MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

CARTESIAN SYSTEM OF RECTANGULAR COORDINATES AND STRAIGHT LINES

Illustration

1. Show that the triangle with vertices (3, 0), (-1, -1) and (2, 4) is isosceles and right angled.

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2. The line $x - y + k = 0$ passes through the point which divides the segment joining the points (2,3) and (4,5) in the the ratio 2 : 3. Find the

value of k.

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3. Show that the centroid of the triangle with vertices $(5\cos\theta, 4\sin\theta)$, $(4\cos\theta, 5\sin\theta)$ and (0, 0) lies on the circle $x^2 + y^2 = 9$.

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4. Find the coordinates of the in-centre of the triangle with vertices $A(-1, 12)$, $B(-1, 0)$ and C (4,0).

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5. If the area of the triangle with vertices at the points whose coordinates are (2, 5), (0, 3) and (4, k) is 4 units, then find the value of k.

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6. Find the equation of the line parallel to x - axis passing through the intersection of the lines $3ax + 2by + 7b = 0$ and $3bx - 2ay - 7a = 0$, where $(a, b) \neq (0, 0)$.

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7. Find the equation of the straight line passing through the point (10, - 7) and making intercepts on the coordinate axes whose sum is 12.

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8. The line L is given by $2x + by = 7$, passes through (8, 3). The line K is parallel to L and has the equation $cx - 3y = c$. Find the distance between L and K.

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9. If $P(4, 7), Q(7, 2)R(a, b)$ and $S(3, 8)$ are the vertices of a parallelogram then find the value of a and b.

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10. which Find the locus of the mid-point of the portion of the line $x \cos \alpha + y \sin \alpha = p$ intercepted between the axes

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11. If origin is shifted to the point (2,3) and the axes are rotated through an angle $\pi / 4$ in the anticlokwise direction, then find the coordinates of the point (7, 11) in the new system of coordinates.

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12. Two sides of a triangle given by $2x + 3y - 5 = 0$ and $5x - 4y + 10 = 0$ intersect at A. Centroid of the triangle is at the origin. Find the equation of the median through A.

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Solved Examples Concept Based Single Correct Answer Type Questions

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

A. (a, 0)

B. $(-a, 0)$

C. $(a\sqrt{3}, 0)$

D. $(-a\sqrt{3}, 0)$

Answer: C

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

A. $ah + bk = 1$

B. $\frac{a}{h} + \frac{b}{k} = 1$

C. $ak + bh = 1$

D. $\frac{a}{k} + \frac{b}{h} = 1$

Answer: B

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3. The line joining the points (2, x) and (3, 1) is perpendicular to the line joining the points (x, 4) and (7, 5). The value of x is

A. 2

B. 3

C. 4

D. 7

Answer: C

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4. If the point (a, b) divides a line between the axes in the ratio 2 : 3, the equation of the line is

A. $ax + by = 5$

B. $bx + ay = 5$

C. $\frac{2x}{a} + \frac{3y}{b} = 5$

D. $2ax + 3by = 5$

Answer: C

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5. Find the point on x-axis which is equidistant from the pair of points: $(7, 6)$ and $(3, 4)$

A. $2\sqrt{5}$

B. $15\sqrt{5}$

C. $15\sqrt{5}/2$

D. $5\sqrt{15}/2$

Answer: C

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6. The slope of a line is 3 times the slope of the other line and the tangent of the angle between them is 4/13, sum of their slopes is equal to

A. 2

B. 4

C. 6

D. 8

Answer: D

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7. A line perpendicular to the line segment joining the points (7, 3) and (3, 7) divides it in the ratio 1 : 3, the equation of the line is

A. $x + y - 10 = 0$

B. $x - y + 4 = 0$

C. $x - y + 2 = 0$

D. $x - y - 2 = 0$

Answer: D

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8. If the distance between the parallel lines $3x + 4y + 7 = 0$ and $ax + y + b = 0$ is 1, the intergral value of b is

A. 1

B. 2

C. 3

D. 4

Answer: C

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9. If p and q are the lengths of perpendiculars from the origin to the lines $x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + ycosec\theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$.

A. $p^2 - 4q^2 = k^2$

B. $p^2 + 4q^2 = k^2$

C. $4p^2 + q^2 = k^2$

D. $p^2 + q^2 = k^2$

Answer: B

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

A. $2m^2 - 7m - 7 = 0$

B. $7m^2 - 7m - 2 = 0$

C. $7m^2 - 2m - 7 = 0$

D. $2m^2 - 7m - 2 = 0$

Answer: C

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11. Equation of the line which makes an intercept of length 2 on positive x - axis and an intercept of length 3 on the negative y-axis is

A. $2x - 3y + 6 = 0$

B. $3x - 2y - 6 = 0$

C. $2x - 3y - 6 = 0$

D. $3x - 2y + 6 = 0$

Answer: B

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12. The perpendicular from the origin to a line L meets it at the point $(3, -9)$, equation of the line L is

A. $x - 3y = 30$

B. $3x - y = 18$

C. $x + 3y + 24 = 0$

D. $3x + y = 18$

Answer: A

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13. The distance of the point (2, 3) from the line $4x - 3y + 26 = 0$ is same as its distance from the line $3x - 4y + p = 0$. The value of p can be

A. 5

B. 25

C. 31

D. -31

Answer: C

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14. If the segment of the line between the lines $x - y + 2 = 0$ and $x + y + 4 = 0$ is bisected at the origin, equation of the line is

A. $y + 3x = 0$

B. $x + 3y = 0$

C. $y - 3x = 0$

D. $x - 3y = 0$

Answer: C

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15. A ray of light passing through the point $(1, 2)$ reflects on the $x - a\xi s$ at point A and the reflected ray passes through the point $(5, 3)$. Find the co-ordinates of A.

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Solved Examples Level 1 Single Correct Answer Type Questions

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

A. (1, 7/3)

B. (1/3, 7/3)

C. (-1, 7/3)

D. (-1/3, 7/3)

Answer: A

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2. The points $(a, b+c)$, $(b, c+a)$ and $(c, a+b)$

A. vertices of an equilateral triangle

B. concyclic

C. vertices of a right angled triangle

D. none of these

Answer: D

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3. 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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4. I. If p is the length of the perpendicular from the origin on the line $\frac{x}{a}+\frac{y}{b}=1$ and a^2, p^2, b^2 are in A.P, then $a^4-2p^2a^2+2p^4=$

A. -1

B. 0

C. 1

D. none of these

Answer: B

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5. If a, x_1, x_2 are in G.P. with common ration r, and b, y_1, y_2 are in G.P. with common ratio s where $s-r=2$, then the area of the triangle with vertices $(a, b), (x_1, y_1)$ and (x_2, y_2) is

A. $\left|ab\left(r^2-1\right)\right|$

B. $ab\left(r^2-s^2\right.$

C. $ab(s^2 - 1)$

D. abrs

Answer: A

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6. Line joining $A(b\cos\alpha, b\sin\alpha)$ and $B(a\cos\beta, a\sin\beta)$, is produced to the point $M(x, y)$ such that $AM : MB = b : a$ then $x\cos\left(\frac{\alpha+\beta}{2}\right) + y\sin\left(\frac{\alpha+\beta}{2}\right) =$

A. -1

B. 0

C. 1

D. $a^2 + b^2$

Answer: B

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7. If the circumcenter of an acute-angled triangle lies at the origin and the centroid is the middle point of the line joining the points $\left(a^2+1, a^2+1\right)$ and $(2a, -2a)$, then find the orthocentre.

A. $y=\left(a^2+1\right)x$

B. $y=2ax$

C. $x+y=0$

D. $(a-1)^2x-(a+1)^2y=0$

Answer: D

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8. If P_1 and p_2 are the lenghts of the perpendiculars drawn from the origin to the two lines

x sec α +y . Cosec α =2a

and x. cos α +y. sin α=a. cos 2 α,

show that $P_1^2 + P_2^2$ is constant for all values of α .

A. $4\sin^2 4\alpha$

B. $4\cos^2 4\alpha$

C. $4\cos ec^2 4\alpha$

D. $4\sec^2 4\alpha$

Answer: C

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9. $OPQR$ is a square and M, N are the middle points of the sides $PQandQR$, respectively. Then the ratio of the area of the square to that of triangle OMN is 4:1 (b) 2:1 (c) 8:3 (d) 7:3

A. $4:1$

B. $2:1$

C. $8:3$

D. $4:3$

Answer: C

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10. The equation of the locus of the point of intersection of the straight lines $x\sin\theta + (1-\cos\theta)y = a\sin\theta$ and $x\sin\theta - (1-\cos\theta)y + a\sin\theta = 0$ is

A. $x^2 - y^2 = a^2$

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

C. $y^2 = ax$

D. none of these

Answer: B

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11. Points A (a,3) and C (5,b) are opposite vertices of a rectangle ABCD. If the other two vertices lie on the line y=2x +c which passes through the point (a,b), then : c=

A. -7

B. -4

C. 0

D. 7

Answer: A

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12. If the equation $(a_1 - a_2)x + (b_1 - b_2)y = c$ represents the perpendicular bisector of the segment joining $(a_1, b_1)(a_2, b_2)$, then $2c =$

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

B. $a_1^2 + b_1^2 + a_2^2 + b_2^2$

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

D. none of these

Answer: C

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13. 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. $x/2 + y/3 = 1$ and $x/2 + y/1 = 1$

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

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

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

Answer: D

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14. If a,b,c are non-zero real numbers in H.P then the line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes through a fixed point whose coordinates are

A. $(1, -2)$

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

C. $(-1, 2)$

D. $(-1, -2)$

Answer: A

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15. The line parallel to the x-axis and passing through the intersection of the lines $ax+2by+3b=0$ and $bx-2y-3a=0$, where $(a, b) \neq (0, 0)$, is above the x-axis at a distance of 3/2 units from it above the x-axis at a distance of 2/3 units from it below the x-axis at a distance of 3/2 units from it below the x-axis at a distance of 2/3 units from it

A. above x-axis at a distance 3/2 from it.

B. above x-axis at a distance 2/3 from it.

C. below x-axis at a distance 3/2 from it.

D. below x-axis at a distance 2/3 from it.

Answer: C

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16. 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. $3x + 4y = 25$

B. $x + y = 7$

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

D. $4x + 3y = 24$

Answer: D

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17. Let A(h, k), B(1, 1) and C(2, 1) be the vertices of a right angled triangle with AC as its hypotenuse. If the area of the triangle is 1, then the set of values which k can take is given by (1) $\{1, 3\}$ (2) $\{0, 2\}$ (3) $\{-1, 3\}$ (4) $\{-3, -2\}$

A. {1,3}

B. {0,2}

C. $\{-1, 3\}$

D. $\{-3, -2\}$

Answer: C

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18. Let $A(2, -3) and B(-2, 1)$ be 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 $2x + 3y = 9$ $2x - 3y = 7$ $3x + 2y = 5$ $3x - 2y = 3$

A. $3x + 2y = 5$

B. $2x - 3y = 7$

C. $2x + 3y = 9$

D. $3x - 2y = 3$

Answer: C

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19. If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is four times their product , then the value of c is

A. 2

B. -1

C. 1

D. -2

Answer: A

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20. which Find the locus of the mid-point of the portion of the line $x\cos\alpha + y\sin\alpha = p$ intercepted between the axes

A. $x^2 + y^2 = 4/p^2$

B. $x^2 + y^2 = 4p^2$

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

D. $1/x^2 + 1/y^2 = 4/p^2$

Answer: D

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21. 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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22. 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 α (0 < α' < pi`/4) with the positive direction of x-axis. Find the equation of diagonal not passing through the origin ?

