MATHS

JEE (MAIN AND ADVANCED MATHEMATICS) FOR BOARD AND COMPETITIVE EXAMS

STRAIGHT LINES

Example

1. Find the slope of a line whose inclination to the positive direction of x-axis in anticlockwise sense is

(a) 30°

(b) 150°

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2. Find the slopw of a line which passes through the points (4,2) and (1,2)

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3. Determine 'a' so that $\frac{1}{2}$, is the slope of the line through the points (5,2) and (3,a)

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4. Let A(4,3) and B(6,4) be two points, find the slope of a line perpendicular to AB.

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5. What is the value of y so that the line through $(3, y) and (2, 7)$ is parallel to the line through $(-1, 4) and (0, 6)$?

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6. By using the concept of slope, show that the points (-2,-10, (4,0), (3,3) and (-3,2) are the vertices f a parallelogram.

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7. Without using Pythagoras theore, show that

$A(4, 3), B(6, 4)$ and $C(5, 6)$ are the vertices of right angled triangle.

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8. 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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9. We know that the slopes of two parallel lines are equal. If two lines having the same slope pass through a common point, then they will coincide. Hence, If A, B and C are three points in the XY-plane, then they will lie on a line i.e. three points are collinear if and only if slope of AB=slope of BC.

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10. Write down the equations of the following lines.

(a) A line paralel to x-axis at a distance of 2 units below it

(b) A line parallel to y-axis at a distsance of 5 units on right head side of it

(c) A line parallel to x-axis passing through (4,2)

(d) A line which is equidistant from $x = 2$ and $x = -4$

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11. Find the equation of a line passing through $(3, -4)$ with slope $\frac{1}{2}$.

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12. Find the equartion of the line for which $\tan\theta = \frac{1}{2}$, where θ is the inclination of the line and

(a) x-intercept is -2

(b) y-intercept is $\frac{1}{2}$

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13. Find the equation of line passing throug $(1, 4)$ and $(2, -3)$.

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14. Find the equation of the medians of the triangle ABC whose vertices are $A(2, 5)B(-4, 9)and\ C(-2, -1)$.

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15. Prove that the points $(4, 3), (1, 4)$ and $(-2, 5)$ are collinear. Also find out the equation of the straight line on which these points lie.

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16. Write the equation of the lines for which $\tan\theta = \frac{1}{3}$, where θ is the inclination of the linw with positive x-axis and

(a) y-intercept is 4

(b) x-intercept is 2

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17. Find the equation of the line which cuts off an intercept 4 on negative direction of x-axis and an intercept of 2 on positive direction of y-axis.

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18. Find the equation of the straight line which makes equal intercepts on the axes and passes through the point $(1, -3)$.

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19. Find the equation of the straight line which is at a distance 3 from the origin and perpendicular from the origin to the line makes an angle of 30^0 with the positive direction of the x-axis.

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

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21. Reduce the equation $\sqrt{3}x + y + 2 = 0$ to: (a) Slope intercept form and find slope and y-intercept. (b) Intercept form and find intercept on the axes (c) The normal form and find $p \, and \, \alpha$

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22. Find the equation of a line with slope 3 and the length of the perpendicular from the origin equal to $\sqrt{10}$

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23. 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 xaxis, (b) Parallel to the vaxis, (c) Passing through the origin.

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24. Find the angle between the lines $y - \sqrt{3}x - 5 = 0$and $\sqrt{3}y - x + 6 = 0.$

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25. Show that the lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, where$b_1, b_2 \neq 0$are (i) paralle

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26. Find the distance of the point (4,5) from the line $3x - 5y + 7 = 0.$

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27. If p is the length of the perpendicular from the origin to the line $\frac{x}{a} + \frac{y}{b} = 1$, then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

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28. Find the points on $y - ais$ whose perpendicular distance from the line $4x - 3y - 12 = 0$ is 3.

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29. Determine the distance between the following pair of parallel lines:

$4x - 3y - 9 = 0 \, and \, 4x - 3y - 24 = 0$

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30. Write the distance between the lines

$4x + 3y - 11 = 0 \, and \, 8x + 6y - 15 = 0.$

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31. Find the equations of lines parallel to $3x - 4y - 5 = 0$ at a unit distance from it.

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32. If in triangle ABC, a = 3, b = 4, c = 5 then find the ratio in which incentre divides the angle bisector BE

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33. 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 $\frac{1}{3}\sqrt{6}$ from this point

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34. Find the value of a if (a,a) and $(-a, -a)$ lies in same side of the line $x + y + 2 = 0$.

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35. Determine all the values of α for which the point (α, α^2) lies inside the triangle formed by the lines. $2x + 3y - 1 = 0$ $x + 2y - 3 = 0$ $5x - 6y - 1 = 0$

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36. A light beam, emanating from the point (3,10) reflects from the straight line $2x + y - 6 = 0$ and, then passes through the point (7,2) .Find the equations of the incident and reflected beams .

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37. Find the equation of image line and reflected line of 2x+3y-5=0 through the line mirror y=x

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38. (i) If a, b, c, are in A.P. then show that $ax.... + ... by + c = 0$ passes through a fixed point. Find then fixed point.

(ii) If $9a^2 + 16b^2 - 24ab - 25c^2 = 0,$ then the family of straight lines $ax + by + 0$ is concurrent at the point whose co-ordinates are given by

_____

(iii) If $3a + 4b - 5c = 0,$ then the family of straight lines $ax + by + c = 0$ passes through a fixed point. Find the coordinates of the point.

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39. The equartion of line which passes through the point of intersection of $2x + 3y - 5 = 0$ and $x + y - 2 = 0$ and also which is farthest from

(2,3).

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40. For the straight lines $4x+3y-6=0$ and $5x+12y+9=0$, find the equation of the:

(i) bisector of the abtuse angle between them

(ii) bisector of the acute angle between them

(iii) bisector of the angle which contains (1,2)

(iv) bisector of the angle which contains (0,0)

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43. Find the new coordinates of $(2, 3)$ if

(i) Origin is shifted to $(1, 1)$

(ii) Axis are rotated by an angle of 45° in anticlockwise sence.

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44. Find the angle between the lines represented by $x^2 + 2xy\sec\theta + y^2 = 0.$

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45. The point of intersection of the straight lines given by the equation $3y^2 - 8xy - 3x^2 - 29x + 3y - 18 = 0is$

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46. A variable straight line is drawn through the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ and meets the coordinate axes at A and B. Show that the locus of the midpoint of AB is the curve $2xy(a+b)=ab(x+y)$

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48. If the straight line drawn through the point $P\left(\sqrt{3},2\right)$ and making an angle $\frac{\pi}{6}$ with the x-axis meets the line $\sqrt{3}x-4y+8=0$ at Q, find the length of PQ.

