MATHS

BOOKS - DHANPAT RAI & CO MATHS (HINGLISH)

CARTESIAN CO-ORDINATE SYSTEM

Illustration

1. If the point P(x, y) be equidistant from the points A(a + b, b - a) and B(a-b,a+b) , then prove that $bx = ay$

A. $ax = by$

B. $bx = ay$

C. $ax + by = 0$

D. $bx + ay = 0$

Answer: B

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2. If P and Q are two points whose coordinates are $(at^2, 2at) and \left(\frac{a}{t^2}, \frac{2a}{t}\right)$ respectively and S is the point (a,0). Show that $\frac{1}{SP} + \frac{1}{sQ}$ is independent of t.

A. a

B. 4a

C. 2a

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

Answer: C

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

A. isoceles and right angles

B. isoscles but not right angled

C. right angled but not isosceles

D. neither right angeld nor isosceles

Answer: A

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4. If the coordinates of t ideas AB and AC of a ABC are (3,5) and (-3,-3) respectively, then write the length of side BC.

A. 10

B. 15

C. 20

D. 30

Answer: C

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5. If 'alpha' be the angle subtended by the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ at origin O, Show that $OP.OQ.\cos\alpha = x_1x_2 + y_1y_2$.

A. $x_1x_2 + y_1y_2$

B. $x_1y_2 + x_2y_1$

C. $|x_1y_2 - x_2y_1|$

D. none of these

Answer: A

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6. If points $O(0, 0)A\left(3, \sqrt{3}\right)$ and $B(3, a)$ are the vertices of an equilaterla triangle then a=

A. 2

B. -3

C. -4

D. none of these

Answer: D

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7. If the points A(1,1), B(-1,-1) and $C\left(-\sqrt{3}, \sqrt{3}\right)$ are the vertices of a triangle is

A. right-angled

B. isoscles but not right angled

C. equilateral

D. name of these

Answer: D

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8. If O is the origin and $P(x_1, y_1), Q(x_2, y_2)$ are two points then $PO \times OQ \sin\angle POQ =$

A. $x_1y_2 + x_1y_2$

B. $x_1y_2 + x_2y_1$

C. $|x_1y_2 - x_2y_1|$

D. none of these

Answer: C

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9. If the coordinates of two points A and B are (3, 4) and $(5, -2)$, respectively, find the coordinates of any point P if $PA = PB$ Area of PAB is 10 sq. units.

A. (2,7)

B. (7,2)

C. (1,0)

D. (0,1)

Answer: B

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10. The area of the quadrilateral whose vertices are $(1, 2)(6, 2), (5, 3)$ and $(3, 4)$, is

A. $\frac{3}{2}$ sq. unirts

B. $\frac{11}{2}$ sq. unirts

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

D. none of these

Answer: B

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11. If two vertices of an equilaterla triangle have integral coordinates, then the third vetex will have

A. integral coodinates which are rtional

B. coordinates which are rational

C. at least one coordinate irrational

D. coordinates which are irrational

Answer: C

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12. If points $(a^2, 0), (0, b^2)$ and $(1, 1)$ are collinear, then

A. $\frac{1}{a^2} + \frac{1}{b^2} = 1$

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

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

D. none of these

Answer: A

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13. If the points $A(\lambda, 2\lambda), B(3\lambda, 3\lambda)$ and $C(3, 1)$ are collinear, then $\lambda =$

A. $1/3$

B. $1/3$

C. $2/3$

D. $2/3$

Answer: B

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14. If area of the triangle formed by $(0, 0), \left(a^{x^2}, 0\right), \left(0, a^{6x}\right)$ is $\frac{1}{2a^5}$ sq. units then $x =$

A. 1,5

B. $-1, 5$

C. $1, \ -5$

D. $-1, \ -5$

Answer: D

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15. The area of a triangle with vertices (a,b+c), (b,c+a) and (c,a+b) is

A. 0

B. $a+b+c$

C. $ab+bc+ca$

D. none of these

Answer: A

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16. 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

A. $\{1, 3\}$

B. $\{0, 2\}$

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

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

Answer: C

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17. If the point $x_1 + t(x_2 - x_1), y_1 + t(y_2 - y_1)$ divides the join of (x_1, y_1) and (x_2, y_2) internally then locus of t is

