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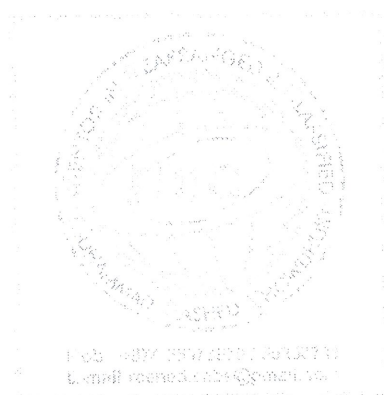
Pure Mathematics-1

**TOPIC- COORDINATE
GEOMETRY**

COORDINATE GEOMETRY

- 1 Find the coordinates of the point at which the perpendicular bisector of the line joining (2, 7) to (10, 3) meets the x-axis. [5]

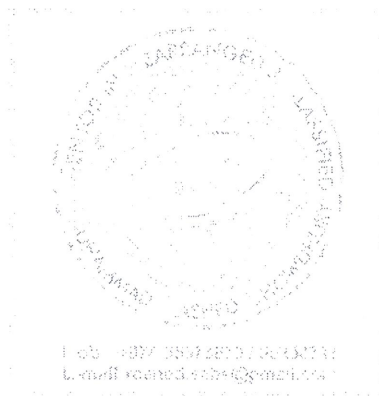
J-14-12-1



COORDINATE GEOMETRY

- 4 The point A has coordinates $(-1, -5)$ and the point B has coordinates $(7, 1)$. The perpendicular bisector of AB meets the x -axis at C and the y -axis at D . Calculate the length of CD . [6]

$J-12-12-4$



COORDINATE GEOMETRY

- 3 The point A has coordinates (3, 1) and the point B has coordinates (-21, 11). The point C is the mid-point of AB.

N-13-13-3

(i) Find the equation of the line through A that is perpendicular to $y = 2x - 7$. [2]

(ii) Find the distance AC. [3]

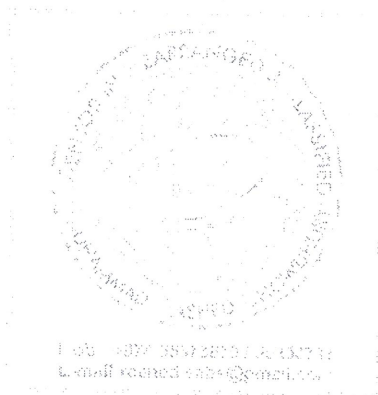


COORDINATE GEOMETRY

4 *C* is the mid-point of the line joining $A(14, -7)$ to $B(-6, 3)$. The line through C perpendicular to AB crosses the y -axis at D .

(i) Find the equation of the line CD , giving your answer in the form $y = mx + c$. [4]

(ii) Find the distance AD . [2]



COORDINATE GEOMETRY

11-16-11
-C68

A curve has equation $y = 3x - \frac{4}{x}$ and passes through the points $A(1, -1)$ and $B(4, 11)$. At each of the points C and D on the curve, the tangent is parallel to AB . Find the equation of the perpendicular bisector of CD .

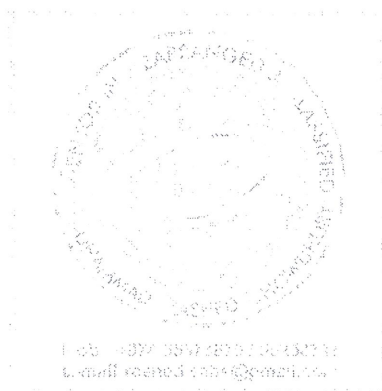
[7]



COORDINATE GEOMETRY

- 7 The coordinates of points A and B are $(a, 2)$ and $(3, b)$ respectively, where a and b are constants. The distance AB is $\sqrt{125}$ units and the gradient of the line AB is 2. Find the possible values of a and of b .

J-14-11 £71 [6]



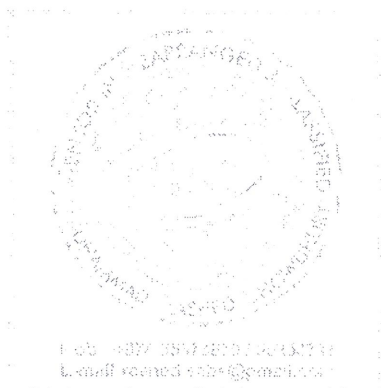
COORDINATE GEOMETRY

5

The line $\frac{x}{a} + \frac{y}{b} = 1$, where a and b are positive constants, intersects the x - and y -axes at the points A and B respectively. The mid-point of AB lies on the line $2x + y = 10$ and the distance $AB = 10$. Find the values of a and b .

[6]

7/16/12
- (6)



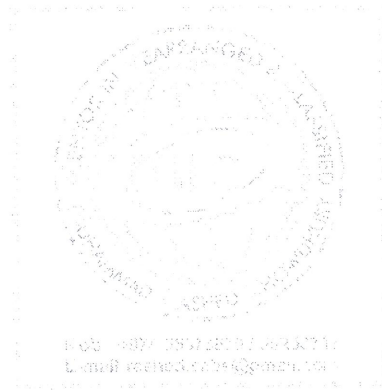
COORDINATE GEOMETRY

7 The curve $y = \frac{10}{2x+1} - 2$ intersects the x -axis at A . The tangent to the curve at A intersects the y -axis at C .

7-13-12-7

(i) Show that the equation of AC is $5y + 4x = 8$. [5]

(ii) Find the distance AC . [2]



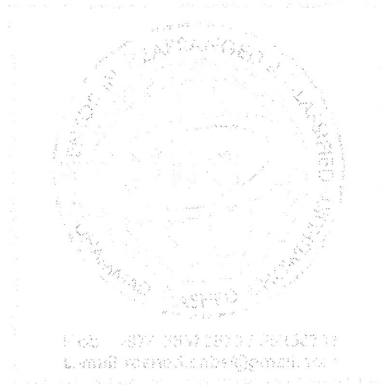
COORDINATE GEOMETRY

- 7 The line L_1 has equation $2x + y = 8$. The line L_2 passes through the point $A(7, 4)$ and is perpendicular to L_1 .

