Countdown to your final Maths exam ... part 13 (2018)

Examiners Report & Markscheme

Mark Scheme

Q1.

Question	Working	Answer	Mark	Notes
		Translation $\begin{pmatrix}4\\2\end{pmatrix}$	B1 B1	for translation for $\begin{pmatrix}4\\2\end{pmatrix}$ Award B0 for evidence shown of more than one type of transformation

Q2.

PAPER: 5MB3H_01					
Question		Working	Answer	Mark	Notes
	(a)		reflection	2	B2 cao (B1 for reflection in vertical line)
	(b)		enlargement sf 2 centre (−6,2)	3	B1 for enlargement B1 for (scale) factor 2 or ×2 B1 for (−6, 2) (NB B0 if not single transformation)

Q3.

Question	Working	Answer	Mark	Notes
(a)		Shape drawn	M1 A1	shape drawn in correct orientation at (4, 5) (3, 7) (7, 7) cao
(b)		description	B1	ft for rotation, 90° anticlockwise, centre (5, 4) oe

Q4.

Question		Working	Answer	Mark	Notes
			Rotation 90° anti-clockwise centre (0, -1)	2	M1 for 2 of: Rotation, 90° anti-clockwise (or 270° clockwise) (centre) (0, -1) A1 correct transformation No marks to be awarded if more than one transformation is given

Q5.

Question		Working	Answer	Mark	Notes
	(a)		Triangle with vertices (2,–1) (4, –1) (4, –4)	2	B2 for triangle with vertices (2,–1) (4, –1) (4, –4) (B1 for triangle in correct orientation **or** rotated 90° anticlockwise centre O
	(b)		Triangle with vertices (7, 2) (13, 2) (7, 11)	3	B3 for triangle with vertices (7, 2) (13, 2) (7, 11) (B2 for 2 vertices correct or enlargement scale factor 3 in wrong position or enlargement, centre (1,2), with different scale factor) (B1 for 1 vertex correct or enlargement, not from (1,2), different scale factor)

Q6.

Question	Working	Answer	Mark	Notes
(a)		Correct shape	2	B2 for correct reflection with vertices (–4, 2) (–6, 3) (–6, 7) (–4, 6) (B1 for reflection in a vertical or horizontal line)
(b)		Correct shape	2	B2 for correct rotation with vertices (–1, 3) (–5, 3) (–6, 5) (–2, 5) (B1 for rotation of 90(°) clockwise about (0,1) or correct orientation fully in top left quadrant)

Q7.

Question	Working	Answer	Mark	Notes
(a)		(−2, 1) (−4, 1) (−2, 2) (−5, 2)	B1	Shape labelled **A**
(b)		(1, −4) (3, −4) (1, −5) (4, −5)	B1	Shape labelled **B**

Q8.

Paper: 5MB3F_01					
Question		Working	Answer	Mark	Notes
			enlargement scale factor 3 centre *O*	3	B1 for enlargement B1 for scale factor 3 B1 for (centre) *O* oe NB: B0 for any combination of transformations

Q9.

Question	Working	Answer	Mark	Notes
(a)		Transformation	2	B2 for a triangle with vertices at (−1, 1), (−2, 3) and (−2, 1) (B1 for a triangle in correct orientation or rotated 90° clockwise centre the origin)
(b)		Description	3	B1 Enlargement B1 Scale factor 3 (accept × 3) B1 Centre (1,0) NB: More than one transformation is B0

Q10.

5MB3H_01 November 2015					
Question		Working	Answer	Mark	Notes
	(a)		translation $\begin{pmatrix}3\\-3\end{pmatrix}$	2	B1 for translation B1 for $\begin{pmatrix}3\\-3\end{pmatrix}$ (B0 if not single transformation)
	(b)		Triangle	2	B2 cao (B1 for rotation a 180 degrees about any point or for a rotation about (0, 1))

Q11.