A. $t < 0$

B. $0 < t < 1$

C. $t < 1$

D. $t = 1$

Answer: B

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

A. $a = 2, b = 4$

B. $a = 3, b = 4$

C. $a = 2, b = 4$

D. $a = 3, b = 5$

Answer: C

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19. If $(1, a), (2, b), \left(c^2, -3\right)$ are vertices of a triangle then the condition for its centroid to lie on x-axis is

A. a=3

B. b=3

C. $a + b = 3$

D. $a + b = 3$

Answer: C

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20. If the vertices of a triangle are at $O(0, 0), A(a, 0)$ and $B(0, a)$. Then, the distance between its circumcentre and orthocentre is

A. $\sqrt{a^1 + b^2}$

B. $\frac{1}{2}\sqrt{a^1 + b^2}$

C. $\sqrt{\frac{a^1+b^2}{2}}$

D. $\frac{1}{4}\sqrt{a^1+b^2}$

Answer: B

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21. Find the incentre of the triangle with vertices $(1, \sqrt{3}), (0, 0)$ and $(2, 0)$

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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22. If the centrroid and circumentre of a triangle are (3,3) and (6,2) respectively, then the orthocentre, is

A. (-3,5)

B. (-3,1)

C. (3,-1)

D. (9,5)

Answer: A

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23. Write the coordinates of the incentre of the triangle having its vertices at (0,0), (5,0) and (0,12).

A. (3,3)

B. (2,2)

C. (7,7)

D. (9,9)

Answer: B

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24. The circumcentre of the triangle formed by $(0, 0), (2, -1)$ and $(-1, 3)$ is $\left(\frac{5}{2}, \frac{5}{2}\right)$. Then the

orthocentre is

A. (-4,-3)

B. (4,3)

C. (-4,3)

D. none of these

Answer: A

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25. Orthocentre of triangle whose vertices are $(0, 0), (3, 4), (4, 0)$ is

A. (3,5/2)

B. (3,12)

C. (3,3/4)

D. (3,9)

Answer: C

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26. At what point should the origin be shifted if the coordinates of a point $(4, 5)$ become $(-3, 9)$?

A. (-7,4)

B. (7,-4)

C. (1,14)

D. (-4,7)

Answer: B

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

A. $\left(\frac{3}{4}, -2\right)$

B. $\left(-\frac{3}{4}, 2\right)$

C. $\left(2, -\frac{3}{4}\right)$

D. $\left(-2, \frac{3}{4}\right)$

Answer: A

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28. The coordinates of the point where origin is shifted is (-1,2) so that the equation $2x^2 + y^2 - 4x + 4y = 0$ become?

A. $X^2 + 2Y^2 = 6$

B. $2X^2 + y^2 = 6$

C. $2X^2 + Y^2 = 4$

D. $X^2 + 2Y^2 = 4$

Answer: B

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29. If the axes be turned through an angle $\tan^{-1} 2$ (in anticlockwise direction), what does the equatio $4xy - 3x^2 = a^2$ become ?

A. $X^2 + 4Y^2 = a^2$

B. $X^2 - 4Y^2 = 4a^2$

C. $X^2 - 4Y^2 = a^2$

D. $X^2 + 4Y^2 = 4a^2$

Answer: C

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30. If (x,y) and (X,Y) be the coordinates of the same point referred to two sets of rectangular axes with the same

origin and if ax+by becomes pX+qY, where a,b are independent of x,y, then

A. $a^2 - b^2 = p^2 - q^2$

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

C. $a^2 + p^2 = b^2 + q^2$

D. $a^2 b^2 = p^2 q^2$

Answer: B

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31. The angle through which the axes must be rotated, without translation, in anit-closwise sence so that the

exprssion $ax^2 + hxy - by^2 + 2gx + 2fy + c$ does not contain the mixed product xy, is given by

A. $\tan^{-1}\left(\frac{2h}{a-b}\right)$

B. $\frac{1}{2}\tan^{-1}\left(\frac{2h}{b-a}\right)$

C. $\frac{1}{2}\tan^{-1}\left(\frac{2h}{a-b}\right)$

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

Answer: C

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Section I Solved Mcqs

1. If t_1, t_2 and t_3 are distinct, the points $(t_1 2at_1 + at_1^3), (t_2, 2at_2 + at_2^3)$ and $(t_3, 2at_3 + at_3^3)$

A. $t_1 t_2 t_3 = 1$

B. $t_1 + t_2 + t_3 = t_1 t_2 t_3$

C. $t_1 + t_2 + t_3 = 0$

D. $t_1 + t_2 + t_3 = -1$

Answer: C

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2. If the vertices of a triangle PQR are rational points, then which of the following points of this triangle may not be rational -