7-3-7

(i) Find the equation of L_2 . [4]

(ii) Given that the lines L_1 and L_2 intersect at the point B , find the length of AB . [4]



COORDINATE GEOMETRY

8 The equation of a curve is $y = 5 - \frac{8}{x}$.

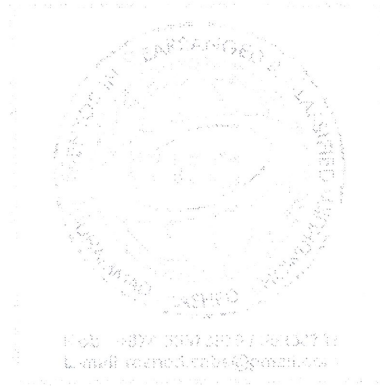
N-8-8

(i) Show that the equation of the normal to the curve at the point $P(2, 1)$ is $2y + x = 4$. [4]

This normal meets the curve again at the point Q .

(ii) Find the coordinates of Q . [3]

(iii) Find the length of PQ . [2]



COORDINATE GEOMETRY

7 The line L_1 passes through the points $A(2, 5)$ and $B(10, 9)$. The line L_2 is parallel to L_1 and passes through the origin. The point C lies on L_2 such that AC is perpendicular to L_2 . Find

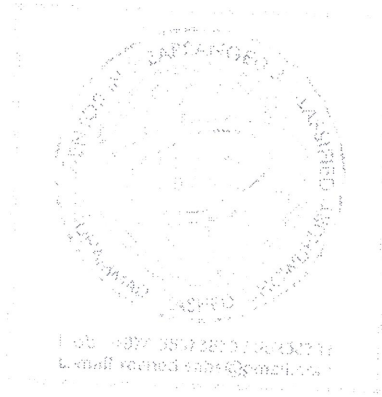
(i) the coordinates of C ,

7-11-12-7

[5]

(ii) the distance AC .

[2]



COORDINATE GEOMETRY

8 Three points have coordinates $A(0, 7)$, $B(8, 3)$ and $C(3k, k)$. Find the value of the constant k for which

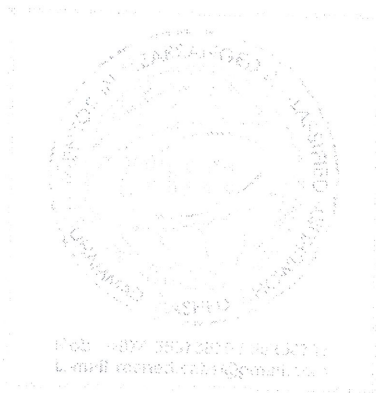
(i) C lies on the line that passes through A and B ,

[4]

(ii) C lies on the perpendicular bisector of AB .

[4]

9-11-12
67
CG



COORDINATE GEOMETRY

2-15-12-65

6 Points A , B and C have coordinates $A(-3, 7)$, $B(5, 1)$ and $C(-1, k)$, where k is a constant.

(i) Given that $AB = BC$, calculate the possible values of k .

[3]

The perpendicular bisector of AB intersects the x -axis at D .

(ii) Calculate the coordinates of D .

[5]



COORDINATE GEOMETRY

7 Three points have coordinates $A(2, 6)$, $B(8, 10)$ and $C(6, 0)$. The perpendicular bisector of AB meets the line BC at D . Find N-5-7

(i) the equation of the perpendicular bisector of AB in the form $ax + by = c$, [4]

(ii) the coordinates of D . [4]

C. be



COORDINATE GEOMETRY

7 The point C lies on the perpendicular bisector of the line joining the points A (4, 6) and B (10, 2).
C also lies on the line parallel to AB through (3, 11).

(i) Find the equation of the perpendicular bisector of AB.

J-15-12-7

[4]

(ii) Calculate the coordinates of C.

[3]



COORDINATE GEOMETRY

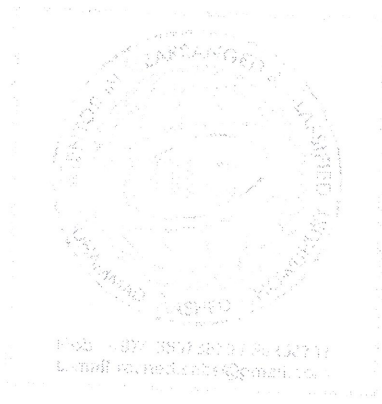
6 A is the point $(a, 2a - 1)$ and B is the point $(2a + 4, 3a + 9)$, where a is a constant.

(i) Find, in terms of a , the gradient of a line perpendicular to AB. *N = 14-13-6*

[3]

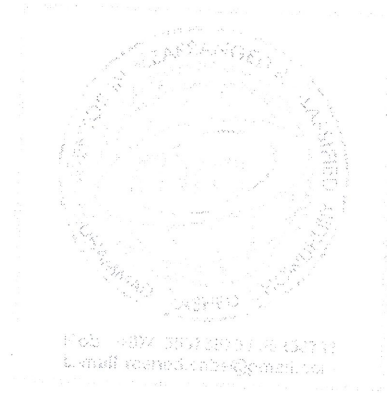
(ii) Given that the distance AB is $\sqrt{(260)}$, find the possible values of a .

[4]



COORDINATE GEOMETRY

- 7 The point A has coordinates $(-1, 6)$ and the point B has coordinates $(7, 2)$. *N-13-11-7*
- (i) Find the equation of the perpendicular bisector of AB, giving your answer in the form $y = mx + c$.
[4]
- (ii) A point C on the perpendicular bisector has coordinates (p, q) . The distance OC is 2 units, where O is the origin. Write down two equations involving p and q and hence find the coordinates of the possible positions of C.
[5]



COORDINATE GEOMETRY

6 Three points, A , B and C , are such that B is the mid-point of AC . The coordinates of A are $(2, m)$ and the coordinates of B are $(n, -6)$, where m and n are constants.