PAPER: 5MB3F_01					
Question		Working	Answer	Mark	Notes
	(a)		Triangle	2	B1 for triangle translated B1 for triangle at (−2,2),(−2,0),(−1,0)
	(b)		Rotation 90° anticlock wise centre (0,0)	3	B1 Rotation B1 90° anticlockwise oe B1 centre (0,0) Note Award no marks if more than one transformation is given

Q12.

Question		Working	Answer	Mark	Notes
		½ × 4 × 3 = 6 $(½)^2$ × 6 =	1.5	3	M1 for ½ × 4 × 3 oe M1 for $(½)^2$ × "6" A1 cao **OR** M2 for ½ × 2 × 1.5 oe (M1 for triangle with all lengths ½ corresponding lengths of triangle *ABC* seen in any position **or** vertices seen at (1, 1) (3,1) and (2.5, 2.5) or stated) A1 cao

Q13.

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
	(a)		Correct shape	2	B2 cao (B1 for shape in the correct orientation below the line $y = x$ or for 2 vertices correct) with vertices at (2, 1), (4, 1), (4, 0), (3, 0)
	(b)		Translation by $\begin{pmatrix}4\\-1\end{pmatrix}$	2	B1 for translation B1 for $\begin{pmatrix}4\\-1\end{pmatrix}$ NB: B0 if more than one transformation given

Q14.

Paper 1MA1: 1H				
Question	Working	Answer	Notes	
(a)		(–2, –2)(–6, –2) (–2, –4) (–4, –4)	M1 A1	Shape drawn in correct orientation
(b)		Enlargement sf –0.5 centre (0,0)	C1	

Q15.

Question		Working	Answer	Mark	Notes
		$\begin{pmatrix}4\\-7\end{pmatrix}+\begin{pmatrix}-3\\-2\end{pmatrix}$	Translation $\begin{pmatrix}1\\-9\end{pmatrix}$	2	B1 for Translation B1 for $\begin{pmatrix}1\\-9\end{pmatrix}$

Q16.

Question		Working	Answer	Mark	Notes
	(a)		Correct shape	1	B1 for correct shape in the correct position
	(b)		Correct shape	1	B1 for correct shape in the correct position (ft) from their answer to part (a)
	(c)		$\begin{pmatrix}-2\\3\end{pmatrix}$	1	C1 ft if A to C is a translation

Q17.

		Working	Answer	Mark	Notes
	(i)		30	1	B1 cao
	(ii)		40	1	B1 cao

Q18.

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
	$3^2 \times 180$	1620	2	M1 for using a scale factor of 3^2 (= 9) A1 cao

Examiner's Report

Q1. No Examiner's Report available for this question

Q2.A good number of fully correct answers to part (a) were seen. The most common incorrect response was for students to draw a reflection in the *y* axis – this was awarded one mark. A rotation of 180° about (0, 0) was also seen quite frequently but, of course this could not be given any marks. A small proportion of students reflected the shape in the *x* axis.

Over three quarters of students gained at least one mark in part (b). Most students scored the mark for enlargement and a good proportion of students were also awarded the mark for stating a correct scale factor. Fewer students gave the correct centre of enlargement. It was heartening to see that nearly all students described a single transformation rather than a combination of transformations.

Q3. No Examiner's Report available for this question

Q4. No Examiner's Report available for this question

Q5. Part (a) was generally answered very well. The majority of candidates who failed to draw the triangle in the correct position did at least draw it in the correct orientation. A small number of candidates rotated the triangle 90° anticlockwise or 180° rather than 90° clockwise. Candidates were not quite as successful in part (b). It was clear that the majority of candidates understood that scale factor 3 increases each length threefold but enlarging from a given centre was not as well understood with candidates often plotting the bottom left vertex at (1, 2) or at the origin. Two marks for an enlargement of scale factor 3 in an incorrect position were frequently awarded. When candidates had used an incorrect scale factor this was most commonly scale factor 2. Some candidates did not use the same scale factor for both the base and the height.

