

Mark scheme

Question			Answer/Indicative content	Marks	Guidance	
1	a		Triangle drawn with vertices at (4, 10), (4, 1), (10, 1)	3	B2 for scale factor 3 but wrong centre or for correct centre but wrong scale factor or for 3 correct plots but no triangle drawn OR B1 for 2 vertices correct	Condone freehand and mark intention e.g. for a translation of the correct image e.g. proportionate triangle within pink overlay lines For B2 and B1 image must fit entirely on grid
	b		$\frac{1}{3}$ oe and (1, 1)	2	B1 for each	Do not accept $\div 3$ as oe Allow 0.33 or better as scale factor, without $\frac{1}{3}$ seen Condone missing brackets for co-ordinate
			Total	5		
2			<i>BPC</i> or <i>CPB</i> and [vertically] opposite	B2 B1 B1dep	B1 for <i>BPC</i> or <i>CPB</i>	Must use 3-letter notation

			<i>ADP</i> or <i>PDA</i> <i>BCP</i> or <i>PCB</i> alternate AAA oe		Must have angle and reason Dependent on previous B2 and B1	Condone • C and D if clear for e.g. <i>D</i> for <i>ADP</i> and C for <i>BCP</i> • Changed order e.g. <i>BCP</i> and <i>PDA</i> • Use of <i>B</i> or <i>C</i> for <i>P</i> e.g. <i>ADC</i> for <i>ADP</i> For reason, condone poor spelling (alternative) and accept “third angle in triangle” oe Accept completely correct statements e.g. “All corresponding angles equal” but not “All angles equal” or “They have the same angles” See Appendix
			Total	4		
3	a		$\begin{pmatrix} 3 \\ -2 \end{pmatrix}$	2	B1 for answer $\begin{pmatrix} 3 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -2 \end{pmatrix}$	For B1 allow $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ B0 for incorrect numbers with vinculum/fraction line.
	b		2a	1		

			Total	3	
4	a		Correct reflection	2	B1 for a correct reflection in any vertical line Mark intention, allow freehand. Reflection must be on the grid given
	b		Correct rotation	2	B1 for correct rotation 180° or 90° anticlockwise about P or 90° clockwise by another point Mark intention, allow freehand. Mark to candidates' advantage Rotation must be on the grid given
			Total	4	
5			Triangle drawn with vertices at (2, 2), (2, 3), (4, 3)	3	B2 for scale factor $\frac{1}{2}$ but wrong centre or for correct centre but wrong scale factor or for 3 correct vertices but no triangle drawn or B1 for 2 correct vertices or a proportional enlargement with incorrect centre Condone freehand, mark intent For B1 and B2 sf $\neq 1$ Similar shape with correct orientation
			Total	3	
6	a		Triangle drawn with vertices at (4, 1), (8, 1), (4, 7)	3	B2 for scale factor 2 but wrong centre or for correct centre but wrong scale factor or for 3 correct plots but no triangle drawn Condone freehand and mark intention e.g. for a translation of the correct image e.g. proportionate

					triangle within pink overlay lines OR B1 for 2 vertices correct Examiner's Comments Candidates were generally successful in picking up at least some marks here. Many were given 2 marks for a correct enlargement in the wrong place. A common error was using (0, 1) as one of the vertices rather than the centre of enlargement. A small number of candidates were very untidy in their drawing. Others drew an enlargement that was outside of the given grid. Some not only enlarged the shape, but also rotated or reflected their final triangle.
	b		$\frac{1}{2}$ oe and (0, 1)	2	B1 for each Do not accept $\div 2$ as oe Condone missing brackets for co-ordinate Examiner's Comments Most candidates were not successful here. Of those who did score, this was generally 1 mark for giving the centre of enlargement as (0, 1). A large number of candidates gave their coordinate without brackets (this was condoned in the mark scheme, however it is important that candidates be aware that coordinates should always be in brackets). It was rare to see the scale factor

