + 4y = 9$ and $y = mx + 1$ is also an integer is :

A. 2

B. 0

C. 4

D. 1

Answer: A

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60. Area of the parallelogram formed by the lines $y = mx, y = mx + 1, y = nx$ and $y = nx + 1$ equals :

A. $\frac{|m+n|}{(m-n)^2}$

B. $\frac{2}{|m+n|}$

C. $\frac{1}{(m+n)}$

D. $\frac{1}{|m-n|}$

Answer: D

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61. A triangle with vertices (4, 0), (-1, -1), (3, 5) is :

A. isosceles and right-angled

B. isosceles but not right-angled

C. right-angled but not isosceles

D. neither right-angled nor isosceles.

Answer: A

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62. A st. line through the point (2, 2) intersects the lines $\sqrt{3}x + y = 0$ and $\sqrt{3}x - y = 0$ at the points A and B. The equation to the line AB so that the triangle OAB is equilateral is :

A. $x - 2 = 0$

B. $y - 2 = 0$

C. $x + y - 4 = 0$

D. None of these

Answer: B

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63. The incentre of the triangle with vertices $\left(1, \sqrt{3}\right), (0, 0)$ and $(2, 0)$ is :

A. $\left(1, \frac{\sqrt{3}}{2}\right)$

B. $\left(\frac{2}{3}, \frac{1}{\sqrt{3}}\right)$

C. $\left(\frac{2}{3}, \frac{\sqrt{3}}{2}\right)$

D. $\left(1, \frac{1}{\sqrt{3}}\right)$

Answer: D

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64. Three straight lines $2x + 11y - 5 = 0, 4x - 3y - 2 = 0$ and $24x + 7y - 20 = 0$:

A. form a triangle

B. are only concurrent

C. are concurrent with one line bisecting the angle between the other two

D. None of these

Answer: C

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65. A straight line through the origin O meets the parallel lines $4x + 2y = 9$ and $2x + y + 6 = 0$ at points P and Q respectively. Then the point O divides the segment PQ in the ratio :

A. $1:2$

B. $3:4$

C. $2:1$

D. $4:3$

Answer: B

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66. Let P(-1, 0), Q(0, 0) and $R\left(3, 3\sqrt{3}\right)$ be three points. Then the equation of the bisector of the angle PQR is :

A. $\frac{\sqrt{3}}{2}x + y = 0$

B. $x + \sqrt{3}y = 0$

C. $\sqrt{3}x + y = 0$

D. $x + \frac{\sqrt{3}}{2}y = 0$

Answer: C

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67. Let $0 < \alpha < \pi/4$ be a fixed angle. If $P = (\cos\theta, \sin\theta)$ and $Q = (\cos(\alpha - \theta), \sin(\alpha - \theta))$, then Q is obtained from P by:

A. clockwise rotation around origin through an angle α

B. anticlockwise rotation around origin through an angle α

C. reflection in the line through origin with slope $\tan\alpha$

D. reflection in the line through origin with slope $\tan\frac{\alpha}{2}$.

Answer: D

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68. Orthocentre of triangle whose vertices are (0, 0), (3, 4), (4, 0) is :

A. $\left(3, \frac{7}{3}\right)$

B. $\left(3, \frac{5}{4}\right)$

C. $(5, -2)$

D. $\left(3, \frac{3}{4}\right)$

Answer: D

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69. $A(2, -3)$ and $B(-2, 1)$ are the vertices of a triangle ABC. If the centroid of this triangle moves on the line $2x + 3y = 1$, then the locus of the vertex C is the line

A. $2x + 3y = 9$

B. $2x - 3y = 7$

C. $3x + 2y = 5$

D. $3x - 2y = 3$

Answer: A

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70. The equation of the straight line passing through the point (4, 3) and making intercepts on the co-ordinate axes whose sum is -1 is :

A. $\frac{x}{2} + \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

B. $\frac{x}{2} - \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

C. $\frac{x}{2} + \frac{y}{3} = 1$ and $\frac{x}{2} + \frac{y}{1} = 1$

D. $\frac{x}{2} - \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

Answer: D

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Multiple Choice Questions Level Ii

1. Area of the triangle with vertices (a, b) (x_1, y_1) and (x_2, y_2), where a, x_1, x_2 are in GP. with common ratio r and b, y_1, y_2 are in GP. with common ratio s is :

