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MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

REVISION OF PREVIOUS TWO DIMENSIONAL COORDINATE GEOMETRY

Illustrative Examples

1. Show that the points (3,0),(6,4) and (-1,3) are the vertices of a right angled isosceles triangle.

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2. Find the point on the y-axis which is equidistant from the points (2,3) and (-1,2).

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3. If the three points (a,b), $(a + k\cos\alpha, b + k\sin\alpha)$ and $(a + k\cos\beta, b + k\sin\beta)$ are the vertices of an equilateral triangle , then which of the following is true and why ?

(i) $|\alpha - \beta| = \frac{\pi}{4}$, (ii) $|\alpha - \beta| = \frac{\pi}{2}$

(iii) $|\alpha - \beta| = \frac{\pi}{6}$, (iv) $|\alpha - \beta| = \frac{\pi}{3}$

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4. Find the circumcentre and circumradius of the triangle whose vertices are (3,4) , (3,-6) and (-1,2).


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5. Show that , if the four points (-7,2),(19,8),(15,-6)and (-11,-12) are joined successively , then a parallelogram will be formed .


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6. Show that the four points (2,5),(5,9), (9,12) and (6,8) when joined in order , form a rhombus .

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7. the coordinates of the vertices A,B,C of the triangle ABC are (7,-3) , (x,8) and (4,y) respectively , if the coordinates of the centroid of the triangle be (2,-1) , find x and y.

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8. The coordinates of the vertex A of the triangle ABC are (7,-4) . If the coordinates of the centroid of the triangle be (1,2) , find the coordinates of the mid - point of the side $\overline{BC}$.

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9. The coordinates of the points A and B are $\left(3, \sqrt{3}\right)$ and $\left(0, 2\sqrt{3}\right)$ respectively , if ABC be an equilateral triangle find the coordinates of C.

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10. If the line - segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ subtends an angle α at the origin O, then find the value of $\cos \alpha$.

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11. Show that the straight line joining the points (4,-3) and (-8,6) passes through the origin .

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12. Find the condition that the points (a,b),(b,a)and $\left(a^2, -b^2\right)$ are in a straight line .

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13. Find the value of x for which the area of the triangle with vertices at (-1,-4),(x,1)and(x,-4) is $12\frac{1}{2}$ square units .

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14. the point A,B,C have respective coordinates (3,4), (-4,3) and (8,-6) . Find the area of ΔABC and the length of the perpendicular from A on $\overline{BC}$.

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15. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in A.P. with the same common difference , then show that the points $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3) are collinear.

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16. The points A,B,C,D have the respective coordinates (-2,-3),(6,-5) , (18,9) and (0,12) . Find the area of the quadrilateral ABCD.

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17. The coordinates of the points A,B,C,D are (0,-1), (-1,2),(15,2) and (4,-5) respectively . Find the ratio in which $\overline{AC}$ divides $\overline{BD}$.

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18. If the vertex of a triangle is (1,1) and the the mid - points of two sides through this vetex are (-1,2) and (3,2) , them find the coordinates of the centroid of the triangle .

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19. Find the value of x for which the points (x+1,2), (1,x+2)and $\left(\frac{1}{x+1}, \frac{2}{x+1}\right)$ are collinear .

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20. The coordinates of the points O,A and B are (0,0), (x,y) and (y,x) respectively . If $\angle AOB = \theta$, then find the value of $\cos\theta$.

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21. If $A(3, 5), B(-5, -4), C(7, 10)$ are the vertices of a parallelogram taken in order, then the

coorinates of the fourth vertex are:

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22. The coordinates of the mid -point of the sides of a triangle are (0,1) (1,1)and (1,0),find the coordinates of the triangle.

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23. find the area of the triangle formed by the lines y=0, x+y=0 and x-4=0

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24. If the coordinates of the vertices of a triangle ABC be (3,0), (0,6)and (6,9)and if D and E respectively divide $\overline{AB}$ and $\overline{AC}$ internally in the ratio 1:2 , then show that the area of $\Delta ABC = 9$x the area of ΔADE.

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25. What does the equation $\frac{x}{a} + \frac{y}{b} = 1$ become if the axes are transferred to parallel axes through the point (a,b)?

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26. Transform the equations

$2x^2 + y^2 - 4x + 4y = 0$ to parallel axes through the point (1,-2).

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27. Transform the equation

$3x^2 + 2y^2 - 4x + 3y = 0$ to parallel axes through the point (1,-2).

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28. find the new origin on the x-axis so that the equation ax+by+c=0 reduce to the form ax+by=0

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29. Find the point to which the origin should be shifted after a translation of axes , so that the equation $3x^2 + 8xy + 3y^2 - 2x + 2y - 2 = 0$ will have no first degree terms.