					given correctly as $\frac{1}{2}$. Many gave -2 or $\div 2$ instead. Key point: Finding the inverse of a given transformation When calculating the inverse of a given enlargement, most candidates seemed unaware that the centre of enlargement would remain the same and fewer still that the scale factor would be the reciprocal of the given scale factor.
			Total	5	
7	a		Three correct comparable ratios e.g. $\frac{8.8}{4} = \frac{12.76}{5.8} = \frac{16.5}{7.5} = 2.2$ or two correct calculations e.g. $\frac{5.8}{4} \times 8.8 = 12.76$ and $\frac{7.5}{4} \times 8.8 = 16.5$ Yes, the ratios are the same or Yes, the lengths are correct	M2 1dep	M1 for 2 comparable ratios or for one correct calculation 3 marks for 3 sides (6 values connected), “yes” and reason M2 for 3 sides (6 values connected) M1 for 2 sides (4 values connected) Dependent on M2 scored
	b		No, length of sides is not known	1	Allow BOD for No, with a justifiable mathematical reason in relation to the diagram, e.g. angles in a triangle add to 180°
			Total	4	
8			<i>BPC</i> or <i>CPB</i> and [vertically] opposite <i>DAP</i> or <i>PAD</i> <i>CBP</i> or <i>PBC</i> alternate	B2 B1 B1dep	B1 for <i>BPC</i> or <i>CPB</i> Must use 3-letter notation

			AAA oe		Must have angle and reason Dependent on previous B2 and B1	Condone - A and B if clear for e.g. A for PAD and B for CBP - Changed order e.g. CBP and PAD - Use of B or C for P e.g. DAB for DAP For reason, condone poor spelling (alternative) and accept “third angle in triangle” oe Accept completely correct statements e.g. “All corresponding angles equal” but not “All angles equal” or “They have the same angles”											
<table><tr><th>Reason</th><th>Mark</th><th>Reason</th></tr><tr><td>Corresponding [pairs of] angles are equal</td><td>1</td><td></td></tr><tr><td>Matching angles in the triangles are equal</td><td>1</td><td></td></tr><tr><td>They have the same angles</td><td>0</td><td>Not specific enough</td></tr></table>						Reason	Mark	Reason	Corresponding [pairs of] angles are equal	1		Matching angles in the triangles are equal	1		They have the same angles	0	Not specific enough
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					<table><tr><td>All angles equal</td><td>0</td><td>Not true</td></tr></table> Examiner's Comments Very few correct answers were seen to this question. Some candidates correctly identified BPC (or CPB) in the first row and a few of those gave the correct reason '[vertically] opposite'; repeating 'alternate' was however common. There was no mark for the reason if the angles were incorrectly identified. Most candidates did not seem secure in their knowledge of alternate, opposite, corresponding, and co-interior angles (often using words such as parallel, adjacent, acute, and congruent instead). A very small number used two letters to try to describe an angle and others gave three letters that actually referred to straight line, like CPD. Many candidates were awarded 1 mark (the B1 for getting the first angle correct), but quite a few received 0 marks. A very few candidates got the first 3 marks but were then not able to justify the decision concisely. Imprecise answers such as 'All the angles are the same' or 'It's an enlargement' were often given. Many seemed unprepared for a geometric 'proof' such as this and the answer space was often left blank.  Assessment for learning Candidates need to be familiar with simple proofs and the use of geometric terms to justify decisions.	All angles equal	0	Not true
All angles equal	0	Not true						
			Total	4				
9	a		$\begin{pmatrix} 2 \\ -3 \end{pmatrix}$	2				