(i) Find the coordinates of C in terms of m and n .

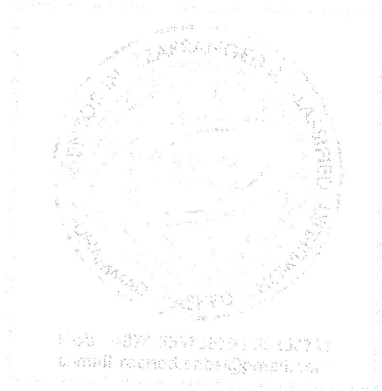
[2]

The line $y = x + 1$ passes through C and is perpendicular to AB .

(ii) Find the values of m and n .

[5]

21-16-18-C6



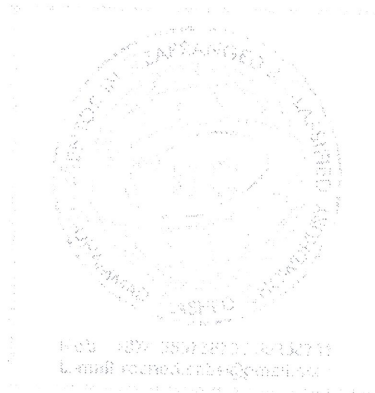
COORDINATE GEOMETRY

7 The point A has coordinates $(p, 1)$ and the point B has coordinates $(9, 3p + 1)$, where p is a constant.

(i) For the case where the distance AB is 13 units, find the possible values of p . [3]

(ii) For the case in which the line with equation $2x + 3y = 9$ is perpendicular to AB, find the value of p . [4]

5-15-13
CG



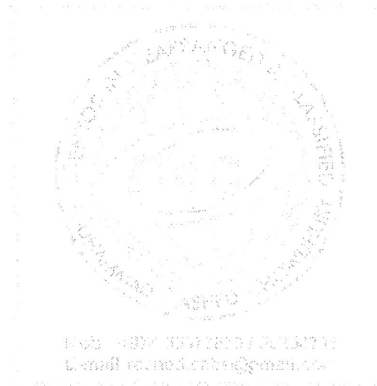
COORDINATE GEOMETRY

11 Triangle ABC has vertices at $A(-2, -1)$, $B(4, 6)$ and $C(6, -3)$.

(i) Show that triangle ABC is isosceles and find the exact area of this triangle. [6]

(ii) The point D is the point on AB such that CD is perpendicular to AB . Calculate the x -coordinate of D . [6]

5-16-15
69



COORDINATE GEOMETRY

6 The line with gradient -2 passing through the point $P(3t, 2t)$ intersects the x -axis at A and the y -axis at B .

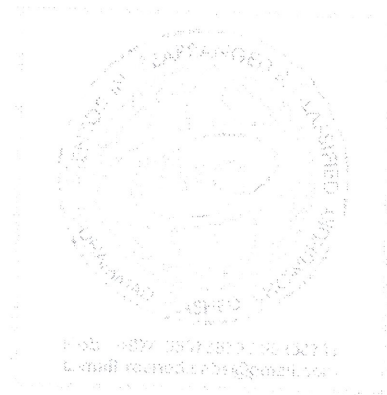
(i) Find the area of triangle AOB in terms of t .

[3]

The line through P perpendicular to AB intersects the x -axis at C .

(ii) Show that the mid-point of PC lies on the line $y = x$.

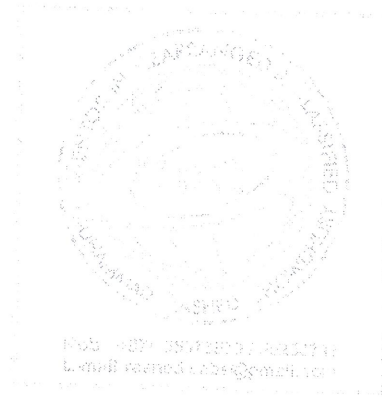
[4]



COORDINATE GEOMETRY

- 4 The line $4x + ky = 20$ passes through the points $A(8, -4)$ and $B(b, 2b)$, where k and b are constants.
- (i) Find the values of k and b . [4]
- (ii) Find the coordinates of the mid-point of AB . [1]

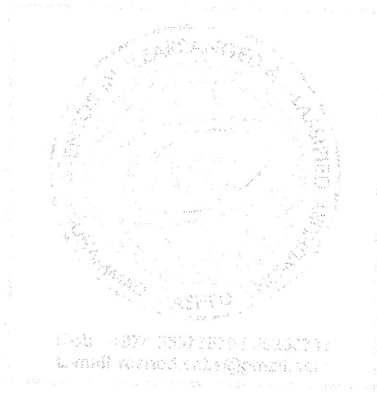
$$2 - 14 - 11 - 4$$



COORDINATE GEOMETRY

- 7 A curve has equation $y = x^2 - 4x + 4$ and a line has equation $y = mx$, where m is a constant.
- (i) For the case where $m = 1$, the curve and the line intersect at the points **A** and **B**. Find the coordinates of the mid-point of **AB**. [4]
- (ii) Find the non-zero value of m for which the line is a tangent to the curve, and find the coordinates of the point where the tangent touches the curve. [5]

J-13-11-7



COORDINATE GEOMETRY

2 Points A , B and C have coordinates $(2, 5)$, $(5, -1)$ and $(8, 6)$ respectively.

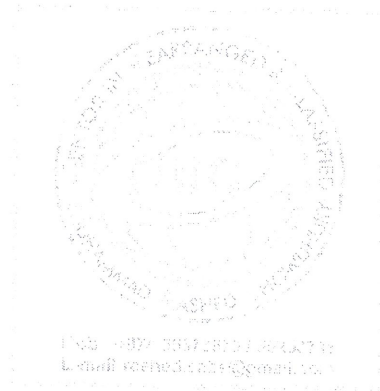
(i) Find the coordinates of the mid-point of AB .

$$N-10-13-2$$

[1]

(ii) Find the equation of the line through C perpendicular to AB . Give your answer in the form $ax + by + c = 0$.