(a) Centroid (b) Incenter

(c) Circumcenter (d) Orthocenter

A. centroid

B. incentre

C. circumentre

D. orthoentre

Answer: B

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3. If all the vertices of a triangle have integral coordinates, then the triangle may be

A. right-angled

B. equilateral

C. isoosceles

D. none of these

Answer: B

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4. If a vertex of a triangle is (1, 1) and the midpoints of two sides of the triangle through this vertex are (-1, 2) and (3, 2), then the centroid of the triangle is

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

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

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

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

Answer: B

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5. One possible condition for the three points (a,b), (b,a) and $\left(a^2, b^2\right)$ to be collinear is

A. $a - b = 2$

B. $a + b = 2$

C. $a = 1 + b$

D. $a = 1 - b$

Answer: C

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6. Let A (a,b) be a fixed point and O be the origin of coordionates. If A_1 is the mid-point of OA, A_2 is the mid-poind of AA_1, A_3 is the mid-point of AA_2 and so on. Then the coordinates of A_n are

A. $\left(a\left(1-2^{-n}\right), b\left(1-2^{-n}\right)\right)$

B. $\left(a\left(2^{n-1}-1\right), b\left(2^{-n}-1\right)\right)$

C. $\left(a\left(1-2^{(n-1)}\right), b\left(1-2^{(n-1)}\right)\right)$

D. none of these

Answer: A

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7. The points $A(0, 0), B(\cos\alpha, \sin\alpha)$ and $C(\cos\beta, \sin\beta)$ are the vertices of a right-angled triangle if

A. $\frac{\sin(\alpha-\beta)}{2} = \frac{1}{\sqrt{2}}$

B. $\frac{\cos(\alpha-\beta)}{2} = -\frac{1}{\sqrt{2}}$

C. $\frac{\cos(\alpha-\beta)}{2} = \frac{1}{\sqrt{2}}$

D. $\frac{\sin(\alpha-\beta)}{2} = -\frac{1}{\sqrt{2}}$

Answer: B

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8. If O is the orthocentre of triangle ABC whose vertices are at $A\left(at_1^2, 2at_1, B\left(at_2^2, 2at_2\right)\right.$ and $C\left(at_3^2, 2at_3\right)$ then the coordinates of the orthocentreof $\Delta O'BC$ are

A. $\left(a\left(t_1^2+t_2^2+t_3^2\right), 2a(t_1+t_2+t_3)\right)$

B. $(-a, 0)$

C. $\left(at_1^2, 2at_1\right)$

D. $(0, a)$

Answer: C

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9. If Δ_1 is the area of the triangle formed by the centroid and two vertices of a triangle Δ_2 is the area of the triangle formed by the mid- point of the sides of the same triangle, then $\Delta_1 : \Delta_2$=

A. $3:4$

B. $4:1$

C. $4:3$

D. $2:1$

Answer: C

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10. The number of point requdistant to three given distinct non-colliear points, is

A. 0

B. 1

C. 2

D. Infinite

Answer: B

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11. The area of the triangle formed by theorigin, the point $P(x, y)$ and its reflection in X-axis is

A. xy

B. $2|xy|$

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

D. $|xy|$

Answer: D

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12. 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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13. The angle through which the coordinates axes be rotated so that xy-term in the equation $5x^2 + 4\sqrt{3}xy + 9y^2 = 0$ may beb missing, is

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $2\pi/3$

Answer: C

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14. If the axes are rotated through an angle of 30° in the anti clockwise direction, then coordinates of point

$(4, -2\sqrt{3})$ with respect to new axes are

A. (2,3)

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

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

D. $(\sqrt{3}, 5)$

Answer: D

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15. If the axes are rotated through an angle of 45° in the clockwise direction, the coordinates of a point in the new systeme are (0,-2) then its original coordinates are

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

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

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

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

Answer: D

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16. To remvoe the first dgree terms in the equation $4x^2 + 9y^2 - 8x + 36y + 4 = 0$, the origin in shifted to the point

A. (1,2)

B. (1,-2)

C. (2,1)

D. (-2,1)

Answer: B

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17. By shifting origin to $(-1, 2)$ the equation $y^2 + 8x - 4y + 12 = 0$ changes as $Y^2 = 4aX$ then $a =$