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30. Reduce the equation $5x^2 - 2y^2 - 30x + 8y = 0$ to the form $ax^2 + by^2 = 1$ by proper translation of axes without rotation .

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

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32. Retaining the directions of axes , the origin is shifted at (a,b), find (a,b) , given that the point (-2,3)

lies on the new x - axis and the point (-3,2) lies on the new y-axis .

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33. A point moves in such a manner that 3 times its distance from the x-axis is greater than 4 times its distance from the y-axis by 7 , find the equation of its locus .

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34. Find the equation to the locus of a moving point which is always equidistant from the points (2,-1) and

(3,2). What curve does the locus represent ?

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35. A and B are two given points whose coordinates are (-5,3) and (2,4) respectively . A point P moves in such a manner that $PA:PB=3:2$. Find the equation to the locus traced out by P. What curve does it represent?

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36. Find the locus of a point which forms a triangle of area 21 square unit with the points (2,-7) and (-4,3).

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37. The sum of the distances of a moving point from the points (c,0) and (-c,0) is always 2a unit $(a > c)$. Find the equation to the locus of the moving point.

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38. The sum of the intercepts cut off from the axes of coordinates by a variable straight line is 10 units . Find the locus of the point which divides internally the part of the straight line intercepted between the axes of coordinates in the ratio $2:3$.

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39. For all values of θ , the coordinates of a moving point P are $(a\cos\theta, b\sin\theta)$, find the equation to the locus of P.

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40. The coodinates of any position of a moving points P are given by $\left(\frac{7t-2}{3t+2}, \frac{4t+5}{t-1}\right)$, where t is variable parameter Find the equation to the locus of P.

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41. The coordinates of a moving point P are $\left[\frac{a}{2}(\text{coses}\theta + \sin\theta), \frac{b}{2}(\text{coses}\theta - \sin\theta)\right]$, where θ is a variable parameter Show that , the , the equation to the locus of P is $b^2x^2 - a^2y^2 = a^2b^2$.

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42. If θ is a variable and a,b are constants then find the locus of the point of intersection of the lines $x\sin\theta + y\cos\theta = a$ and $x\cos\theta - y\sin\theta = b$.

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Exercise 1 Mcq

1. The abscissa of any point on y -axis is -

A. 0

B. 1

C. -1

D. none of these

Answer: A

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2. If the axes are transferred to parallel axes throught the point (0-4) , then the equation $4x + 3y + 12 = 0$ reduces to the form -

A. $4x + 3y = 5$

B. $4x + 3y = 2$

C. $4x + 3y = 0$

D. $4x - 3y = 0$

Answer: C

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3. If the axis are transferred to parallel axis throught the point (α, β), then equation of the circle $(x-\alpha)^2+(y-\beta)^2=a^2$ reduces to the form-

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

B. $x^2+y^2=\alpha^2$

C. $x^2+y^2=\beta^2$

D. $x^2+y^2=0$

Answer: A

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4. The square of the distance between the points (x,-y) and (-x,y) is -

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

B. x^2+y^2

C. $4\left(x^2+y^2\right)$

D. $2x^2+4y^2$

Answer: C

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5. The coordinates of the mid -point of line -segment joining the points (a,-b) and (-a,b) are -

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

B. $(0, 0)$

C. $\left(0, \frac{b}{2}\right)$

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

Answer: B

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6. A diameter of a circle has the extreme points (7,9) and (-1,-3) . The coordinates of the centre of the circle are -

A. $(-3, 3)$

B. $(-3, -3)$

C. $(3, -3)$

D. $(3, 3)$

Answer: D

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7. The coordiantes of the centroid of the triangle fromed by the points $(x-y, y-z), (-x, -y)$ and (y, z) are -

A. (-3,3)

B. (-3,-3)

C. (3,-3)

D. (3,3)

Answer: C

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8. If twice the abscissa of a point moving in the xy - plane always exceeds three times its ordinate by 1, then the locus of the points is a-

A. circle

B. straight line

C. parabola

D. none of these

Answer: B

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9. For all values of θ , the coordinates of a moving point P are $(a\cos\theta, a\sin\theta)$, the locus of P will be a-

A. circle

B. straight line

C. parabola

D. none of these

Answer: A

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10. If the square of distance of a moving point from the point (2,0) is equal to 4 units , then the locus of the moving point is a -

A. straight

B. circle

C. hyperbola

D. parabola

Answer: B

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11. The point P lies on 3rd quadrant and its distances from x- axis and y -axis are 6 and 4 respectively . The coordinates of P will be -