[3]



COORDINATE GEOMETRY

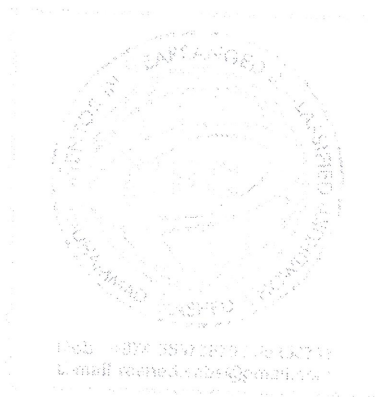
10 The equation of a curve is $y = 3 + 4x - x^2$.

N-10-11-10

(i) Show that the equation of the normal to the curve at the point (3, 6) is $2y = x + 9$. [4]

(ii) Given that the normal meets the coordinate axes at points A and B , find the coordinates of the mid-point of AB . [2]

(iii) Find the coordinates of the point at which the normal meets the curve again. [4]



COORDINATE GEOMETRY

9 The coordinates of A are $(-3, 2)$ and the coordinates of C are $(5, 6)$. The mid-point of AC is M and the perpendicular bisector of AC cuts the x -axis at B .

7-12-11-9

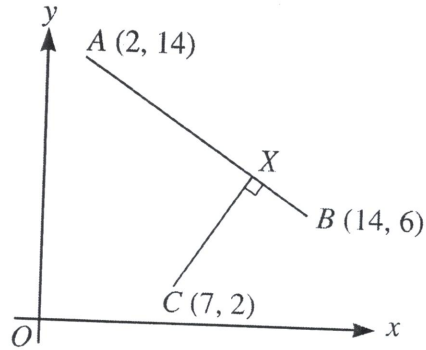
- (i) Find the equation of MB and the coordinates of B . [5]
- (ii) Show that AB is perpendicular to BC . [2]
- (iii) Given that $ABCD$ is a square, find the coordinates of D and the length of AD . [2]



COORDINATE GEOMETRY

7

C6



The diagram shows three points $A(2, 14)$, $B(14, 6)$ and $C(7, 2)$. The point X lies on AB , and CX is perpendicular to AB . Find, by calculation,

7-13-13-7

- (i) the coordinates of X ,
- (ii) the ratio $AX : XB$.

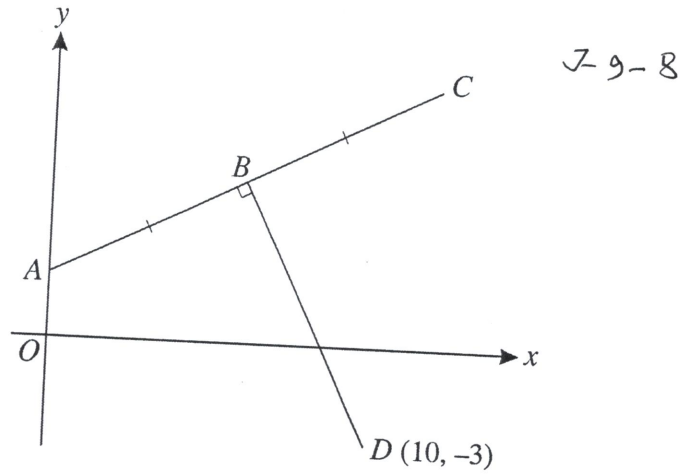
[6]

[2]



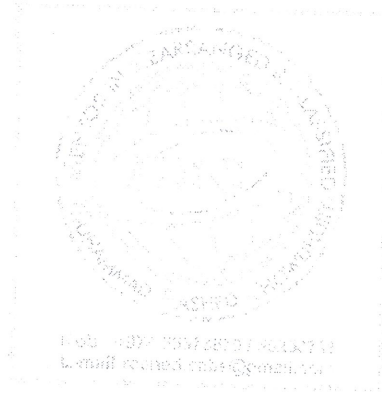
COORDINATE GEOMETRY

8



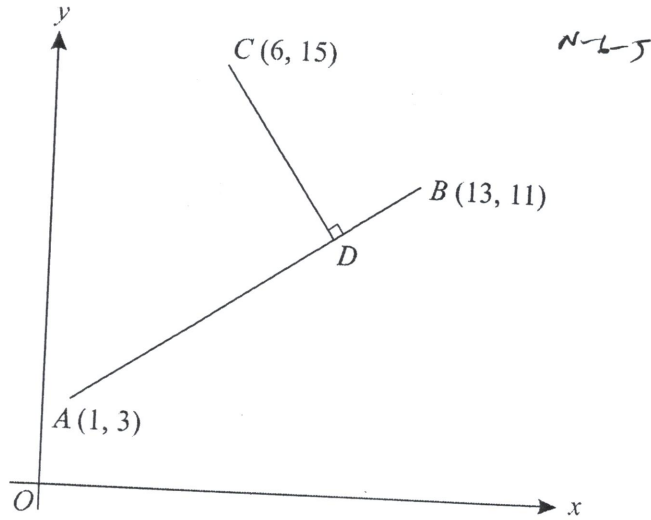
The diagram shows points A , B and C lying on the line $2y = x + 4$. The point A lies on the y -axis and $AB = BC$. The line from $D(10, -3)$ to B is perpendicular to AC . Calculate the coordinates of B and C .

[7]



COORDINATE GEOMETRY

5

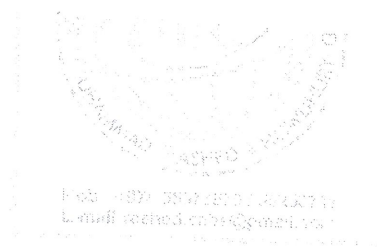


The three points $A(1, 3)$, $B(13, 11)$ and $C(6, 15)$ are shown in the diagram. The perpendicular from C to AB meets AB at the point D . Find

- (i) the equation of CD ,
- (ii) the coordinates of D .