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49. Find the equation to the pair of straight lines joining the origin to the intersections oi the straight line $y = mx + c$ and the curve $x^2 + y^2 = a^2$. Prove that they are at right angles if $2c^2 = a^2(1 + m^2)$.

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50. STATEMENT-1: The point $P(-22, 28)$lies on the line $3x + 2y + 10 = 0$ such that for the points $A(4, 2)$ and $B(2, 4)$, $|PA - PB|$ is maximum. STATEMENT-2: A point P on $ax + by + c = 0$ such that $|PA - PB|$ maximum is determined by the point of intersection of the line AB and $Ax + by + c = 0$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: C

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51. if the line $y = x\sqrt{3}$ cuts the curve $x^3 + y^3 + 3xy + 5x^2 + 3y^2 + 4x + 5y + 1 = 0$ at point A, B, C then find the value of $OA.\ OB.\ OC$ is equal to (where O is the origin)

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Try Yourself

1. find the slope of a line whose inclination to the positive directioin of x-axis in anticlockwise sense is i. 60^0 ii.0^0 iii. 150^0 iv. 120^0

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2. Find the slope of a line which passes through points (3,2) and (-1,5).

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3. Determine x so that the line passing through $(3, 4)$ and $(x, 5)$ makes an angle of 135^0 with the positive direction of the x-axis.

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4. Let $P(0, 1)$ and $Q(4, 0)$ are two points. Find the slope of line perpendicular to PQ.

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5. Prove that the points $(-2, -1), (1, 0), (4, 3)$, and $(1, 2)$ are the vertices of a parallelogram. Is it a rectangle ?

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6. Find the angle between x-axis and line joining points (0,0) and (1, 2)`.

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

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8. Find the equation of the line parallel to x-axis and passing through $(2, -1)$ points,

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9. Find the equations of straight lines which pass through $(2, 1)$ and are respectively parallel and perpendicular to the x-axis.

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10. Find the equation the straight line passing through (-2,3) and inclined at an angle of 45^0 with the x-axis.

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11. Find the equation of the line passing through $(0, a)$ and $(b, 0)$.

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12. Prove that the points $A(4, 3), B(3, 0)$ and $C(2, -3)$ are collinear. Also, find the line passing through these three points.

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13. Find the equation of a line wiith slope -1 and cutting off an intercept of 4 units on negative direction of

(a) x-axis

(b) y-axis

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14. Find the equation of the line cutting off intercepts of 2 and 4 on negative x-axis and negative y-axis respectively.

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15. Find the equation of the straight line which passes through the point (5, 6) and has intercept on the axes euqal in magnitude but opposite in sign.

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16. Find the equation of the line whose perpendicular distance from origin is 5 units and the angle which the normal makes with the positive

direction of x-axis is 225°.

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17. Find the equation of the straight line upon which the length of the perpendicular from the origin is 2 and the slope of this perpendicular is $\frac{5}{12}$.

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18. Transform the equation of the line $\sqrt{3}x + y - 8 = 0$ to (i) slope intercept form and find its slope and y-intercept (ii) intercept form and find intercepts in the coordinates axes (iii) normal form and find the inclination of the perpendicular segment from the origin on the line with the axis and its length.

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19. Reduce the lines $3x - 4y + 4 = 0 \, and \, 2x + 4y - 5 = 0$ to the normal form and hence find which line is nearer to the origin.

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20. Find the perpendicular distance from the origin of the perpendicular from the point (1,2) upon the straight line $x - \sqrt{3}y + 4 = 0$.

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

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22. Find the distance between the parallel lines $x + y = 1$ and $x + y + 2 = 0$

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23. Prove that the lines $2x + 3y = 19 \, and \, 2x + 3y + 7 = 0$ are equidistant from the line $2x + 3y = 6$.

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Assignment Section A Objective Type Questions Only One Answer

1. For specifying a straight line, how many geomatrical parameters should be known ?

A. 1

B. 2

C. 3

D. 4

Answer: B

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2. Find the point on y-axis which is equidistant from $A(-5, -2)$ and $B(3, 2)$?

A. $(-2, 0)$

B. $(0, -2)$

C. $(1, -2)$

D. $(-2, 1)$

Answer: B

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3. The value (s) of x for which the area of triangle formed by the points $(5, -1), (x, -3)$ and $(6, 3) is \frac{11}{2}$ unit square is/are

A. $\frac{15}{2}$

B. 2

C. Both 1 & 2

D. neither 1 nor 2

Answer: C

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4. The distance between the points $(a\cos\alpha, a\sin\alpha)$ and $(a\cos\beta, a\sin\beta)$ where a> 0

A. $2\left|a\sin\frac{\alpha-\beta}{2}\right|$

B. $\left|a\sin\frac{\alpha-\beta}{2}\right|$

C. $2\left|a\sin\frac{\alpha+\beta}{2}\right|$

D. $\left|a\sin\frac{alphs+\beta}{2}\right|$

Answer: A

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

A. $(1,\ 1)$

B. $(\ -1,\ 1)$

C. $(1,\ -1)$

D. $(\ -1,\ -1)$

Answer: D

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6. The triangle formed by the lines $x+y=0,\ 3x+y=4,\ x+3y=4$ is

A. Right angled

B. Equitateral

C. Scalene

D. Isosceles

Answer: D

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7. Four points $A(6,\ 3),\ B(-3,\ 5),\ C(4,\ -2)$ and $D(x,\ 3x)$ are given in such a way that $\frac{DBC}{ABC} = \frac{1}{2}$, find x.