					B1 for answer $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ For B1 allow $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ B0 for incorrect numbers with vinculum/fraction line. Examiner's Comments Candidates had difficulty here, but a number correctly identified either the horizontal or vertical component for B1. The common error was to give the vertical component as positive, i.e. $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$. Others gave the reverse vector $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$. The misconception of writing a vector as a fraction has been highlighted in previous series and again occurred on numerous occasions here. If the components were correct however, SC1 was given.
	b		-a	1	Examiner's Comments This question proved to be the most challenging of the whole paper. The majority that attempted it gave a numerical response. Some of these were written in vector notation. Some were the reverse of their response to (a).
			Total	3	
10	a		Correct reflection	2	B1 for a correct reflection in any vertical line Use overlay as a guide, mark intention, allow freehand. Reflection must be on the grid given Examiner's Comments

					The vast majority of candidates answered correctly. Some candidates drew the reflection freehand however, occasionally leading to them being out of tolerance. Incorrect attempts were often a translation of the original shape, with the top point in the correct place for the reflection. A few candidates reflected the triangle in a different vertical mirror line, which was given B1.
	b		Correct rotation	2	B1 for correct rotation 180° or 90° or clockwise about P or 90° anticlockwise by another point Use overlay as a guide, mark intention, allow freehand. Mark to Candidates advantage Rotation must be on the grid given Red Overlays have to be correct for B1 Green Overlay shows correct answer for 2 marks, but can be moved around the grid to check for B1. <u>Examiner's Comments</u> Success in this part was more varied, with only around half giving a fully correct response. A number of candidates rotated the triangle 90° clockwise or 180° around Point P, or 90° anti-clockwise around a different centre of rotation (a translation of the expected correct response), all of which were given B1. As in part (a), some candidates drew their triangle freehand, which did lead

					to incorrectly sized responses that were given 0 marks.  Assessment for learning Candidate should always use a ruler to draw shapes. Candidates should also be aware that it is often beneficial to identify important points/vertices first, then connect them. For all transformation questions, tracing paper should be available and its use is often advantageous. There are many exam questions across the previous series that candidates can use for practice (these can be viewed and assembled into classroom tests using OCR ExamBuilder; log in, select 'GCSE (9-1) Maths and use the filters to view 'Congruence and Similarity'>'Plane isometric transformations' questions).
			Total	4	
11			Triangle drawn with vertices at (2, 2), (4, 2), (4, 3)	3	B2 for scale factor $\frac{1}{2}$ but wrong centre or for correct centre but wrong scale factor or for 3 correct vertices but no triangle drawn or B1 for 2 correct vertices or a proportional enlargement Condone freehand, mark intent Red overlay scores 3 B2 includes enlargement in correct proportions with horizontal side touching both the green and red lines For B1 and B2 $sf \neq 1$ Similar shape with correct orientation

					with incorrect centre	
					<u>Examiner's Comments</u>	
					There were very few fully correct responses here; even those with the correct scale factor often placed their triangle at (0, 0), (2, 0) and (2, 1). A few candidates were given 2 marks for a triangle drawn with a correct centre of enlargement, but incorrect scale factor. The majority of candidates were only given B1, for a proportional enlargement with an incorrect centre.	
			Total	3		
12			Rotation [centre] (0, 3) 180°	1 1 1		More than 1 transformation scores 0 A vector alone does not imply translation but does with "and then..." Do not accept turn oe for rotation Condone missing brackets; do not accept $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$ for (0, 3) Allow if accurate point plotted ($\frac{1}{2}$ square) and referred to Ignore direction
			Total	3		
13			$\begin{pmatrix} 7 \\ 5 \end{pmatrix}$	2	M1 for $\overline{PQ} + \overline{QR}$ or $\begin{pmatrix} 2 \\ 3 \end{pmatrix} + \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ or	M1 If fraction line in final answer For M1 allow 2 + 5 and 3 + 2