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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23. 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 is a

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: A

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24. If x_1, x_2, x_3 and $y_1, y_2, y_3$are both 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 an ellipse

B. lie on a circle

C. are vertices of a triangle

D. lie on a straight line

Answer: D

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25. Q,R and S are the points on line joining the points $P(a, x)$ and $T(b, y)$ such that $PQ = QR = RS = ST$ then $\left(\frac{5a + 3b}{8}, \frac{5x + 3y}{8}\right)$ is the mid point of

A. PQ

B. QR

C. RS

D. ST

Answer: B

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26. if a, b, c form a GP with common with ratio r, the sum of the ordinates of the points of intersection of the lines $ax + by + c = 0$ and the curve $x + 2y^2 = 0$ is

A. $-r^2/2$

B. $-r/2$

C. r/2

D. $r^2/2$

Answer: C

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27. If $\alpha, \beta\gamma$ are the real roots of the equation $x^3 - 3px^2 + 3qx - 1 = 0$, then find the centroid of the triangle whose vertices are $\left(\alpha, \frac{1}{\alpha}\right), \left(\beta, \frac{1}{\beta}\right)$ and $\left(\gamma, \frac{1}{\gamma}\right)$.

A. (p, q)

B. (p/3, q/3)

C. (p + q, p -q)

D. (3p, 3q)

Answer: A

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28. The line L has intercepts a and b on the coordinate axes. The coordinate axes are rotated through a fixed angle, keeping the origin

fixed. If p and q are the intercepts of the line L on the new axes, then $\frac{1}{a^2}-\frac{1}{p^2}+\frac{1}{b^2}-\frac{1}{q^2}$ is equal to

A. -1

B. 0

C. 1

D. none of these

Answer: B

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29. The set of lines $ax+by+c=0$, where $3a+2b+4c=0$ is concurrent at the point...

A. (3, 2)

B. (2, 4)

C. (3, 4)

D. (3/4, 1/2)

Answer: D

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30. If P(1,0), Q(-1,0) and R (2,0) are three given points, then the locus of the point S satisfying the relation $(SQ)^2 + (SR)^2 = 2(SP)^2$

A. (0, 0)

B. (2/3, 0)

C. $(-3/2, 0)$

D. $(0, -2/3)$

Answer: C

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31. If the algebraic sum of the distances of a variable line from the points $(2, 0), (0, 2),$ and $(-2, -2)$ is zero, then the line passes through the fixed point. $(-1, -1)$ (b) $(0, 0)$ $(1, 1)$ (d) $(2, 2)$

A. $(-1, -1)$

B. (0, 0)

C. (1, 1)

D. (2, 2)

Answer: B

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32. Find the equation of the straight line which passes throughthe point of intersection of the straight lines $3x-4y+1=0$ and $5x+y-1=0$ and makes equal intercepts upon the co-ordinate axes.

A. $22x+22y=13$

B. $23x + 23y = 11$

C. $11x + 11y = 23$

D. $8x - 3y = 0$

Answer: B

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33. If the point (3, 4) lies on the locus of the point of intersection of the lines $x\cos\alpha + y\sin\alpha = a$ and $x\sin\alpha - y\cos\alpha = b$ (α is a variable), the point (a, b) lies on the line $3x - 4y = 0$ then $|a + b|$ is equal to

A. 1

B. 7

C. 12

D. 5

Answer: B

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34. Statement 1 : The equation of the sides of a triangle are x - 3y = 0, 4x + 3y = 5 and 3x + y = 0. The line 3x-3y = 0 passes through the orthocentre of triangle. Statement 2 : If two lines of slope m_1 and m_2 are perpendicular, then $m_1 m_2 = -1$

A. incentre

B. centroid

C. circumcentre

D. orthocentre of the triangle

Answer: D

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35. Locus of the mid-points of the intercepts between the coordinate axes by the lines passing through $(a, 0)$ does not intersect

A. x - axis

B. y - axis

C. y = x

D. y = a

Answer: B

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36. If h denotes the arithmetic mean and k denotes the geometric mean of the intercepts made on the coordinate axes by the lines passing through the point (1, 1), then the point (h, k) lies on

A. a circle

B. a parabola

C. a straight line

D. a hyperbola

Answer: B

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37. Ifa,b,c are in A.P., a,x,b,are in G.P and b,y,c are also in G.P then the point (x,y) lies on

A. a straight line

B. a circle

C. an ellipse

D. a hyperbola

Answer: B

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38. If one of the diagonals of a square is along the line $x = 2y$ and one of its vertices is (3, 0), then its sides through this vertex are given by the

equations (A) $y-3x+9=0, 3y+x-3=0$ (B) $y+3x+9=0, 3y+x-3=0$ (C) $y-3x+9=0, 3y-x+3=0$ (D) $y-3x+9=0, 3y+x+9=0$

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

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

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

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

Answer: B

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39. The line, which is parallel to X-axis and crosses the curve $y=\sqrt{x}$ at an angle 45°, is

A. x = 1/4

B. y = 1/4

C. y = 1/2

D. $y = 1$

Answer: C

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40. A rectangle has two opposite vertices at the points (1,2) and (5,5). If the other vertices lie on the line $x=3$, then their coordinates are

A. (3, 1)

B. (3, 2)

C. (3, 4)

D. (3, 6)

Answer: A

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41. 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 segement PQ in the ratio $1:2\ 3:4\ 2:1\ 4:3$

A. $1:2$

B. $3:4$

C. $2:1$

D. $4:3$

Answer: B

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42. Let P = (-1, 0), Q = (0, 0) and R = $(3, 3\sqrt{3})$ be three points. The equation of the bisector of the angle PQR

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

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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43. The number of integer values of m, for which the x-coordiante 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

A. 2

B. 0

C. 4

D. 1

Answer: A

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44. 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. 6

B. $11/5$

C. $29/5$

D. 5

Answer: A

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45. A line is drawn through the point (1, 2) to meet the coordinate 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 (1) $-\frac{1}{4}$ (2) -4 (3) -2 (4) $-\frac{1}{2}$

A. -2

B. $-1/2$

C. $-1/4$

D. -4

Answer: A

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46. 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. $x + 3y = 5, \quad 3x - y = 5$

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

C. $2x + 3y = 7, \quad 3x - 2y = 4$

D. $3x + y = 7, \quad x - 3y = -1$

Answer: A

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47. The orthocentre of the triangle formed by the lines xy = 0 and $2x + 3y - 5 = 0$ is

A. (2, 3)

B. (3, 2)

C. (0, 0)

D. (5, -5)

Answer: C

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48. The equations of the sides of a parallelogram are x = 2, x = 3 and y = 1, y = 5. Equations to the pair of diagonals are

A. $4x + y = 7, 4x - y = 13$

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

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

D. $4x + y = 13, 4x - y = 7$

Answer: D

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49. The lines joining the origin to the point of intersection of The lines joining the origin to the point of intersection of $3x^2 + mxy = 4x + 1 = 0$ and $2x + y - 1 = 0$ are at right angles. Then which of the following is not a possible value of m? -4 (b) 4 (c) 7 (d) 3

A. $\lambda = -4$

B. $\lambda = 4$

C. $\lambda = 7$

D. all values of λ

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. exactly two values of p

B. more than two values of p

C. no value of p

D. exactly one value of p

Answer: D

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51. 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 by has the equation $\frac{x}{c}+\frac{y}{3}=1$. Then the distance between L and K is

(a) $\sqrt{17}$ (b) $\frac{17}{\sqrt{15}}$ (c) $\frac{23}{\sqrt{17}}$ (d) $\frac{23}{\sqrt{15}}$

A. $17/\sqrt{5}$

B. $23/\sqrt{17}$

C. $23/\sqrt{15}$

D. $\sqrt{15}$

Answer: B

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

A. P lies on the line segment PQ

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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53.

$L_1 = x + 3y - 5 = 0, L_2 = 3x - ky - 1 = 0, L_3 = 5x + 2y - 12 = 0$

are concurrent if k=

A. $k^2 + 4k - 45 = 0$

B. $5k^2 + 51k + 45 = 0$

C. $5k^2 - 19k - 6 = 0$

D. $5k^2 + 51k + 54 = 0$

Answer: D

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54. Consider the lines

$L_1 : x + y = 10, \quad L_2 : x + y = 60$

$L_3 : x = 40, \quad L_4 : y = 40.$

L_1 meets x - axis and y - axis at A and B respectively.

L_4 meets y - axis at C and L_2 at D

L_3 meets L_2 at E and x-axis at F.

Perimeter of the hexagon ABCDEF is

A. $100 + 50\sqrt{2}$

B. $50 + 40\sqrt{2}$

C. 100

D. none of these

Answer: A

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55. Line through $P(a, 2)$ meets the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ at A and D and meets the coordinate axes at B and C so that PA, PB, PC, PD are in G.P., then possible values of a can be:

A. $\frac{2}{13}$

B. $\frac{13}{2}$

C. $\frac{13}{5}$

D. $\frac{5}{13}$

Answer: B

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56. The parallelogram is bounded by the lines $y = ax + c; y = ax + d; y = bx + c$ and $y = bx + d$ and has the area 18 the parallelogram bounded by the lines

$y = ax + c, y = ax - d, y = bx + c$ and $y = bx - d$ has area 72 given that $a, b, c\&d$ are positive numbers find the smallest possible value of $(a + b + c + d)$

A. 13

B. 14

C. 15

D. 16

Answer: D

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57. 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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58. Given the four lines with the equations

$x + 2y - 3 = 0, 3x + 4y - 7 = 0,$

$2x + 3y - 4 = 0, 4x + 5y - 6 = 0,$ then

A. they are all concurrent

B. they are sides of a qudrilateral

C. only three lines are concurrent

D. none of these

Answer: C

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59. The point (4, 1) undergoes the following three transformations successively: (a) Reflection about the line y = x (b) Translation through a distance 2 units along the positive direction of the x-axis. (c) Rotation through an angle $\frac{\pi}{4}$ about the origin in the anti clockwise direction. The final position of the point is given by the co-ordinates.

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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60. If the sum of the distances of a point from two perpendicular lines in a plane is 1, then its locus is a square (b) a circle a straight line (d) two

intersecting lines

A. square

B. circle

C. straight line

D. two intersecting lines.

Answer: A

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61. The diagonals of a parallelogram PQRS are along the lines 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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62. Let $A_0A_1A_2A_3A_4A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths the line segments A_0A_1, A_0A_2 and A_0A_4 is

A. $3/4$

B. $3\sqrt{3}$

C. 3

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

Answer: C

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

$\left(1, \frac{\sqrt{3}}{2}\right)$ (b) $\left(\frac{2}{3}, \frac{1}{\sqrt{3}}\right)$ $\left(\frac{2}{3}, \frac{\sqrt{3}}{2}\right)$ (d) $\left(1, \frac{1}{\sqrt{3}}\right)$

A. $(1, \sqrt{3}/2)$

B. $(2/3, 1/\sqrt{3})$

C. $(2/3, \sqrt{3}/2)$

D. $(1, 1/\sqrt{3})$

Answer: D

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64. A ray of light travels along the line $2x - 3y + 5 = 0$ and strikes a plane mirror lying along the line $x + y = 2$. The equation of the straight line containing the reflected ray is

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

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

C. $21x - 7y + 1 = 0$

D. $21x + 7y - 1 = 0$

Answer: B

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65. Let $0 < \alpha < \frac{\pi}{2}$ be a fixed angle . If $p = (\cos\theta, \sin\theta)$ and $Q(\cos(\alpha - \theta))$, then Q is obtained from P by

A. clockwise rotation around origin through an angle α

B. anti clockwise rotation around origin through an angle α

C. reflection in the line through the origin with slope tan α

D. reflection in the line through the origin with slope tan $\alpha/2$

Answer: D

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Solved Examples Level 2 Single Correct Answer Type Questions

1. If the points $\left(\frac{a^3}{a-1}, \frac{a^2-3}{a-1}\right), \left(\frac{b^3}{b-1}, \frac{b^2-3}{b-1}\right), \left(\frac{c^3}{c-1}, \frac{c^2-3}{c-1}\right)$ are collinear for 3 distinct values a, b, c and $a \neq 1, b \neq 1, c \neq 1$, then find the value of $abc - (ab + bc + ca) + 3(a + b + c)$.