A. $\frac{11}{8}$

B. $\frac{8}{11}$

C. 3

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

Answer: A

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8. The lines $x = 3, y = 4$ and $4x - 3y + a = 0$ are concurrent for a equal to

A. 0

B. -1

C. 2

D. 3

Answer: A

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9. y-axis divides the linje segment joining $(-3, -4)$ and $(1, -2)$ in the ratio

A. $1:3$

B. $2:3$

C. $3:1$

D. $3:2$

Answer: C

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10. The distance of the mid point of the line joining the points $(a\sin\theta, 0)$ and $(0, a\cos\theta)$ from the origin is

A. $\frac{a}{2}$

B. $\frac{1}{-2}(\sin\theta + \cos\theta)$

C. $a(\sin\theta + \cos\theta)$

D. a

Answer: A

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11. The slope of the line passing through the points (a^2, b) and (b^2, a) is

A. $\frac{1}{a+b}$

B. $a+b$

C. $\frac{-1}{a+b}$

D. $-(a+b)$

Answer: C

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12. If the slope of a line joining the points $(7, 3)$ and $(k, 2)$ is -4, then the value of k is

A. $\frac{29}{4}$

B. $\frac{-29}{4}$

C. $\frac{4}{29}$

D. $\frac{-4}{29}$

Answer: A

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13. The value of 'p' such that the line passing through the points $(-4, p)$ and $(1, 3)$ is parallel to the line passing through the points 1 $(-2, 5)$ and $(8, 7)$ is

A. 2

B. -2

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

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

Answer: A

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14. The value of 'p' such that line passing through the points $(-4, p) \& (1, 3)$ is perpendicular to a line passing through the points $(-2, 5)$ and $(8, 7)$ is

A. 13

B. -13

C. 7

D. 5

Answer: A

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15. The two lines $ax + by + c = 0$ and $a'x + b'y + c' = 0$ are perpendicular if (i) $ab' = a'b$ (ii) $ab + a'b' = 0$ (iii) $ab' + a'b = 0$ (iv) $aa' + bb' = 0$

A. $aa' + = 0$

B. $ab' = ba'$

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

D. $ab' + ba' = 0$

Answer: A

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16. 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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17. Angle made by the line passsing through $(1, 0)$ and $(-2, \sqrt{3})$ with x-axis is

A. 120°

B. 150°

C. 60°

D. 135°

Answer: B

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18. Angle between $x = 2$ and $x - 3y = 6$ is

A. ∞

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

C. $\tan\left(\frac{-1}{3}\right)$

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

Answer: B

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19. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$, then $m =$

A. $\frac{a \pm 3\sqrt{2}}{7}$

B. $\frac{2 \pm 3\sqrt{2}}{7}$

C. $\frac{1 \pm 3\sqrt{2}}{7}$

D. $\frac{2 \pm 5\sqrt{2}}{7}$

Answer: C

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20. Prove that the points (2,-1), (0,2), (2,3) and (4,0) are the coordinates other vertices of a parallelogram and find the angle between its

diagonals.

A. 90°

B. 0°

C. $\tan^{-1}(2)$

D. $\tan^{-1}\left(\frac{1}{2}\right)$

Answer: C

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21. The obtuse angle between the lines $y = -2x$ and $y = x + 2$ is

A. 120°

B. 135°

C. 150°

D. 160°

Answer: B

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22. The points $(-a, -b), (0, 0). (a, b)$ and $\left(a^2, a^3\right)$ are

A. Collinear

B. Vertices of rectangle

C. Vertices of parallelogram

D. Vertices of square

Answer: A

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23. Find the equation of lines passing through (1,2) and making angle 30° with Y-axis.

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

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

C. $x - \sqrt{3}y + 2\sqrt{3} - 1 = 0$

D. $x - \sqrt{3}y + 2\sqrt{3} + 1 = 0$

Answer: C

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24. Show that the equations of the 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. $\sqrt{3}x - y - 2 - 3\sqrt{3} = 0, x = 2$

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

Answer: A

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25. The equations of the lines through (1.0) and making angle of 45° with $x - 2y$=3` are

A. $x + 3y = 3, 3x - y = 1$

B. $x + 3y = 1, 3x - y = 3$

C. $x - 3y = 1, x + 3y = 1$

D. $3x + y = 3, 3x - y = 3$

Answer: B

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26. The equation of a line which passes through $(2, 3)$ and makes an angle of 30° with the positive direction of x-axis is

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

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

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

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

Answer: A

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27. Find the equation of the line on which the length of the perpendicular segment from the origin to the line is 4 and the inclination of the perpendicular segment with the positive direction of x axis is 30^0.

A. (a) $\sqrt{3}x + y = 8$

B. (b) $\sqrt{3}x = 8$

C. (c) $y - \sqrt{3}x = 8$

D. (d) $y + \sqrt{3}x + 8 = 0$

Answer: A

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28. The equation of a line parallel to x-axis at a diestance of 3 units above x-axis is

A. $y = -3$

B. $y = 3$

C. $x = 3$

D. $x = -3$

Answer: B

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29. The equation of a line parallel to y-axis, at a distance of $\frac{5}{2}$ units to the lift of x-axis is

A. $2y - 5 = 0$

B. $2y + 5 = 0$

C. $2x + 5 = 0$

D. $x + 5 = 0$

Answer: C

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30. The equation of line passing through $(-2, 3)$ and having inclination of 120° with positive x-axis is

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

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

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

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

Answer: B

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31. Find the equation of the line passing through the point (-4, -5) and perpendicular to the line joining the points (1, 2) and (5, 6).

A. $x + y - 9 = 0$

B. $x + y + 9 = 0$

C. $x = y + 9$

D. $y = x + 9$

Answer: B

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32. The equation of the line, which is perpendicular to $5x - 2y = 7$ and passes through the midpoint of line segment joining $(2, 7)$ and $(-4, 1)$ is

A. $2x + 5y + 18 = 0$

B. $2x = 18 + 5y$

C. $2x + 5y - 18 = 0$

D. $5y = 2x + 18$

Answer: C

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33. In what ratio is the line joining the points $(2, 3) and (4, 1)$ divides the segment joining the points $(1, 2) and (4, 3)$?

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:3$

Answer: A

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34. 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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35. Find the equation of the straight line which passes through the point $(1 - 2)$ and cuts off equal intercepts from axes.

A. $x + y - 1 = 0$

B. $x - y + 1 = 0$

C. $-x + y + 1 = 0$

D. $x + y + 1 = 0$

Answer: D

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36. The equation of the line passing through the point $(1, 2)$ and perpendicular to the line $x + y + 1 = 0$ 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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37. 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. $3x + 5y + 15 = 0$

Answer: A

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38. The equation of the straight line passing through the point $(3, 2)$ and perpendicular to the line $y = x$ is

A. $x - y = 5$

B. $x + y = 5$

C. $x + y = 1$

D. $x - y = 1$

Answer: B

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39. Find the equation of the straight line on which the length of the perpendicular from the origin is 4 units and the line makes an angle of 120^0 with positive direction of x-axis

A. $\sqrt{3}x + y + 8 = 0$

B. $\sqrt{3}x - y = 8$

C. $-\sqrt{3}x + y = 8$

D. $\sqrt{3}x - \sqrt{3}y = 8$

Answer: A

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40. The equation of straight line passing through the point of intersection of the straight line $3x-y+2=0$ and $5x-2y+7=0$ and having infinite slope is

A. $x=2$

B. $x=3$

C. $x=4$

D. $x+y=3$

Answer: B

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41. If the intercept of a line between the coordinate axes is divided by the point $(-5,4)$ in the ratio $1:2,$ then find the equation of the line.

