



MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

CONIC SECTIONS



1. Given that A(1,1) and B(2, -3) are two points and D is a point on

AB produced such that AD=3AB. Find the coordinates of D.

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2. Find the coordinates of the point which divides the line segments joining the points (6, 3) and (-4, 5) in the ratio 3:2 (i) internally and (ii) externally.



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

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4. If the points $(1, 1): (0, \sec^2 \theta)$; and $(\cos ec^2 \theta, 0)$ are collinear, then find the value of θ

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5. Given that A_1 , A_2 , A_3 , A_n are n points in a plane whose coordinates are x_1 , y_1), (x_2, y_2) , (x_n, y_n) , respectively. A_1A_2 is bisected at the point P_1 , P_1A_3 is divided in the ratio A: 2 at P_2 , P_2A_4 is divided in the ratio 1:3 at P_3 , P_3A_5 is divided in the ratio 1: 4 at P_4 , and so on until all n points are exhausted. Find the final point so obtained.

6. If P divides OA internally in the ratio $\lambda_1 : \lambda_2$ and Q divides OA externally in the ratio $\lambda_1; \lambda_2$, then prove that OA is the harmonic mean of OP and OQ.

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7. Prove that the point (-2, -1), (1, 0), (4, 3) and (1, 2) are the

vertices of parallel-gram. Is it a rectangle?

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8. Determine the ratio in which the line 3x + y - 9 = 0 divides the

segment joining the points (1,3) and (2,7).

9. Find the orthocentre of the triangle whose vertices are (0, 0), (3, 0),

and (0,4).

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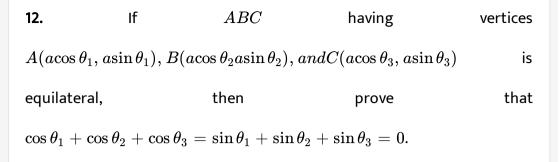
10. If a vertex of a triangle is (1, 1), and the middle points of two sides passing through it are -2, 3 and (5, 2), then find the centroid of the triangle.

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11. The vertices of a triangle are $A(\,-1,\,-7), B(5,1) and C(1,4)$. If the

internal angle bisector of $\angle B$ meets the side AC in D, then find the

length AD.



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13. If the point (x, -1), (3, y), (-2, 3), and (-3, -2) taken in order

are the vertices of a parallelogram, then find the values of xandy.

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14. If the midpoints of the sides of a triangle are (2, 1), (-1, -3), and (4, 5), then find the coordinates of its vertices.

15. 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.



16. If a vertex, the circumcenter, and the centroid of a triangle are (0, 0), (3,4), and (6, 8), respectively, then the triangle must be (a) a right-angled triangle (b) an equilateral triangle (c) an isosceles triangle (d) a right-angled isosceles triangle

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17. Orthocenter and circumcenter of a ΔABC are (a, b)and(c, d), respectively. If the coordinates of the vertex A are (x_1, y_1) , then find the coordinates of the middle point of BC.

18. If $A(x_1, y_1), B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of traingle ABC

and $x_1^2+y_1^2=x_2^2+y_2^2=x_3^2+y_3^2,$ then show that $x_1\sin 2A+x_2\sin 2B+x_3\sin 2C=y_1\sin 2A+y_2\sin 2B+y_3\sin 2C=0$

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19. The points
$$(a,b), (c,d), ext{ and } \left(rac{kc+la}{k+l}, rac{kd+lb}{k+l}
ight)$$
 are (a) vertices of

an equilateral triangle (b) vertices of an isosceles triangle (c) vertices of a

right-angled triangle (d) collinear

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20. The circumcenter of the triangle formed by the line y = x, y = 2x,

and y = 3x + 4 is

A. (a) (6, 8)

B. (b) (6, -8)

C. (c) (3, 4)

D. (d) (-3, -4)

Answer: null



21. 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) so that AM and BM are in the ratio b:a. Then

$$x\cos{\left(rac{lpha+eta}{2}
ight)}+y\sin{\left(rac{lpha+eta}{2}
ight)}$$

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22. If the middle points of the sides of a triangle are (-2, 3), (4, -3), and (4, 5), then find the centroid of the triangle.

23. In what ratio does the x-axis divide the line segment joining the points

$$(2, -3)$$
 and (5, 6)?

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24. If (1, 4) is the centroid of a triangle and the coordinates of its any two vertices are (4, -8) and (-9, 7), find the area of the triangle.

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25. If $(x_i, y_i), i = 1, 2, 3$, are the vertices of an equilateral triangle such

that

$$(x_1+2)^2+(y_1-3)^2=(x_2+2)^2+(y_2-3)^2=(x_3+2)^2+(y_3-3)^2,$$
 then find the value of $rac{x_1+x_2+x_3}{y_1+y_2+y_3}$.