					B1 for answer $\binom{7}{k}$ or $\binom{k}{5}$	
			Total	2		
14				2	B1 for correct orientation but wrong location	Mark intention accepting unruled and shaded squares to indicate imag
			Total	2		
15			G E	2	B1 for each	
			Total	2		
16			Yes Yes No Yes	2	B1 for 3 correct	Accept any unambiguous indication e.g. ✓ for yes or X for no
			Total	2		
17	a		Vector a + b correctly drawn with direction arrow	2	M1 for $\binom{3}{-1}$ or for $\binom{1}{3} + \binom{2}{-4}$ correctly drawn in an incomplete vector triangle with or without arrows	Could be part of a complete vector triangle For 2 or 1 marks allow correct vector drawn when construction/counting lines/arcs are drawn Condone omission of brackets
	b		Vector a correctly drawn with direction arrow	1		Across (a) and (b), penalise first instance only where direction arrow is omitted or in the incorrect direction

			Total	3	
18	a		Triangle C at (-5, 1) (-3, 1) (-4, 3)	2	B1 for reflection in $y = -1$
	b		Triangle A at (4, 7) (6, 7) (5, 9)	2	B1 for translation of $\begin{pmatrix} 3 \\ j \end{pmatrix}$ or $\begin{pmatrix} k \\ 6 \end{pmatrix}$ or for triangle at (-2, -5) (0, -5) (-1, -3) In all parts condone unlabelled if clear. Accept good freehand. Vertices within 2 mm by eye
	c		Triangle B at (1, -1) (1, -3), (3, -2)	2	B1 for 90° anticlockwise rotation or correct size and orientation incorrect position
			Total	6	
19	a		$\begin{pmatrix} 5 \\ -4 \end{pmatrix}$	2	B1 each value or SC1 for $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$ or $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$ Do not accept coordinates
	b		$\begin{pmatrix} -5 \\ 4 \end{pmatrix}$ drawn with correct arrow	1	
			Total	3	
20			$y = 3x - 21$ with correct working	5	M1 for attempt at $\frac{\text{change in } y}{\text{change in } x}$ A1 for 'm' = 3 'correct working' requires evidence of at least M1M1 or M1A1 may be implied on the diagram or may be implied by -3

					M1 for $0 = \text{their } 'm' \times 7 + 'c'$ or $-12 = \text{their } 'm' \times 3 + 'c'$ or for $\frac{7}{4}$ $\times [\pm]12$ oe A1 for $'c' = -21$ If 0 scored, SC1 for implying the y-intercept is -21 with no or insufficient working, may be seen on the diagram or for D is (3, -12)	M1A1 soi by $['m'] \ 3$ Allow FT from D or <i>their</i> D stated may be implied on the diagram
			Total	5		
21			Translation $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$ Rotation 180[°] [clockwise/anticlockwise] [Centre] (0, 1)	1 2 1 1 1	or 7 left and 3 up B1 for each component of the vector or 7 left or 3 up or SC1 for $\begin{pmatrix} 7 \\ 3 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ 7 \end{pmatrix}$	For each statement marks spoilt if extra transformations For each statement treat extra descriptors as choice Mark statement 1 and 2 independently unless a single transformation is described across the entire answer space Condone omission of brackets Do not allow a coordinate

					Condone omission of brackets Allow 1 for [negative] enlargement 1 for scale factor $\times 1$ 1 for [centre] (0, 1)
			Total	6	
22			15	2	M1 for $\frac{20 \times 27}{36}$ oe or $\frac{20}{36} = \frac{y}{27}$ oe or $\frac{y}{20} = \frac{27}{36}$ oe or scale factor of 1.8, 0.556 or 0.5..., 0.75, 1.3 or 1.33[3]
			Total	2	
23	a		Three correct comparable ratios eg $\frac{7}{2.5} = \frac{8.96}{3.2} = \frac{11.2}{4} = 2.8$ or two correct calculations eg $\frac{3.2}{2.5} \times 7 = 8.96$ and $\frac{4}{2.5} \times 7 = 11.2$ Yes, the ratios are the same or Yes, the lengths are correct	M2 1dep	M1 for 2 comparable ratios or for one correct calculation dependent on M2 scored 3 marks for 3 sides (6 values connected), "yes" and reason M2 for 3 sides (6 values connected) M1 for 2 sides (4 values connected) Examiner's Comments From those who made an attempt at this question, complete and correct responses were quite rare. Those who made a meaningful attempt usually found the scale factor of 2.8 and realised its significance. It was

