Matrices and Coordinate Geometry Revision

S08 P2

3 Find the coordinates of the points where the straight line $y = 2x - 3$ intersects the curve $x^2 + y^2 + xy + x = 30$. [5]

9 Given that $\mathbf{A} = \begin{pmatrix} 4 & 1 \\ 2 & 3 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 3 & -5 \\ 0 & 2 \end{pmatrix}$ and $\mathbf{C} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$, calculate

(i) $\mathbf{AB}$, [2]

(ii) $\mathbf{BC}$, [2]

(iii) the matrix $\mathbf{X}$ such that $\mathbf{AX} = \mathbf{B}$. [4]

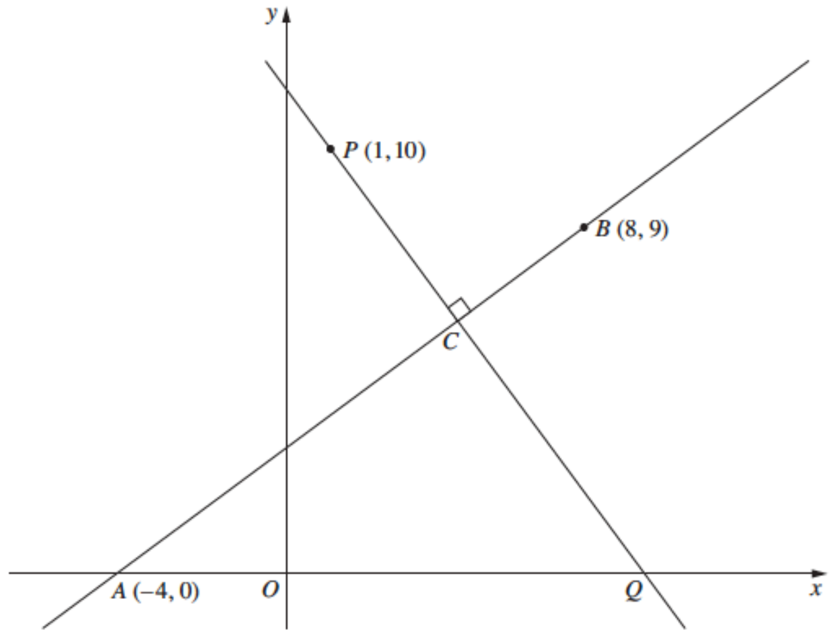
10

Solutions to this question by accurate drawing will not be accepted.

The points $A(-2, 2)$, $B(4, 4)$ and $C(5, 2)$ are the vertices of a triangle. The perpendicular bisector of AB and the line through A parallel to BC intersect at the point D. Find the area of the quadrilateral $ABCD$. [10]

S09 P1

10 Solutions to this question by accurate drawing will not be accepted.



The diagram shows the line AB passing through the points $A(-4, 0)$ and $B(8, 9)$. The line through the point $P(1, 10)$, perpendicular to AB, meets AB at C and the x-axis at Q. Find

(i) the coordinates of C and of Q, [7]

(ii) the area of triangle ACQ. [2]

S09 P2

2 Given that $\mathbf{A} = \begin{pmatrix} 7 & 6 \\ 3 & 4 \end{pmatrix}$, find $\mathbf{A}^{-1}$ and hence solve the simultaneous equations

$$7x + 6y = 17,$$
$$3x + 4y = 3.$$

[4]

10 The line $2x + y = 12$ intersects the curve $x^2 + 3xy + y^2 = 176$ at the points A and B. Find the equation of the perpendicular bisector of AB. [9]

S10 P12

1 Find the coordinates of the points of intersection of the curve $y^2 + y = 10x - 8x^2$ and the straight line $y + 4x + 1 = 0$. [5]

8 Given that $\mathbf{A} = \begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} -2 & 0 \\ 1 & 4 \end{pmatrix}$, find

(i) $3\mathbf{A} - 2\mathbf{B}$, [2]

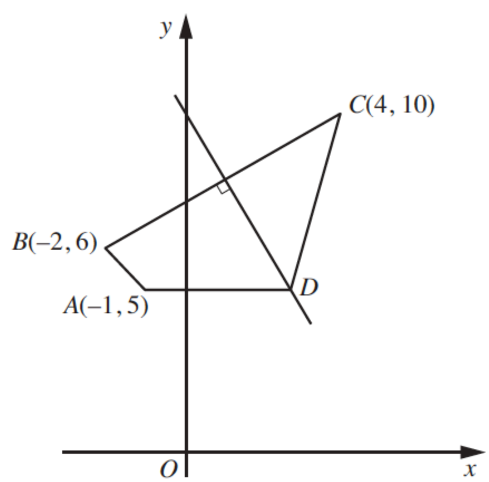
(ii) $\mathbf{A}^{-1}$, [2]

(iii) the matrix $\mathbf{X}$ such that $\mathbf{XB}^{-1} = \mathbf{A}$. [3]

S10 P21

6 The line $y = x + 4$ intersects the curve $2x^2 + 3xy - y^2 + 1 = 0$ at the points A and B. Find the length of the line AB. [7]

7 **Solutions to this question by accurate drawing will not be accepted.**



In the diagram the points $A(-1, 5)$, $B(-2, 6)$, $C(4, 10)$ and D are the vertices of a quadrilateral in which AD is parallel to the x-axis. The perpendicular bisector of BC passes through D. Find the area of the quadrilateral $ABCD$. [8]

8 **(a)** Given that $\mathbf{A} = \begin{pmatrix} 2 & 3 & 7 \\ 1 & -5 & 4 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 2 & 1 \\ 8 & 6 \end{pmatrix}$, calculate

(i) $2\mathbf{A}$, [1]

(ii) $\mathbf{B}^2$, [2]

(iii) $\mathbf{BA}$. [2]

(b) **(i)** Given that $\mathbf{C} = \begin{pmatrix} 2 & 1 \\ 7 & 6 \end{pmatrix}$, find $\mathbf{C}^{-1}$. [2]

(ii) Given also that $\mathbf{D} = \begin{pmatrix} 4 & 3 \\ -2 & -1 \end{pmatrix}$, find the matrix $\mathbf{X}$ such that $\mathbf{XC} = \mathbf{D}$. [2]

W08 P2

1 Given that $\mathbf{A} = \begin{pmatrix} 13 & 6 \\ 7 & 4 \end{pmatrix}$, find the inverse matrix $\mathbf{A}^{-1}$ and hence solve the simultaneous equations

$$13x + 6y = 41,$$
$$7x + 4y = 24.$$

[4]

9 The line $y = 2x - 9$ intersects the curve $x^2 + y^2 + xy + 3x = 46$ at the points A and B. Find the equation of the perpendicular bisector of AB. [8]

W09 P1

2

Team \ Place	1st	2nd	3rd	4th
Harriers	6	3	1	2
Strollers	3	2	4	3
Road Runners	2	5	5	0
Olympians	1	2	2	7

The table shows the results achieved by four teams in twelve events of an athletics match. In each event, 1st place scores 5 points, 2nd place scores 3 points, 3rd place scores 2 points and 4th place scores 1 point.

(i) Write down two matrices whose product shows the total number of points scored by each team. [2]

(ii) Evaluate this product of matrices. [2]

W09 P2

8 It is given that $\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 1 & -3 \\ 2 & 0 \end{pmatrix}$ and $\mathbf{C} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$. Find

(i) $\mathbf{AB}$, [2]

(ii) $\mathbf{BC}$, [2]

(iii) $\mathbf{A}^{-1}$, and hence find the matrix $\mathbf{X}$ such that $\mathbf{AX} = \mathbf{B}$. [4]