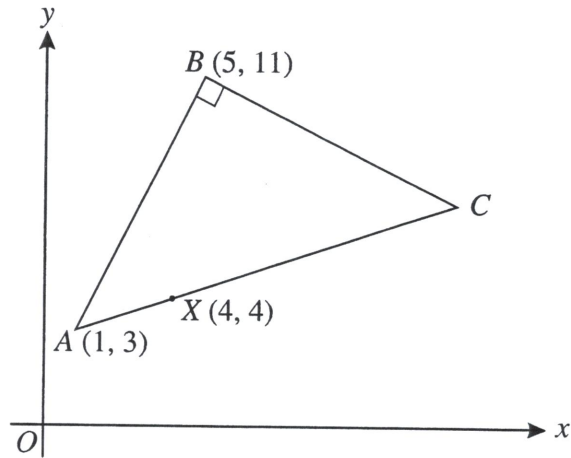
[3]

[4]



COORDINATE GEOMETRY

5



The diagram shows a triangle ABC in which A has coordinates $(1, 3)$, B has coordinates $(5, 11)$ and angle ABC is 90° . The point $X(4, 4)$ lies on AC . Find

N-2-2-5

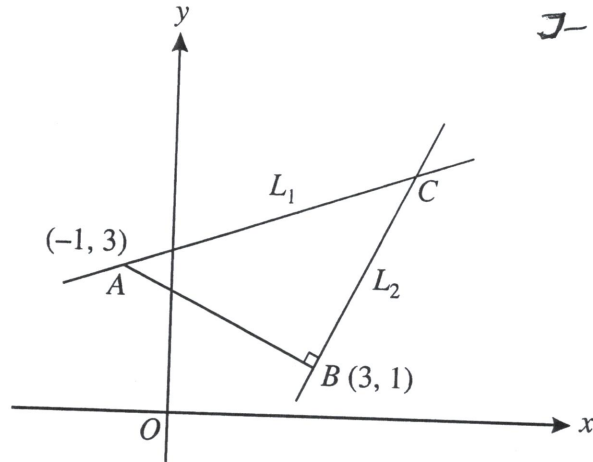
- (i) the equation of BC , [3]
- (ii) the coordinates of C . [3]



COORDINATE GEOMETRY

4

J-10-12-4



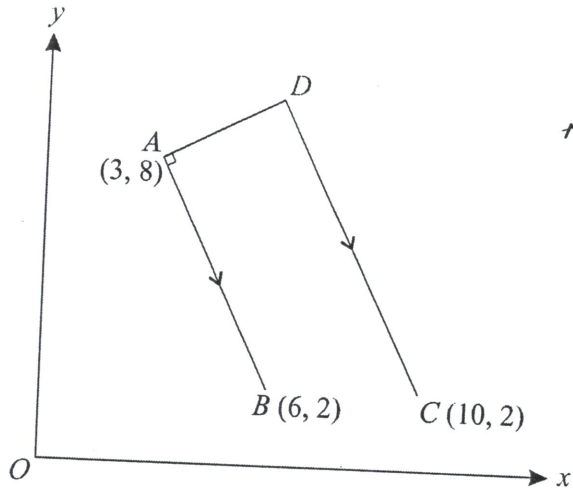
In the diagram, A is the point $(-1, 3)$ and B is the point $(3, 1)$. The line L_1 passes through A and is parallel to OB . The line L_2 passes through B and is perpendicular to AB . The lines L_1 and L_2 meet at C . Find the coordinates of C .

[6]



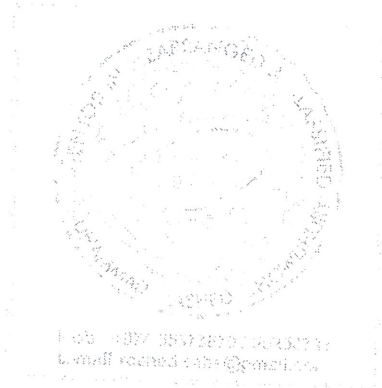
COORDINATE GEOMETRY

6



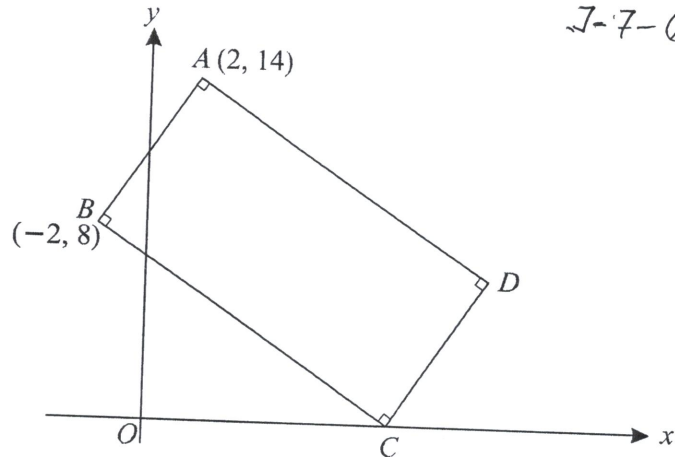
N-7-6

The three points $A(3, 8)$, $B(6, 2)$ and $C(10, 2)$ are shown in the diagram. The point D is such that the line DA is perpendicular to AB and DC is parallel to AB . Calculate the coordinates of D . [7]



COORDINATE GEOMETRY

6

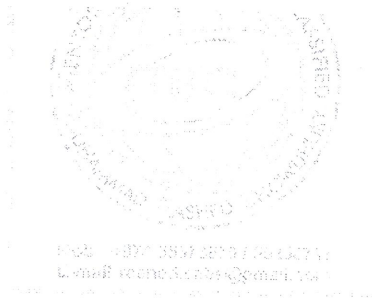


The diagram shows a rectangle $ABCD$. The point A is $(2, 14)$, B is $(-2, 8)$ and C lies on the x -axis. Find

- (i) the equation of BC ,
- (ii) the coordinates of C and D .

