

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	$\begin{pmatrix} -12 \\ 20 \end{pmatrix}$	1			
1(b)	$\begin{pmatrix} -13 \\ 14 \end{pmatrix}$	2		B1 for $\begin{pmatrix} -13 \\ j \end{pmatrix}$ or $\begin{pmatrix} k \\ 14 \end{pmatrix}$	
2(a)	(3, 1)	1			
2(b)	Q plotted at $(-4, 2)$	1			
2(c)	R plotted at $(1, 2)$	1			
2(d)	Line $y = 3$ drawn	1			
3(a)	$(-1, 4)$	1			
3(b)	Q marked at $(2, 2)$	1			
3(c)	$\begin{pmatrix} -6 \\ -5 \end{pmatrix}$	1		FT <i>their</i> point Q	
3(d)	PR	1			
4(a)	$(-0.5, 1)$	2		B1 for each	

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4(b)	$\begin{pmatrix} 7 \\ -3 \end{pmatrix}$	2		B1 for each	
4(c)	7.62 or 7.615 to 7.616	2		FT <i>their (b)</i> M1 for $(\text{their } 7)^2 + (\text{their } -3)^2$ oe	
4(d)	$[y =] -4x - 1$ final answer	3		B2 for answer $-4x + c$ [oe] or for correct equation in different form or for $-4x - 1$ or for $-4m - 1$ OR M1 for $\frac{-5 - 7}{1 - -2}$ oe M1 for correct substitution shown of $(-2, 7)$ or $(1, -5)$ or <i>their</i> $(-0.5, 1)$ into $y = (\text{their } m)x + c$ oe OR M1 for $7 = -2m + c$ and $-5 = m + c$ A1 for $m = -4$ and $c = -1$	

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4(e)	$[y =] \frac{1}{4}x + \frac{11}{4}$ final answer	3		<p>M1 for grad = $\frac{1}{4}$ oe nfw soi, FT negative reciprocal of <i>their</i> gradient from (d)</p> <p>M1 for correct substitution shown of (5, 4) into $y = (\text{their } m)x + c$ oe or, if no substitution shown, (5, 4) satisfies <i>their</i> final linear equation.</p>	
5	$\begin{pmatrix} -12 \\ 21 \end{pmatrix}$	1			
6(a)	$\begin{pmatrix} 40 \\ 16 \end{pmatrix}$	1			
6(b)	$\begin{pmatrix} -2 \\ -6 \end{pmatrix}$	1			
7	(2, 4)	1			
8(a)	$\begin{pmatrix} -6 \\ 14 \end{pmatrix}$	1			

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8(b)	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	1			
9(a)	$\begin{pmatrix} -5 \\ 3 \end{pmatrix}$	1			
9(b)	$\begin{pmatrix} -15 \\ 9 \end{pmatrix}$	1		FT <i>their (a)</i>	
10(a)	(3, 1)	1			
10(b)	<i>D</i> plotted at (−2, −1)	1			
10(c)	<i>E</i> plotted at (1, −2)	2		B1 for <i>E</i> plotted at (1, <i>k</i>) or (<i>k</i> , −2) or $\overrightarrow{AE} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$	
11(a)	(−1, −2)	1			
11(b)	$\begin{pmatrix} 6 \\ 0 \end{pmatrix}$	1			
11(c)	<i>C</i> marked at (3, 3)	1			

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11(d)(i)	$\begin{pmatrix} 4 \\ 5 \end{pmatrix}$	1		FT <i>their</i> (b) + $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$	
11(d)(ii)	\overrightarrow{AC}	1			
11(e)(i)	Correct parallelogram drawn	1		FT <i>their</i> (c) provided <i>ABCD</i> forms a parallelogram	
11(e)(ii)	30 cm ²	2		FT the area of <i>their</i> <i>ABCD</i> provided it is a parallelogram. B1 for each	
12(a)	$\begin{pmatrix} 6 \\ 17 \end{pmatrix}$	2		B1 for each	
12(b)	6.4[0] or 6.403...	2		M1 for $4^2 + 5^2$	
13	(1, 2)	1			
14(a)(i)	16	1			
14(a)(ii)	12	1			
14(b)(i)	(5, 2)	1			