A. 1

B. 2

C. -2

D. -1

Answer: B

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18. If α, β, γ are the real roots of the equation $x^3 - 3ax^2 + 3bx - 1 = 0$ then the centroid of the triangle with vertices $\left(\alpha, \frac{1}{\alpha}\right)\left(\beta, \frac{1}{\beta}\right)$ and $\left(\gamma, \frac{1}{\gamma}\right)$ is at the point

A. (a, b)

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

C. $(a + b, a - b)$

D. $(3a, 3b)$

Answer: A

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19. 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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20. Find the incentre of the triangle with vertices $(1, \sqrt{3}), (0, 0)$ and $(2, 0)$

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

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

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

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

Answer: D

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21. 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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22. The x-coordiante of the incentre of the triangle that has the coordiantes of mid points of its sides as (0,1),(1,1) and (1,0) is:

A. $2+\sqrt{2}$

B. $1+\sqrt{2}$

C. $2-\sqrt{2}$

D. $1-\sqrt{2}$

Answer: C

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23. $OPQR$ is a square and M, N are the middle points of the sides PQ and QR, respectively. Then the ratio of the area of the square to that of triangle OMN is

A. $4:1$

B. $2:1$

C. $8:3$

D. $4:3$

Answer: C

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24. Let $O(0,0)$, $P(3,4)$ and $Q(6,0)$ be the vertices of triangle OPQ. The point R inside the triangle OPQ is such that the triangles OPR, PQR, OQR are of equal area. The coordinates of R are

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

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

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

D. $\left(\frac{4}{3}, \frac{2}{3}\right)$

Answer: C

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25. 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 segmennt RQ

B. Q lies on the line segmet PR

C. R lies on the line segment QP

D. P,Q,R are non-colinear

Answer: D

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26. A triangle are$(6, 0). (0, 6)$ and $(6, 6)$. If distance between circumcenter and orthocenter and distance between circumcenter and centroid are λ and u unit respectively, then (λ, u) lies on:

A. $y = 3x$

B. $x = 3y$

C. $y = 2x$

D. $x = 2y$

Answer: C

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27. The x-coordiante of the incentre of the triangle that has the coordiantes of mid points of its sides as (0,1),(1,1) and (1,0) is:

A. $2+\sqrt{2}$

B. $2-\sqrt{2}$

C. $1+\sqrt{2}$

D. $1-\sqrt{2}$

Answer: B

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28. Let $A(5, 12), B(-13\cos\theta, 13\sin\theta)$ and $-C(13\sin\theta, 13\cos\theta)$ are angular points of ABC where $\theta \in R$. The locus of orthocentre of DeltaABC is

A. x-y=7

B. x-y-7=0

C. x+y-7=0

D. x+y+7=0

Answer: A

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29. Let k be an integer such that the triangle with vertices $(k, -3k)$, $(5, k)$ and $(-k, 2)$ has area $28 sq.$ units. Then the orthocenter of this triangle is at the point :

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

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

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

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

Answer: D

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Section Ii Assertion Reason Type

1. Statement-1 : The points a(3,4), B(2,7) ,C(4,4) dn D(3,5) are such that are of them lies inside the triangle formed by other the points

Statement-2 : Centroid of a triangle always lies inside the triangle

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

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

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

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

Answer: A

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2. Statement-1: The orthocentre of the triangle having its verticews at A(2,0), B(4,0) and C(4,6) is at the point o(4,0)

Statement-2 : Orthocentre of a right triangle is at the vertex forming a right angle

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

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

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

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

Answer: A

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3. Statement-1: Let x_1, x_2, x_3, y_1, y_1 and y_3 be integers and $A(x_1, y_1), B(x_2, y_2)$ and $C(x_3, y_3)$ be three non-collinear points. Then ΔABC is not equilateral.

Statement-2: Area of an equlateral trinalge is $\frac{\sqrt{3}}{4}(\text{Side})^2$

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

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

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

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

Answer: A

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4. Statement-1: If the circumcentre of a triangle lies at origin and centroid is the middle point of the line joining the points (2,3) and (4,7), then its orthocentre satisfies the relation $5x - 3y = 0$

Statement-2: The circumcentre, centroid and the orthocentre of a triangle is on the same line and centroid divides the lines segment joining circumcentre in the ratio $1:2$

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

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

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

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

Answer: A

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5. Statement-1 : The points A(-2,2), B(2,-2) and C(1,1) are the vertices of an obtuse angled isoscles triangle.

Statement-2: Every abtuse angle tirangle is isosceles.