A. $(-6, -4)$

B. $(-4, -6)$

C. $(6, -4)$

D. $(-6, 4)$

Answer: B

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12. When the origin is shifted (retaining the direction of the axis) at the point (-5,9) ,then the coordinates of the point (3,4) will be -

A. $(-8, -5)$

B. $(-8, 5)$

C. $(8, -5)$

D. $(8, 5)$

Answer: C

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13. AB is a diameter of a circle having centre at C , if the coordinates of A and C are (6,-7) and (5,-2) respectively , then the coordinates of B will be -

A. (4,3)

B. $(-4, 3)$

C. $(4, -3)$

D. $(-4, -3)$

Answer: A

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14. The centroid of the triangle formed by the points (1,2),(2,4)and (-3,6) is -

A. (0,0)

B. (0,4)

C. (4,0)

D. (4,4)

Answer: B

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15. (a , 2b) divides the line segment joining by the points (3a,0),(0,3b) in the ratio-

A. $1:2$

B. $2:1$

C. $1:3$

D. $3:1$

Answer: C

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16. A point moves in the xy -plan such that three times its distance from the y- axis exceeds two times its distance from the x- axis by 4. Then the equation to the moving points is -

A. $2x - 3y = 4$

B. $3x + 2y = 4$

C. $3x - 2y = 4$

D. $3x - 2y + 4 = 0$

Answer: C

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17. State in which of the following quadrants the point $\left(\sqrt{5}-3, \sqrt{5}-2\right)$ lies ?

A. first

B. second

C. third

D. fourth

Answer: B

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18. The coordinates of a point referred to rectangular axis $\overleftrightarrow{OX}$ and $\overleftrightarrow{OY}$ are (4,-3) , state which of the following are the coordinates of the same point when the axis are shifted to the point (-2,5) without rotation ?

A. $(-6, 8)$

B. $(6, -8)$

C. $(-6, -8)$

D. $(-8, 6)$

Answer: B

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19. If the points $(am^2, 2am)$, $(an^2, 2an)$ and $(a, 0)$ are collinaear then value of mn is -

A. 1

B. -2

C. -1

D. 1

Answer: C

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20. State which of the follwing is the distance between the points $(a+b, c-d)$ and $(a-b, c+d)$?

A. $2\sqrt{a^2+c^2}$

B. $2\sqrt{b^2+d^2}$

C. $\sqrt{a^2+c^2}$

D. $\sqrt{b^2+d^2}$

Answer: B

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21. Which of the following is equal to the distance between the points (-13,-11) and (-2,-9)`?

A. $5\sqrt{10}$

B. $5\sqrt{3}$

C. $2\sqrt{30}$

D. $5\sqrt{5}$

Answer: D

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22. the ditance between the points (x,-7) and (3,-3) is 5 unit , state which of the following are the values of x?

A. 0 or 6

B. 2 or 3

C. 5 or 1

D. $-6 \text{ or } 0$

Answer: A

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23. State which of the follwing are the coordinates of the mid - point of the line -segment joining the points $(l, 2m)$ and $(-l+2m, 2l-2m)$?

A. (l,m)

B. (l,-m)

C. (m,-l)

D. (m,l)

Answer: D

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24. The point P divides the line -segmen joining the points A (1,5) and B(-4,-7) internally in the ratio $2:3$ .State which of the following is the abscissa of P?

A. -1

B. 11

C. 1

D. -11

Answer: A

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25. A point divides the line -segment joining the points (2,-5) and (-3,-2) externally in the ratio $4:3$. State which of the follwing is the ordinate of the point ?

A. -18

B. -7

C. 18

D. 7

Answer: D

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26. State which of the following are the coordinates of the centroid of the triangle formed by joining the points (7,-5),(-2,5) and (4,6) ?

A. (3,-2)

B. (2,3)

C. (3,2)

D. (2,-3)

Answer: C

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27. State which of the following is equal to the area of the traingle formed by joining the points (0,4) , (0,0) and (-6,0) ?

A. 24 square unit

B. 12 square unit

C. 6 square unit

D. 8 square unit

Answer: B

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28. E is the mid - point of the diagonal AC of the rectangle ABCD , if the coordinates of A and E are (7,-8) and (2,-2) , then state which of the following are the coordinates of C ?

A. (3,4)

B. (-3,-4)

C. (3,-4)

D. (-3,4)

Answer: D

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29. State which of the following is equal to the area of the triangle formed by joining the points (3,2) , (5,4) and (2,2) ?

A. 1 square unit

B. 2 square unit

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

D. 6 square unit

Answer: A

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30. A point moves in the xy - plane in such a manner that its distance from the origin is always 3 unit . State which of the following is the equation to the locus of the moving point ?

