Matrices and Coordinate Geometry Revision Mark Scheme

S08 P2

3	Eliminates x or y	M1	
	$7x^2 - 14x - 21 = 0$ or $7y^2 + 14y - 105 = 0$ oe	A1	
	Solve 3 term quadratic	M1	
	$(x+1)(x-3)$	A1	
	(3,3) and (–1,–5)	A1	
	[or $x = \frac{2 \pm \sqrt{16}}{2}$	M1	
	–1 and 3	A1	
	(3,3) and (–1,–5)	A1]	[5]
9	**(i)** Matrix multiplication	M1	
	$\begin{pmatrix} 12 & -18 \\ 6 & -4 \end{pmatrix}$	A1	
	(ii) Matrix multiplication	M1	
	$\begin{pmatrix} 7 \\ 2 \end{pmatrix}$	A1	
	(iii) $\mathbf{A}^{-1} = \frac{1}{10}\begin{pmatrix} 3 & -1 \\ -2 & 4 \end{pmatrix}$	B1 + B1	
	premultiply $\begin{pmatrix} 3 & -5 \\ 0 & 2 \end{pmatrix}$	M1	
	$\begin{pmatrix} 0.9 & -1.7 \\ -0.6 & 1.8 \end{pmatrix}$	A1	[8]

12

M(1, 3)	B1	
grad AB = ⅓	B1	
uses $m_1 m_2 = -1$	M1	
$y - 3 = -3(x-1)$ or $3x + y = 6$	A1	
grad BC = –2	B1	
$y - 2 = -2(x+2)$ or $2x + y = -2$	M1	
solve equation of MD with equation of AD	M1	
$x = 8, y = -18$	A1	
method for area	M1	
77	A1	[10]

S09 P1

10	**(i)**	$m_{AB} = 0.75$ line AB $y - 0 = 0.75(x + 4)$	M1 A1	M1 for attempt at m_{AB} and line AB
		$m_{PQ} = -\frac{4}{3}$	M1	M1 for use of '$m_1m_2 = -1$' and attempt at line PQ
		line PQ $y - 10 = -\frac{4}{3}(x - 1)$	A1	
		intersection at C (4, 6) Q (8.5 0)	M1 A1 √ B1 [7]	M1 for attempt at solving simultaneous equations Ft on their line PQ
	(ii)	$AC = 10$, $CQ = 7.5$ Area = 37.5	M1 A1 [2]	M1 for attempt at lengths and area

S09 P2

2 $\mathbf{A}^{-1} = \frac{1}{10}\begin{pmatrix} 4 & -6 \\ -3 & 7 \end{pmatrix}$ B2,1,0

premultiply $\begin{pmatrix} 17 \\ 3 \end{pmatrix}$ M1

$x = 5$, $y = -3$ A1

4

10

Eliminate y (or x)	M1
$x^2 + 12x + 32 = 0$ (or $y^2 - 48y + 560 = 0$)	A1
solve 3-term quadratic	M1
$x = -4$ and $x = -8$ (or $y = 20$ and $y = 28$)	A1
(–4, 20) and (–8, 28)	A1√
M (–6, 24)	M1
Grad AB = –2	B1
Uses grad perpendicular = $\frac{-1}{m_{AB}}$ and coordinates of a point	M1
$y = \frac{1}{2}x + 27$ or $y - 24 = \frac{1}{2}(x + 6)$ or $x - 2y + 54 = 0$	A1

9

S10 P12

1	$24x^2 - 6x = 0$ (or $y^2 + 3y + 2 = 0$) leading to (0, 1) and $\left(\frac{1}{4}, -2\right)$	M1 M1 DM1 A1,A1 [5]	M1 for attempt to get an equation in one variable. M1 for attempt to get 2 or 3 term quadratic = 0 DM1 for attempt to solve A1 for each pair of values

8

8	**(i)** $\begin{pmatrix} 16 & 9 \\ 1 & -2 \end{pmatrix}$	B1 B1 [2]	B1 at least 2 correct B1 all correct
	(ii) $\frac{1}{8-3}\begin{pmatrix} 2 & -3 \\ -1 & 4 \end{pmatrix}$	B1 B1 [2]	B1 for determinant B1 for matrix
	(iii) $\mathbf{X} = \mathbf{AB}$ $= \begin{pmatrix} -5 & 12 \\ 0 & 8 \end{pmatrix}$	M1 A2,1,0 [3]	M1 for attempt at valid method –1 each error