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

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

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

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

Answer: C

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6. Statement-1: The quadrilaterial whoe vertices (in order) are A(1,0), B(0,3) , C(-2,0) and D(0,2) cannot be convex.

Statement-2: A quadriilateral ABCD (in oder is) is convex iff when any diagonla is taken then the remaining vertices must be on the opposite sides of it.

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

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

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

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

Answer: A

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Exercise

1. If the vertices of a triangle are at $O(0, 0), A(a, 0)$ and $B(0, a)$. Then, the distance between its circumcenter and orthocenter is

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

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

C. $\sqrt{2}a$

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

Answer: B

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2. The angles A, B and C of a ΔABC are in A.P. If $AB = 6, BC = 7$,then $AC =$

A. 5

B. 7

C. 8

D. none of these

Answer: D

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3. If the distance between the points $P(a\cos 48^\circ, 0)$ and $Q(0, a\cos 12^\circ)$ is d, then $d^2 - a^2 =$

A. $\frac{a^2}{4}(\sqrt{5}-1)$

B. $\frac{a^2}{4}(\sqrt{5}+1)$

C. $\frac{a^2}{8}(\sqrt{5}-1)$

D. $\frac{a^2}{8}(\sqrt{5}+1)$

Answer: D

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4. If the centroid of the triangle formed by the points $(a,\ b),\ (b,\ c)$ and $(c,\ a)$ is at the origin, then

A. 0

B. abc

C. $3abc$

D. $-3abc$

Answer: C

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

A. (0,0)

B. (8,0)

C. (4,6)

D. none of these

Answer: A

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6. If the coordinates of two vertices of an equilateral triangle are $(2, 4)$ and $(2, 6)$, then the coordinates of its third vertex are

A. $(\sqrt{3}, 5)$

B. $(2\sqrt{3}, 5)$

C. $(2 + \sqrt{3}, 5)$

D. (2,5)

Answer: C

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7. If O is the origin P(2,3) and Q(4,5) are two, points, then $OP \cdot OQ \cos\angle POQ$=

A. 8

B. 15

C. 22

D. 23

Answer: D

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8. If O is the origin and $P(x_1, y_1), Q(x_2, y_2)$ are two points then $PO \times OQ \sin\angle POQ =$

A. $x_1x_2 + y_1 + y_2$

B. $x_1y_2 + x_2 + y_1$

C. $|x_1y_2 - x_2y_1|$

D. none of these

Answer: C

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9. If O(0,0), A(4,0) and B(0,3) are the vertice of a triangle OAB, then the coordinates of the excentre oppsite to the vertex O(0,0)

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10. If P(3,7) is a point on the line joining A(1,1) and B(6,16), then the harmonic conjugate Q of point P has the coordinates

A. (9,29)

B. (-9,29)

C. (9,-29)

D. (-9,-29)

Answer: D

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11. The coordinates of the centrid of a triangle having its circumcentre and orthocenrtre at (7/2,5/2) and (2,1) respectively, are

A. (3,2)

B. (13/6,3/2)

C. (5/2,3/2)

D. (3/2,5/2)

Answer: A

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12. The mid-point of the sides of a ΔABC are D(6,1) ,E(3,5) and F(-1,-2) then the coordinates of the vertex opposite to D are

A. (-4,2)

B. (-4,5)

C. (2,5)

D. (10,5)

Answer: A

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13. If the coordinates of orthocentre O' are centroid G of a ΔABC are (0,1) and (2,3) respectively, then the coordinates of the circumcentre are

A. (3,2)

B. (1,0)

C. (4,3)

D. (3,4)

Answer: D

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14. The ratio in which the y-axis divides the line segement joining $(3, 6), (12, -3)$ is

A. $2:1$

B. $1:2$

C. $3:4$

D. none of these

Answer: A

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15. If C and D are the points of internal and external division of line segment AB in the same ratio, then AC,AB, AD are in

A. AP

B. GP

C. HP

D. AGP

Answer: V

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16. If the centroid of a triangle is $(1,\ 4)$ and two of its vertices are $(4,\ -3)$ and $(-9,\ 7)$, then the area of the

triangle is 183 sq. units (b) $\frac{183}{2}$ sq. units (c) 366 sq. units (d) $\frac{183}{4}$ sq. units

A. $\frac{138}{2}$

B. $\frac{319}{2}$

C. $\frac{183}{2}$

D. $\frac{381}{2}$

Answer: V

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17. A triangle with vertices $(4, 0), (-1, -1), (3, 5)$, is