A. $bc + ca + ab + abc = 0$

B. $a + b + c = abc$

C. $bc + ca + ab = abc$

D. $bc + ca + ab - abc = 3(a + b + c)$

Answer: D

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2. If two vertices of a triangle are $(-2, 3)$ and $(5, -1)$ the orthocentre lies at the origin, and the centroid on the line $x + y = 7$, then the third vertex lies at $(7, 4)$ (b) $8, 14)$ $(12, 21)$ (d) none of these

A. (7, 4)

B. (8, 14)

C. (12, 21)

D. none of these

Answer: D

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3. The points A (2, 3), B(3, 5), C (7, 7) and D(4, 7) are such that

A. ABCD is a parallelogram

B. A, B, C and D are collinear

C. D lies inside the triangle ABC

D. D lies on the boundary of the triangle ABC

Answer: D

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4. If $p, x_1, x_2 \ldots x_i, \ldots.$ and $q, y_1, y_2 \ldots, y_i, \ldots.$ are in A.P.m with common difference a and b respectively, then the centre of mean position of the points $A_i(x_i, y_i), i = 1, 2. \ldots n$ lies on the line

Note : Centre of Mean Position $\left(\frac{\Sigma\xi}{n}, \frac{\Sigma yi}{n}\right)$

A. $ax - by = aq - bp$

B. $bx - ay = ap - bq$

C. $bx - ay = bp - aq$

D. $ax - by = bq - ap$

Answer: C

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5. If P is a point (x, y) on the line $y = -3x$ such that P and the point (3, 4) are on the opposite sides of the line $3x - 4y = 8,$ then $x > \frac{8}{15}$ (b) $x > \frac{8}{5}$ $y < -\frac{8}{5}$ (d) $y < -\frac{8}{15}$

A. $x > 8/15, y < -8/5$

B. $x > 8/5, y < -8/15$

C. $x = 8/15, y = -8/5$

D. none of these

Answer: A

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6. The are enclosed by $2|x| + 3|y| \leq 6$ is

A. 3 sq. units

B. 4 sq. units

C. 12 sq. units

D. 24 sq. units

Answer: C

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7. Let O be the origin, and let A (1, 0), B (0, 1) be two points. If P (x, y) is a point such that $xy > 0$ and $x + y < 1$ then:

A. P lies either inside the triangle OAB or in the third quadrant

B. P cannot lie inside the triangle OAB

C. P lies inside the triangle OAB

D. P lies in the first quadrant only

Answer: A

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8. A line has intercepts a and b on the coortdinate axes. When the axes are rotateed through an angle α, keeping the origin fixed, the line makes equal intercepts on the coordinate axes, then $\tan\alpha$ =

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

B. $\frac{a-b}{a+b}$

C. $a^2 - b^2$

D. none of these

Answer: B

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9. Statement 1 : The equation of the sides of a triangle are x - 3y = 0, 4x + 3y = 5 and 3x + y = 0. The line 3x-3y = 0 passes through the orthocentre of triangle. Statement 2 : If two lines of slope m_1 and m_2 are perpendicular, then $m_1 m_2 = -1$

A. incentre

B. centroid

C. circumcentre

D. orthocentre of the triangle

Answer: D

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10. The equation of the line through $(1, 2)$, which makes equal intercepts on the axes is

A. $x + y = 3$

B. $4x + y = 6$

C. $4x - y = 6$

D. $3x + 2y = 1$

Answer: B

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11. The point $(4, 1)$ undergoes the following two successive transformations

(i) Reflection about the line $y = x$

(ii) Translation through a distance 2 units along the positive X-axis.

Then the final coordinate of the point are

A. (4, 3)

B. (3, 4)

C. (1, 4)

D. (4, 4)

Answer: B

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12. 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. none of these

Answer: C

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13. The line joining two points A(2,0) and B(3,1) is rotated about A in anticlockwise direction through an angle of 15°. find the equation of line in the new position. If b goes to c in the new position what will be the coordinates of C.

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

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

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

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

Answer: B

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14. The medians AD and BE of the triangle with vertices A(0, b), B(0, 0) and C(a, 0) are mutually perpendicular if

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

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

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

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

Answer: C

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15. $A_1, A_2 \ldots A_n$ are points on the line y = x lying in the positive quadrant such that $OA_n = nOA_{n-1}$, O being the origin. If $OA_1 = 1$ and the coordinates of A_n are $\left(2520\sqrt{2}, 2520\sqrt{2}\right)$, then n =

A. 5

B. 6

C. 7

D. 8

Answer: C

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16. If x_1, x_2, x_3 are the abcissa of the points A_1, A_2, A_3 respectively where the lines $y = m_1x, y = m_2x, y = m_3$ x meet the line $2x - y + 3 = 0$ such that m_1, m_2, m_3 are in A.P., then x_1, x_2, x_3 are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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17. If the lines $x = k, k = 1, 2 : \ldots, n$ meet the line $y = 3x + 4$ at the points $A_k(x_k, y_k), k = 1, 2, \ldots, n$ then the ordinate of the centre of Mean position of the points $A_k, k = 1, 2, \ldots, n$ is

A. $\frac{n+1}{2}$

B. $\frac{3n+11}{2}$

C. $\frac{3(n+1)}{2}$

D. none of these

Answer: B

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18. If $y = ax$ is one of the lines belonging to the family of lines representing the sides of an equilateral triangle with one vertex at the origin, then the product of the slopes of all the lines of this family is

A. a^3

B. $a\left(a^2-3\right)$

C. $a\left(1-3a^2\right)$

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

Answer: D

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19. The sum of the intercepts cut off by the axes on lines $x+y=a, x+y=ar, x+y=ar^2$.....∞ where $a \neq 0$ and r =1/2

A. 2a

B. $a\sqrt{2}$

C. $2\sqrt{2}a$

D. $a/\sqrt{2}$

Answer: C

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20. The distance between the parallel lines given by $(x+7y)^2+4\sqrt{2}(x+7y)-42=0$ is

A. $4/5$

B. $4\sqrt{2}$

C. 2

D. $10\sqrt{2}$

Answer: C

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21. If the lines joining the origin to the intersection of the line y=nx+2 and the curve $x^2+y^2=1$ are at right angles, then the value of n^2 is

A. $m^2=1$

B. $m^2 = 3$

C. $m^2 = 7$

D. $2m^2 = 1$

Answer: C

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22. If one of the lines given by the equation $2z^2 + axy + 3y^2 = 0$ coincide with one of those given by $2x^2 + bxy - 3y^2 = 0$ and the other lines represented by them be perpendicular, then

A. $a = -5, b = 1$

B. $a = 5, b = -1$

C. $a = 5, b = 1$

D. none of these

Answer: C

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23. If the equation $ax^3 + 3bx^2y + 3cxy^2 + dy^3 = 0$ represents three coincident lines, then :

A. a = d

B. b = c

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

D. ac = bd

Answer: C

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24. Two of the lines represented by $x^3 - 6x^2y + 3xy^2 + dy^3 = 0$ are perpendicular for

A. all real values of d

B. two real values of d

C. three real values of d

D. no real value of d

Answer: B

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25. The line $x + y = 1$ meets the lines represented by the equation $y^3 - xy^2 - 14x^2y + 24x^3 = 0$ at the points A,B,C. If O is the point of intersection of the lines represented by the given equation then $OA^2 + OB^2 + OC^2$ =

A. $22/9$

B. $85/72$

C. $181/72$

D. $221/72$

Answer: D

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26. The equation of the lines represented by $x^2 + 2xy - y^2 = 0$ are

A. x = 2

B. y = 3

C. $3x - 2y = 0$

D. none of these

Answer: B

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27. Find λ if $(\lambda, 2)$ is an interior point of ΔABC formed by $x + y = 4, 3x - 7y = 8$ and $4x - y = 31$

A. $2 < \lambda < 22/3$

B. $2 < \lambda < 33/4$

C. $22/3 < \lambda < 33/4$

D. $\lambda > 9$

Answer: C

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28. Consider the lines given by : $L_1 : x + 3y - 5 = 0, L_2 : 3x - ky - 1 = 0, L_3 : 5x + 2y - 12 = 0$ If a be the value of k for which lines L_1, L_2, L_3 do not form a triangle and c be the value of k for which one of L_1, L_2, L_3 is parallel to at least one of the other lines, then $abc =$

A. 5

B. $5/6$

C. $-6/5$

D. -9

Answer: B

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29. Let the algebraic sum of the perpendicular distances from the points $(2, 0), (0, 2) and (1, 1)$ to a variable straight line be zero. Then the line pass through a fixed point whose coordinates are $(1, 1)$ b. $(2, 2)$ c. $(3, 3)$ d. $(4, 4)$

A. $(1, -1)$

B. $(-1, 1)$

C. (1, 1)

D. $(-1, -1)$

Answer: C

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30. The locus of the point P (h, k), when the area of the triangle formed by the lines $y = x, x + y = 2$ and the line through P (h, k) and parallel to the x - axis is $4h^2$ is

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

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

C. $2x - y - 1 = 0$

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

Answer: B

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Solved Examples Numerical Answer Type Questions

1. Two points A (a, 0) and B (0, b) are given, O is the origin and M is a point on the line joining AB such that $\angle OMA$ is a right angle. If $|OM| = 8$, then AM. BM is equal to

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2. If the coordinates of a point are (x, y) where $x^2 + 2x - 3 = 0$ and $y^2 - 6y - 7 = 0$, then the sum of the squares of the distances of all such points from the origin is K where K =

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3. Let the sides of a triangle ABC are all integers with A as the origin. If $(2, -1)$ and (3, 6) are points on the line AB and AC, respectively, (lines AB and AC may be extended to contain these points), and lengths of any two sides are primes that differ by 50. If a is least possible length of the third side and S is the least possible perimeter of the triangle then aS is equal to K^2 where K =

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4. If O is the origin and the coordinates of A and B are (51, 65) and (75, 81), respectively. Then $OA \times OB \cos\angle AOB$ is equal to

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5. When the axes of coordinates are rotates through an angle $\pi/4$ without shifting the origin, the equation $2x^2 + 2y^2 + 3xy = 4$ is transformed to the equation $7x^2 + y^2 = k$ where the value of k is

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6. When origin is shifted to the point (4, 5) without changing the direction of the coordinate axes, the equation $x^2 + y^2 - 8x - 10y + 5 = 0$ is tranformed to the equation $x^2 + y^2 = K^2$. Value of $|K|$ is

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7. $A(a+1, a-1), B\left(a^2+1, a^2-1\right)$ and $C\left(a^3+1, a^3-1\right)$ are given points. D (11, 9) is the mid point of AB and E (41, 39) is the mid point of BC. If F is the mid point of AC then $(BF)^2$ is equal to K^2, where K =

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8. 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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9. If O is the origin anf A_n is the point with coordinates $(n, n+1)$ then $(OA_1)^2 + (OA_2)^2 + \ldots\ldots + (OA_7)^2$ is equal to

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10. Two point $B(x_1, y_1)$ and $C(x_2, y_2)$ are such that x_1, x_2 are the roots of the equation $x^2 + 4x + 3 = 0$ and y_1, y_2 are the roots of the equation $y^2 - y - 6 = 0$. Also $x_1 < x_2$ and $y_1 > y_2$. Coordinates of a third point A are (3, -5). If t is the length of the bisector of the angle BAC, then l^2 is equal to.