A. $x + y = 3$

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

C. $x + y = 9$

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

Answer: D

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Exercise 1 Very Short Type Questions

1. The sides of the rectangle ABCD are parallel to the coordinate axis. If the coordinates of the vertices B and D be (7,3) and (2,6) respectively, find the coordinates of the vertices A and C .

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2. Transform the equation $x^2 + xy - 3x - y + 2 = 0$ to parallel axis through the point (1,1).

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3. Transform the equation $y^2 - 4x + 4y + 8 = 0$ to parallel axes through the point (1,-2).

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4. What does the equation $(a-b)\left(x^2+y^2\right) - 2abx = 0$ become when the origin is shifted to the point $\left(\frac{ab}{a-b}, 0\right)$ without rotation of axes ?

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5. Retaining the directions of axes , the origin is shifted to (h,k) , find (h,k) , given that the point (3,-1) lies on the new x - axis and the point (-2,4) lies on the new y - axis .

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6. Show that the distance between the points (1,1) and $\left[\frac{2m^2}{1+m^2}, \frac{(1-m)^2}{1+m^2}\right]$ is the same for all values of m .

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7. The square of the distance between the points (-2,a) and (a,-3) is 85 , find a .

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8. If the point (x,y) is equidistant from the points (2,-1) and (-3,4) , then show that , y=x+2 .

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9. Find the condition so that the point (a,b) may be equidistant from the points (8,4) and (-2,-4) .

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10. Show that the points (2,2) , (-2,-2) and $\left(-2\sqrt{3}, 2\sqrt{3}\right)$ are the vertices of an equilateral triangle .

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11. Prove that the points (-1,5) , (3,2) and (-1,-1) are the vertices of an isosceles traigle . Find the coordinates of its centroid.

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12. Show that the points (6,6) , (2,3) and (4,7) are the vertices of a right angled triangle

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13. Prove that the points (7,9) , (3,-7) and (-3,3) form a right angled isoseles triangle .

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14. The coordinates of the points A and B are (2,4) and (2,6) respectively . The point P is on that side of

AB opposite to the origin . If PAB be an equilateral triangle , find the coordinates of P.

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15. The centre of a circle is at (5,3) and its radius is 5 . Find the length of the chord which is bisected at (3,2) .

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16. If the point (x,y) be equidistant from the points (a+b,b-a) and (a-b,a+b) , prove that bx =ay .

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17. The base of an isosceles triangle is the line -segment joining the points (7,-1) and (9,3) , if the abscissa of the vertex be 4 find its ordinate .

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18. Find the ratio in which the point (1,2) divides the line -segment joining the points (-3,8) and (7,-7) .

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19. Find the ratio in which the point (-5,-20) divides the line -segment joining the points (4,7) and (1,-2) .

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20. In what ratio the line - segment joining the points (3,4) and (2,-3) is divided by the x -axes ? Also find the ratio in which it is divided by the y- axis .

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21. P is a point on the line - segment $\overline{AB}$ such that $\overline{AP} = \overline{3PB}$, if the coordinates of A and B are (3,-4)

and (-5,2) respectively , find the coordinates of P.

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22. The line -segment $\overline{CD}$ is produced to Q such that $2\overline{CQ} = 5\overline{DQ}$, if the coordinates of C and D are (4,7) and (-2,4) respectively , find the coordinates of Q.

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23. Find the coordinates of the point of trisection of the line - segment joining the points (-2,3) and (3,-1) that is nearer to (-2,3) .

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24. Show that the line -segment joining the points (8,3),(-2,7) and the line -segment joining (11,-2),(-5,12) bisect each other .


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25. Find (x,y) if (3,2) , (6,3) , (x,y) and (6,5) are the vertices of a parallelogram taken in order ,


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26. If $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ and (x_4, y_4) be the consecutive vertices of a parallelogram , show that , $x_1 + x_3 = x_2 + x_4$ and $y_1 + y_3 = y_2 + y_4$.

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27. Find the coordinates of the point of intersection of the medians of the triangle formed by joining the points (-1,-2),(8,4) and (5,7).

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28. The coordinates of the vertices of a triangle are (4,-3) , (-5,2) and (x,y). If the centre of gravity of the triangle is at the origin then find x,y.

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29. The centroid of a triangle is (-1,-2) and coordinates of its two vertices are (4,6) and (-8-12) . Find the coordinates of its third vertex .

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30. The coordinates of the vertices A ,B and C of the triangle ABC are (-1,3),(1,-1) and (5,1) respectively . Find the length of the median through the vertex A.

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31. For what value of k the points (1,-1) , (2,1) and (k,5) shall be on the same straight line ?