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14(b)(ii)A	$(-5, 2)$	1			
14(b)(ii)B	$(5, 10)$	2		B1 for $(5, k)$ or $(7, 2)$	
14(b)(iii)	$\begin{pmatrix} 44 \\ -14 \end{pmatrix}$	2		FT <i>their (b)(i)</i> B1 for $\begin{pmatrix} 44 \\ k \end{pmatrix}$ or $\begin{pmatrix} 49 - \text{their}5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -14 \end{pmatrix}$ or $\begin{pmatrix} k \\ -12 - \text{their}2 \end{pmatrix}$	
14(c)(i)	Enlargement (SF) 0.5 oe (centre) $(-3, 1)$	3		B1 for each	
14(c)(ii)	Rotation 180° (centre) $(4, 8)$	3		B1 for each	
15(a)	$\begin{pmatrix} -1 \\ 4 \end{pmatrix}$	1			

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15(b)	$\begin{pmatrix} -21 \\ 28 \end{pmatrix}$	1			
16(a)	$\begin{pmatrix} -19 \\ -2 \end{pmatrix}$	2		B1 for answer $\begin{pmatrix} -19 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -2 \end{pmatrix}$ or for $\begin{pmatrix} -9 \\ 6 \end{pmatrix}$ or $\pm \begin{pmatrix} 10 \\ 8 \end{pmatrix}$ seen	
16(b)	3.61 or 3.605 to 3.606	2		M1 for $\sqrt{([-]3)^2 + 2^2}$ oe	
16(c)	B1 for $-3m + 5n = 14$ and $2m + 4n = 9$ B4 for $[m =] -\frac{1}{2}$ or -0.5 and $[n =] 2\frac{1}{2}$ or 2.5 or $\frac{5}{2}$ with evidence of a correct algebraic method	5		Accept equivalents M1 for correctly equating one set of coefficients of <i>their</i> equations or rearranges one of <i>their</i> equations to make <i>m</i> or <i>n</i> the subject e.g. $[m =] \frac{1}{2} (9 - 4n)$ oe M1 for correct method to eliminate one variable for <i>their</i> equations	

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				or correctly substitutes <i>their m</i> or <i>their n</i> into the other equation e.g. $- \frac{3(9 - 4n)}{2} + 5n = 14$ oe B1 for one correct answer	
17(a)	$\begin{pmatrix} 2 \\ 4 \end{pmatrix}$ cao	1			
17(b)	4.47 or 4.472...	2		M1 for $(\textit{their } 2)^2 + (\textit{their } 4^2)$	
17(c)	(7, 10)	2		B1 for each	
17(d)	$y = 2x - 4$ oe	3		M1 for gradient = $\frac{6 - 2}{5 - 3}$ oe or answer $y = mx - 4$ M1 for substituting (3, 2) or (5, 6) into $y = \textit{their } mx + c$ or into $y - k = \textit{their } m(x - h)$ or into $\textit{their } y = mx - 4$	
17(e)	(0, -4)	1		FT <i>their</i> (d)	

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18	Rotation (5, 3) 90° clockwise oe	3		B1 for each	
19(a)(i)	Rotation 180° (0, 0)	3		B1 for each	
19(a)(ii)	Enlargement 0.5 oe (- 1, 1)	3		B1 for each	
19(b)(i)	Shape drawn at (3, -1), (5, -1), (3, -5)	2		B1 for reflection in $x = 0$ or $y = k$	
19(b)(ii)	Shape drawn at (-4, 2), (-2, 2), (-4, 6)	2		B1 for a translation by $\begin{pmatrix} -7 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 1 \end{pmatrix}$	
20	Enlargement [sf] $-\frac{1}{2}$ [centre] (4, 4)	3		B1 for each	

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21(a)	Enlargement [centre] (2, 1) [sf] 2	3		B1 for each	
21(b)	Rotation [centre] (0, 0) 180°	3		B1 for each	
21(c)(i)	Triangle at (−3, 4) (0, 4) (−3, 6)	2		B1 for translation by $\begin{pmatrix} -5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$	
21(c)(ii)	Triangle at (2, −5) (5, −5) (2, −7)	2		B1 for reflection in $y = k$ ($k \neq -2$)	
22(a)(i)	Translation $\begin{pmatrix} -7 \\ -4 \end{pmatrix}$	2		B1 for each	
22(a)(ii)	Enlargement [centre] (−1, 0) [scale factor] 2	3		B1 for each	