26. A particle just clears a wall of height b at distance a and strikes the ground at a distance c from the point of projection. The angle of projection is (1) $\frac{\tan^{-1}b}{ac}$ (2) 45^{o} (3) $\frac{\tan^{-1}(bc)}{a(c-a)}$ (4) $\frac{\tan^{-1}(bc)}{a}$ Watch Video Solution

27. Find the locus of a point, so that the join of (-5, 1) and (3, 2) subtends a right angle at the moving point.

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28. The sum of the squares of the distances of a moving point from two fixed points (a,0) and (-a, 0) is equal to a constant quantity $2c^2$. Find the equation to its locus.



29. AB is a variable line sliding between the coordinate axes in such a way that A lies on the x-axis and B lies on the y-axis. If P is a variable point on AB such that PA = b, Pb = a, and AB = a + b, find the equation of the locus of P.

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30. A rod of length l slides with its ends on two perpendicular lines. Find the locus of its midpoint.

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31. Find the locus of the point $ig(t^2-t+1,t^2+t+1ig),t\in R.$

32. Find the locus of a point such that the sum of its distance from the points (2, 2) and (2, -2) is 6.



33. Two points P(a,0) and Q(-a,0) are given. R is a variable point on one side of the line PQ such that $\angle RPQ - \angle RQP$ is a positive constant 2α . Find the locus of the point R.

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34. If the coordinates of a variable point *P* are $(a \cos \theta, b \sin \theta)$, where θ

is a variable quantity, then find the locus of P_{\cdot}



35. Find the locus of a point whose distance from (a, 0) is equal to its distance from the y-axis.



36. The coordinates of the point A and B are (a,0) and (-a, 0), respectively. If a point P moves so that $PA^2 - PB^2 = 2k^2$, when k is constant, then find the equation to the locus of the point P.

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37. The locus of the foot of perpendicular drawn from origin to a variable

line passing through fixed points (2,3) is a circle whose diameter is?



38. A variable line through the point P(2,1) meets the axes at A an d B .

Find the locus of the centroid of triangle OAB (where O is the origin).



39. If $A(\cos \alpha, \sin \alpha)$, $B(\sin \alpha, -\cos \alpha)$, C(1, 2) are the vertices of *ABC*, then as α varies, find the locus of its centroid.

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40. Let A(2, -3) and B(-2, 1) be the vertices of ΔABC . If the centroid of the triangle moves on the line 2x + 3y = 1, then find the locus of the vertex C.



41. Convert the following points from polar coordinates to the
corresponding Cartesian coordinates. (i)

$$(ii)(iii)((iv)(v)2, (vi)\frac{\pi}{vii}3(viii)(ix)(x))(xi)$$
 (xii) (xiii) (ii)
 $(xiii)(\xi v)((xv)(xvi)0, (xvii)\frac{\pi}{xviii}2(xix)(\times)(\times i))(xxii)$ (xxiii) (iii)
 $(xxiv)(\times v)((xxvi)(\times vii) - \sqrt{(xxviii)2(xxix)}(xxx), (\times \xi)\frac{\pi}{xxxii}4(x)$
(xxxvii)

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42. A straight line is drawn through P(3, 4) to meet the axis of x and y at AandB, respectively. If the rectangle OACB is completed, then find the locus of C.



43. A variable line passing through point P(2, 1) meets the axes at A and B. Find the locus of the circumcenter of triangle OAB (where O is the origin).

44. A point moves such that the area of the triangle formed by it with the

points (1, 5) and (3, -7)is21squarts Then, find the locus of the point.

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45. Find the locus of the point of intersection of lines $x \cos \alpha + y \sin \alpha = a$ and $x \sin \alpha - y \cos \alpha = b(\alpha \text{ is a variable}).$

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46. Find the locus of the middle point of the portion of the line $x \cos \alpha + y \sin \alpha = p$ which is intercepted between the axes, given that p remains constant.



47. Q is a variable point whose locus is 2x + 3y + 4 = 0; corresponding to a particular position of Q, P is the point of section of OQ, O being the origin, such that OP: PQ = 3: 1. Find the locus of P.



48. Convert y = 10 into a polar equation.

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49. Convert the following Cartesian coordinates to the corresponding polar coordinates using positive r and negative r. (i) (ii)(iii)((iv)(v) - 1, 1(vi))(vii) (viii) (ii) $(ix)(x)((xi)(\xi i)2, -3(xiii))(xiv)$ (xv)

50. Find the minimum distance of any point on the line 3x + 4y - 10 = 0

from the origin using polar coordinates.