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32. If the points (a,0),(0,b) and (1,1) are collinear , then show that $\frac{1}{a}+\frac{1}{b}=1.$

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33. If the points (1,2) and (2,4) and (t,6) be collinear , find the value of t.

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34. Find the area of the triangle having vertices (1,4) , (-1,2)and (-4,-1) . Interpret the result .

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35. Find the area of the triangle having vertices (a,b+c), (b,c+a) and (c,a+b) and interpret the result geometrically .

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36. Show that the straight line joining the points (-3,2) and (6,-4) passes through the origin .

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37. Examine the collinearity of the point (2,3),(4,5),and (6,5) .

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38. If the A and B have coordinates $(a\cos\theta, b\sin\theta)$ and $(-a\sin\theta, b\cos\theta)$ respectively and O is the origin then , then show that the area of $\Delta OAB)$ is independent of θ .

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39. What does the eqution $\frac{x}{a}+\frac{y}{b}=2$ become if the axes are transferred to parallel axes through the point (a,b)

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40. A point moves in the xy - plane in such a way that its distances from the x-axes and the point (1,-2) are always equal . Find the eqution to its locus.

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41. A point moves such that its distance from the y-axes is equal to its distance from the point (2,0). Find its locus and identify the nature of the conic .

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Exercise 1 Short Type Questions

1. Coordinates of the vertices A,B,C of a triangle ABC are (m+3,m),(m,m-2)and (m+2,m+2) respectively Show that the area of the triangle ABC is independent of m .

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2. Find the coordinates of the point which is equaidistant from the points (-1,3),(2,-2) and (4,6).

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3. Find the circumcentre of the triangle formed by the points (-3,1) , (1,3) and (3,0) .

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4. The coordinates of the vertices of a triangle are (0,0) , (5,3) and (3,5) respectively , find the circumcentre and circumradius of the triangle .

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5. The coordinates of the circumcentre of the triangle ABC are (8,3) , if the coordinates of the vertices A,B

and C be (x,-9),(y-2)and(-5,3) respectively , find the values of x and y.

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6. Prove that the points (2,-2) ,(8,4), (5,7) and (-1,1) are the vertices of a rectangle , find the area of the rectangle.

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7. Show that the points (-2,-1),(5,4),((6,7) and (-1,2) are the vertices of a parallelogram .Is the parallelogram a rectangle ?

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8. Prove that the four points (4,3),(6,4),(5,6) and (3,5) are the vertices of a square.

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9. Prove that the points (0,0),(0,10),(8,16)and (8,6)are the vertices of a rhombus , find the area of the rhombus. Show also that the diogonal of the rhombus intersect at right angle

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10. If the point (0,4) divides the line-segment joining the points (-4,10) and (2, 1), internally in a definite ratio , find the coordinate of the point which divide the segment externally in the same ratio.

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11. The straight line joining the points (2, -2)and (4, 6) extended each way a distance equal to half it own length. Determine the coordinate of the terminal point.

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12. The coordinates of the vertex A of Δ ABC are (2,5), if the centroid of the triangle at (-2,1), find the coordiinates of the mid-point of the side $\overline{BC}$.

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13. The area of the trianglr formed by joining the points (2,7), (5,1) and (x.3)is 18 square units . Find x

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14. Prove that the points (-4,-5) ,(9,8)and the mid-point of the line-segment joining the point (2,1) and

(6,5) are on the same straight line

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15. Find the value of m for which the area of the triangle having vertices at (-1,m) , (m-2,1) and (m-2,m) is $12\frac{1}{2}$ square units .

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16. The vertices A,B and C of ΔABC have coordinates (-3,-2),(2,-2) and (6,1) respectively . Find the area of the ΔABC and the length of the perpendicular from A on $\overline{BC}$.

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17. Prove that the points $(p, p^2), (q, q^2)$ and $(r, r^2)(p \neq r)$ can never be collinear.

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18. Find the area of the vertices A,B,C and D of the quadrilateral whose vertices have coordinates (1,1) , (3,4),(5,-2) and (4,-7).

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19. The coordinates of the vertices A,B,C and D of the quadrilateral ABCD are (1,2) , (-5,6) , (7,-4) and (k-2) , if the area of the quadrilateral be zero , then find the value of k.

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20. What does the equation $3x^2 + 2xy + 3y^2 - 18x - 22y + 50 = 0$ become if the axis are tranferred to parallel axis through the point (2,3) ?

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21. Find the point to which the origin should be shifted after a translation of axis so that the following equations will have no first degree terms :

(i) $x^2 + y^2 - 4x - 8y + 3 = 0$, (ii) $x^2 + y^2 - 5x + 2y - 5 = 0$

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22. Verify that the area of the triangle with vertices (6,2), (-3,4) and (4,-3) remains unaltered under the translation of axis when the origin is shifted to the point (2,-1).