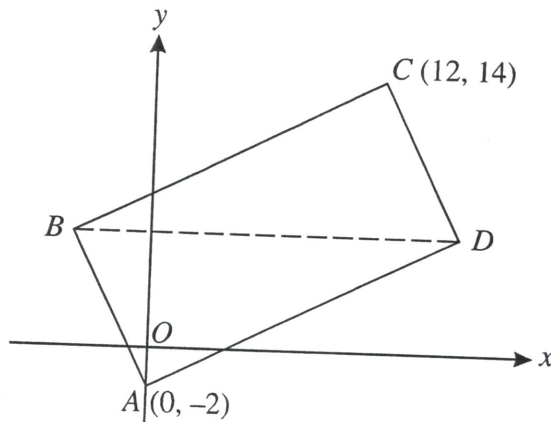
[4]

[3]



COORDINATE GEOMETRY

9



N-9-12-9

The diagram shows a rectangle $ABCD$. The point A is $(0, -2)$ and C is $(12, 14)$. The diagonal BD is parallel to the x -axis.

(i) Explain why the y -coordinate of D is 6.

[1]

The x -coordinate of D is h .

(ii) Express the gradients of AD and CD in terms of h .

[3]

(iii) Calculate the x -coordinates of D and B .

[4]

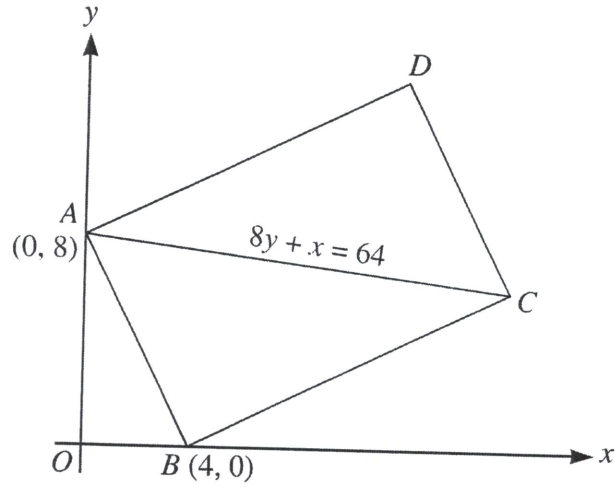
(iv) Calculate the area of the rectangle $ABCD$.

[3]

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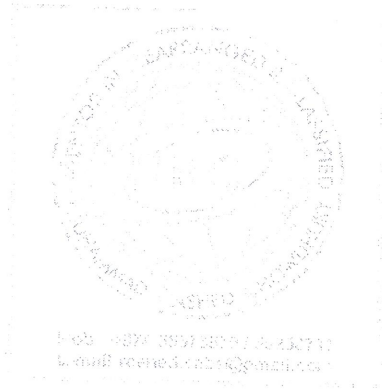
COORDINATE GEOMETRY

5



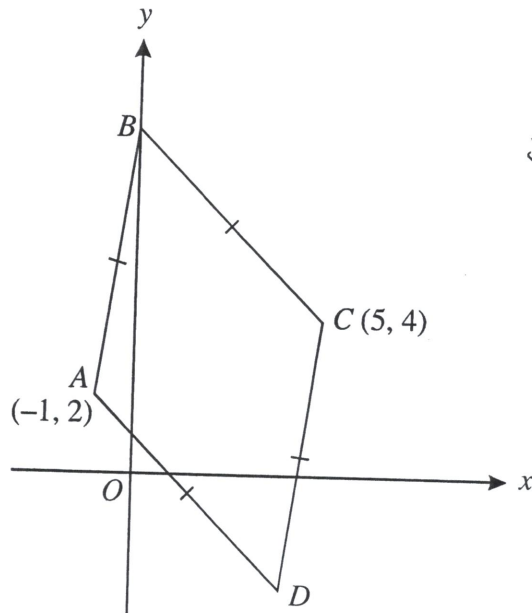
The diagram shows a rectangle $ABCD$ in which point A is $(0, 8)$ and point B is $(4, 0)$. The diagonal AC has equation $8y + x = 64$. Find, by calculation, the coordinates of C and D . [7]

N-13-12-J



COORDINATE GEOMETRY

8



The diagram shows a rhombus $ABCD$ in which the point A is $(-1, 2)$, the point C is $(5, 4)$ and the point B lies on the y -axis. Find

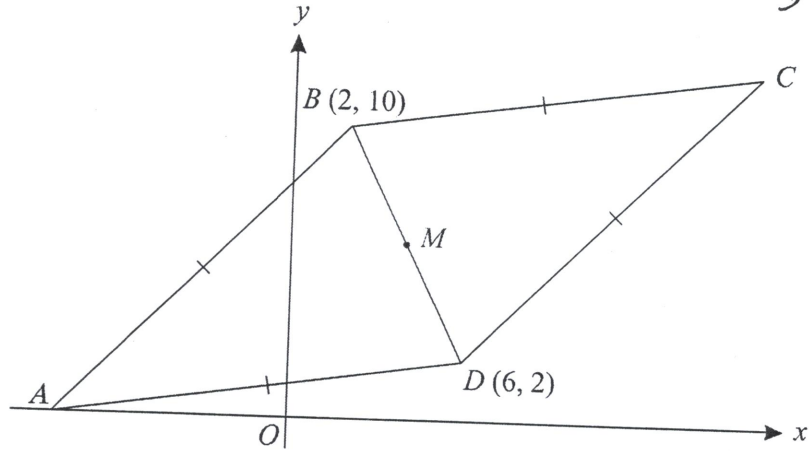
- (i) the equation of the perpendicular bisector of AC , [3]
- (ii) the coordinates of B and D , [3]
- (iii) the area of the rhombus. [3]

COORDINATE GEOMETRY

5

7-5-5

C. Geo



The diagram shows a rhombus $ABCD$. The points B and D have coordinates $(2, 10)$ and $(6, 2)$ respectively, and A lies on the x -axis. The mid-point of BD is M . Find, by calculation, the coordinates of each of M , A and C .