S10 P21

6	Eliminate x or y	M1	
	$4x^2 + 4x - 15 = 0$ or $4y^2 - 28y + 33 = 0$	A1	
	Factorise 3 term quadratic or use formula	M1	
	$x = 3/2$ and $-5/2$	A1	
	$y = 11/2$ and $3/2$	A1√	
	$\sqrt{4^2 + 4^2}$	M1	
	$\sqrt{32}$ or $4\sqrt{2}$ or 5.66	A1	[7]

7	Midpoint (1, 8)	B1	
	Gradient BC = $2/3$	B1	
	Uses $m_1 m_2 = -1$ and equation of perpendicular bisector	M1	
	$y - 8 = -3/2(x - 1)$ or $3x + 2y = 19$	A1	
	Solve with $y = 5$	M1	
	D (3, 5)	A1	
	Complete method for area	M1	
	15	A1	[8]

8 **(a)** **(i)** $\begin{pmatrix} 4 & 6 & 14 \\ 2 & -10 & 8 \end{pmatrix}$ B1

(ii) Matrix multiplication M1

$\begin{pmatrix} 12 & 8 \\ 64 & 44 \end{pmatrix}$ A1

(iii) Matrix multiplication M1

$\begin{pmatrix} 5 & 1 & 18 \\ 22 & -6 & 80 \end{pmatrix}$ A1

(b) **(i)** $C^{-1} = \frac{1}{5}\begin{pmatrix} 6 & -1 \\ -7 & 2 \end{pmatrix}$ or B1+B1

(ii) $X = DC^{-1}$ M1

$\frac{1}{5}\begin{pmatrix} 3 & 2 \\ -5 & 0 \end{pmatrix}$ or $\begin{pmatrix} 0.6 & 0.4 \\ -1 & 0 \end{pmatrix}$ A1 [9]

W08 P2

1 $\mathbf{A}^{-1} = \frac{1}{10}\begin{pmatrix} 4 & -6 \\ -7 & 13 \end{pmatrix}$ B1+B1

evaluate $\mathbf{A}^{-1}\begin{pmatrix} 41 \\ 24 \end{pmatrix}$ M1

$x = 2$, $y = 2.5$ A1

[4]

9 eliminate y (or x) M1

$7x^2 - 42x + 35 = 0$ (or $7y^2 + 42y - 49 = 0$) oe A1

solve 3 term quadratic M1

$x = 1$ and 5 (or $y = -7$ and 1) A1

find second coordinates M1

find mid-point M1

use m_{AB}, $m_1 m_2 = -1$ and coordinates of a point M1

$y + 3 = -\frac{1}{2}(x - 3)$ or $x + 2y + 3 = 0$ or $y = -\frac{1}{2}x - \frac{3}{2}$ A1

[8]

W09 P1

2	**(i)** **(ii)** $\begin{pmatrix} 6 & 3 & 1 & 2 \\ 3 & 2 & 4 & 3 \\ 2 & 5 & 5 & 0 \\ 1 & 2 & 2 & 7 \end{pmatrix} \begin{pmatrix} 5 \\ 3 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 43 \\ 32 \\ 35 \\ 22 \end{pmatrix}$	B1, B1 [2] B2, 1, 0 [2]	B1 for each matrix, must be in correct order –1 for each error

W09 P2

8 **(i)** Matrix multiplication M1

$\begin{pmatrix} 0 & -6 \\ 10 & -12 \end{pmatrix}$ A1

(ii) Matrix multiplication M1

$\begin{pmatrix} 11 \\ 10 \end{pmatrix}$ A1

(iii) $A^{-1} = \frac{1}{10}\begin{pmatrix} 3 & 1 \\ -4 & 2 \end{pmatrix}$ B1+B1

$X = A^{-1}B$ stated M1

$\frac{1}{10}\begin{pmatrix} 5 & -9 \\ 0 & 12 \end{pmatrix}$ A1 [8]