A. $5x-8y+60=0$

B. $8x-5y+60=0$

C. $2x - 5y + 30 = 0$

D. $8x + 5y + 15 = 0$

Answer: B

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42. Let PS be the median of the triangle with vertices $P(2, 2), Q(6, -1) and R(7, 3)$ Then equation of the line passing through $(1, -1)$ and parallel to PS is $2x - 9y - 7 = 0$ $2x - 9y - 11 = 0$ $2x + 9y - 11 = 0$ $2x + 9y + 7 = 0$

A. $2x - 9y - 4 = 0$

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

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

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

Answer: D

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43. The equation of the line through the origin and perpendiculr to the line joining $(a, 0)$ and $(-a, 0)$ is

A. $y = 0$

B. $x = 0$

C. $x = -a$

D. $y = -a$

Answer: B

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44. A line passes through the point (2,2) and is perpendicular to the lines $3x + y = 3$. Its y-intercept is $1/3$ b. 2/3 c. 1 d. 4/3

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

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

C. 1

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

Answer: D

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

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

Answer: A

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

(A) 13

(B) $\frac{7}{13}\sqrt{3}$

(C) $\sqrt{13}$

(D) $\frac{7}{13}$

A. 13

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

C. $\sqrt{13}$

D. $\frac{1}{13}$

Answer: C

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47. The distance between the lines 3x + 4y = 9 and 6x + 8y = 15 is :

A. $\frac{13}{10}$

B. $\frac{10}{13}$

C. $\frac{3}{10}$

D. $\frac{10}{3}$

Answer: C

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48. 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. $\frac{130}{\sqrt{29}}$

B. $\frac{130}{7\sqrt{29}}$

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

D. $\frac{130}{17}$

Answer: C

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49. What are the points on x-axis whose perpendicular distance from the line $4x + 3y = 12\ is\ 4$?

A. $(8, 0), (-2, 0)$

B. $(8, 0), (0, 4)$

C. $(-2, 0), (-4, 0)$

D. $(-8, 0), (2, 0)$

Answer: A

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50. Find all points on $x + y = 4$ that lie at a unit distance from the line $4x + 3y - 10 = 0$.

A. $(3, 1), (-7, 11)$

B. $(3, 1), (7, 11)$

C. $(-3, 1), (-7, 11)$

D. $(1, 3), (-7, 11)$

Answer: A

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Assignment Section B Objective Type Questions Only One Answer

1. A point equidistant from the line $4x + 3y + 10 = 0,\ 5x - 12y + 26 = 0\ and\ 7x + 24y - 50 = 0$ is a. (1,-1) $b.$ (1,1)$c.$ (0,0)$d.$ (0,1)`

A. $(1, -1)$

B. $(1, 1)$

C. $(0, 0)$

D. $(0, 1)$

Answer: C

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2. If the points $(a, b), (1, 1)$ and $(2, 2)$ are collinear then

A. $a = 2b$

B. $a = 3b$

C. $2a = b$

D. $a = b$

Answer: D

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3. If the sides of triangle ABC are such that $a = 4b = 5, c = 6,$ then the ratio in which incentre divide the angle bisector of B is

A. $2:3$

B. $2:1$

C. $5:2$

D. $1:1$

Answer: B

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4. Which of the following is not always inside a triangle?

A. Incentre

B. Centroid

C. Intersection of altitudes

D. Intersectio of medians

Answer: C

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5. If the coordinates of vertices of a triangle is always rational then the triangle cannot be

A. Scalene

B. Isosceles

C. Rightangle

D. Equilateral

Answer: D

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6. If the angle between two lines is 45° and the slope of one line is 2, then the product of possible slopes of other line is

A. -1

B. 1

C. 2

D. 6

Answer: A

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7. 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 the interval

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

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

C. $(3, \infty)$

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

Answer: D

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8. Let $P \equiv (-1, 0), Q \equiv (0, 0)$, and $R \equiv \left(3, 3\sqrt{3}\right)$ be three points.

Then the equation of the bisector of $\angle PQR$ is

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

B. $x + \left(\frac{\sqrt{3}}{2}\right)y = 0$

C. $\left(\frac{\sqrt{3}}{2}\right)x + y = 0$

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

Answer: A

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9. 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 $\frac{x}{c} + \frac{y}{c} = 1$. Then the distance between L and K is

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

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

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

D. $\sqrt{17})$

Answer: B

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10. If $P(1, 2)Q(4, 6), R(5, 7),$ and $S(a, b)$ are the vertices of a parallelogram $PQRS,$ then (a)$a = 2, b = 4$ (b) $a = 3, b = 4$ (c) $a = 2, b = 3$ (d) $a = 1, b = -1$

A. $a = 2, b = 4$

B. $a = 3, b = 4$

C. $a = 2, b = 3$

D. $a = 3, b = 3$

Answer: C

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11. Find the equation of the bisector of the obtuse angle between the lines $3x - 4y + 7 = 0$ and $12x + 5y - 2 = 0$.

A. $11 + 3y - 9 = 0$

B. $3x - 11y + 9 = 0$

C. $11x - 3y - 9 = 0$

D. $11x - 3y + 9 = 0$

Answer: D

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A. Rectangle

B. Square

C. Rhombus

D. Trapezium

Answer: C

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13. Find all points on $x + y = 4$ that lie at a unit distance from the line $4x + 3y - 10 = 0$.

A. $(11, 7)$

B. $(3, 1)$

C. $(-7, 11) \& (3, 1)$

D. $(7, 11) \& (1, -3)$

Answer: C

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14. The line 5x + 4y = 0 passes through the point of intersection of straight lines x+2y-10 = 0, 2x + y =-5

A. $x + 2y - 10 = 0, 2x + y = -5$

B. $x + 2y + 10 = 0, 2y - y + 5 = 0$

C. $x - 2y - 10 = 0, 2x + y - 5 = 0$

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

Answer: A

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15. The equation of the base of an equilateral triangle is $x + y = 2$ and its vertex is $(2, -1)$. Find the length and equations of its sides.