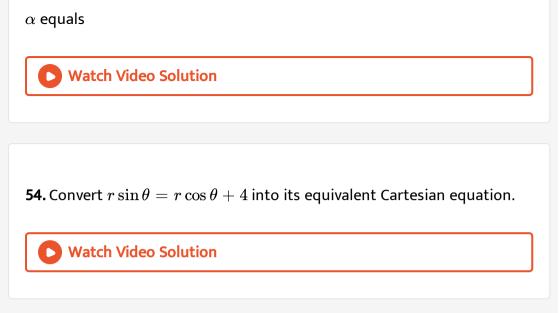
51. If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less than $\sqrt{5}$, then the set of possible values of a is (1) (-3, 3) (2) $(-3, \infty)$ (3) $(3, \infty)$ (4) $(-\infty, -3)$

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52. Express the polar equation $r = 2\cos\theta$ in rectangular coordinates.



53. Let L be the line of intersection of the planes 2x + 3y + z = 1 and x + 3y + 2z = 2. If L makes an angles α with the positive x-axis, then $\cos \alpha$



55. Convert $r = \cos e c \theta e^{r \cos \theta}$ into its equivalent Cartesian equation.

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56. A particle just clears a wall of height b at distance a and strikes the ground at a distance c from the point of projection. The angle of projection is (1) $\frac{\tan^{-1}b}{ac}$ (2) 45^{o} (3) $\frac{\tan^{-1}(bc)}{a(c-a)}$ (4) $\frac{\tan^{-1}(bc)}{a}$

57. Convert the following polar coordinates to its equivalent Cartesian coordinates. (i) $(ii)(iii)2, \pi)(iv)$ (v) (ii) $(vi)(vii)((viii)(ix)\sqrt{(x)2(xi)}(xii), (\xi ii)\frac{\pi}{xiv}6(xv)(xvi)(xvii))(xviii)$ (xix) (iii) $(xx)(\times i)((xxii)(\times iii) - 3, -(xxiv)\frac{\pi}{xxv}6(xxvi)(\times vii)(\times viii))(xxii)$ (xxx)

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58. If (2, 3, 5) is one end of a diameter of the sphere $x^2 + y^2 + z^2 - 6x - 12y - 2z + 20 = 0$, then the coordinates of the other end of the diameter are (1) (4, 9, -3) (2) (4, -3, 3) (3) (4, 3, 5) (4) (4, 3, -3)

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59. Convert $r = 4 \tan \theta \sec \theta$ into its equivalent Cartesian equation.



60. Given the equation $4x^2 + 2\sqrt{3}xy + 2y^2 = 1$. Through what angle should the axes be rotated so that the term xy is removed from the transformed equation.

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61. The equation of a curve referred to a given system of axes is $3x^2 + 2xy + 3y^2 = 10$. Find its equation if the axes are rotated through an angle 45^0 , the origin remaining unchanged.

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

63. What does the equation $2x^2 + 4xy - 5y^2 + 20x - 22y - 14 = 0$ become when referred to the rectangular axes through the point (-2, -3), the new axes being inclined at an angle at 45^0 with the old axes?



64. 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.

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

66. Find the equation to which the equation $x^2 + 7xy - 2y^2 + 17x - 26y - 60 = 0$ is transformed if the origin is shifted to the point (2, -3), the axes remaining parallel to the original axies.

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67. The equation of curve referred to the new axes, axes retaining their directions, and origin (4,5) is $X^2 + Y^2 = 36$. Find the equation referred to the original axes.

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68. If the point (2, 3), (1, 1), and (x, 3x) are collinear, then find the value of x, using slope method.



69. Which line is having the greatest inclination with the positive direction of the x-axis?

(i) Line joining the points (1, 3) and (4, 7)

(ii)Line 3x - 4y + 3 = 0

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70. Find the orthocentre of ΔABC with vertices A(1,0), B(-2,1),

and C(5, 2)

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71. The angle between the line joining the points (1, -2), (3, 2) and the

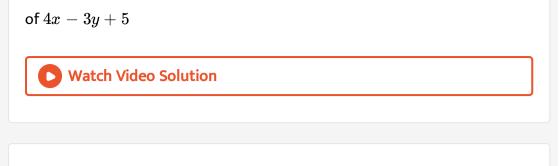
line x + 2y - 7 = 0 is

72. The line joining the points A(2, 1) and B(3, 2) is perpendicular to the line $(a^2)x + (a+2)y + 2 = 0$. Find the values of a. Watch Video Solution value of k are the 73. For what points (k, 2-2k)(-k+1, 2k)and(-4-k, 6, 6-2k) are collinear? Watch Video Solution

74. Find the area of the quadrilateral ABCD having vertices A(1, 1), B(7, -3), C(12, 2), and D(7, 21).

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75. Given that P(3, 1), Q(6, 5), and R(x, y) are three points such that the angle PQR is a right angle and the area of RQP is 7, find the value



76. If O is the origin and if the coordinates of any two points Q_1 and Q_2

are $(x_1,y_1) \ and \ (x_2,y_2),$ respectively, prove that

 $OQ_1.~OQ_2\cos \angle Q_1OQ_2 = x_1x_2+y_1y_2.$

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77. Prove that the area of the triangle whose vertices are (t, t-2), (t+2, t+2), and (t+3, t) is independent of t.