Q6. In part (a) the vast majority of students successfully reflected the shape but many did not use the correct line of reflection. Typical mistakes included reflecting in $x = 1$, $y = -1$ and the y-axis. On the whole students showed care in their drawings with straight lines and accurate plotting. Centres should focus on ensuring students can identify and draw the line of reflection.

A significant number of students scored maximum marks in part (b). Most of those who did not achieve full marks were awarded a mark for a rotation of 90° either by rotating about the wrong centre but with the shape in the correct quadrant or by rotating clockwise. Again centres need to ensure students can identify the correct centre of rotation.

Q7. Many students met with some success in this question. In part (a) there were some students who rotated the shape by 90° rather than 180°. Sometimes the shape was not accurately drawn in the correct position.

In part (b) students were not careful enough counting squares, and sometimes positioned the shape within one square of what was needed. Some failed to take account of the minus signs in determining direction of move.

Q8. Over one third of students recognised the transformation as an enlargment and gave the correct scale factor but correct identification of the centre of enlargement was very rare indeed. Many students lost marks through giving multiple transformations as answers, mostly in an attempt to give information about the position of the image in the absence of a centre of enlargment. Typically, a translation was described or vector given.

Q9. Part (a) was well answered with most students scoring at least one mark, generally for a triangle drawn in the correct orientation, and often going on to score the second mark for this triangle being in the correct position. Part (b) was also well attempted with many students scoring two marks generally for the correct transformation and the correct scale factor. Most students did not provide a centre of enlargement whilst others said the centre was (0, 1) even though many had drawn the lines on the grid showing that the centre was (1, 0). There are still students who write a combination of an enlargement and a translation, and therefore score no marks for writing more than one transformation.

Q10. It was rare to see a complete correct solution in (a). Many confused "translation" with "transformation" whilst it was not uncommon to find the 3 and the −3 reversed. The only common error in part (b) was in choosing a point of rotation other than (0,1), usually (0,0), (−1,1) or (1,0).

Q11. In part (a) too many students failed to understand the term "translate"; this was evidenced by examples of rotations and reflections. Part (b) was answered with greater success. Many noted it was a rotation, and this was usually followed by a description of direction and angle, with only a minority making errors in this statement. Missing out a reference to the centre of rotation was a common error.

Q12. The most common method used that lead to the correct answer was to enlarge the triangle and then find the area of the enlarged triangle. It was, however, disappointing to see many candidates successfully enlarge the triangle and then fail to find its area. Those candidates who started with the area of the given triangle invariably divided by 2 rather than $(2)^2$ to find the area of the enlarged triangle. It was very rare indeed to see the area scale factor being used. Equally disappointing was the number of candidates who tried and failed to find the correct area of the given triangle. A significant number of students who drew the enlarged triangle did not understand that a

scale factor of ½ would result in a smaller triangle.

Q13. Many failed to get the correct answer in part (a), with shapes incorrectly oriented and drawn in a variety of places on the grid. A common error was to just draw a reflection in the *x* axis.

In part (b) frequent errors included an inability to count squares, and giving the vector as a coordinate, or without brackets at all. Centres need to remind students that descriptions in words are not acceptable as an alternative to vector notation. Some could not remember the word "translation" and used "transformation" instead.

Q14. No Examiner's Report available for this question

Q15. No Examiner's Report available for this question

Q16. No Examiner's Report available for this question

Q17. The majority of candidates correctly wrote 30 as their answer to part (i) but in part (ii), only about a quarter of candidates realised that the size of angle *A* remained unchanged after the enlargement, with 40 × 3 = 120 being by far the most common incorrect answer.

Q18. This question was not well done. The great majority of students attempted the question but responses were usually restricted to "180 × 3 = 540" though a significant number of students used a volume scale factor of 33 (= 27) and gave their answer as 4860, failing to take into account that the depth of soil in each flower bed was the same. Some of the best solutions used an algebraic approach where expressions such as 3x × 3y × z lead students to identify the correct scale factor of 9.