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

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

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

D. $\sqrt{3}$

Answer: A

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16. A ray of light is sent along the line which passes through the point (2, 3). The ray is reflected from the point P on x-axis. If the reflected ray passes through the point (6, 4), then the co-ordinates of P are

A. $\left(\frac{26}{7}, 0\right)$

B. $\left(0, \frac{26}{7}\right)$

C. $\left(\frac{-26}{7}, 0\right)$

D. $(-3, 0)$

Answer: A

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17. Line $ax + by + p = 0$ makes angle $\frac{\pi}{4}$ with $\cos\alpha + y\cos\alpha + y\sin\alpha = p, p \in R^+$. If these lines and the line $x\sin\alpha - y\cos\alpha = 0$ are concurrent, then $a^2 + b^2 = 1$ (b) $a^2 + b^2 = 2$ $2\left(a^2 + b^2\right) = 1$ (d) none of these

A. $a^2 + b^2 = 1$

B. $a^2 + b^2 = 2$

C. $2\left(a^2 + b^2\right) = 1$

D. $a^2 + b^2 = 3$

Answer: B

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18. Find the image of the point $(-8, 12)$ with respect to line mirror $4x + 7y + 13 = 0$.

A. $(16, 2)$

B. $(-16, -2)$

C. $(-12, 5)$

D. $(12, -5)$

Answer: B

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19. In a triangle ABC, if A is $(1, 2)$ and the equations of the medians through B and c are $x + y = 5$ and $x = 4$ respectively then B must be:

A. $(1, 4)$

B. $(7, -2)$

C. $(4, 1)$

D. $(-2, 7)$

Answer: B

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20. The equation of straight line equally inclined to the axes and equidistant from the point $(1, -2)$ and $(3, 4)$ is:

A. $x + y + 1 = 0$

B. $x - y + 1 = 0$

C. $x - y - 1 = 0$

D. $x + y - 1 = 0$

Answer: C

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21. A line passing through $(0, 0)$ and perpendicular to $2x + y + 6 = 0, 4x + 2y - 9 = 0$ then the origin divids the line in the ratio of

A. $1:2$

B. $2:1$

C. $4:3$

D. $3:4$

Answer: C

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22. The centroid of the triangle formed by the pair of straight lines $12x^2 - 20xy + 7y^2 = 0$ and the line $2x - 3y + 4 = 0$is

A. $\left(\frac{8}{3}, \frac{8}{3}\right)$

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

C. $(2, 2)$

D. $(1, 1)$

Answer: A

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23. If $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ bisect angles between each other, then find the condition.

A. $p = q + 1$

B. $pq = -1$

C. $p + q + 1 = 0$

D. $pq = 2$

Answer: B

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24. If a, b and c are in AP, then the straight line $ax + by + c = 0$ will always pass through a fixed point whose coordinates are (a) (1,2) (b) (1,-2) (c) (2,3) (d) (0,0)

A. $(1, -2)$

B. $(1, 2)$

C. $(0, -2)$

D. $(1, -1)$

Answer: A

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25. The straight line $ax + by = 1$ makes with the curve $px^2 + 2axy + qy^2 = r$, a chord which subtends aright angle at the origin. Then

A. $r\left(b^2 + q^2\right) = p + a$

B. $r\left(b^2 + p^2\right) = p + q$

C. $r\left(a^2 + b^2\right) = p + q$

D. $\left(a^2 + p^2\right)r = q + b$

Answer: C

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26. the lines L_1 and L_2 denoted by $3x^2 + 10xy + 8y^2 + 14x + 22y + 15 = 0$ intersect at the point P and have gradients M_1 and M_2 respectively.The acute angles between them is θ . which of the following relations hold good ?

A. $(-1, -2)$

B. $(1, -2)$

C. $(1, 2)$

D. $(-2, 1)$

Answer: B

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27. The equation of the lines through the origin and which are perpendicular to the pair of $x^2 - 3xy + 2y^2 = 0$ is

A. $2x^2 - 3xy + y^2 = 0$

B. $2x^2 + 2xy + y^2 = 0$

C. $2x^2 + 2xy + y^2 = 0$

D. $2x^2 - 3xy - y^2 = 0$

Answer: C

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28. A ray of light is sent 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 line containing the reflected ray.

A. $2x - 29y - 30 = 0$

B. $29x - 2y - 31 = 0$

C. $3x - 31y + 37 = 0$

D. $31x - 3y + 37 = 0$

Answer: B

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29. The mid-point of the line segment joirning $(3, -1)$ and $(1, 1)$ is shifted by two units (in the sense of increasing y) perpendicular to the line segment. Find the co-ordinates of the point in the new position

A. $(2+\sqrt{2}, \sqrt{2})$

B. $(\sqrt{2}, 2+\sqrt{2})$

C. $(2+\sqrt{2}, \sqrt{2})$

D. $(\sqrt{2}, 2-\sqrt{2})$

Answer: A

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30. Sum of the possible values of λ for which the following threes line $x+y=1, \lambda x+2y=3, \lambda^2 x+4y+9=0$ are concurrent is

A. -15

B. 14

C. 16

D. -14

Answer: A

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A. $x^{2/3} - y^{2/3} = c^{2/3}$

B. $x^{1/3} - y^{1/3} = c^{1/3}$

C. $x^{2/3} - y^{2/3} = c^{2/3}$

D. $x^{1/3} - y^{2/3} = c^{1/3}$

Answer: C

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32. The value of h for which $3x^2 - 2hxy + 4y^2 = 0$represents a pair of coincident lines are

A. $\pm 3\sqrt{3}$

B. $\pm \sqrt{3}$

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

D. $\pm \sqrt{6}$

Answer: C

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33. Distance between the pari of straight lines $x^2 + 6xy + 9y^2 + 4x + 12y - 5 = 0$ is given by

A. $\frac{3}{\sqrt{10}}$

B. $\frac{5}{\sqrt{10}}$

C. $\frac{6}{\sqrt{10}}$

D. $\frac{7}{\sqrt{10}}$

Answer: C

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Assignment Section C Objective Type Questions More Than One Answer

1. Consider triangle ABC where $A = (4, 4), B = (7, 4), C = (4, 7)$ then

A. The centriod of triangle ABC is (5,5)

B. The orthocentre of triangle ABC is (4,4)

C. The circum centre is $\left(\frac{11}{2}, \frac{11}{2}\right)$

D. The incentre is $\left(\frac{11+4\sqrt{2}}{2+\sqrt{2}}, \frac{11+4\sqrt{2}}{2+\sqrt{2}}\right)$

Answer: A::B::C::D

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2. The equation of the lines passes through $(2, 3)$ and making an angle of 45° with the line $2x - y + 3 = 0$ is

A. $y + 3x = 9$

B. $3y + 9x = 27$

C. $3y - x = 7$

D. $x + y - 5 = 0$

Answer: A::B::C

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3. If (a,a) lies between the lines $|x + y| = 2,$ then a lies in the interval