A. $ab(r-1)(s-1)(s-r)$

B. $\frac{1}{2}ab(r+1)(s+1)(s-r)$

C. $\frac{1}{2}ab(r-1)(s-1)(s-r)$

D. $ab(r+1)(s+1)(r-s)$

Answer: C

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2. The medians AD and BE of a triangle with vertices A (0, b), B(0, 0) and C(a, 0) are perpendicular ot each other if :

A. $b = \sqrt{2}a$

B. $a = \sqrt{-2b}$

C. $b = \sqrt{-2a}$

D. $a = \pm\sqrt{2b}$

Answer: D

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3. The points $(0, 8/3), (1, 3)$ and $(82, 30)$ are vertices of :

A. An acute angled triangle

B. An isosceles triangle

C. An right-angled triangle

D. None of these

Answer: D

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4. The straight lines $x+y=0, 3x+y-4=0$ and $x+3y-4=0$ form a triangle, which is :

A. Isosceles

B. Equilateral

C. Right angled

D. None of these

Answer: A

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5. The equations of the sides of a triangle are :

$x+y-5=0, x-y+1=0$ and $y-1=0$, then the co-ordinates of the circumcentre are:

A. (2, 1)

B. (1, 2)

C. (2, -2)

D. (1, -2)

Answer: A

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6. The slope of the line, which is drawn through the point (1, 2) so that its point of intersection with the line $x + y + 3 = 0$ is at a distance $3\sqrt{2}$ is :

A. $\frac{1}{\sqrt{3}}$

B. $\sqrt{3}$

C. 1

D. $\frac{\sqrt{3}-1}{2}$

Answer: C

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7. The lines $y = mx, y + 2x = 0, y = 2x + k$ and $y + mx = k$ form a rhombus if m is equal to :

A. -1

B. $\frac{1}{2}$

C. 1

D. 2

Answer: D

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8. The equations to a pair of opposite sides of a parallelogram are $x^2 - 5x + 6 = 0$ and $y^2 - 6y + 5 = 0$. The equations to its diagonals are :

A. $4x + y = 0$ and $y = 4x - 7$

B. $x + 4y = 13$ and $y = 4x - 7$

C. $4x + y = 13$ and $4y = x - 7$

D. None of these

Answer: D

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9. The equation of a straight line passing through the point (-5, 4) and which cuts off an intercept of $\sqrt{2}$ units between the lines $x + y + 1 = 0$ and $x + y - 1 = 0$ is :

A. $x - 2y + 13 = 0$

B. $2x - y + 14 = 0$

C. $x - y + 9 = 0$

D. $x - y + 10 = 0$

Answer: C

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10. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in G.P. with the same common ratio, then the points $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3) :

A. lie on a st. line

B. lie on an ellipse

C. lie on a circle

D. are vertices of a triangle

Answer: A

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11. Let PQR be a right-angled isosceles triangle right-angled at P(2, 1). If the equation of the line QR is $2x + y = 3$, then the equation representing the pair of lines PQ and PR is :

A. $3x^2 - 3y^2 + 8xy + 20x + 10y + 25 = 0$

B. $3x^2 - 3y^2 + 8xy - 20x - 10y + 25 = 0$

C. $3x^2 - 3y^2 + 8xy + 10x + 15y + 20 = 0$

D. $3x^2 - 3y^2 - 8xy - 10x - 15y - 20 = 0$

Answer: B

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12. If the quadrilateral formed by the lines $ax + by + cz = 0, ax + b'y + c = 0, a'x + by + c' = 0, a'x + b'y + c' =$ have perpendicular diagonals, then :

A. $b^2 + c^2 = b'^2 + c'^2$

B. $c^2 + a^2 = c'^2 + a'^2$

C. $a^2 + b^2 = a'^2 + b'^2$

D. None of these

Answer: C

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13. If two vertices of a triangle are (5, -1) and (-2, 3) and if orthocentre lies at the origin, then the co-ordinates of third vertex are:

A. (4, 7)

B. (-4, -7)

C. (2, -3)

D. (5, -1)

Answer: B

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14. If the points (1, 2) and (3, 4) were to be on the same side of the line $3x - 5y + a = 0$, then :

A. $7 < a < 11$

B. $a = 7$

C. $a = 11$

D. $a < 7$ or $a > 11$

Answer: D

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15. A straight rod of length 9 units slides with its ends A, B always on the X and Y-axis respectively . Then the locus of the centroid of ΔOAB is :