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23. The distance of a point P from the striaght line x=-4 is equal to its distance from the point (3,0) . Find the equation to the locus of P.

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24. A point P(x,y) moves in the xy - plane in such a way that its distance from the point (0,4) is equal to $\frac{2}{3}$ rd of its distance from the x axis , find the equation to the locus of P.

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25. A point moves in a plane such that its distance from the point (2,3) exceeds its distance from the y-axis by 2 . Find the equation to the locus of the point .

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26. Find the locus of a point which moves so that the sum of the squares of its distances from the points (3,0) and (-3,0) is always equal to 50.

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27. Find the equation to the locus of a moving point which is equidistant from the points (2,3) and (4,-1).

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28. The coordinates of a moving point P are $\left(at^2, 2at\right)$, where t is a variable parameter . Find the equation to the locus of P.

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29. If θ is a variable , find the equation to the locus of a moving point whose coordinates are

$(a \sec \theta, b \tan \theta)$

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30. The ratio of the distances of a moving point from the points (3,4) and (1,-2) is 2:3 , find the locus of the moving point.

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31. A point so moves that the sum of squares of its distances from (a,0) and (-a,0) is $2b^2$. Find the equation to the locus of the moving point . If a=b then what will be the locus of the moving point?

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32. A(1,2) and B (5,-2) are two given point on the xy-plane, on which C is such a moving point, that the numerical value of the area of ΔCAB IS 12 square unit. Find the equation to the locus of C.

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33. A moving point is always collinear with the point (2,-1) and (3,4) , find the equation to the locus of the moving point

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34. Find the equation to the locus of the moving point which is equidistant from the point (2a, 2b) and (2c,2d). Interpret geometrically the equationto the locus .

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35. The coordinates of a moving point P are $\left(ct + \frac{c}{t}, ct - \frac{c}{T}\right)$, where t is a variable parameter . Find the equation to the locus of P.

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36. The sum of the distances of a moving point from the points (3,0) and (-3,0) is always equal to 12 . Find the equation to the locus and identify the conic represented by the equation.

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37. Find the equation to the locus of a moving point which moves in such a way that the difference of its distance from the points (5,0) and (-5,0) is always 5 unit.

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38. The variable straight line $\frac{x}{a}+\frac{y}{b}=1$ is such that , a+b=10. Find the locus of the middle point of that part of the line , which is intercepted between the axes .

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39. The sum of the intercepts cut off from the coordinate axes by a variable line is 14 units . Find the locus of the point which divides internally the portion of the line intercepted between the coordinate axes in the ratio $3:4$.

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40. $S\left(\sqrt{a^2-b^2}, 0\right)$ and $S'\left(-\sqrt{a^2-b^2}, 0\right)$ are two given points and P is a moving point in the xy - plane such that SP+S'P=2a . Find the equation to the locus of P.

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41. The coordinates of moving point P are $\left(\frac{2t+1}{3t-2}, \frac{t-1}{t+1}\right)$, where t is a variable parameter . Find the equation to the locus of P.

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42. The coordinates of a moving point P are $[6\sec\theta, 8\tan\theta]$ where θ is a variable parameter . Show that equation to the locus of P is $\frac{x^2}{36} - \frac{y^2}{64} = 1.$

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43. If θ is a variable and a is contant , then find the locus of the point of intersection of the lines $x\cos\theta + y\sin\theta = a$ and $x\sin\theta - y\cos\theta = a.$

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44. line $x \sin\theta + y\cos\theta = p$ intercepted between the coordinate axes .

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Exercise 1 Long Type Questions

1. The coordinates of the points A,B,C are (-2,1),(-1,-3) and (3,-2) respectively . Show that , AB =BC and $\angle ABC$ is a right angle If D is the fourth vertex of the square ABCD , find the coordinates of D and also find the point of intersection of diagonals of ABCD.

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2. Find the lenghts of the medians of the triangle whose vertices are (2,-4),(6,-2) and (-4,2).

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3. If (4,3) , (-2,7) and (0,11) are the coordinates of the mid -points of the sides of a triangle , find the coordinates of its vertices .

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4. The 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 $\overline{AM}:\overline{BM} = b:a$, prove that $x + y\tan\frac{\alpha+\beta}{2} = 0$.

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5. A(-1,5),B(3,1)and C(5,7) are the vertices of the ΔABC. If D ,E and F are the mid - points of the sides $\overline{BC}, \overline{CA}$ and $\overline{AB}$ respectively , find the area of ΔDEF. Show also that , $\Delta ABC = 4\Delta DEF$.