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11. L is a line passing through the origin and making an angle θ with the positive direction of x-axis. L_n is a line perpendicular to L at a distance n from the origin. L_n meets x-axis at A_n. Distance of A_n from the origin O is d_n. If the geometric mean of $d_1, d_2, \ldots . d_n$ is 5040 sec θ the value of n is _____.

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12. L_1 is a line passing through the point $A(n, n + 1)$ having slope, n, L_2 is a line passing through the point $B(-n, n^2)$ and is perpendicular to

L_1, If L_1 and L_2 intersect on y-axis, then n is equal to _____ $(n > 0)$

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13. A variable plane at a distance of 1 unit from the origin cuts the axes at A, B and C. If the centroid $D(x, y, z)$ of $\triangle ABC$ satisfies the relation $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = K$, then the value of K is

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14. For every interger n, a line L_n is drawn through the point $P_n(n, n+1)$ perpendicular to the line $x - y + 1 = 0$ meeting x-axis at A_n and y-axis at B_n. If O is the origin then $\sum_{n=0}^{10} (OA_n + OB_n)$ is equal to

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15. Line $4x + 5y - 7 = 0$ meets the coordinate axes at A and B. Through the mid - point of AB a line is drawn perpendicular to it meeting the line

$2x + y = 0$ at $Q(\alpha, \beta)$, the value of $1/\alpha - 1/\beta$ is equal to

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16. A_1, A_2 are two arithmetic means between two positive real numbers a and b. P is the point of intersection of the perpendicular lines $2x + y - 20 = 0$ and $x - 2y + 10 = 0$. If the centroid of the triangle with vertices $(a, b), (A_1, A_2)$ and (A_2, A_1) lies at the point P, the value of ab is equal to

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17. Reflection of the point A (5, 12) in the line $y = x \tan\theta$ is $P(\alpha, \beta)$. The locus of P as θ varies is the curve $x^2 + y^2 = k^2$, the value of k is _____

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18. If area of the parallelogram formed by the lines $x+3y-a=0, 3x-2y+3a=0, x+3y+4a=0$ and $3x-2y+7a=0$ is 220 sq. units, then value of a is _____

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19. 7. If the orthocentre of the triangle formed by the lines 2x+3y-1 0, x+2y-1-0, ax +by-1-0 is at origin then find (a, b)

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20. Lines $x=n, y=n^3$ intersect at the point A_n. L_n is a line through A_n parallel to $x+y=0$ and make an intercept of length l_n on the axis of x, then the value of $\sum_{n=1}^{5} l_n$ is equal to K^4-16, where K =

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21. The straight lines $L = x + y + 1 = 0$ and $L_1 = x + 2y + 3 = 0$ are intersecting,'m' is the Slope of the straight line L_2 such that L is the bisector of the angle between L_1 and L_2 . The value of m^2 is

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22. If the coordinates of the orthocentre of the triangle formed by the lines $y = 0, 37x - 36y + 37 \times 36 = 0$ and $64x - 63y + 64 \times 63 = 0$ is (a, b). Then $a + b$ is equal to

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23. One diagonal of a square is the portion of the line $x/97 + y/79 = 1$ intercepted between the axes p_1, p_2 are the length of the perpendiculars from the vertices of the other diagonal on the axis of y. If $p_2 < p_1$ then p_1/p_2 is equal to

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24. A straight line passing through the point (87, 33) cuts the positive direction of the coordinate axes at the point P and Q. If Q is the origin then the minimum area of the triangle OPQ is.

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25. If $A_1, A_2 \ldots\ldots A_n$ are points on the line $y = x$ lying in the positive quadrant such that $OA_n = n.\, OA_{n-1}, O$ being the origin. If $OA_1 = 1$ then the co-ordinates of A_8 are $\left(3a\sqrt{2}, 3a\sqrt{2}, \right)$ where a is equal to

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Exercise Concept Based Single Correct Answer Type Questions

1. A is a point on the positive x-axis at a distance 3 units from the origin and B is a point on the positive y-axis at a distance 4 units from the origin. If P divides AB in the ratio 1 : 2, the coordinates of P are

A. (1, 8/3)

B. (2, 4/3)

C. (8/3, 1)

D. (4/3, 2)

Answer: B

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2. The slopes of the line which passes through the origin, and the mid - point of the line segment joining the points. $P(3, -4)$ and $Q(-5, -2)$ is

A. 3

B. -3

C. -1

D. 1

Answer: A

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3. Distance between $P(x_1, y_1)$ and $Q(x_2, y_2)$ when PQ is parallel to y - axis is

A. $x_1 - x_2$

B. $|x_1 - x_2|$

C. $y_1 - y_2$

D. $|y_1 - y_2|$

Answer: D

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4. The lines parallel to the axes and passing through the point (4, -5) are

A. $x = -5, y = 4$

B. $x = 5, y = -4$

C. $x = 4, y = -5$

D. $x = -4, y = 5$

Answer: C

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5. The equation of the line whose perpendicular distance from the origin is 3 units and the angle which the normal makes with with the positive direction of x -axis is 30° is

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

B. $\sqrt{3}x + y = 6$

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

D. $x + \sqrt{3}y = 6$

Answer: B

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6. Points $(8, 2), (-2, -2)$ and (3, 0) are the vertices of

A. an equilateral triangle

B. an isosceles triangle

C. right angled triangle

D. none of these

Answer: D

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7. If the angle between the lines $\sqrt{3}y - x + 4 = 0$ and $x + y - 6 = 0$ is θ, then tan θ is equal to.

A. $\sqrt{3}+1$

B. $\sqrt{3}-1$

C. $2+\sqrt{3}$

D. $3+\sqrt{2}$

Answer: C

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8. Equation of the line passing through the point $(a-1), (a+1)$ and making zero intercept on both axes is

A. $ax+ay-1=0$

B. $(a+1)x+(a-1)y=0$

C. $(a-1)x-(a+1)y=0$

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

Answer: D

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9. The angle which the normal to the line $x - \sqrt{3}y + 8 = 0$ passing through the origin, makes with the positive x - axis is

A. 30°

B. 60°

C. 120°

D. 150°

Answer: C

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10. If the line through the points (h, 7) and (2, 3) intersects the line $3x - 4y - 5 = 0$ at right angles, then the value of h is

A. -1

B. 1

C. 5

D. -5

Answer: A

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11. Equation of a line passing through the intersection of the lines $7x - y + 2 = 0$ and $x - 3y + 6 = 0$ parallel to x - axis is

A. y = 2

B. $y = -2$

C. y = 3

D. $y = -3$

Answer: A

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12. The value of p for which the lines $2x + y - 3 = 0, 3x - y - 2 = 0$ and $x - py + 5 = 0$ may intersect at a point is

A. 2

B. 3

C. 5

D. 6

Answer: D

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

A. $6x + 4y + 5 = 0$

B. $18x + 12y + 11 = 0$

C. $18x + 12y - 11 = 0$

D. $12x + 8y + 7 = 0$

Answer: B

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

A. 2k

B. k^2

C. $2k^2$

D. $k^2/2$

Answer: B

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15. The distance of the line $2x + 3y - 5 = 0$ from the point (3, 5) along the line $5x - 3y = 0$ in units is

A. $\frac{2\sqrt{34}}{21}$

B. $\frac{16}{21}$

C. $\frac{4\sqrt{34}}{21}$

D. $\frac{3\sqrt{43}}{21}$

Answer: C

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Exercise Level 1 Single Correct Answer Type Questions

1. The points $(k-1, k+2), (k, k+1), (k+1, k)$ are collinear for

A. any value of k

B. $k = -1/2$ only

C. no value of k

D. integral values of k only

Answer: A

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2. If the value of K, is the points (k, 2-2k), (1-k, 2k) and (-4-k, 6-2 k) are collinear.

A. four real value of k

B. no integral value of k

C. two integral value of k

D. only one integral value of k

Answer: D

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3. The quadrilateral ABCD formed by the points A (0, 0), B (3, 4), C (7, 7) and D (4, 3) is a

A. rectangle

B. square

C. rhombus

D. parallelogram

Answer: C

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4. The triangle with vertices A (2, 7), B (4, y) and $C(-2, 6)$ is right angled at A if

A. $y = -1$

B. y = 0

C. y = 1

D. none of these

Answer: A

Watch Video Solution

5. The line segment joining the points $(3, -4)$ and $(1, -2)$ is divided by $Y-$ axis in the ratio

A. $1:3$

B. $2:3$

C. $3:1$

D. $3:2$

Answer: C

Watch Video Solution

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

A. isosceles

B. right angled

C. equilateral

D. none of these

Answer: A

Watch Video Solution

7. The points $P(a, b + c), Q(b, c + a)$ and $R(c, a + b)$ are such that PQ = QR if

A. a, b, c are in A.P.

B. a, b, c are in G.P.

C. a, b, c are in H.P.

D. none of these

Answer: A

View Text Solution

8. Let a,b,c be in A.P and x,y,z be in G.P.. Then the points $(a, x), (b, y)$ and (c, z) will be collinear if

A. $x^2 = y$

B. $x = z^2$

C. $y^2 = z$

D. x, y, z are in A.P.

Answer: D

Watch Video Solution

9. The centroid of a triangle lies at the origin and the coordinates of its two vertices are $(-8, 7)$ and $(9, 4)$. The area of the triangle is

A. 95/6

B. 285/2

C. 190/3

D. 285

Answer: B

View Text Solution

10. The mid points of the sides AB and AC of a triangle aBC are $(2, -1)$ and $(-4, 7)$ respectively, then the length of BC is

A. 10

B. 20

C. 25

D. 30

Answer: B

View Text Solution

11. If the vertices of a triangle ABC are $A(-4, -1), B(1, 2)$ and C (4, -3), then the coordinates of the circumcentre of the triangle are,

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

B. $(0, -4)$

C. $(0, -2)$

D. $(-3/2, 1/2)$

Answer: C

Watch Video Solution

12. The extremities of a diagonal of a parallelogram are the points $(3, -4)$ and $(-6, 5)$. If third vertiex is $(-2, 1)$ then the coordinates of the fourth vertex are

A. (1, 0)

B. (0, 0)

C. (1, 1)

D. none of these

Answer: D

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13. If the vertices $PandQ$ of a triangle PQR are given by (2, 5) and $(4, -11)$, respectively, and the point R moves along the line N given by $9x + 7y + 4 = 0$, then the locus of the centroid of triangle PQR is a straight line parallel to PQ (b) QR (c) RP (d) N

A. AB

B. BC

C. CA

D. L_1

Answer: D

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14. The number of lines that can be drawn through the point $(4, -5)$ at a distance 12 from the point $(-2, 3)$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

Watch Video Solution

15. If O be the origin and $A(x_1, y_1), B(x_2, y_2)$ are two points, then what is $(OA)(OB)\cos\angle AOB$?

A. $x_1y_1 + x_2y_2$

B. $x_1x_2 + y_1y_2$

C. $x_1y_2 + x_2y_1$

D. $x_1x_2 - y_1y_2$

Answer: B

Watch Video Solution

16. If the lines ax+y+1=0, x+by+1=0 and x+y+c=0 (a,b and c being distinct and different from 1) are concurrent the value of $\frac{a}{a-1} + \frac{b}{b-1} + \frac{c}{c-1}$ is

A. -1

B. 0

C. 1

D. none of these

Answer: C

Watch Video Solution

17. The lien $\frac{x}{3}+\frac{y}{4}=1$ meets the $y-$ and $x-axys$ at $AandB$, respectively. A square $ABCD$ is constructed on the line segment AB away from the origin. The coordinates of the vertex of the square farthest from the origin are (7, 3) (b) (4, 7) (c) (6, 4) (d) (3, 8)

A. (7, 3)

B. (4, 7)

C. (6, 4)

D. (3, 8)

Answer: B

Watch Video Solution

18. A line L intersects three sides BC, CA and AB of a triangle in P,Q,R respectively, show that $\frac{BP}{PC}.\frac{CQ}{QA}.\frac{AR}{RB} = -1$

A. -1

B. 1

C. 2

D. 3

Answer: A

Watch Video Solution

19. If the vertices P, Q, R of a triangle PQR are rational points, which of the following points of the triangle POR is (are) always rational point(s) ?