					common to see little or no working with an answer yes or no and a sentence about the sides adding up to different lengths. Many candidates attempted to draw the triangles.
	b		No, length of sides is not known	1	Allow BOD for No, with a justifiable mathematical reason in relation to the diagram, e.g. angles in a triangle add to 180° <u>Examiner's Comments</u> The following post-exam correction was issued to centres and published to Teach Cambridge: Turn to page 19 of the question paper and look at the three angles in each of the triangles in question 23(b). In both triangles, cross out the number '70' and replace with '28'. The angles in the two triangles should now be 28°, 105° and 47°. The error here that the triangles have an angle sum greater than 180° had little effect on candidate responses. Those who stated 'no' with a justifiable mathematical reason were given the mark. Most responses were 'yes', with the reason that the angles are the same.
			Total	4	
24			Yes Yes No Yes	2	B1 for 3 correct Accept any unambiguous indication e.g ✓

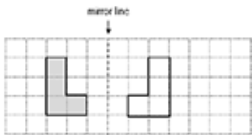
					for yes or ✕ for no <u>Examiner's Comments</u> Almost all candidates attempted this question and many candidates gained 1 or 2 marks. The common mistakes were to give the second set 'No' and the third set 'Yes'. B1 was given for three correct responses, so candidates making both these mistakes scored 0. The misconception on the second pair of triangles may have been from jumping too quickly to the conclusion that 6 cm matches 6 cm so the other two pairs of sides don't match, i.e. incorrect use of scale factors.
			Total	2	
25	a		Vector a correctly drawn with direction arrow	1	Across (a) and (b), penalise first instance only where direction arrow is omitted or in the incorrect direction <u>Examiner's Comments</u> Many candidates showed a lack of knowledge of drawing vectors. Most turned the space into a coordinate grid and attempted to plot the vector as if it was a pair of coordinates. Where candidates did attempt to draw a vector, often the direction arrow was omitted. There was a high number of candidates who did not attempt this question.

					M1 for $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$ Could be part of a complete vector triangle or for $\begin{pmatrix} 3 \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ -4 \end{pmatrix}$ correctly drawn in an incomplete vector triangle with or without arrows For 2 or 1 marks allow correct vector drawn when construction/counting lines/arcs are drawn. Condone omission of brackets. <u>Examiner's Comments</u> Candidates overall scored more marks here than in part (a), as the omission of direction arrows were only penalised in the first response from a candidate. Some candidates scored no marks in (a), but full marks in (b). Several candidates who did not show knowledge of drawing vectors did score M1 for correctly adding the vectors numerically to get $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$. Some omitted the brackets. Only a few candidates wrote a fraction line in the vector. There was a high number of candidates who did not attempt this question.  OCR support These resources would be useful for this topic: Check In test: 9.03 Plane vector
b			Vector a + b correctly drawn with direction arrow	2	

					geometry (or download all Foundation check In tests) Section Check In test: Topic 9: Congruence and similarity
			Total	3	
26	a		Triangle A at (–5, 4) (–3, 4) (–4, 6)	2	See overlay. In all parts condone unlabelled if clear. Accept good freehand. Vertices within 2mm by eye B1 for translation of $\begin{pmatrix} -6 \\ 7 \end{pmatrix}$ or $\begin{pmatrix} 6 \\ 7 \end{pmatrix}$ or for triangle at (7, –2) (9, –2) (8, 0) Blue overlay 2 Red overlay B1 Vertical line shows where bottom left vertex should be for $\begin{pmatrix} -6 \\ 7 \end{pmatrix}$ Horizontal line shows where base line of triangle should be for $\begin{pmatrix} 6 \\ 7 \end{pmatrix}$ <u>Examiner's Comments</u> Most candidates understood how to do a translation; however, errors were made when actually counting and occasionally the translated triangle ended up in the wrong position. Several translated triangle T itself by $\begin{pmatrix} 6 \\ 3 \end{pmatrix}$, which scored B1.
	b		Triangle B at (–3, 2) (–1,1) (–1, 3)	2	