A. $(-1, 0]$

B. $[0, 1)$

C. $(1, 2)$

D. $(-2, -1)$

Answer: A::B

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4. A line parallel to the straight line $3x - 4y - 2 = 0$and at a distance of 4 units from it is

A. $3x - 4y + 20 = 0$

B. $4x - 3y + 12 = 0$

C. $3x - 4y + 18 = 0$

D. $3x - 4y - 22 = 0$

Answer: C::D

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5. If the point $P(x, y)$ be equidistant from the points $A(a+b, a-b)$ and $B(a-b, a+b)$ then

A. $ap = bq$

B. $aq = bp$

C. $p^2 - q^2 = 2(ap + bp)$

D. $Pcanbe(a, b)$

Answer: B::D

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6. The equation of a bisector of the angle between the lines $y - q = \frac{2a}{1-a^2}(x-p)$ and $y - q = \frac{2b}{1-b^2}(x-p)$is

A. $(y-q)(a+b) + (x-p)(1-ab) = 0$

B. $(y-q)(1-ab) + (x-p)(a+b) = 0$

C. $(x-p)(a+b) - (y-q)(1-ab) = 0$

D. $(x-p)(a+b)+(y-b)(1-ab)=0$

Answer: A::C

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7. The point of injtersection of the line $\frac{x}{p}+\frac{y}{q}=1$ and $\frac{x}{q}+\frac{y}{p}=1$ lies on the line

A. $x-y=0$

B. $(x+y)(p+q)=2qp$

C. $(ax+by)(p+q)=(a+b)pq$

D. $(ax-by)(p+q)=)a-b)pq$

Answer: A::B::C::D

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8. If two vertices of an equilateral triangle are $(1, 1)$ and $(-1, -1)$ then the third vertex may be

A. (a) $(-\sqrt{3}, -\sqrt{3})$

B. (b) $(-\sqrt{3}, \sqrt{3})$

C. (c) $(\sqrt{3}, -\sqrt{3})$

D. (d) $(\sqrt{3}, \sqrt{3})$

Answer: B::C

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9. The lines x+2y+3=0, x+2y-7=0, and 2x-y-4=0 are the sides of a square. The equation of the remaining side of the square can be

A. $2x - y - 6 = 0$

B. $2x - y + 6 = 0$

C. $2x - y - 14 = 0$

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

Answer: B::C

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10. Let L_1 be a straight line passing through the origin and L_2 be the straight line $x + y = 1$ if the intercepts made by the circle $x^2 + y^2 - x + 3y = 0$ on L_1 and L_2 are equal, then which of the following equations can represent L_1?

A. $x + y = 0$

B. $x - y = 0$

C. $x + 7y = 0$

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

Answer: B::C

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11. Equation(s) of the straight line(s), inclined at 30^0 to the x-axis such that the length of its (each of their) line segment(s) between the coordinate axes is 10 units, is (are) $x + \sqrt{3}y + 5\sqrt{3} = 0$ $x - \sqrt{3}y + 5\sqrt{3} = 0$ $x + \sqrt{3}y - 5\sqrt{3} = 0$ $x - \sqrt{3}y - 5\sqrt{3} = 0$

A. $x - \sqrt{3}y + 5\sqrt{3} = 0$

B. $x + \sqrt{3}y + 5\sqrt{3} = 0$

C. $x - \sqrt{3}y - 5\sqrt{3} = 0$

D. $x + \sqrt{3}y - 5\sqrt{3} = 0$

Answer: A::C

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12. A (1,3) and C(7,5) are two opposite vertices of a square. The equation of side through A is

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

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

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

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

Answer: A::D

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13. A right angled triangle ABC having a right angle at C, CA=b and CB=a, move such that angular points A and B slide along x-axis and y-axis respectively. Find the locus of C

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

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

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

D. $y = -\frac{a}{b}x$

Answer: C::D

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A. $c = 3$

B. Other two vertices $(4, 4)$ and $(2, 0)$

C. $c = -4$

D. Other two vertices are $(-4, 3)$ and $(2, 3)$

Answer: B::C

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Assignment Section D Linked Comprehension Type Questions

1. a and b are real numbers between 0 and 1

$A(a, 1), B(1, b)$ and $C(0, 0)$ are the vertices of a triangle.

If ΔABC is equilateral its area is

A. $\frac{7\sqrt{3}+12}{4}$

B. $\frac{8\sqrt{3}-12}{4}$

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

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

Answer: B

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2. a and b are real numbers between 0 and 1

$A(a, 1), B(1, b)$ and $C(0, 0)$ are the vertices of a triangle.

If $\Delta ABC$is isosceles with $AC = BC$ and $5(AB)^2 = 2(AC)^2$ then

A. $ab = \frac{1}{4}$

B. $ab = \frac{1}{8}$

C. $ab = \frac{1}{16}$

D. $ab = \frac{1}{2}$

Answer: A

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3. a and b are real numbers between 0 and 1 $A(a, 1), B(1, b)$ and $C(0, 0)$ are the vertices of a triangle.

If $\angle C = 90^\circ$ then

A. $a + b = 0$

B. $a - b = 0$

C. $a + b = 1$

D. $a - b = 1$

Answer: A

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4. Let the equations of perpendicular bisectors of sides AC and $of\Delta ABCbex+y=3$ and $x-y=1$ respectively Then vertex A is is (0,0)

The orthocentre of ΔABC is

A. (A)$(1, 1)$

B. (B)$(2, 1)$

C. (C)$(0, 0)$

D. (D)$(0, 1)$

Answer: B

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5. Let the equations of perpendicular bisectors of sides AC and $ABof\Delta ABCisx+y=3$ and $x-y=1$ respectively Then vertex A is is (0,0)

The circumcentre of the ΔABC is

A. $(1, 1)$

B. $(2, 1)$

C. $(0, 0)$

D. $(0, 1)$

Answer: B

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6. Let the equations of perpendicular bisectors of sides AC and AB of $\triangle ABC$ be $x + y = 3$ and $x - y = 1$ respectively. Then vertex A is is (0,0).

Length of side BC of the ΔABC is

A. (a) $\sqrt{2}$

B. (b) $\sqrt{8}$

C. (c) $\sqrt{12}$

D. (d) $\sqrt{20}$

Answer: D

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7. Two consecutive sides of a parallelogram are $4x + 5y = 0$ and $7x + 2y = 0$. If the equation of one diagonal is $11x = 7y = 9,$ find the equation of the other diagonal.