A. centroid

B. incentre

C. circumcentre

D. orthocentre

Answer: A

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20. Let $A_0A_1A_2A_3A_4A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths the line segments A_0A_1, A_0A_2 and A_0A_4 is

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

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

C. $y = \pm x$

D. none of these

Answer: A

Watch Video Solution

21. 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. $2x - 9y - 7 = 0$

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

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

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

Answer: D

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22. Two equal sides of an isosceles triangle are given by the equations $7x - y + 3 = 0$ and $x + y - 3 = 0$. The slope of the third side is

A. $m^2 - 1 = 0$

B. $m^2 - 3 = 0$

C. $3m^2 - 1 = 0$

D. $3m^2 + 8m - 3 = 0$

Answer: D

Watch Video Solution

23. Two sides of a rhombus ABCD are parallel to the lines y = x + 2 and y = 7x + 3 If the diagonals of the rhombus intersect at the point (1, 2) and the vertex A is on the y-axis, then vertex A can be

A. 2

B. 5

C. $2/5$

D. $5/2$

Answer: D

Watch Video Solution

24. A line which makes an acute angle θ with the positive direction of the x-axis is drawn through the point $P(3, 4)$ to meet the line $x = 6$ at R and $y = 8$ at S. Then, $PR = 3\sec\theta$ $PS = 4\cos ec\theta$ $PR = +PS = \left(2\frac{3\sin\theta + 4\cos\theta\square}{\sin 2\theta}\right.$ $\frac{9}{(PR)^2} + \frac{16}{(PS)^2} = 1$

A. $\theta = \pi/3$

B. $\theta = \pi/4$

C. $\pi/6$

D. $\pi/12$

Answer: C

Watch Video Solution

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

A. $bx \pm ay = 0$

B. $ax \pm by = 0$

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

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

Answer: B

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26. ABCD is a quadrilateral. P (3,7) and Q (7, 3) are the middle points of the diagonals AC and BD respectively. The coordinates of the mean point (or the centre of mean position) of the vertices of the quadrilateral are

A. (0, 0)

B. (3, 3)

C. (5, 5)

D. (7, 7)

Answer: C

Watch Video Solution

27. A line meets x - axis at A and y-axis at B such that incentre of the triangle OAB is (1,1). Equation of AB is

A. $2x + y = 2$

B. $3x + 4y = 12$

C. $2x + y = 6$

D. $2x + y = 4$

Answer: B

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28. ABCD is a rectangle in the clockwise direction. The coordinates of A are (1, 3) and of C are (5, 1), vertices B and D lie on the line $y = 2x + c$, then the coordinates of D are

A. (2, 0)

B. (4, 4)

C. (0, 2)

D. (2, 4)

Answer: A

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29. The area of a triangle is 5. Two of its vertices are $(2, 1)$ and $(3, -2)$. The third vertex lies on $y = x + 3$. Find the third vertex.

A. $(6, -1)$

B. (4, 5)

C. $(-1, 20)$

D. (2, 9)

Answer: D

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30. The diagonals of a parallelogram PQRS are along the lines 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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31. If $a,\ b, c$ are in A.P., then the line $ax + by + c = 0$ passes through a fixed point. write the coordinates of that point.

A. a single line

B. a family of concurrent lines

C. a family of parallel lines

D. none of these

Answer: B

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32. If area of the triangle formed by the line L perpendicular to $5x - y = 1$ and the coordinate axes is 5, then the distance of L from the origin is

A. $5\sqrt{2}$

B. $5/\sqrt{13}$

C. $5\sqrt{13}$

D. none of these

Answer: B

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33. The area enclosed by the lines $|x| + |y| = 2$ is

A. 1 sq unit

B. 2 sq units

C. 4 sq units

D. none of these

Answer: D

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34. If the circumcentre of a triangle lies at the point (a, a) and the centroid is the mid - point of the line joining the points $(2a+3, a+4)$ and $(a-4, 2a-3)$, then the orthocentre of the triangle lies on the line

A. y = x

B. $(a-1)x+(a+1)y=0$

C. $(a-1)x-(a+1)y=0$

D. $(a+1)x-(a-1)y=2a$

Answer: D

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35. If $A\left(at^2, 2at\right), B\left(\frac{a}{t^2}, -\frac{2a}{t}\right)$ and $C(a, 0)$ be any three points, show that $\frac{1}{A}C+\frac{1}{B}C$ is independent of t.

A. a

B. t

C. both a and t

D. none of these

Answer: B

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36. Show that the reflection of the line $px + qy + r = 0$ in the line $x + y + 1 = 0$ is the line $qx + py + (p + q - r) = 0,$ where $p \neq -q.$

A. $x - y = p + q$

B. $x - y = p - q$

C. $x + y + 1 = 0$

D. $x + y - 1 = 0$

Answer: C

Watch Video Solution

37. Coordinates of the vertices B and C of the base of a triangle ABC are $(-a, 0)$ and (a, 0) respectively. If $C - B = \pi/3$, the vertex A lies on the curve

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

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

C. $\sqrt{3}(x^2 - y^2) + 2xy - \sqrt{3}a^2 = 0$

D. $\sqrt{3}(x^2 + y^2) - 2xy + \sqrt{3}a^2 = 0$

Answer: C

View Text Solution

38. If the line $\sqrt{5}x = y$ meets the lines x = 1, x = 2, ... x = n at points $A_1, A_2, \ldots\ldots, A_n$ respectively, then $(0A_1)^2 + (0A_2)^2 + \ldots. + (0A_n)^2$ is equal to

A. $3n^2 + 3n$

B. $2n^3 + 3n^2 + n$

C. $3n^3 + 3n^2 + 2$

D. $(3/2)(n^4 + 2n^3 + n^3)$

Answer: B

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39. One diagonal of a square is the portion of the line $3x + 2y = 12$ intercepted between the axes. The cordinates of the extremity of the other diagonals not lying in the first quadrant are

A. $(1, -1)$

B. $(-1, -1)$

C. $(-1, 1)$

D. none of these

Answer: C

View Text Solution

40. If $y = m_i x + \frac{1}{m_i (i = 1, 2, 3)}$ represents three stright lines whose slopes are the roots of the equation. $2m^3 - 3m^2 - 3m + 2 = 0$, A and B are the algebraic sum of the intercepts made by the lines on x - axis and y - axis respectively, then $\alpha A + \beta B = 0$ if (α, β) is

A. (4, 7)

B. (2, 7)

C. (7, 2)

D. $(-1, -7)$

Answer: B

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41. If the system of equations $a_1x + b_1y + c_1, a_2x + b_2y + c_2 = 0$ is inconsistent, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

A. a family of concurrent lines

B. a family of parallel lines

C. u = 0 or v = 0

D. none of these

Answer: B

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42. Reflection of the line $x + y + 1 = 0$ in the line $lx + my + n = 0$ is

A. $(x + y + 1)(l + m) - 2(l^2 + m^2)(lx + my + n) = 0$

B. $(x + y + 1)(l^2 + m^2) - 2(l + m)(lx + my + n) = 0$

C. $(l + m + 1)(x + y) - 2(lx + my)(l^2 + m^2) = 0$

D. none of these

Answer: B

View Text Solution

43. ABCD is square in which A lies on positive y-axis and B lies on the positive x-axis. If D is the point (12, 17), then co-ordinate axis. of C is

A. (17, 12)

B. (17, 5)

C. (14, 16)

D. (15, 3)

Answer: B

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44. ABCD is a rhombus. Its diagonals AC and BD intersect at the point M and satisfy BD = 2 AC. If the coordinates of D and M are(1,1) &

(2,-1respectively. Then find the coordinates of A

A. (3, 1/2)

B. (1, -3/2)

C. (3/2, 1)

D. (1/2, 3)

Answer: B

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45. A straight line passes through the point (-5,2) and the portion of the line intercepted between the axes is divided at this point in the ratio 2:3. Find the equation of the line.

A. $3x + 4y = 7$

B. $4x + 3y = 7$

C. $4x - 3y = 1$

D. $3x - 4y + 1 = 0$

Answer: B

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46. The equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of perpendicular lines if

A. a = 3, b = 4

B. $a = 4, b = -3$

C. $h = -1$

D. $a = 11, b = -11$

Answer: D

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47. The equation $ax^2 + 2hxy + ay^2 = 0$ represents a pair of coincident lines through origin, if

A. h = 2a

B. 2h = a

C. $h^2 = a$

D. $h^2 = a^2$

Answer: D

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48. The equation $ax^2 + by^2 + cx + cy = 0c! \equiv 0$ represents a pair of straight lines if

A. a = 0

B. b = 0

C. $a + b = 0$

D. none of these

Answer: C

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49. The equation $x^2 - 6x^2y + 11xy^2 - 6y^3 = 0$ represents three straight lines passing through the origin, the slopes of which form an

A. an A.P.

B. a G.P.

C. an H.P.

D. none of these

Answer: C

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50. If the slope of the lines given by...$8x^3 + ax^2y + bxy^2 + y^3 = 0$ are in G.P.,then.....

A. a = b

B. 2a = b

C. a = 2b

D. $a + b = 0$

Answer: C

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51. If the slope of one of the lines given by $6x^2 + axy + y^2 = 0$ exceeds the slope of the other by one, then a is equal to

A. ± 2

B. 5

C. -5

D. ± 5

Answer: D

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52. If the slope of one of the lines represented by $ax^2 + (3a + 1)xy + 3y^2 = 0$ be reciprocal of the slope of the other, then the slope of the lines are

A. 3/2, 2/3

B. 1/2, 2/1

C. $1/3, 3$

D. $-1/3, \ -3$

Answer: D

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53. If pairs of opposite sides of a quadrilateral are $x^2 - 7x + 6 = 0$ and $y^2 - 14y + 40 = 0$ then equations of its diagonals are

A. $5x - 6y + 14 = 0$

B. $6x + 5y + 14 = 0$

C. $6x + 5y - 56 = 0$

D. $6x + 5y - 14 = 0$

Answer: B

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54. The equation of a line bisecting the join of (2010, 1600) and $(-1340, 1080)$ and having intercept on the axes in the ratio 1 : 2 is

A. $2x + y = 1680$

B. $x + 2y = 1680$

C. $2x + y = 2010$

D. none of these

Answer: C

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55. Let the coordinates of P be (x, y) and of Q be (α, β) where α is the geometric and β is the arithmetic mean of the coordinates of P. If the mid point of PQ is (42, 31) the coordinates of P are

A. (61, 21)

B. (49, 25)

C. (31, 31)

D. none of these

Answer: B

Watch Video Solution

56. Image of the point $(-1, 3)$ with respect to the line y = 2x is

A. (7/5, 14/5)

B. (1, 2)

C. (3, 1)

D. (5, 1)

Answer: C

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57. The point (a^2, a) lies between the straight lines $x + y = 6$ and $x + y = 2$ for

A. all values of a

B. no value of a

C. $|2a - 3| < 1$

D. $|2a + 5| > 1$

Answer: C

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58. Perimeter of the quadrilateral bounded by the coordinate axis and the lines $x + y = 50$ and $3x + y = 90$ is

A. $80 + 20\sqrt{2}$

B. $80 + 10\sqrt{10}$

C. $80 + 20\sqrt{2} + 10\sqrt{10}$

D. 110

Answer: C

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59. If the sum of the slopes of the lines given by $3x^2 - 2cxy - 5y^2 = 0$ is twice their product, then the value of c is