A. $x^2 + y^2 = 3$

B. $x^2 + y^2 = 9$

C. $x^2 + y^2 = 1$

D. $x^2 + y^2 = 81$

Answer: B

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16. The vertices of a triangle are (6, 0), (0, 6) and (6, 6). The distance between its circumcentre and centroid is :

A. $2\sqrt{2}$

B. 2

C. $\sqrt{2}$

D. 1

Answer: C

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17. A (1, 3) and C(7, 5) are two opposite vertices of a square. The equation of a side thro' A is :

A. $x + 2y - 7 = 0$ or $2x - y + 1 = 0$

B. $x - 2y + 5 = 0$

C. $2x + y - 5 = 0$

D. None of these

Answer: A

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18. The diagonals of a parallelogram PQRS are along the line $x + 3y = 4$ and $6x - 2y = 7$. Then PQRS must be :

A. rectangle

B. square

C. cyclic quadrilateral

D. rhombus.

Answer: D

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19. Let n be the number of points having rational co-ordinates equidistant from the point $(0, \sqrt{3})$, then:

A. $n > 2$

B. $n \leq 2$

C. $n \geq 1$

D. $n = 1$

Answer: B

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20. If the vertices of an equilateral triangle have rational co-ordinates, then the triangle cannot be :

A. right-angled

B. equilateral

C. right-angled isosceles

D. isosceles.

Answer: B

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21. If the lines $y = m_r x, r = 1, 2, 3$ cut off equal intercepts on the transversal $x + y = 1$, then $1 + m_1, 1 + m_2, 1 + m_3$ are in :

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: C

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22. If $a = \frac{\tan\theta}{\tan 3\theta}$, then the point $P(a, a^2)$:

A. may lie on the line $3y = x$ or $y = 3x$

B. necessarily lies in the acute angle between the lines y = 3x and 3y = x

C. necessarily lies in the obtuse angle between the lines y = 3x and 3y = x

D. $a \in \left(\frac{1}{3}, 3\right)$

Answer: B

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23. If two sides of a triangle are represented by :

$2x - 3y + 4 = 0$ and $3x + 2y - 3 = 0$, then its orthocentre lies on the line :

A. $x - y + \frac{8}{15} = 0$

B. $4x + 3y + \frac{5}{13} = 0$

C. $9x - y + \frac{9}{13} = 0$

D. $3x - 2y + 1 = 0$

Answer: C

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24. The distance of the point (1, 2) from the line $x + y = 0$ measured parallel to the line $3x - y = 2$ is :

A. $\frac{3\sqrt{2}}{8}$

B. $\frac{3\sqrt{10}}{4}$

C. 10

D. $5\sqrt{5}$

Answer: B

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25. If a, b, c are the pth, qth and rth terms of an H.P., then the lines $bcx + py + 1 = 0, cax + qy + 1 = 0$ and $abx + ry + 1 = 0$:

A. are concurrent

B. form a triangle

C. are parallel

D. None of these

Answer: C

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26. If $\alpha\beta > 0, ab > 0$ and the variable line $\frac{x}{a}, \frac{y}{b} = 1$ is drawn through the given point $P(\alpha, \beta)$, then the least area of the triangle formed by this line and the co-ordinate axes is :

A. $2\alpha\beta$

B. $3\alpha\beta$

C. $\alpha\beta$

D. None of these

Answer: A

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27. A ray of light coming from the point (1, 2) is reflected at a point A on the x-axis and then passes through the point (5, 3). The co-ordinates of the point A are :

A. $\left(\frac{13}{5}, 0\right)$

B. $\left(\frac{5}{13}, 0\right)$

C. $(-7, 0)$

D. None of these

Answer: A

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28. If two vertices of an equilateral triangle have integral co-ordinates, then the third vertex will have :

A. integral co-ordinates

B. co-ordinates, which are rational

C. at least one co-ordinate irrational

D. co-ordinates, which are irrational.

Answer: C

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29. Let A(1, 2) and B(3, 4) be two points. Let C(x, y) be a point such that $(x-1)(x-3)+(y-2)(y-4)=0$. If ar $(\Delta ABC)=1$, then the maximum number of positions of C in xy-plane is :

A. 2

B. 4

C. 6

D. 8

Answer: B

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30. If p, p' be the lengths of perpendicular from (0, 0) on the lines:

$x \sec\theta + y\text{cosec}\theta = 2a$ and $x\cos\theta + y\sin\theta = a\cos 2\theta$ respectively,

then $\left(\frac{p}{p'} + \frac{p'}{p}\right)^2$ equals:

A. $4\cos^2 4\theta$

B. $4\text{cosec}^2 4\theta$

C. $4\sin^2 4\theta$

D. $4\cot^2 4\theta.$

Answer: B

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31. The points P(2,3) , Q(3, 5), R(7, 7) and S(4, 5) are such that:

A. P, Q, R and S are collinear

B. PQRS is a parallelogram

C. S lies on the boundary of the triangle PQR

D. S lies inside the triangle PQR

Answer: D

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32. If P is a point (x, y) on the line $y = -3x$ such that P and Q(3, 4) are on opposite sides of the line $3x - 4y = 8$, then :

A. $x > \frac{8}{5}, y < \frac{-8}{15}$

B. $x > \frac{8}{15}, y < -\frac{8}{5}$

C. $x = \frac{8}{15}, y = \frac{-8}{5}$

D. None of these

Answer: B

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33. Let A(-1, 0), B(0, 0) and $C\left(3, 3\sqrt{3}\right)$ be three points. Then the bisector of $\angle ABC$ is :

A. $x + \sqrt{3}y = 0$

B. $x + \frac{\sqrt{3}}{2}y = 0$

C. $\sqrt{3}x + y = 0$

D. $\frac{\sqrt{3}}{2}x + y = 0$

Answer: C

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34. The position of a moving point in XY-plane at time t is given by $\left(u\cos\alpha, t, u\sin\alpha, t-\frac{1}{2}gt^2\right)$, where u, α, g are constants. The locus of the moving point is :

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: B

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35. If the line y = mx meets the lines $x+2y-1=0$ and $2x-y+3=0$ at the same point, then m equals :

A. 1

B. -1

C. 2

D. -2

Answer: B

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36. Co-ordinates of the vertices of a triangle are (2, 0), (6, 0) and (1, 5). The distance between circumcentre and orthocentre is :

A. 4

B. 5

C. 6

D. None of these

Answer: B

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37. The equation of base of an equilateral triangle is $x + y = 2$ and vertex is (2, -1). Then the length of the side of the triangle equals:

A. $\sqrt{\frac{1}{3}}$

B. $\sqrt{3}$

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

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

Answer: C

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38. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point (1, 1) and the co-ordinate axes, lies in the first quadrant. If its area is 2, then the value of b is :

A. -1

B. 3

C. -3

D. 1

Answer: C

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39. A square of side a lies above the x-axis and has one vertex at the origin. The side passing through the origin makes an angle $\alpha\left(0<\alpha<\frac{\pi}{4}\right)$ with the positive direction of x-axis. The equation of its diagonal not passing through the origin is :

A. $y(\cos\alpha+\sin\alpha)+x(\sin\alpha-\cos\alpha)=a$

B. $y(\cos\alpha+\sin\alpha)+x(\sin\alpha+\cos\alpha)=a$

C. $y(\cos\alpha+\sin\alpha)+x(\cos\alpha-\sin\alpha)=a$

D. $y(\cos\alpha-\sin\alpha)-x(\sin\alpha-\cos\alpha)=a.$

Answer: C

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40. If the equation of the locus of a point equidistant from the points (a_1, b_1) and (a_2, b_2) is :

$(a_1 - a_2)x + (b_1 - b_2)y + c = 0$, then c =

A. $a_1^2 - a_2^2 + b_1^2 - b_2^2$

B. $\frac{1}{2}(a_1^2 + a_2^2 + b_1^2 + b_2^2)$

C. $\sqrt{a_1^2 + b_1^2 - a_2^2 - b_2^2}$

D. $\frac{1}{2}(a_2^2 + b_2^2 - a_1^2 - b_1^2)$

Answer: D

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41. Locus of centroid of the triangle whose vertices are $(a\cos t, a\sin t), (b\sin t, -b\cos t)$ and (1, 0), where t is a parameter, is :

A. $(3x + 1)^2 + (3y)^2 = a^2 - b^2$

B. $(3x-1)^2+(3y)^2=a^2-b^2$

C. $(3x-1)^2+(3y)^2=a^2+b^2$

D. $(3x+1)^2+(3y)^2=a^2+b^2$

Answer: C

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42. Triangle is formed by the co-ordinates (0, 0), (0, 21) and (21, 0). Find the number of integral co-ordinates strictly inside the triangle (integral co-ordinates has both x and y) :