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22(b)	Shape correctly drawn at (6, -3) (7, -3) (7, 1) (4, 1) (4, -1) (5, -1) (5, 0) (6, 0)	2		B1 for correct 90° anticlockwise rotation about (6, -3) or correct orientation but rotated about the wrong centre	
23(a)	Kite	1			
23(b)	4	1			
23(c)(i)	Enlargement [centre] (-8, 2) [scale factor] 2	3		B1 for each	
23(c)(ii)	Translation $\begin{pmatrix} 0 \\ -10 \end{pmatrix}$ OR Reflection in $y = -1$ oe	2		B1 for each	
23(d)(i)	Correct rotation (6, -1), (7, -4), (6, -5), (5, -4)	2		B1 for a correct 90° clockwise rotation about (0, 0) or correct orientation, incorrect position	

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23(d)(ii)	Correct reflection (3, -6), (6, -5), (7, -6), (6, -7)	2		B1 for a correct reflection in $y = 1$ or in $x = k, k \neq 1$	
24(a)	Triangle drawn at (2, -1), (2, -4), (3, -4)	2		B1 for two correct points If 0 scored, SC1 for reflection of triangle T in $y = -x$	
24(b)	Triangle drawn at (-5, 6), (-2, 5), (-5, 5)	2		B1 for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or by $\begin{pmatrix} k \\ 3 \end{pmatrix}$ If 0 scored SC1 for triangle drawn at (-4.5, 3.5), (-4.5, 4.5) and (-1.5, 3.5)	
24(c)	Enlargement [SF] -1.5 oe [centre] (0, 3)	3		B1 for each	

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25	$\frac{5}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ final answer	4		<p>M1 for $\overrightarrow{AK} = -\frac{1}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ or $\overrightarrow{BK} = \frac{2}{3}\mathbf{a} - \frac{2}{3}\mathbf{b}$</p> <p>M1 for \overrightarrow{AL} (or \overrightarrow{OK}) = \mathbf{a} + <i>their</i> \overrightarrow{AK} oe soi or \overrightarrow{OK} (or \overrightarrow{AL}) = \mathbf{b} + <i>their</i> \overrightarrow{AK} oe soi or $\overrightarrow{BL} = \mathbf{a}$ + <i>their</i> \overrightarrow{AK} oe soi</p> <p>M1 for a correct route e.g. \overrightarrow{OL}, $\mathbf{a} + \overrightarrow{AL}$, $\mathbf{b} + \overrightarrow{BL}$</p>	
26	4 : 3 oe	2		<p>M1 for $\overrightarrow{AD} = -\frac{4}{7}\mathbf{x} + \frac{4}{7}\mathbf{y}$ oe or $\overrightarrow{DB} = -\frac{3}{7}\mathbf{x} + \frac{3}{7}\mathbf{y}$ oe</p>	
27	5	2		<p>M1 for $(\text{their}3)^2 + (\text{their}4)^2$ or better</p>	

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28(a)	$\mathbf{a} - \frac{2}{5} \mathbf{b}$ oe simplified	2		M1 for $-\mathbf{b} + \mathbf{a} + \frac{3}{5} \mathbf{b}$ or a correct route	
28(b)	$\frac{5}{2} \mathbf{a}$ oe	2		B1 for $k\mathbf{a}$ where $k > 1$ or $\frac{5}{2} \overrightarrow{OR}$	
29	$[\pm] 21$	3		M2 for $29^2 - 20^2$ oe or better or M1 for $20^2 + k^2 = 29^2$ oe	
30	$\frac{5}{9} \mathbf{a} + \frac{4}{9} \mathbf{b}$	2		M1 for $\frac{4}{9} (\mathbf{b} - \mathbf{a})$ or $\frac{5}{9} (\mathbf{a} - \mathbf{b})$ or a correct route	
[Total: 150]					