A. 2

B. 3

C. 6

D. none of these

Answer: B

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60. one of the lines given by $2cx^2 + 2xy - (c^2 - 1)y^2 = 0$ is $2x + 3y = 0$ then the integer value of c is`

A. 2

B. 3

C. 4

D. 8

Answer: C

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Exercise Level 2 Single Correct Answer Type Questions

1. If (0, 1), (1, 1) and (1, 0) are the mid points of the sides of a triangle, the coordinates of its incentre are

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

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

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

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

Answer: C

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2. The vertices of the triangle ABC are A(1, 2), B (0, 0) and C (2, 3), then the greatest angle of the triangle is

A. 75°

B. 105°

C. 120°

D. none of these

Answer: D

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3. The points $\left(0, \frac{8}{3}\right)$, $(1, 3)$, and $(82, 30)$ are the vertices of an obtuse-angled triangle an acute-angled triangle a right-angled triangle none of these

A. obtuse angled triangle

B. acute angled triangle

C. right angled triangle

D. none of these

Answer: D

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4. Area of the rhombus bounded by the four lines, $ax \pm by \pm c = 0$ is

A. $2a^2 / bc$

B. $2b^2 / ca$

C. $2c^2 / ab$

D. none of these

Answer: C

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5. If $x \cos \alpha + y \sin \alpha = -\sin \alpha \tan \alpha$ be the equation of a line, then the length of the perpendiculars on the line from the points $\left(a^2, 2a\right), (ab, a + b)$ and $\left(b^2, 2b\right)$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

View Text Solution

6. The coordinates of the points A and B are, respectively, (-3, 2) and (2, 3). P and Q are points on the line joining A and B such that AP = PQ = QB. A square PQRS is constructed on PQ as one side, the coordinates of R can be

A. $(-4/3, 7/3)$

B. $(0, 13/3)$

C. $(1/3, 8/3)$

D. $(2/3, 1)$

Answer: D

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7. If $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are the vertices of the triangle then show that:`

A. the median through A

B. the altitude through A

C. the perpendicular bisector of BC

D. the line joining the centroid with a vertex

Answer: A

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8. Given four lines whose equations are $x + 2y - 3 = 0, 2x + 3y - 4 = 0, 3x + 4y - 7 = 0$ and $4x + 5y - 6 = 0$

, then the lines are

A. concurrent

B. the sides of a quadrilateral with one vertex at (3, 0)

C. the sides of a cyclic quadrilateral

D. none of these

Answer: D

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9. A ray of light coming fromthe point (1, 2) is reflected at a point A on the x-axis and then passes through the point (5,3). The coordinates of the point A is :

A. (5/13, 0)

B. (-7, 0)

C. (13/5,0)

D. (15, 0)

Answer: C

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10. If $\Delta_1, \Delta_2, \Delta_3$ are the areas of the triangles with vertices $(0, 0), (a\tan\alpha, b\cot\alpha), (a\sin\alpha, b\cos\alpha), (a, b), \left(a\sec^2\alpha, b\cos ec^2\alpha\right), (a +$ and $(0, 0), (a\tan\alpha, -b\cot\alpha), (a\sin\alpha, b\cos\alpha)$, then $Detla_1, \Delta_2, \Delta_3$ are in G.P. for

A. all values of α

B. only one value of α

C. finite number of values of α

D. no value of α

Answer: D

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11. The orthocentre of the triangle formed by the lines $y = 0, (1+t)x - ty + t(1+t) = 0$ and $(1+u)x - uy + u(1+u) = 0 (t \neq u)$ for all values of t and u lies on the line.

A. $x - y = 0$

B. $x + y = 0$

C. $x - y + 1 = 0$

D. $x + y + 1 = 0$

Answer: B

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12. A(3,0) and B(6,0) are two fixed points and U(x_1, y_1) is a variable point of the plane .AU and BU meets the y axis at C and D respectively and AD meets OU at V. Then for any position of U in the plane CV passes through fixed point (p,q) whose distance from origin is

A. (0, 0)

B. (0, 2)

C. (2, 0)

D. none of these

Answer: C

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13. The incenter of the triangle with vertices $(1, \sqrt{3}), (0, 0),$ and $(2, 0)$ is $\left(1, \frac{\sqrt{3}}{2}\right)$ (b) $\left(\frac{2}{3}, \frac{1}{\sqrt{3}}\right)$ $\left(\frac{2}{3}, \frac{\sqrt{3}}{2}\right)$ (d) $\left(1, \frac{1}{\sqrt{3}}\right)$

A. $(1, \sqrt{3}/2)$

B. $(2/3, 1/\sqrt{3})$

C. $(2/3, \sqrt{3}/2)$

D. $(1, 1/\sqrt{3})$

Answer: D

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14. 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 $2x - y + 6 = 0$ (b) $2x - y + 8 = 0$ $2x - y - 10 = 0$ (b) $2x - y - 14 = 0$

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

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

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

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

Answer: B

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15. The distance between the orthocentre and the circumcentre of the triangle with vertices (0, 0), (0, a) and (b, 0) is

A. $\sqrt{a^2 - b^2}/2$

B. $a + b$

C. $a - b$

D. $\sqrt{a^2 + b^2}/2$

Answer: D

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16. The centroid of a triangle lies at the origin and the coordinates of its two vertices are $(-8, 0)$ and (9, 11), the area of the triangle in sq. units is

A. $11/8$

B. $8/11$

C. 88

D. none of these

Answer: D

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17. The line $3x + 2y = 24$ meets the y-axis at A and the x-axis at B. The perpendicular bisector of AB meets the line through $(0, -1)$ parallel to the x-axis at C. If the area of triangle ABC is A , then the value of $\frac{A}{13}$ is_____

A. $(29/2, -1)$

B. $(29/2, 13)$

C. $(-13/2, 1)$

D. $(-13/2, 13)$

Answer: B

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18. The straight lines $4x - 3y - 5 = 0, x - 2y = 0, 7x + y - 40 = 0$ and $x + 3y + 10 = 0$ from

A. a rectangle

B. a parallelogram

C. a cyclic quadrilateral

D. none of these

Answer: C

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19. The straight lines $x + 2y - 9 = 0, 3x + 5y - 5 = 0$, and $ax + by - 1 = 0$ are concurrent, if the straight line $35x - 22y + 1 = 0$ passes through the point (a, b) (b) (b, a) $(- a, - b)$ (d) none of these

A. (a, b)

B. (b, a)

C. $(a, - b)$

D. $(- a, b)$

Answer: A

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20. If the slope of one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ be the square of the other, then $\frac{a+b}{h} + \frac{8h^2}{ab} =$

A. 0

B. 1

C. 6

D. 8

Answer: C

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21. The locus represented by the equation $(x - y + c)^2 + (x + y - c)^2 = 0$ is

A. a line parallel to x-axis

B. a point

C. a pair of straight lines

D. a line parallel of y - axis

Answer: B

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Exercise Numerical Answer Type Questions

1. A line is such that its segment between the axes is bisected at the point (23, 27) the product of the intercepts made by the line on the coordinate axes is.

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2. If the circumcentre of the triangle whose vertices are (0, 2), (3, 5) and (5, 8) is (h, k) then $\left(h^2+k^2\right)$ is equal to

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3. If Δ denotes the area of the triangle with vertices (0, 0), (5, 0) and (5/6, 25/6) then Δ is equal to

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4. Vertices of a parallelogram are $(0,0), \left(\frac{1}{m-n}, \frac{m}{m-n}\right), \left(\frac{-1}{m-n}, \frac{m}{m-n}\right)$ and (0, 1) are m,n are the roots of the equation $441x^2+42x-8=0$. If area of the parallelogram is A then A is equal to

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5. (p, q) is point such that p and q are integers, $p \geq 50$ and the equation $px^2 + qx + 1 = 0$ has real roots. Square of the least distance of the point from the origin is

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

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7. The point P(a, b) is such that $b - 25a = 4$ and the arithmetic mean of a and b is 28. Q(x, y) is the point such that x and y are two geometric means between a and b, if O is the origin then $(OP)^2 + (OQ)^2$ is equal to

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8. The point $(p, p+1)$ lies on the locus of the point which moves such that its distance from the point (1, 0) is twice the distance from (0,1). The value of $1/p^2 + 1/p^4$ is equal to

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9. If $A_n = (n, n+1)$, then $10(A_{10}A_{11})^2 + 11(A_{11}A_{12})^2 + \ldots + 20(A_{20}A_{21})^2$ is equal to

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10. If A denotes the area enclosed by $3|x| + 4|y| \leq 12$ then A is equal to

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11. The locus of the mid - point of the portion intercepted between the axes by the line $x\cos\alpha + y\sin\alpha = p$ passes through the point

$(p+1, p-1)$, then $\left|p^4 - 5p^2\right|$ is equal to

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12. If the point (3, 4) lies on the locus of the point of intersection of the lines $x\cos\alpha + y\sin\alpha$=a and $x\sin\alpha - y\cos\alpha = b$ (α is a variable), the point (a, b) lies on the line $3x - 4y = 0$ then $\frac{a^2 - b^2}{2}$ is equal to

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13. The coordinates of the feet of the perpendiculars from the vertices of a triangle on the opposite sides are (20, 25), (8, 16) and (8, 9). If the orthocentre of the triangle is (h, k) then k/h is equal to.

Note : The triangle joining the feel of the perpendiculars from the vertices of a trangle on the opposite sides is called the PEDAL TRIANGLE of the triangle.

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14. Through the point p (3, -5), a line is drawn inclined at 45 with the positive direction of x-axis. It meets the line $x + y - 6 = 0$ at the point Q. Find the length of PQ.

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15. If $P(1, 2), Q(a, b), R(5, 7)$ and S (2, 3) are the vertices of a parallelogram, then sum of the squares of the length of its diagonals is $2k^3$ where k is equal to

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16. The medians AD and BE of the triangle with vertices A(0, b), B(0, 0) and C(a, 0) are mutually perpendicular if

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17. Sum of the squares of the lengths of the perpendiculars of a point P on the line y = x from the lines y = 2x and y = 3x is equal to 81. $\frac{1}{20}OP^2$ is equal to

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18. If the line whose equation is $9x - 2ky + k = 0$ passes through intersection of the lines whose equations are $2x + 7y + 22 = 0$ and $5x - y + 19 = 0$ then the value of $|k|$ is equal to

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19. The equations of tangents to the ellipse $9x^2 + 16y^2 = 144$ from the point (2,3) are:

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20. P and Q are the points of intersection of the curves $y^2 = 4x$ and $x^2 + y^2 = 12$. If Δ represents the area of the triangle OPQ, O being the origin, then Δ is equal to $\left(\sqrt{2} = 1.41\right)$.

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

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Questions From Previous Years Aieee Jee Main Papers

1. If the pair of lines $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ intersect on the y-axis then

A. $2fgh = bg^2 + ch^2$

B. $bg^2 \neq ch^2$

C. $abc = 2fgh$

D. none of these

Answer: A

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2. which Find the locus of the mid-point of the portion of the line $x\cos\alpha + y\sin\alpha = p$ intercepted between the axes

A. $x^2 + y^2 = 4/p^2$

B. $x^2 + y^2 = 4p^2$

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

D. $1/x^2 + 1/y^2 = 4/p^2$

Answer: D

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3. 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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4. The sides of a triangle are $3x + 4y$, $4x + 3y$ and $5x + 5y$ units, where $x, y > 0$. The $\triangle$ is

A. right angled

B. obtuse angled

C. equilateral

D. none of these

Answer: A

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5. 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 α (0 < α' < pi`/4) with the positive direction of x-axis. Find the equation of diagonal not passing through the origin ?