					B1 for 90° clockwise rotation or correct size and orientation incorrect position Blue overlay 2 Red overlay shows B1 for clockwise rotation <u>Examiner's Comments</u> Most candidates seemed to understand the concept of a rotation. Common errors were rotating in the wrong direction or around the wrong point.
	c		Triangle C at (1, -3) (3, -3) (2, -5)	2	B1 for reflection in $x = -1$ Blue overlay 2 Red overlay B1 <u>Examiner's Comments</u> This part was least well done. Common errors were reflecting the wrong triangle or reflecting in one of the axes rather than the line $y = -1$ as required. Candidates who reflected in the line $x = -1$ scored 1 mark.
			Total	6	
27			Rotation [centre] (0, 2) 180°	1 1 1	More than 1 transformation scores 0 A vector alone does not imply translation but does with "and then..." Do not accept turn oe for rotation Condone missing

					brackets; do not accept $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$ for (0, 2) Allow if accurate point plotted ($\frac{1}{2}$ square) and referred to Ignore direction <u>Examiner's Comments</u> Very few candidates gained 3 marks in this question. Some candidates gained a mark for recognising rotation, but terms often used such as 'turned' or 'flipped' were not accepted and scored no marks. Few candidates gave the coordinates of the centre and the degree of rotation was only given sometimes. A few candidates gave a combination of transformations such as 'rotated and then moved...' and this scored 0 marks.
			Total	3	
28			$\begin{pmatrix} 7 \\ 3 \end{pmatrix}$	2	M1 If fraction line in final answer M1 for $\overrightarrow{PQ} + \overrightarrow{QR}$ or $\begin{pmatrix} 3 \\ 2 \end{pmatrix} + \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ Or B1 for answer $\begin{pmatrix} 7 \\ 3 \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ For M1 allow 3 + 4 and 2 + 1 <u>Examiner's Comments</u> Only a very small number of candidates scored a mark here and the correct answer was rarely seen. Most candidates chose to multiply or cross multiply the components of the vectors and $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ was sometimes seen.

					This topic was not well understood by most candidates.
			Total	2	
29				2	B1 for correct orientation but wrong location Mark intention accepting unruled and shaded squares to indicate image Examiner's Comments Many correct answers were seen and, in this question, freehand was condoned. A small number of candidates translated the shape.
			Total	2	
30		E F		2	B1 for each Examiner's Comments E and F was the most common outcome. Other combinations were seen without any clear pattern.
			Total	2	
31	a	$\begin{pmatrix} -5 \\ 2 \end{pmatrix}$		2	B1 each value or SC1 for $\begin{pmatrix} -5 \\ 2 \end{pmatrix}$ or $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$ Do not accept coordinates Examiner's Comments Many candidates showed little knowledge of vectors and did not make an attempt at either part of this question. Answers seen included the numbers in the wrong order and sign errors. Some candidates displayed their solution as a fraction.

	b		$\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ drawn with correct arrow	1	<u>Examiner's Comments</u> Very few correct answers were seen. A few candidates drew the correct line but omitted the arrow. A common incorrect answer was to draw the reflection of the line given.	
			Total	3		
32			Translation $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$ Rotation 180[°] [clockwise/anticlockwise] [Centre] (0, -2)	1 2 1 1 1	or 5 right and 4 down B1 for each component of the vector or 5 right or 4 down or SC1 for $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$ or $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$ For each statement marks spoilt if extra transformations For each statement treat extra descriptors as choice Mark statement 1 and 2 independently unless a single transformation is described across the entire answer space Condone omission of brackets Do not allow a coordinate Condone omission of brackets Allow 1 for [negative] enlargement 1 for scale factor -1 1 for [centre] (0, -2)	
					<u>Examiner's Comments</u> A slight change in the format and style made this a demanding question for many candidates. “ Two different single transformations” was misunderstood or misinterpreted by many. Answers were spoiled because	