A. 190

B. 105

C. 231

D. 205

Answer: A

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43. If non-zero numbers a, b, c are in H.P., then the straight line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes through a fixed point. That point is :

A. (-1, -2)

B. (-1, 2)

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

D. (1, -2)

Answer: D

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44. If a vertex of a triangle is (1, 1) and the mid-points of two sides through this vertex are (-1, 2) and (3, 2), then the centroid of the triangle is :

A. $\left(\frac{-1}{3}, \frac{7}{3}\right)$

B. $\left(-1, \frac{7}{3}\right)$

C. $\left(\frac{1}{3}, \frac{7}{3}\right)$

D. $\left(1, \frac{7}{3}\right)$

Answer: D

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45. A straight line through the point A(3, 4) is such that its intercept between the axes is bisected at A. Its equation is :

A. $x + y = 7$

B. $3x - 4y + 7 = 0$

C. $4x + 3y = 24$

D. $3x + 4y = 25$

Answer: C

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46. If (a, a^2) falls inside the angle made by the lines $y = \frac{x}{2}, x > 0$ and $y = 3x, x > 0$, then a belongs to :

A. $\left(0, \frac{1}{2}\right)$

B. $(3, \infty)$

C. $\left(\frac{1}{2}, 3\right)$

D. $\left(-3, -\frac{1}{2}\right)$

Answer: C

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47. The perpendicular bisector of the line segment joining P(1, 4) and Q(k, 3) has y-intercept -4.

Then a possible value of k is :

A. -4

B. 1

C. 2

D. -2

Answer: A

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48. The co-ordinates of a point on the line $x + y = 3$ such that the point is at equal distances from the lines $|x| = |y|$ are :

A. (0, 3)

B. (3, 0)

C. (-3, 0)

D. (0, -3)

Answer: A

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49. Consider three points $P \equiv (-\sin(\beta-\alpha), -\cos\beta), Q \equiv (\cos(\beta-\alpha), \sin\beta)$ and $R \equiv (\cos\beta -$, where $0 < \alpha, \beta, \theta < \frac{\pi}{4}$. Then:

A. P lies on the line segment RQ

B. Q lies on the line segment PR

C. R lies on the line segment QP

D. P, Q, R are non-collinear.

Answer: D

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50. The lines $p(p^2+1)x - y + q = 0$ and $(p^2+1)^2 x + (p^2+1)y + 2q = 0$ are perpendicular to a common line for :

A. no value of p

B. exactly one value of p

C. exactly two values of p

D. more than two values of p.

Answer: B

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1. The line L given by $\frac{x}{5}+\frac{y}{b}=1$ passes through the point (13, 32). The line K is parallel to L and has the equation $\frac{x}{c}+\frac{y}{3}=1$. Then the distance between L and K is :

A. $\frac{23}{\sqrt{15}}$

B. $\sqrt{17}$

C. $\frac{17}{\sqrt{15}}$

D. $\frac{23}{\sqrt{17}}$

Answer: D

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2. A straight line L through the point (3, -2) is inclined at an angle 60° to the line $\sqrt{3}x + y = 1$. If L also intersects the x-axis, then the equation of L is :

A. $y + \sqrt{3}x + 2 - 3\sqrt{3} = 0$

B. $y - \sqrt{3}x + 2 + 3\sqrt{3} = 0$

C. $\sqrt{3}y - x + 3 + 2\sqrt{3} = 0$

D. $\sqrt{3}y + x - 3 + 2\sqrt{3} = 0$

Answer: B

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3. The lines $x + y = |a|$ and $ax - y = 1$ intersect each other in the first quadrant. Then the set of all possible values of a is the interval :

A. $(0, \infty)$

B. $[1, \infty)$

C. $(-1, \infty)$

D. $(-1, 1]$

Answer: B

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4. If A(2, -3) and B(-2, 1) are two vertices of a triangle and third vertex moves on the line $2x + 3y = 9$, then the locus of the centroid of the triangle is :

A. $x - y = 1$

B. $2x + 3y = 1$

C. $2x + 3y = 3$

D. $2x - 3y = 1$

Answer: B

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5. If the line $2x + y = k$ passes through the point, which divides the line segment joining the points (1, 1) and (2, 4) in the ratio $3:2$, then k equals:

A. $\frac{29}{5}$

B. 5

C. 6

D. $\frac{11}{5}$

Answer: C

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6. A line is drawn through the point (1, 2) to meet the co-ordinate axes at P and Q such that it forms a triangle OPQ, where O is the origin. If the area of the triangle OPQ is least, then the slope of the line PQ is :