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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6. If the pair of straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then

A. $p = -q$

B. pq = 1

C. $pq = -1$

D. p = q

Answer: C

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7. 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 is a

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: A

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8. If x_1, x_2, x_3 and y_1, y_2, y_3 are both 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 an ellipse

B. lie on a circle

C. are vertices of a triangle

D. lie on a straight line

Answer: D

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9. 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 the value of c is $aa2 - a22 + b12 - b22$ $\sqrt{a12 + b12 - a22 - b22}$ $\frac{1}{2}(a12 + a22 + b12 + b22)$ $\frac{1}{2}(a22 + b22 - a12 - b12)$

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

B. $(1/2)\left(a_1^2 + a_2^2 + b_1^2 + b_2^2\right)$

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

D. $(1/2)\left(a_2^2 + b_2^2 - a_1^2 - b_1^2\right)$

Answer: D

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10. Let $A(2, -3) and B(-2, 1)$ be 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 $2x + 3y = 9$ $2x - 3y = 7$ $3x + 2y = 5$ $3x - 2y = 3$

A. $3x + 2y = 5$

B. $2x - 3y = 7$

C. $2x + 3y = 9$

D. $3x - 2y = 3$

Answer: C

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11. 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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12. If the sum of the slopes of the lines given by $x^2 + 2cxy - y^2 = 0$ is four times their product, then c has the value

A. 2

B. -1

C. 1

D. -2

Answer: A

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13. If one of the lines given by $6x^2 - xy + 4cy^2 = 0$ is $3x + 4y = 0$, then $c =$

A. 3

B. -1

C. 1

D. -3

Answer: D

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14. The line parallel to the x-axis and passing through the intersection of the lines $ax + 2by + 3b = 0$ and $bx - 2y - 3a = 0$, where $(a, b) \neq (0, 0)$, is above the x-axis at a distance of 3/2 units from it above the x-axis at a distance of 2/3 units from it below the x-axis at a distance of 3/2 units from it below the x-axis at a distance of 2/3 units from it

A. above x-axis at a distance 3/2 from it.

B. above x-axis at a distance 2/3 from it.

C. below x-axis at a distance 3/2 from it.

D. below x-axis at a distance 2/3 from it.

Answer: C

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

A. (1, 7/3)

B. (1/3, 7/3)

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

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

Answer: A

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16. If a,b,c are non-zero real numbers in H.P then the line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes through a fixed point whose coordinates

are

A. $(1, -2)$

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

C. $(-1, 2)$

D. $(-1, -2)$

Answer: A

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17. If the pair of lines $ax^2 + 2(a+b)xy + by^2 = 0$ lie along diameters of a circle and divide the circle into four sectors such that the area of one of the sectors is thrice the area of another sector then

A. $3a^2 + 10ab + 3b^2 = 0$

B. $3a^2 + 2ab + 3b^2 = 0$

C. $3a^2 - 10ab + 3b^2 = 0$

D. $3a^2 - 2ab + 3b^2 = 0$

Answer: B

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18. 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. $3x + 4y = 25$

B. $x + y = 7$

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

D. $4x + 3y = 24$

Answer: D

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19. Let A(h, k), B(1, 1) and C(2, 1) be the vertices of a right angled triangle with AC as its hypotenuse. If the area of the triangle is 1, then the set of values which k can take is given by (1) $\{1, 3\}$ (2) $\{0, 2\}$ (3) $\{-1, 3\}$ (4) $\{-3, -2\}$

A. $\{1, 3\}$

B. $\{0, 2\}$

C. $\{-1, 3\}$

D. $\{-3, -2\}$

Answer: C

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20. Let P = (-1, 0), Q = (0, 0) and R = $(3, 3\sqrt{3})$ be three points. The equation of the bisector of the angle PQR

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

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

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

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

Answer: A

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21. If one of the lines of $my^2 + \left(1 - m^2\right)xy - mx^2 = 0$ is a bisector of the angle between the lines $xy = 0$, then m is

A. $-1/2$

B. -2

C. 1

D. 2

Answer: C

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22. The perpendicular bisector of the line segment joining P (1, 4) and Q (k, 3) has yintercept -4 . Then a possible value of k is (1) 1 (2) 2 (3) -2 (4) -4

A. -4

B. 1

C. 2

D. -2

Answer: A

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

A. exactly two values of p

B. more than two values of p

C. no value of p

D. exactly one value of p

Answer: D

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24. 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 by has the equation $\frac{x}{c}+\frac{y}{3}=1$. Then the distance between L and K is

(a) $\sqrt{17}$ (b) $\frac{17}{\sqrt{15}}$ (c) $\frac{23}{\sqrt{17}}$ (d) $\frac{23}{\sqrt{15}}$

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

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

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

D. $\sqrt{15}$

Answer: B

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25. The lines $L_1 : y - x = 0$ and $L_2 : 2x + y = 0$ intersect the line $L_3 : y + 2 = 0$ at P and Q respectively . The bisectors of the acute angle between L_1 and L_2 intersect L_3 at R .

Statement 1 : The ratio PR : RQ equals $2\sqrt{2} : \sqrt{5}$

Statement - 2 : In any triangle , bisector of an angle divides the triangle into two similar triangles .

A. Statement - 1 is true, statement - 2 is true and statement - 2 is a correct explanation for statement - 1.

B. Statement - 1 is true, statement - 2 is true but statement - 2 is Not a correct explanation for statement - 1

C. Statement - 1 is false, Statement - 2 is true.

D. Statement - 1 is true, Statement - 2 is faslse.

Answer: C

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26. 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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27. IfA(2,-3) and B(-2, 1) are two vertices of a triangle and third vertex moves on the line 2x +3y 9,th the locus of the centroid of the triangle is

21. AIEEE-2011 (1) x-y=1 (2) 2x + 3y = 1 (3) 2x + 3y = 3 (4) 2x-3y = 1

A. $x - y = 1$

B. $2x + 3y = 1$

C. $2x + 3y = 3$

D. $2x - 3y = 1$

Answer: B

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28. 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. 6

B. $11/5$

C. $29/5$

D. 5

Answer: A

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29. A line is drawn through the point (1, 2) to meet the coordinate 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 (1) $-\frac{1}{4}$ (2) -4 (3) -2 (4) $-\frac{1}{2}$

A. -2

B. $-1/2$

C. $-1/4$

D. -4

Answer: A

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30. A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching x-axis, the equation of the reflected rays is (1) $\sqrt{3}y = x - \sqrt{3}$ (2) $y = \sqrt{3}x - \sqrt{3}$ (3) $\sqrt{3}y = x - 1$ (4) $y = x + \sqrt{3}$

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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31. Equation of the line passing through the points of imtersection of the parabola $x^2 = 8y$ and the ellipse $\frac{x^2}{3} + y^2 = 1$ is

A. $y - 3 = 0$

B. $y + 3 = 0$

C. $3y + 1 = 0$

D. $3y - 1 = 0$

Answer: D

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32. A light ray emerging from the point source placed at $P(1, 3)$ is reflected at a point Q in the axis of x. If the reflected ray passes through the point $R(6, 7)$, then the abscissa of Q is:

A. 1

B. 3

C. $7/2$

D. $5/2$

Answer: D

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33. If the three lines $x - 3y = p$, $ax + 2y = q$ and $ax + y = r$ from a right-angled triangle then:

A. $a^2 - 9a + 18 = 0$

B. $a^2 - 6a - 12 = 0$

C. $a^2 - 6a - 18 = 0$

D. $a^2 - 9a + 12 = 0$

Answer: A

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34. The x-coordinate of the incentre of the triangle that has the coordinates of mid points of its sides as (0, 1), (1, 1) and (1, 0) is (1) $2 - \sqrt{2}$ (2) $1 + \sqrt{2}$ (3) $1 - \sqrt{2}$ (4) $2 + \sqrt{2}$

A. $2 - \sqrt{2}$

B. $1+\sqrt{2}$

C. $1-\sqrt{2}$

D. $2+\sqrt{2}$

Answer: A

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35. If the x-intercept of some line L is double as that of the line, $3x+4y=12$ and the y-intercept of L is half as that of the same line, then the slope of L is:-

A. -3

B. $-3/8$

C. $-3/2$

D. $-3/16$

Answer: D

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36. If the extremities of the base of an isosceles triangle are the points $(2a, 0)$ and (0, a), and the equation of one of the side is $x = 2a$, then the area of the triangle is $5a^2 sq units$ (b) $\frac{5a^2}{2} sq units$ $\frac{25a^2}{2} sq units$ (d) none of these

A. $\frac{5}{4}a^2$

B. $\frac{5}{2}a^2$

C. $\frac{25}{4}a^2$

D. $5a^2$

Answer: B

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37. Let θ_1, be the angle between two lines $2x + 3y + c = 0$ and $-x + 5y + c, = 0,$ and θ_2 be the angle

betweentwo lines $2x + 3y + c = 0$ and $-x + 5y + c_1 = 0$, where c_1, c_2, c_3, are any real numbers : Statement-1: If c_2 and c_3, are proportional, then $\theta_1 = \theta_2$ Statement-2: $\theta_1 = \theta_2$ for all c_2 and c_3.

A. Statement - 1 is true, statement - 2 is true and statement - 2 is a correct explanation for statement - 1.

B. Statement - 1 is true, statement - 2 is true but statement - 2 is Not a correct explanation for statement - 1

C. Statement - 1 is false, Statement - 2 is true.

D. Statement - 1 is true, Statement - 2 is faslse.

Answer: A

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38. If the image of point $P(2, 3)$ in a line L is $Q(4, 5)$ then, the image of point $R(0, 0)$ in the same line is:

A. (2, 2)

B. (4, 5)

C. (3, 4)

D. (7, 7)

Answer: D

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39. Let $A(-3, 2)$ and $B(-2, 1)$ be the vertices of a triangle ABC. If the centroid of this triangle lies on the line $3x + 4y + 2 = 0$, then the vertex C lies on the line :

A. $4x + 3y + 5 = 0$

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

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

D. $3x + 4y + 5 = 0$

Answer: B

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40. 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 and is equidistant from the two axes then (1) $2bc - 3ad = 0$ (2) $2bc + 3ad = 0$ (3) $3bc - 2ad = 0$ (4) $3bc + 2ad = 0$

A. $2bc - 3ad = 0$

B. $2bc + 3ad = 0$

C. $3bc - 2ad = 0$

D. $3bc + 2ad = 0$

Answer: C

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41. 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. $4x - 7y - 11 = 0$

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

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

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

Answer: B

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42. Let a & b be any two numbers satisfying $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{4}$.Then, the foot of the perpendicular from the origin on variable line $\frac{x}{a} + \frac{y}{b} = 1$ lies on

A. a hyperbola with each semi - axis $= \sqrt{2}$

B. a hyperbola with each semi - axis = 2

C. a circle of radius = 2

D. a circle of radius $= \sqrt{2}$

Answer: C

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43. Given three points P, Q, R with P (5, 3) and R lies on the x-axis. If equation of RQ is $x - 2y = 2$ and PQ is parallel to x-axis, then centroid of ΔPQR lies on the line

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

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

C. $5x - 2y = 0$

D. $2x - 5y = 0$

Answer: D

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44. The base of an equilateral triangle is along theline given by $3x + 4y = 9$. If a vertex of the triangle is $(1, 2)$, then the length of a side of the triangle is

A. $\frac{2\sqrt{3}}{15}$

B. $\frac{4\sqrt{3}}{15}$

C. $\frac{4\sqrt{3}}{5}$

D. $\frac{2\sqrt{3}}{5}$

Answer: B

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45. If a line intercepted between the coordinate axes is trisected at a point $A(4, 3)$, which is nearer to x-axis, then its equation is

A. $4x - 3y = 7$

B. $3x + 2y = 18$

C. $3x + 8y = 36$

D. $x + 3y = 13$

Answer: B

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46. If the three distinct lines

$x + 2ay + a = 0, x + 3by + b = 0$ and

$x + 4ay + a = 0$ are concurrent , then the point (a,b) lies on a .