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78. Find the area of a triangle having vertices A(3, 2), B(11, 8) and C(8, 12).

79. In ABC Prove that $AB^2 + AC^2 = 2 \bigl(AO^2 + BO^2 \bigr)$, where O is the middle point of BC



80. Two points O(0,0) and $A(3,\sqrt{3})$ with another point P form an equilateral triangle. Find the coordinates of P.

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81. Find the coordinate of the circumcenter of the triangle whose vertices

are A(5, -1), B(-1, 5), and C(6,6)`. Find its radius also.

82. Find the orthocentre of ΔABC with vertices A(1,0), B(-2,1),

and C(5, 2)



83. If $(b_2 - b_1)(b_3 - b_1) + (a_2 - a_1)(a_3 - a_1) = 0$, then prove that the circumcenter of the triangle having vertices $(a_1, b_1), (a_2, b_2)$ and (a_3, b_3) is $\left(\frac{a_{2+a_3}}{2}, \frac{b_{2+}b_3}{2}\right)$ Watch Video Solution

84. If line 3x - ay - 1 = 0 is parallel to the line (a + 2)x - y + 3 = 0

then find the value of a_{\cdot}

85. If A(2, -1) and B(6, 5) are two points, then find the ratio in which the food of the perpendicular from (4, 1) to AB divides it.

86. Angle of a line with the positive direction of the x-axis is θ . The line is rotated about some point on it in anticlockwise direction by angle 45^0 and its slope becomes 3. Find the angle θ .

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87. Let A(6, 4)andB(2, 12) be two given point. Find the slope of a line perpendicular to AB.



88. If the points (a, 0), (b, 0), (0, c), and (0, d) are concyclic (a, b, c, d > 0), then prove that ab = cd.



89. If A(-2,1), B(2,3) and C(-2, -4) are three points, find the angle between BA and BC.

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90. The line joining the points (x, 2x) and (3, 5) makes an obtuse angle

with the positive direction of the x-axis. Then find the values of x_{\cdot}



91. If the line passing through (4,3)and(2,k) is parallel to the line

 $y=2x+3, ext{ then find the value of } k \cdot$



92. Find the area of the pentagon whose vertices are A(1, 1), B(7, 21), C(7, -3), D(12, 2), and E(0, -3)

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93. Let A=(3,4) and B is a variable point on the lines |x| =6. IF $AB\leq 4$

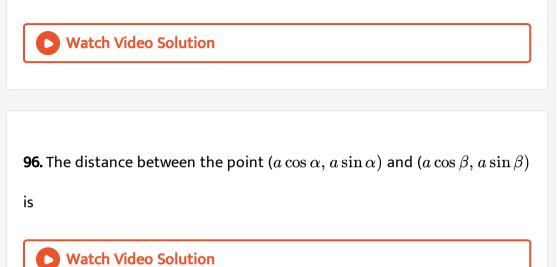
, then find the number of position of B with integral coordinates.

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94. The three points (-2, 2)(8, -2), and(-4, -3) are the vertices of (a) an isosceles triangle (b) an equilateral triangle (c) a right-angled triangle (d) none of these



95. The points $(-a, -b), (a, b), (a^2, ab)$ are (a) vertices of an equilateral triangle (b) vertices of a right angled triangle (c) vertices of an isosceles triangle (d) collinear



97. Find the length of altitude through A of the triangle ABC, where

$$A \equiv (\,-3,0)B \equiv (4,\,-1), C \equiv (5,2)$$

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98. 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.



99. If the point (0, 0), $(2, 2\sqrt{3})$, and (p, q) are the vertices of an equilateral triangle, then (p,q) is

A. (a) (0,-4)

B. (b) (4,4)

C. (c) (4,0)

D. (d) (5,0)

Answer: null

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100. Given points $P(2, 3), Q(4, -2), and R(\alpha, 0)$ (i) Find the value of $(ii)\alpha(iii)$ (iv) if (v)(vi)PR + rQ(vii) (viii) is minimum (ix) Find the value

of (x)lpha(xi) (xii) if $(xiii)(\xi v)|(xv)PR-RQ|(xvi)$ (xvii) is maximum



101. If the vertices of a triangle have rational coordinates, then prove that

the triangle cannot be equilateral.