A. $-\frac{1}{4}$

B. -4

C. -2

D. $-\frac{1}{2}$

Answer: C

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7. A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching x-axis, the equation of the reflected ray is :

A. $\sqrt{3}y = x - \sqrt{3}$

B. $y = \sqrt{3}x - \sqrt{3}$

C. $\sqrt{3}y = x - 1$

D. $y = x + \sqrt{3}$

Answer: A

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8. The x-co-ordinate of the incentre of the triangle that has the co-ordinates of mid-points of its sides as (0, 1), (1, 1) and (1, 0) is :

A. $2 - \sqrt{2}$

B. $1 + \sqrt{2}$

C. $1 - \sqrt{2}$

D. $2 + \sqrt{2}$

Answer: A

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9. For $a > b > c > 0$, the distance between (1, 1) and the point of intersection of the lines:

$ax + by + c = 0$ and $bx + ay + c = 0$

is less then $2\sqrt{2}$. Then :

A. $a + b - c > 0$

B. $a - b + c < 0$

C. $a - b + c > 0$

D. $a + b - c < 0$

Answer: A

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10. Let PS be the median of the triangle with vertices P(2, 2), Q(6, -1) and R(7, 3). The equation of the line passing through (1, -1) and parallel to PS is :

A. $2x + 9y + 7 = 0$

B. $4x + 7y + 3 = 0$

C. $2x - 9y - 11 = 0$

D. $4x - 7y - 11 = 0$

Answer: A

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11. Let a, b, c and d be non-zero numbers. If the point of intersection of the lines $4ax + 2ay + c = 0$ and $5bx + 2by + d = 0$ lies in the fourth quadrant is equidistant from the two axes, then :

A. $2bc + 3ad = 0$

B. $3bc - 2ad = 0$

C. $3bc + 2ad = 0$

D. $2bc - 3ad = 0$

Answer: B

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12. The number of points, having both co-ordinates as integers, that lie in the interior of the triangle with vertices (0, 0), (0, 41) and (41, 0), is :

A. 901

B. 861

C. 820

D. 780

Answer: D

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1. The line joining A(2, -7) and B(6, 5) is divided into 4 equal parts by the points P, Q and R such that AQ = RP = QB. The mid-point of PR is :

A. (8, -2)

B. (4, -1)

C. (-8, 1)

D. (4, 12)

Answer: B

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2. Let $P \equiv (-1, Q), Q \equiv (0, 0)$ and $R \equiv \left(3, 3\sqrt{3}\right)$ be three points. The equation of the bisector of the angle PQR is :

A. $\sqrt{3}x + y = 0$

B. $x + \sqrt{3}y = 0$

C. $\sqrt{3}x - y = 0$

D. $x - \sqrt{3}y = 0$

Answer: C

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3. If the straight line $ax + by + c = 0$ always passes through (1, -2), then a, b, c are in:

A. H.P.

B. A.P.

C. G.P.

D. None of these

Answer: B

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4. A straight line through P(1, 2) is such that the intercept between the axes is bisected at P. Then the equation of the straight line is :

A. $x + y = 1$

B. $x + y = 3$

C. $x + 2y = 5$

D. $2x + y = 4$

Answer: D

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5. The minimum area of the triangle formed by the variable line $3\cos\theta x + 4\sin\theta y = 12$ and co-ordinate axes is :

A. 144

B. $\frac{25}{2}$

C. $\frac{49}{4}$

D. 12

Answer: D

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6. A straight line passes through the points (5, 0) and (0, 3). The length of perpendicular from the point (4, 4) on the line is :

A. $\frac{\sqrt{17}}{2}$

B. $\sqrt{\frac{17}{2}}$

C. $\frac{15}{\sqrt{34}}$

D. $\frac{17}{2}$

Answer: B

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7. If the line through $A \equiv (4, -5)$ is inclined at an angle 45° with the positive direction of the x-axis, then the co-ordinates of the two points on opposite sides of A at a distance $3\sqrt{2}$ are :

A. (7, 2), (1, 8)

B. (7, 2), (1, -8)

C. (7, -2), (1, -8)

D. (7, 2), (-1, 8)

Answer: C

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8. A line passes through (2,2) and is perpendicular to the line $3x + y = 3$

Its y - intercept is _____

A. $\frac{1}{3}$

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

C. $\frac{4}{3}$

D. 1

Answer: C

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