A. circle

B. hyperbola

C. straight line

D. parabola

Answer: C

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47. If the circumcenter of an acute-angled triangle lies at the origin and the centroid is the middle point of the line joining the points (a^2+1, a^2+1) and $(2a, -2a)$, then find the orthocentre.

A. $y - 2ax = 0$

B. $y - (a^2+1)x = 0$

C. $y + x = 0$

D. $(a-1)^2 x - (a+1)^2 y = 0$

Answer: D

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48. A straight line L is perpendicular to the line $5x - y = 1$. The area of the triangle formed by line L, and the coordinate axes is 5. Find the equation of line L.

A. $7/\sqrt{5}$

B. $5/\sqrt{13}$

C. $7/\sqrt{13}$

D. $5/\sqrt{7}$

Answer: B

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49. The number of points, having both coordinates are 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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50. Locus of the image of the point (2, 3) in the line $(2x-3y+4)+k(x-2y+3)=0, k\varepsilon R$, is a : (1) straight line parallel to x-axis. (2) straight line parallel to y-axis (3) circle of radius $\sqrt{2}$ (4) circle of radius $\sqrt{3}$

A. straight line parallel to x-axis

B. straight line parallel to y - axis

C. circle of radius $\sqrt{2}$

D. circle of radius $\sqrt{3}$

Answer: C

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51. 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: A

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52. The points $\left(0, \frac{8}{3}\right)$, $(1, 3)$ and $(82, 30)$ are vertices of

A. form an obtuse angled triangle

B. form an acute angled triangle

C. form a right angled triangle

D. lie on a straight line

Answer: D

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53. Let L be the line passing through the point P (1, 2) such that its intercepted segment between the coordinate axes is bisected at P. If L_1 is the line perpendicular to L and passing through the point $(-2, 1)$, then the point of intersection of L and L_1 is :

A. $\left(\frac{4}{5}, \frac{12}{5}\right)$

B. $\left(\frac{11}{20}, \frac{29}{10}\right)$

C. $\left(\frac{3}{10}, \frac{17}{5}\right)$

D. $\left(\frac{3}{5}, \frac{23}{10}\right)$

Answer: A

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54. Two sides of a rhombus are along the lines,$x - y + 1 = 0$ and $7x - y - 5 = 0$. If its diagonals intersect at $(-1, -2)$, then which

one of the following is a vertex of this rhombus ? (1) $(-3, -9)$ (2) $(-3, -8)$ (3) $\left(\frac{1}{3}, -\frac{8}{3}\right)$ (4) $\left(-\frac{10}{3}, -\frac{7}{3}\right)$

A. $(-3, -9)$

B. $(-3, -8)$

C. $\left(\frac{1}{3} - \frac{8}{3}\right)$

D. $\left(-\frac{10}{3}, -\frac{7}{3}\right)$

Answer: C

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55. If a variable line drawn through the intersection of the lines $\frac{x}{3} + \frac{y}{4} = 1$and $\frac{x}{4} + \frac{y}{3} = 1$ meets the coordinate axes at A and $B, (A \neq B)$, then the locus of the midpoint of AB is (A) $6xy = 7(x + y)$ (B) $4(x + y)^2 - 28(x + y) + 49 = 0$ (C) $7xy = 6(x + y)$ (D) $14(x + y)^2 - 97(x + y) + 168 = 0$

A. $7xy = 6(x + y)$

B. $4(x+y)^2 - 28(x+y) + 49 = 0$

C. $6xy = 7(x+y)$

D. $14(x+y)^2 - 97(x+y) + 168 = 0$

Answer: A

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56. The point $(2, 1)$ is translated parallel to the line $L: x - y = 4$ by $2\sqrt{3}$ units. If the new point Q lies in the third quadrant, then the equation of the line passing through Q and perpendicular to L is

A. $x + y = 2 - \sqrt{6}$

B. $2x + 2y = 1 - \sqrt{6}$

C. $x + y = 3 - 3\sqrt{6}$

D. $x + y = 3 - \sqrt{6}$

Answer: D

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57. A straight line through origin O meets the lines $3y = 10 - 4x$ and $8x + 6y + 5 = 0$ at point A and B respectively. Then , O divides the Segment AB in the ratio.

A. $2:3$

B. $1:2$

C. $4:1$

D. $3:4$

Answer: C

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58. A ray of light is incident along a line which meets another line, $7x - y + 1 = 0$, at the point (0, 1). The ray isthen reflected from this point along the line, $y + 2x = 1$. Then the equation of the line of

incidence of the ray of light is (A) $41x + 38y - 38 = 0$ (B) $41x - 38y + 38 = 0$ (C) $41x + 25y - 25 = 0$ (D) $41x - 25y + 25 = 0$

A. $41x - 25y + 25 = 0$

B. $41x + 25y - 25 = 0$

C. $41x - 38y + 38 = 0$

D. $41x + 38y - 38 = 0$

Answer: C

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59. A square of each side 2, lies above the x-axis and has one vertex at the origin. If one of the sides passing through the origin makes an angle 30° with the positive direction of the x-axis, then the sum of the x-coordinates of the vertices of the square is:

A. $2\sqrt{3} - 1$

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

C. $\sqrt{3}-2$

D. $\sqrt{3}-1$

Answer: B

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60. Let the orthocentre and centroid of a triangle be $(-3,5)$ and $B(3,3)$ respectively. If C is the circumcentre of the triangle then the radrus of the circle having line segment AC as diameter, is

A. $2\sqrt{10}$

B. $3\sqrt{\frac{5}{2}}$

C. $\frac{3\sqrt{5}}{2}$

D. $\sqrt{10}$

Answer: B

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61. The straight line through a fixed point (2,3) intersects the coordinate axes at distinct point P and Q. If O is the origin and the rectangle OPRQ is completed then the locus of R is

A. $2x + 3y = xy$

B. $3x + 2y = xy$

C. $3x + 2y = 6xy$

D. $3xy + 2y = 6y$

Answer: B

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62. If in parallelogram $ABDC$, the coordinate of A, B and C are respectively $(1, 2)$, $(3, 4)$ and $(2, 5)$, then the equation of the diagonal AD is

A. $5x - 3y + 1 = 0$

B. $5x + 3y - 11 = 0$

C. $3x - 5y + 7 = 0$

D. $3x + 5y - 13 = 0$

Answer: A

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63. Consider the set of all lines px+qy+r=0 such that 3p+2q+4r=0. Which one of the following statements is true ?

A. The lines are concurrent at the point (3/4, 1/2)

B. Each line passes through

C. The lines are parallel

D. The lines are not concurrent

Answer: A

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Questions From Previous Years B Architecture Entrance Examination Papers

1. The y-axis and the lines $\left(a^5 - 2a^3\right)x + (a+2)y + 3a = 0$ and $\left(a^5 - 3a^2\right)x + 4y + a - 2 = 0$ are concurrent for

A. Two values of a

B. Three values of a

C. Five values of a

D. no value of a

Answer: A

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2. If the point of intersection of the lines $2px + 3qy + r = 0$ and $px - 2qy - 2r = 0$ lies strictly in the fourth quadrant and is equidistant from the two axes, then

A. $5p + 4q = 0$

B. $4p - 5q = 0$

C. $4p + 5q = 0$

D. $5p - 4q = 0$

Answer: D

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3. Consider a triangle ABC with at $(0, -3)$, $\left(-2\sqrt{3}, 3\right)$ and $\left(2\sqrt{3}, 3\right)$ respectively. The incentre of the triangle with vertices at the mid points of the sides of triangle ABC is

A. (0, 0)

B. (0, 1)

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

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

Answer: B

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4. The equation of straight line belonging to both the families of lines $(x-y+1)+\lambda_1(2x-y-2)=0$ and $(5x+3y-2)+\lambda_2(3x-y-4)=0$ where λ_1, λ_2 are arbitrary numbers is (A) $5x-2y-7=0$ (B)$2x+5y-7=0$ (C) $5x+2y-7=0$ (D) $2x-5y-7=0$

A. $5x-2y-7=0$

B. $2x+5y-7=0$

C. $5x+2y-7=0$

D. $2x-5y-7=0$

Answer: A

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5. Statement -1 : The equation $|x| + |y| = 2$ represents a parallelogram.

Statement - 2 : Lines $x + y = 2$ and $x + y = -2$ are parallel. Also lines $x - y = 2$ and $-x + y = 2$ are parallel.

A. Statement - 1 is true, statement - 2 is true and statement - 2 is a correct explanation for statement - 1.

B. Statement - 1 is true, statement - 2 is true but statement - 2 is Not a correct explanation for statement - 1

C. Statement - 1 is false, Statement - 2 is true.

D. Statement - 1 is true, Statement - 2 is faslse.

Answer: B

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6. The line joining two points A(2,0) and B(3,1) is rotated about A in anticlockwise direction through an angle of 15°. find the equation of line

in the new position. If b goes to c in the new position what will be the coordinates of C.

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

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

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

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

Answer: A

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7. If m_1, m_2 be the roots of the equation $x^2 + \left(\sqrt{3} + 2\right)x + \sqrt{3} - 1 = 0$, then the area of the triangle formed by the lines $y = m_1 x, y = m_2 x$ and $y = 2$ is

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

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

C. $\frac{1}{2}\left(\frac{-\sqrt{3}+2}{\sqrt{3}-1}\right)$

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

Answer: A

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8. Statement - 1 : The line $2x+y+6=0$ is perpendicular to the line $x-2y+5=0$ and second line passes through (1, 3).

Statement - 2 : Product of the slopes of any two parallel lines is equal to -1.

A. Statement - 1 is true, statement - 2 is true and statement - 2 is a correct explanation for statement - 1.

B. Statement - 1 is true, statement - 2 is true but statement - 2 is Not a correct explanation for statement - 1

C. Statement - 1 is false, Statement - 2 is true.

D. Statement - 1 is true, Statement - 2 is faslse.

Answer: C

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9. If a variable line passes through the point of intersectionof the lines $x + 2y - 1 = 0$ and $2x - y - 1 = 0$ and meets the coordinate axes in A and B, then the locus of the midpoint of AB is : (A) $x + 3y = 0$ (B) $x + 3y = 10$ (C) $x + 3y = 10xy$ (D) None of these

A. $x + 3y = 0$

B. $x + 3y = 10$

C. $x + 3y = 10xy$

D. $x + 3y + 10xy = 0$

Answer: C

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10. If the point(p,5) lies on the parallel to y-axis and passing thorugh the intersection of the lines $2\left(a^2+1\right)x+by+4\left(a^3+a\right)=0$, the p is equal to

A. $-2a$

B. $-3a$

C. 2a

D. 3a

Answer: A

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11. If the points $(x, -3x)$ and (3, 4) lie on the opposite side of the line $3x-4y=8$, then

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

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

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

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

Answer: A

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12. Two vertices of a triangle are (3,-2) and (-2,3) and its orthocentre is (-6,1) . Then the third vertex of this triangle can not lie on the line

A. $4x + y = 2$

B. $5x + y = 2$

C. $3x + y = 3$

D. $6x + y = 0$

Answer: B

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13. A line passing through the point P (1, 2) meets the line $x + y = 7$ at the distance of 3 units from P. Then the slope of this line satisfies the equation

A. $7x^2 - 18x + 7 = 0$

B. $16x^2 - 39x + 16 = 0$

C. $7x^2 - 6x - 7 = 0$

D. $8x^2 - 9x + 1 = 0$

Answer: A

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14. If m and n are length of the perpendicular from origin to the straight lines whose equations are $x \cot \theta - y = 2 \cos \theta$ and $4x + 3y = -\sqrt{5} \cos 2\theta, (\theta \in (0, \pi))$, respectively, then the value of $m^2 + 5n^2$ is

A. 7

B. 1

C. 3

D. 5

Answer: B

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