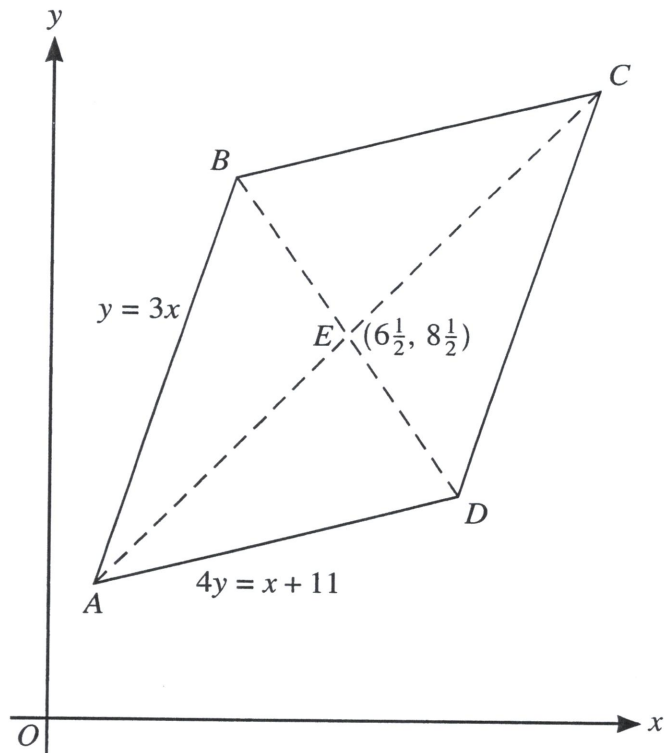
[6]



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COORDINATE GEOMETRY

11



The diagram shows a parallelogram $ABCD$, in which the equation of AB is $y = 3x$ and the equation of AD is $4y = x + 11$. The diagonals AC and BD meet at the point $E(6\frac{1}{2}, 8\frac{1}{2})$. Find, by calculation, the coordinates of A , B , C and D .

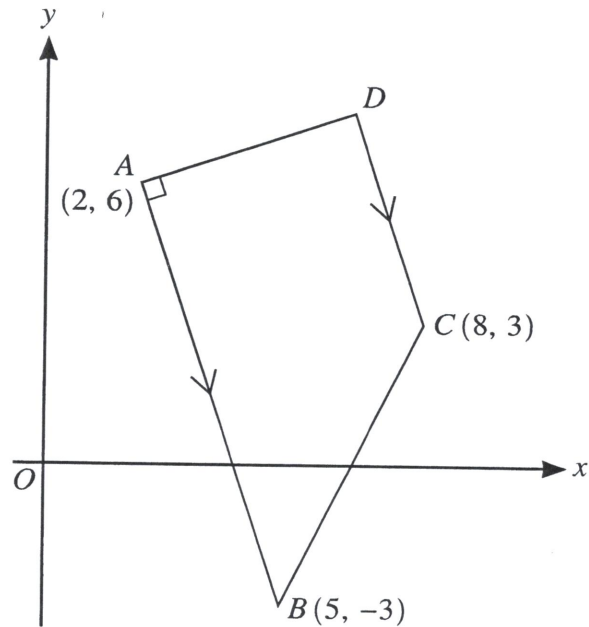
7-11-13-11

[9]

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COORDINATE GEOMETRY

9



The diagram shows a trapezium $ABCD$ in which AB is parallel to DC and angle BAD is 90° . The coordinates of A , B and C are $(2, 6)$, $(5, -3)$ and $(8, 3)$ respectively.

N-14-1-9

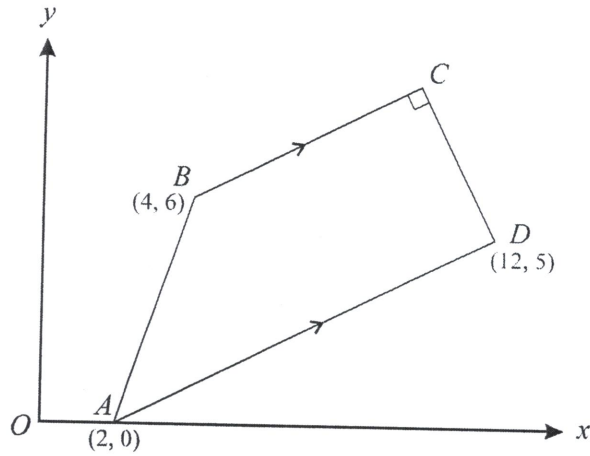
- (i) Find the equation of AD . [3]
- (ii) Find, by calculation, the coordinates of D . [3]

The point E is such that $ABCE$ is a parallelogram.

- (iii) Find the length of BE . [2]

COORDINATE GEOMETRY

5



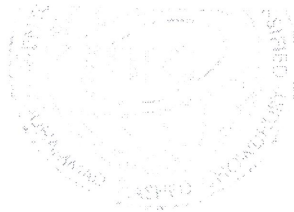
The diagram shows a trapezium $ABCD$ in which BC is parallel to AD and angle $BCD = 90^\circ$. The coordinates of A , B and D are $(2, 0)$, $(4, 6)$ and $(12, 5)$ respectively.

(i) Find the equations of BC and CD .

[5]

(ii) Calculate the coordinates of C .