A. $x - y = 0$

B. $7x - 11y = 0$

C. $x + y = 0$

D. $11x + 7y = 0$

Answer: A

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8. Two adjacent sides of a parallelogram are $4x + 5y = 0$,and $7x + 2y = 0$. If the equation of one diagonal is $11x + 7y = 9$

Area of the parallelogram is

A. $(0, 0)$

B. $(1, 1)$

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

D. All of these

Answer: D

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9. Two adjacent sides of a parallelogram are $4x + 5y = 0$,and $7x + 2y = 0$. If the equation of one diagonal is $11x + 7y = 9$

Area of the parallelogram is

A. A) 3

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

C. C) 6

D. D) $\frac{2\sqrt{85}}{3}$

Answer: A

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10. If α, β roots of $x^2 - 6p_1x + 2 = 0, \beta, \gamma$ are roots of $x^2 - 6p_2x + 3 = 0$ and γ, α are roots of equation $x^2 - 6p_3x + 6 = 0$ where p_1, p_2, p_3 are positive then

The values of α, β, γ respectively are

A. $2, 3, 1$

B. $2, 1, 3$

C. $1, 2, 3$

D. $-1, -2, -3$

Answer: B

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11. If α, β roots of $x^2 - 6p_1x + 2 = 0, \beta, \gamma$ are roots of $x^2 - 6p_2x + 3 = 0$ and γ, α are roots of equation $x^2 - 6p_3x + 6 = 0$ where p_1, p_2, p_3 are positive then

The values of p_1, p_2, p_3 respectively are

A. $\frac{1}{2}, \frac{2}{3}, \frac{5}{6}$

B. $1, 2, 5$

C. $6, 1, 4$

D. $2, \frac{3}{2}, \frac{6}{5}$

Answer: A

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12. If α, β roots of $x^2 - 6p_1x + 2 = 0, \beta, \gamma$ are roots of $x^2 - 6p_2x + 3 = 0$ and γ, α are roots of equation $x^2 - 6p_3x + 6 = 0$ where p_1, p_2, p_3 are positive then

If $A\left(\alpha, \frac{1}{\alpha}\right), B\left(\beta, \frac{1}{\beta}\right), C\left(\gamma, \frac{1}{\gamma}\right)$ be vertices of ΔABC then centroid of ΔABC is

A. $\left(4, \frac{11}{18}\right)$

B. $\left(2, \frac{11}{18}\right)$

C. $\left(-2\frac{11}{18}\right)$

D. $\left(-4\frac{11}{18}\right)$

Answer: B

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Section E Assertion Reason Type Questions

1. STATEMENT-1: The straight lines $2x + 3y + 5 = 0$ and $3x - 2y + 1 = 0$ are perpendicular to each other.

STATEMENT-2: Two lines $y = m_1x + c_1$ and $y = m_2x + c_2$ where $m_1, m_2 \in$ R are perpendicular if $m_1, m_2 = -1$.

STATEMENT-2: Two lines $y = m_1 \times + x_1$ and $y = m_2x + c_2 where m_1, m_2 \in R$ are peprendicular if $m_1m_2 = -1$.

A. Statement-1 is True, Statemetn-2 is True, Statemetn-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statemetn-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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2. Consider the system of equations

$a_1x + b_1y + c_1z = 0$

$a_2x + b_2y + c_2z = 0$

$a_3x + b_3y + c_3z = 0$

If $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$, then the system has

A. more than one solution

B. one trivial and one non trivial solution

C. no solution

D. only trivial solution (0,0,0)

Answer: B

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3. Statement 1: Each point on the line $y - x + 12 = 0$ is equidistant from the lines $4y + 3x - 12 = 0, 3y + 4x - 24 = 0$ Statement 2: The locus of

a point which is equidistant from two given lines is the angular bisector of the two lines.

A. Statement-1 is True, Statemetn-2 is True, Statemetn-2 is a correct explanation for Statement-3

B. Statement-1 is True, Statemetn-2 is True, Statement-2 is NOT a correct explanation for Statement-3

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: C

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4. STATEMENT-1: Let $y = 3x, x = 0$ and $y = 5$ be the sides of a triangle the radius of circumcircle of the triangle will be $\frac{5\sqrt{5}}{3\sqrt{2}}$.

STATEMENT-2: In a right angle triangle the radius of circumcircle is half of the hypoyensuse of the triangle.

A. (a)Statement-1 is True, Statemetn-2 is True, Statemetn-2 is a correct explanation for Statement-1

B. (b)Statement-1 is True, Statemetn-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. (c)Statement-1 is True, Statement-2 is False

D. (d)Statement-1 is False, Statement-2 is True

Answer: A

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5. STATEMENT-1: The line $2009x + 2010y + 2011 = 0$ where $2009a + 2011c = 0$ passes through the point $\left(\frac{a}{b}, \frac{b}{c}\right)$, where $abc \neq 0$.

STATEMENT-2: If $2009a + 2010 + 2011c = 0$, then the straight line $ax + by + c = 0, abc \neq 0$ passes through $\left(\frac{2009}{2011}, \frac{2010}{2011}\right)$.

A. Statement-1 is True, Statemetn-2 is True, Statemetn-2 is a correct explanation for Statement-5

B. Statement-1 is True, Statemetn-2 is True, Statement-2 is NOT a correct explanation for Statement-5

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B

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6. STATEMENT-1: The straight line $1005x - 2011y + 1006 = 0$ passes through (1,1)

STATEMENT-2: The straight line $ax - by + c = 0$ passes through $(1, 1)$ if $a + c = b$.

A. Statement-1 is True, Statemetn-2 is True, Statemetn-2 is a correct explanation for Statement-6

B. Statement-1 is True, Statemetn-2 is True, Statement-2 is NOT a correct explanation for Statement-6

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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Section F Matrix Mathc Type Question

1. The vertices of a triangle are $A(a, 0) B(0, b)$ and $C(a, b)$

Column-I	Column-II
(A) Centroid	(p) $\left(\frac{a}{2}, \frac{b}{2}\right)$
(B) Circumcentre	(q) (a, b)
(C) Orthocentre	(r) $\left[\frac{a^3}{a^2+b^2}, \frac{b^3}{a^2+b^2}\right]$
(D) Foot of the altitude from C	(s) $\left(\frac{2a}{3}, \frac{2a}{3}\right)$

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2. ABCD is a rectangle in the clock-wise direction. The co-ordinates of A are $(1, 3)$ and of C are (5,1) vertices B and D lie on line $y = 2x + c$. The co-ordinate of the