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6. The coordinates of A , B , C are (6,3), (-3,5) and (4,-2) respectively and P is the point (x,y) , show that , $\frac{\text{area of the}\Delta PBC}{\text{area of the}\Delta ABC} = \left|\frac{x+y-2}{7}\right|$

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7. The points P,Q,R are collinear , if the coordinates of P and Q be (3,4) and (7,7) respectively and $\overline{PR} = 10$ unit , find the coordinates of R.

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8. The coordinates of the points A,B,C D are respectively (6,3) , (-3,5) , (4,-2) and (x,3x), if $\frac{\text{area of the}\Delta DBC}{\text{area of the}\Delta ABC} = \frac{1}{2}$, find x.

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9. The coordinates of the points A,B,C and D are (-2,3), (8,9), (0,4) and (3,0) respectively . Find the ratio in which the line -segment $\overline{AB}$ is divided by the line -segment $\overline{CD}$.

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10. The coordinates of the points A and B are (3,4) and (5,-2) respectively , if $\overline{PA} = \overline{PB}$ and the area of the $\Delta PAB = 10$ square unit , find the coordinates of P.

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11. The area of a quadrilateral is 28 square unit. If the coordinates of its angular points be (-1,6) (-2,-4) , (3,-2) and (a,b) , then show that , 2a+b=6 or , 2a+b=2

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12. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in G.P. with the same common ratio , then show that the points $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3) lie on a straight line .

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13. Shift the origin to a suitable point so that the equation $2x^2 - 4x + 3y + 5 = 0$ will not contain the term in x and the constant term.

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14. Find the point to which the origin should be shifted so that the equation $3y^2 + 6y - 5x - 7 = 0$ is reduced to the form $y^2 = ax$.

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15. Show that the distance between two points remains unaltered by the translation of axes .

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16. Reduce the equation $x + y + 5 = 0$ and $x - 2y + 2 = 0$ to the form

ax+by =0 by proper choice of the origin and find this new origin.

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17. Choose a new origin (h,k) (retaining the directions of axes) so that the equation $5xy + y^2 + 25x - 5y - 65 = 0$ is reduced to the form $Ax'y' + By'^2$ =1 . Also find the actual values of A and B.

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18. Find the distance between the point $(1+\sqrt{2}, 1-\sqrt{2})$ and $(0,0)$

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19. Show that the straight line joining the mid - points of two sides of a triangle is equal to half the third side .

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20. Show that the straight lines joining the mid - points of the opposite sides of a quadrilateral bisect

each other .

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21. Prove analytically that the area of a triangle is four times that of the triangle obtained by joining the mid - points of the sides of the given triangle .

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22. Using analytical method prove that the mid - point of the hypotenuse of a right angled triangle is equidistant from the three vertices .

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23. If two medians of a triangle are equal , prove analytically that the triangle is isosceles .

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24. Using coordinate geometry prove that an isosceles traigle has two equal medians.

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25. D,E,F are the mid - points of the sides $\overline{BC}, \overline{CA}$ and $\overline{AB}$ respectively of the triangle ABC , using coordinate geometry show that , $3\left(BC^2+CA^2+AB^2\right)=4\left(AD^2+BE^2+CF^2\right).$

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26. ABC is a right angled triangle right angled at B. If P and Q are the mid - points of the sides $\overline{AB}$ and $\overline{BC}$ respectively , then show that , $4\left(AQ^2+PC^2\right)=5AC^2.$

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Sample Questions For Competitive Exams A Multiple Correct Answer Type

1. Area of a traigle ABC is 5 sq . Units , slope of a median through A is -2 and the coordinates of B and C are (-1,3) and (3,5) respectively , then the distance of A from origin will be -

A. 6 units

B. 4 units

C. $2\sqrt{2}$ units

D. $3\sqrt{2}$ units

Answer: A,C

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2. If B(1,3) be equidistant from the point A(6,-1) and $C(\lambda, 8)$, then the value of λ is /are -

A. -3

B. 3

C. 5

D. -5

Answer: A,C

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3. The base of an isosceles triangle ABC is the line segment joining the points $B(a+b, b-a)$ and $C(a-b, a+b)$, then the coordinate of A is -

A. (a,b)

B. (b,a)

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

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

Answer: A,D

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4. A(1,2) and B(7,10) are two given points on the xy plane, for a point P(x,y) in the xy - plane such that $\angle APB = 60^\circ$, area of the triangle APB is maximum , then P is lying on-

A. the straight line 3x+4y=36

B. the any line which is perpendicular on AB

C. the line which is perpendicular bisector of AB

D. the circle which is passing through (1,2) and (7,10) with radius 10 units.

Answer: A,C

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5. Point P divides line joining A(-5,1) and B(3,5) in the ratio $\lambda:1$. The coordinates of P and Q are (1,5) and (7,2) respectively . If the area of the triangle PQR be 2 sq . Units , then the value of λ is -