					some thought they had to provide two transformations for each point while others spread their single transformation over the two sections provided. Only a very small minority gained all 6 marks. Candidates struggled to use the correct terminology: rather than “translation” many used “move” or “transform”. They described the translation using “5 right” which scored a mark or “5 across” which didn’t, and “4 down”, rather than giving the vector. Rather than “rotation” they referred to “turning”. Others described how coordinates had moved, the position of the shapes, and referred to the positive and negative aspects of the coordinate grid. A significant number did not respond to the question at all.
			Total	6	
33			$y = 2x - 18$ with correct working	5	M1 for attempt at $\frac{\text{change in } y}{\text{change in } x}$ A1 for ‘m’ = 2 M1 for $0 = \text{their}$ ‘m’ $\times 9 +$ ‘c’ or $-6 = \text{their}$ ‘m’ $\times$ $6 +$ ‘c’ or for $\frac{2}{3} \times [\pm] 6$ oe A1 for ‘c’ = -18 If 0 scored, SC1 for implying the y intercept is -18 with no or insufficient working, may be seen on the diagram or for D is (6, -6) ‘correct working’ requires evidence of at least M1M1 or M1A1 may be implied on the diagram or may be implied by -2 M1A1 soi by [‘m’ =$] 2$ Allow FT from D or <i>their</i> D stated may be implied on the diagram Examiner’s Comments Combining the demand of parallelogram properties with the equation of a straight line, this question was by far the least attempted and proved just too difficult for most. The large majority of

					candidates picked numbers out of the diagram with some attempting substitution into $y = mx + c$, so answers such as $y = -6x + 9$ or $y = 9x - 6$ were extremely common. The first step of recognising the required line would be parallel to AB and therefore the gradients would be the same was not considered by most. A few did state “change in y / change in x” but then used the coordinates of the diagonal of the parallelogram, C and A, or used the values given on the x axis. A number tried to use the diagram to find the y-intercept, but given that it was “Not to scale” the common answer was -12. Occasionally a mark was earned for giving the correct coordinate of $(6, -6)$ for D.
			Total	5	
34	a		Triangle at $(-8, 6)$, $(-8, 2)$, $(0, 6)$	2	B1 for reflection in $x = k$ or in $y = 0$ Mark intention, condone freehand <u>Examiner's Comments</u> Few candidates drew the correct reflection in this part. Some drew a reflection in the x-axis to score 1 mark. Many answers were translations, but rotations and forms of stretch were also seen.
	b		Enlargement $\frac{1}{4}$ or 0.25 $(0, -6)$	3	B1 for each element Marks spoilt if extra transformations Condone omission of brackets Accept centre as a vector $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$ <u>Examiner's Comments</u>

					Very few correct descriptions were seen. Occasionally the word 'enlargement' was seen, but few scale factors were given or correct. Providing the centre of enlargement was even less frequent. Words like 'shrunk' and 'reduced' are not acceptable and neither is 'divided by 4' instead of '1/4'.
			Total	5	
35			24	2	$M1 \text{ for } \frac{32 \times 15}{20} \text{ oe or}$ $\frac{32}{20} = \frac{x}{15} \text{ oe or } \frac{15}{20} = \frac{x}{32} \text{ oe}$ or scale factor of 1.6, 0.625, 0.75, 1.3 or 1.33[3] <u>Examiner's Comments</u>  Misconception Candidates did not appear to be familiar with the concept of proportion. Many subtracted the sides, leading to a common incorrect answer of 27. The use of a scale factor was rare.
			Total	2	