Column-I	Column-II
(A) Middle point of *BD*	(p) (2, 0)
(B) Middle point of *AB*	(q) (3, 2)
(C) Middle point of *BC*	(r) $\left(\frac{5}{2}, \frac{7}{2}\right)$
(D) Point *D*	(s) $\left(\frac{9}{2}, \frac{5}{2}\right)$

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3. Match column I and column II according to the given condition

Column I	Column II
(A) If the algebraic sum of perpendiculars from the points (2, 3), (1, 3) and (3, 6) to a variable line is zero then the coordinates of the fixed point through which the lines passes are not equal to	(p) $\left(\frac{5}{3}, \frac{5}{3}\right)$
(B) For a triangle the coordinates of circum-centre and orthocentre are (1, 1) and (3, 3) respectively then the coordinates of centroid of the triangle are	(q) (1, 1)
(C) The incentre of the triangle with vertices (3, 0), (0, 4) and (0, 0) is	(r) (0, 0)
(D) Orthocentre of the triangle formed by the lines $xy = 0$ and $x + y = 2$ is	(s) (3, 4)
	(t) (1, 4)

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Section G Integer Answer Type Questions

1. The number of intergral values of k if x coordinate of the point of intersection of the line $5x + 7y = 12$ and $y = kx + 2$ is also an integer is

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2. The number of lines passing through $(1, 1)$ and intersecting a segment of length 2 unit between the lines $x + y = 1$and $x + y = 3$ is

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3. The axes are rotated through an angle, keeping origin fixed then the equation of the line $3x + 4y - 12 = 0$ becomes $ax + by - ab = 0$.If

$\frac{1}{a^2}+\frac{1}{b^2}=k^2$. then the value of 12k is

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4. Let a line $\frac{x}{a}+\frac{y}{b}=1$ intersects the x-axis at A and y-axis at B resapectively. A line parallel to it is drawn to intersect the axes in P and Q respectively. The extermities of the lines are joined transversely. If the locus of point of intersection of the line joining them is $\frac{x}{a}=c\frac{y}{b}$, then c is equal to

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Section H Multiple True False Type Questions

1. STATEMENT-1: If three points $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ are collinear, then $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0$

STATEMENT-2: If $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0$ then the points

$(x_1, y_1), (x_2, y_2), (x_3, y_3)$ will be collinear.

STATEMENT-3: If lines $a_1x + b_1y + c_1 = 0, a_2 = 0$ and $a_3x + b_3y + c_3 = 0$ are concurrent then $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$

A. T F T

B. T T T

C. F F F

D. F F T .

Answer: 2

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2. STATEMENT-1: Let ΔABC be rigtht angle with vertices $A(0, 2), B(1, 0)$ and $C(0, 0)$ if D is the point on AB such that the segment CD bisects angle C then the length of CD is $\frac{2\sqrt{2}}{3}$.

STATEMENT-2: The number of points on the straight line which joins

$(-4, 11)$ to $(16, -1)$ whose co-ordinates are positve interger is 3.

STATEMENT-3: If $k = 2$ then the lines $L_1 : 2x + y - 3 = 0, L_2 : 5x + ky - 3 = 0$ and $L_3 : 3x - y - 2 = 0$ are concurrent.

A. F T F

B. T F T

C. T T F

D. F F T .

Answer: 3

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Section I Subjective Type Questions

1. Sum of intercepts made by the lines $y = x + 2, y = 2x + 3, y = 3x + 4, \ldots\ldots, y = 50x + 51,$ on y-axis is _____

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2. Vertices of a triangle are $(0, 0), (41\alpha, 37)$ and $(-37, 41\beta)$, where α and β are the roots of the equation $3x^2 - 16x + 15 = 0$. The area of the triangle is _____.

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3. If the circumcentre of the triangle whose vertices are $(0, 2), (3, 5)$ and $(5, 8)$is (h,k) then $4(h^2 + k^2)$ equals_____.

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4. If the line $y = 3x$ meets the lines $x = 1, x = 2 \ldots, x = 12$ at points $A_1, A_2, \ldots A_{12}$ respectively then $(OA_1)^2 + (OA_2)^2 + \ldots + (OA_{12})^2$ is equal to _____

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5. The co-ordinates of a point A_n is $\left(n, n, \sqrt{n}\right)$ where $n \in \mathbb{N}$, If $O(0, 0, 0)$ is the origin then $\sum_{i=1}^{12} (OA_i)^2$ equals _____.

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Section J Aakash Challengers Questions

1. The lines $xy = 0$ and $x + y = 17$ from a triangle in the x-y plane. The total numbe of points having co-ordinates which are prime numbers and lie inside the traingle is

A. (a)23

B. (b)24

C. (c)25

D. (d)26

Answer: D

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2. A line passes through $A(1, 1)$ and $B(100, 1000)$. The number of points with integral co-ordinates on the line strictly between A and B is

A. 7

B. 8

C. 9

D. 10

Answer: A

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3. In a ABC, $A \equiv (\alpha, \beta)$, $B \equiv (1, 2)$, $C \equiv (2, 3)$, point A lies on the line $y = 2x + 3$, where α, β are integers, and the area of the triangle is S such that $[S] = 2$ where $[\ .]$ denotes the greatest integer function.

Then the possible coordinates of A can be $(-7, -11)$ $(-6, -9)$ $(2, 7)$ $(3, 9)$

A. $(-7, 11)$

B. $(-6, -9)$

C. $(2, 7)$

D. $(3, 9)$

Answer: A::B::C::D

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4. Let P $(\sin\theta, \cos\theta)$, $(0 \leq \theta \leq 2\pi)$, be apoint in a triangle with vertices (0,0), $\left(\sqrt{3/2}, 0\right)$ and $\left(0, \sqrt{3/2}\right)$. Then ,

A. $\left(0, \frac{\pi}{12}\right)$

B. $\left(\frac{5\pi}{12}, \frac{\pi}{2}\right)$

C. $\left[\pi, \frac{5\pi}{3}\right]$

D. $\left[\frac{\pi}{2}, \pi\right]$

Answer: A::B

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5. The equations of two equal sides $ABandAC$ of an isosceles triangle ABC are $x + y = 5$ and $7x - y = 3$, respectively. Then the equation of side BC if $ar(ABC) = 5unit^2$ is $x - 3y + 1 = 0$ (b) $x - 3y - 21 = 0$ $3x + y + 2 = 0$ (d) $3x + y - 12 = 0$

A. $x - 3y + 1 = 0$

B. $x - 3y + 21 = 0$

C. $3x + y - 2 = 0$

D. $3x + y - 12 = 0$

Answer: A::B::C::D

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