A. $\frac{19}{5}$

B. $\frac{31}{9}$

C. 23

D. 6

Answer: A,C

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Sample Questions For Competitive Exams B Integer Answer Type

1. $A\left(0, \sqrt{2}\right)$ and $B\left(2\sqrt{2}, 0\right)$ are two vertices of a triangle ABC and AB=BC . If the equation of the side BC be $x = 2\sqrt{2}$, then the area of triangle ABC is (in sq . Units)-

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2. Is the coordinate of the three vertices of a recengle ABCD be A(1,0) , B (2,0) and D(-1,4), then the abscissa of C is -

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3. Let O(0,0) , P(2,0) and Q (6,0) be the vertices of triangle OPQ . If R be a point inside the triangle OPQ such that areas of $\Delta OPQ, \Delta PQR$ and ΔOQR are equal , then the abscissa of R is -

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4. (0,0) , (0,21) and (21,0) are the vertices of a triangle . If there are $95x$ number of points inside the triangle having coordinates as integral value , then the value of x is -

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5. The vertices of the triangle are (0,0) , (3,4) and (4,0) . If the coordinate of its orthocetre be $\left(3, \frac{x}{4}\right)$, then the value of x is -

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Sample Questions For Competitive Exams C Matrix Match Type

1. Find the distance between the point $\left(\sqrt{3}, 4\right)$ and $(0, 0)$

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2. Find the distance between the point $(11, 9)$ and $(7, 2)$

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Sample Questions For Competitive Exams D Comprehension Type

1. Let us consider one vertex and one side through the vertex along x -axis of a triangle . Now the coordinates of the vertices B,C and A of any triangle ABC (0,0) ,(a,0) and (h,k) respectively should be taken .

If in triangle ABC , AC =3 ,BC=4 and median AD is perpendicular with median BE , then the area of ΔABC is -

A. $\sqrt{7}$ sq . Units

B. $\sqrt{11}$ sq . Units

C. $2\sqrt{2}$ sq. units

D. none of these

Answer: B

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2. Let us consider one vertex and one side through the vertex along x -axis of a triangle . Now the coordinates of the vertices B,C and A of any triangle ABC (0,0) ,(a,0) and (h,k) respectively should be taken . If internal bisector of angle $\angle A$ of the triangle ABC intersects BC at D such that BD =4 and DC =2 then -

A. $AC > 6 \text{ and } AB > 4$

B. $2 < AC < 6 \text{ and } AB < 1$

C. $2 < AC < 6 \text{ and } 4 < AB < K$

D. none of these

Answer: C

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3. Let us consider one vertex and one side through the vertex along x -axis of a triangle . Now the coordinates of the vertices B,C and A of any triangle ABC (0,0) ,(a,0) and (h,k) respectively should be taken . If the altitude (AE) of the triangle in question (ii) greater than $\sqrt{10}$ and the lenght of AB and AC are of integral value , then the lenght of AC is -

A. 3

B. 6

C. 4 or 5

D. none of these

Answer: C

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4. Let ABCD is a square with sides of unit lenghts . Points E and F are taken on sides AB and AD respectively so that AE =AF . Let P be a point inside the square ABCD.

The maximum area of quandrilateral CDFE will be -

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{5}{8}$

D. $\frac{3}{8}$

Answer: C

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5. Let ABCD is a square with sides of unit lenghts . Points E and F are taken on sides AB and AD respectively so that AE =AF . Let P be a point inside the square ABCD.

The value of $(PA)^2 - (PB)^2 + (PC)^2 - (PD)^2$ is equal to -

A. 3

B. 2

C. 1

D. 0

Answer: D

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6. Let ABCD is a square with sides of unit lenghts . Points E and F are taken on sides AB and AD respectively so that AE =AF . Let P be a point inside the square ABCD. Let a line passing throught point A

divides the square ABCD into two parts so that area of one part is double to another , then lenght of the line segment inside the square is -

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

B. $\frac{\sqrt{13}}{3}$

C. $\frac{\sqrt{11}}{3}$

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

Answer: B

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Sample Questions For Competitive Exams E Assertion Reason Type

1. Consider two point $A(2, 5)$ and $B(3, 4)$ in the XY plane . P is a point divides the line segment AB externally in the ratio $2:5$ .Find the co ordinate of P.

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2. Consider two point $A(1, -1)$ and $B(3, 2)$ in the XY plane . P is a point divides the line segment AB externally in the ratio $1:2$ .Find the co ordinate of P.

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