[2]

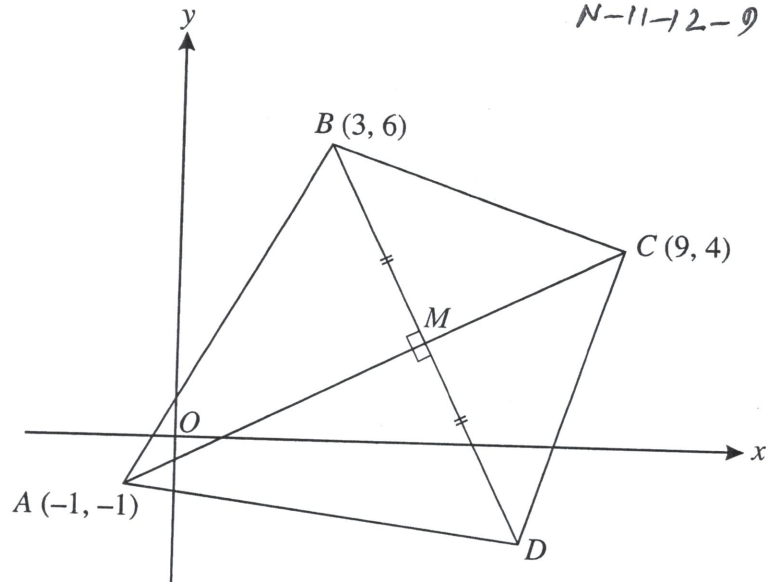


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COORDINATE GEOMETRY

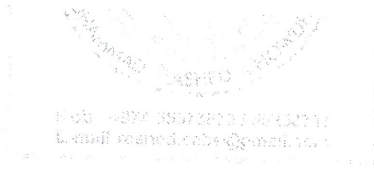
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N-11-12-9



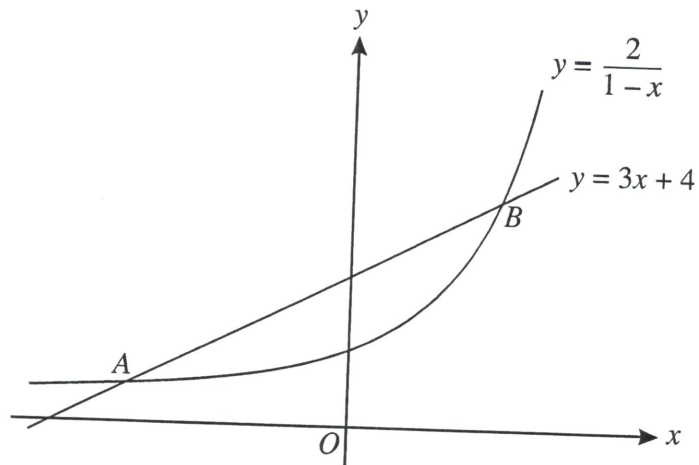
The diagram shows a quadrilateral $ABCD$ in which the point A is $(-1, -1)$, the point B is $(3, 6)$ and the point C is $(9, 4)$. The diagonals AC and BD intersect at M . Angle $BMA = 90^\circ$ and $BM = MD$. Calculate

- (i) the coordinates of M and D , [7]
- (ii) the ratio $AM : MC$. [2]



COORDINATE GEOMETRY

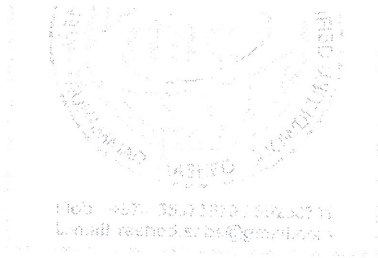
8



The diagram shows part of the curve $y = \frac{2}{1-x}$ and the line $y = 3x + 4$. The curve and the line meet at points A and B.

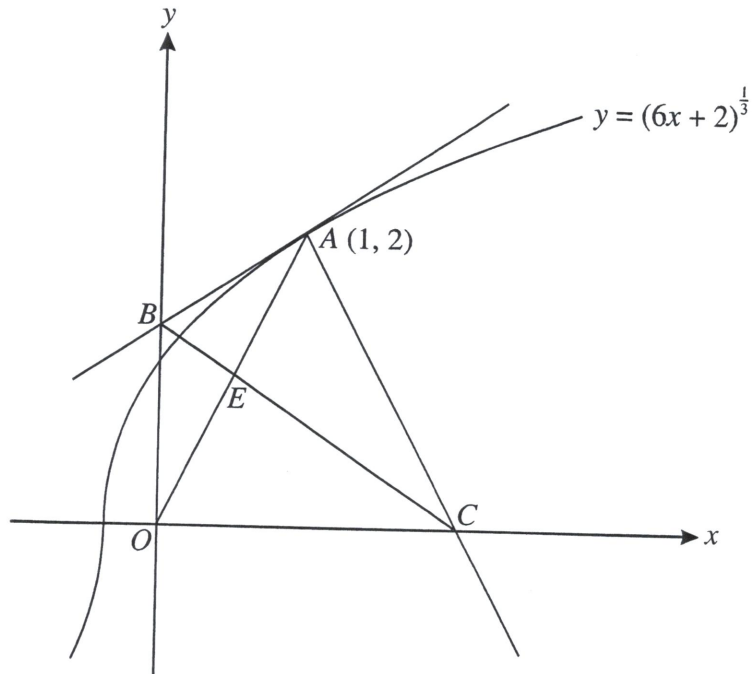
N-10-12-8

- (i) Find the coordinates of A and B. [4]
- (ii) Find the length of the line AB and the coordinates of the mid-point of AB. [3]



COORDINATE GEOMETRY

11



N-12-11-11

The diagram shows the curve $y = (6x + 2)^{\frac{1}{3}}$ and the point $A(1, 2)$ which lies on the curve. The tangent to the curve at A cuts the y -axis at B and the normal to the curve at A cuts the x -axis at C .

- (i) Find the equation of the tangent AB and the equation of the normal AC . [5]
- (ii) Find the distance BC . [3]
- (iii) Find the coordinates of the point of intersection, E , of OA and BC , and determine whether E is the mid-point of OA . [4]

Diff & Const

COORDINATE GEOMETRY

10 A curve is such that $\frac{dy}{dx} = \frac{2}{a}x^{-\frac{1}{2}} + ax^{-\frac{3}{2}}$, where a is a positive constant. The point $A(a^2, 3)$ lies on the curve. Find, in terms of a ,

(i) the equation of the tangent to the curve at A , simplifying your answer, [3]

(ii) the equation of the curve. [4]

It is now given that $B(16, 8)$ also lies on the curve.

(iii) Find the value of a and, using this value, find the distance AB . [5]