A. isosceles and right angled

B. isoscles but not right angled

C. right angled but not isosceles

D. neither right angeld nor isosceles

Answer: A

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18. The angle through which the coordinates axes be rotated so that xy-term in the equation $5x^2 + 4\sqrt{3}xy + 9y^2 = 0$ may beb missing, is

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi / 2$

Answer: V

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19. In order to make the first degree terms missing in the equation $2x^2 + 7y^2 + 8x - 14y + 15 = 1,$ the origin should be shifted to the point

A. (-2,1)

B. (1,2)

C. (2,1)

D. (1,-2)

Answer: A

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20. When the origin is shifted to a suitable point, the equation $2x^2 + y^2 - 4x + 4y = 0$ transformed as 2x^2+y^2-8x +8y+ 18=0`. The point to which origin was shifted is

A. (1,2)

B. (1,-2)

C. (-1,2)

D. (-1,-2)

Answer: D

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21. If by shifting the origin at (1,1) the coordinates of a point P become $(\cos\theta, \cos\phi)$ then the original coordinates of P were

A. $\left(2\cos^2\theta/2, 2\cos^2\phi/2\right)$

B. $\left(2\sin^2\theta/2, 2\sin^2\phi/2\right)$

C. $(2\cos\theta/2, 2\cos\phi/2)$

D. $(2\sin\theta/2, 2\sin\phi/2)$

Answer: A

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22. By rotating the coordinates axes through 30° in anticlockwise sense the eqution $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$ change to

A. $X^2 - Y^2 = 3a^2$

B. $X^2 - Y^2 = a^2$

C. $X^2 - Y^2 = 2a^2$

D. none of these

Answer: B

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23. In a $\triangle ABC$ the sides $BC = 5, CA = 4$ and $AB = 3$. If $A(0, 0)$ and the internal bisector of angle A meets BC in D

$\left(\frac{12}{7}, \frac{12}{7}\right)$ then incenter of $\triangle ABC$ is

A. (2,2)

B. (2,3)

C. (3,2)

D. (1,1)

Answer: D

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24. The harmonic conjugate of (4,-2) with respect to (2,-4) and (7,1) is

A. (-8,-14)

B. (2,3)

C. (-2,-3)

D. (1,1)

Answer: A

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25. If the coordinates of the centroid and a vertex of an equilaterqal triangle are (1,1) and (1,2) respectively, then the coordinates of another vertex, are

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

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

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

D. none of these

Answer: C

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26. The transformed equation of $3x^2 + 3y^2 + 2xy - 2 = 0$ when the coordinats axes are rotated through an angle of 45°, is

A. $X^2 + 2Y^2 = 1$

B. $2X^2 + Y^2 = 1$

C. $X^2 + Y^2 = 1$

D. $X^2 + 3Y^2 = 1$

Answer: B

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27. The transformed equation of $x^2 + 6xy + 8y^2 = 10$ when the axes are rotated through an angled $\pi/4$ is

A. $15x^2 - 14xy + 3y^2 = 20$

B. $15x^2 + 14xy - 3y^2 = 20$

C. $15x^2 + 14xy + 3y^2 = 20$

D. $15x^2 - 14xy - 3y^2 = 20$

Answer: C

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28. Let $0 \leq \theta \leq \frac{\pi}{2}$ and $x = X\cos\theta + Y\sin\theta, y = X\sin\theta - Y\cos\theta$ such that $x^2 + 2xy + y^2 = aX^2 + bY^2$, where a and b are constant, then

A. $a = -1, b = 3, \theta = \frac{\pi}{4}$

B. $a = 1, b = -3, \theta = \frac{\pi}{3}$

C. $a = 3, b = -1, \theta = \frac{\pi}{4}$

D. $a = 3, b = -1, \theta = \frac{\pi}{3}$

Answer: C

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29. If $x = X\cos\theta - Y\sin\theta,\ y = X\sin\theta + Y\cos\theta$ and $x^2 + 4xy + y^2 = AX^2 + BY^2, 0 \leq \theta \leq \frac{\pi}{2}$, then

A. $\theta = \frac{\pi}{6}, A = 3, B = -1$

B. $\theta = \frac{\pi}{4}, A = 3, B = -1$

C. $\theta = \frac{\pi}{4}, A = -6, B = -1$

D. $\theta = \frac{\pi}{4}, A = -6, B = 1$

Answer: B

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