JustMaths

Countdown to your final Maths exam ... part 3

Examiners Report & Markscheme

Examiner's Report

Q1. This question was well attempted by most students and blank responses were very rare. Students regularly gained full marks. Those that gained two marks usually lost the final mark for either forgetting to indicate the direction, clockwise, or for writing an incorrect coordinate for the centre of rotation.
Weaker candidates confused their transformations e.g. rotations in a line or translated about a point so scored zero.

Q2. Whilst the majority of students correctly rotated the given shape in part (a), a correct clockwise rotation of 90o was the most common error. This however did gain partial credit. Some students drew a 180o rotation and some rotated the given shape about centres other than the origin. Part (b) was less well done, many failing to correctly identify the equation of the line of reflection. Many students described the transformation as a reflection about the origin. This just gained one mark for correctly stating the type of transformation and the reference to the origin was ignored. Too many students used the word 'flipped' rather than reflection, or tried to describe a mirror line by a description rather than y = x. A significant number of students offered a combination of transformations, ignoring the request in the question for a single transformation. This scored no marks at all.

Q3. The reflection in part (a) proved demanding for many. Reflections in vertical or horizontal line were common as were translations. A significant number of candidates were able to reflect the vertex at the right angle correctly but then had the vertical side of the reflected triangle as 3 cm rather than 2 cm. Some tried to use different lines of reflection other than the given line.

In part (b) candidates had to name the transformation as a translation rather than give a written description. Likewise, giving a written description of the translation such as ' 2 left and 4 down' was insufficient; the correct vector had to be seen in order to gain full marks.

Common errors were incorrect signs on one or other of the vector components or incorrect order. The vector was inverted by many candidates with fewer either writing the vector as coordinates or omitting the brackets.

Q4. This question was poorly understood, with a large number of candidates failing to recognise which lines to reflect the shapes in. Many candidates frequently used the y-axis or $y = -1$ instead of $x = -1$, or the y-axis instead of $y = 0$. When you compound this with those candidates who ended up with **Q** in the fourth quadrant rather than the second, it is easy to see why fully correct solutions were given by only just over 10% of candidates.

Those candidates who ended up with only **R** or both **Q** and **R** correctly drawn and placed gained 1 mark and earned a further mark if they could write 'for rotation of 180°' or 'for an enlargement of scale factor −1'. It was disappointing that three quarters of candidates scored no marks on this question.

Q5. Many candidates failed to give one of the necessary requirements for an enlargement, most commonly omitting the centre of enlargement. Centres should make candidates aware that any use of combined transformations will not entitle them to any marks. It should also be stressed that coordinates should be written correctly and not as a column vector.

Q6. Many fully correct enlargements were seen and those candidates who didn't get full marks often gained two marks for an enlargement with scale factor 3 but in the wrong position. A substantial number of candidates did not seem to understand the significance of the centre of enlargement. A common wrong answer was to use the centre of enlargement as one of the vertices in the enlarged shape. Candidates using the ray method rather than 'counting squares' sometimes misplaced the vertices through inaccurate line drawing. It was disappointing to see some candidates lose marks through carelessness and be up to half a square out with some of their vertices.

Q7. A good number of candidates were able to collect two marks here. Where candidates obtained one mark this was often due to giving translation as the transformation, but then describing the movement rather than giving the vector, giving an incorrect vector or writing the vector incorrectly as a coordinate. Common errors with the vector were incorrect signs on the two elements and transposition of the two numbers. It was pleasing to see that a relatively small number of candidates described a completely incorrect transformation, however there were a significant number who gave more than one transformation, despite the instruction in the question, and therefore lost marks.

Q8. This was a challenging question that was attempted by most candidates but poorly done by many. Those who drew guide lines from the correct centre often got full marks. Many of the incorrect responses were due to candidates using the wrong scale factor (often ½) or using the wrong centre of enlargement.

Q9. Errors in part (a) involved transposing the *x* and *y* parts of the vector or moving the shape to a position where one vertex was at (−3, 2). Others used the vector incorrectly to move the top right (5,3) vertex to (0, 6), the position that top left (3,4) vertex should have after translation.

Incorrect mathematical language and lack of detail spoiled many descriptions in part (b) with "turn" often given instead of rotation and errors or omissions with the direction or centre. Students need to be clear about which of the 2 diagrams is being rotated to prevent errors with direction. All marks were lost when a candidate introduced a second transformation, usually a translation.

Q10. 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.

Q11. This question was well understood and well answered by almost all students. Almost all students gained at least one mark in (a) usually for not giving their correct ratio in its simplest form in (a) and in (b) for establishing that the cost of the white tiles was £96 and the blue tiles was £64. A common wrong answer in (b) was £150 (the total cost of all the tiles).

Q12. Many students found this question to be straightforward and presented their calculations and conclusion in a clear concise manner. Almost all students realised the need to round their answers to the nearest integer. However, there were also many responses consisting of false starts and incorrect assumptions and examiners often had to work hard to identify a correct method from a jumble of calculations. The most successful approach was to work out the amount of squash needed to provide drinks for the 140 children then divide by 750. A large proportion of the incorrect answers given were "38" gained by dividing the amount of orange drink needed (28000 ml) by the amount of squash (750 ml) in each bottle. A common sense check might have alerted students to a possible error if they had reflected on the need for 38 bottles of squash to provide enough orange drink for 140 people.

Q13. Most candidates were able to gain 2 marks here for finding the ages as 30 and 36. The better candidates went on to simplify 30:36 to give 5:6 thus giving easier calculations and most of these went on to score full marks. Those who attempted to divide 770 by 66 often gave their answer to this as 11 remainder 44 or 11.6 or sometimes just 11. Whilst many were then able to score the next method mark for multiplying their answer to the division by 30 or 36 they lost the accuracy mark for the final answers due to premature rounding.

Q14. Part (a) was a multistep question which caught many candidates out. Although the information given was not difficult to organise, many candidates overlooked the fact that 2400 had to be reduced by 15%. Of those that did spot this a great majority could get the correct 360 and most of these went on to derive the 2040 as the dry weight of constituents. The ratio part of the problem was dealt with very well, whether it was 2400 or 2040, although a few candidates shared out the 360.

Part (b) required some insight and thought on how to go about answering the question. As this was a starred (QWC, Quality of Written Communication) question candidates were expected to make their calculations and resulting conclusion really clear. The most common successful method was to multiply the weight of cement found in part (a) by 30 and compare the answer with 6.5 tonnes. This comparison could only be legitimately made if the two weights were in the same units. Many candidates could not convert tonnes to kilograms correctly, often using a conversion factor of 10000. The other efficient method seen was to convert the 6.5 tonnes of cement to kilograms, to then divide by 30 and compare with the answer (255) in part (a). To get full marks candidates had to have a correct method, be able to convert between kg and tonnes and come to a conclusion based on their calculations.

Q15. This question was well attempted by most candidates with many scoring full marks. The most common error was 32 where candidates did 2 × 16 rather than 2.5 × 16. Other candidates calculated the amount of biscuits that could be made from each ingredient then either chose the wrong answer, made a computational error or added all their answers together. A few candidates tried to calculate the ingredients needed for one biscuit but, for almost all, the calculations proved too difficult. Computational errors were common on this question.

Q16. Students employed a variety of methods to work out the amount of each ingredient needed to make the dessert for 15 people. By far the best method was to work out the multiplier of 2.5 from 15 ÷ 6 and then to apply this to each ingredient. However many students first divided each amount by 6 and rounded their answer before multiplying by 15. This led to inaccurate answers and far more complicated arithmetic processes.

Mark Scheme

Q1.

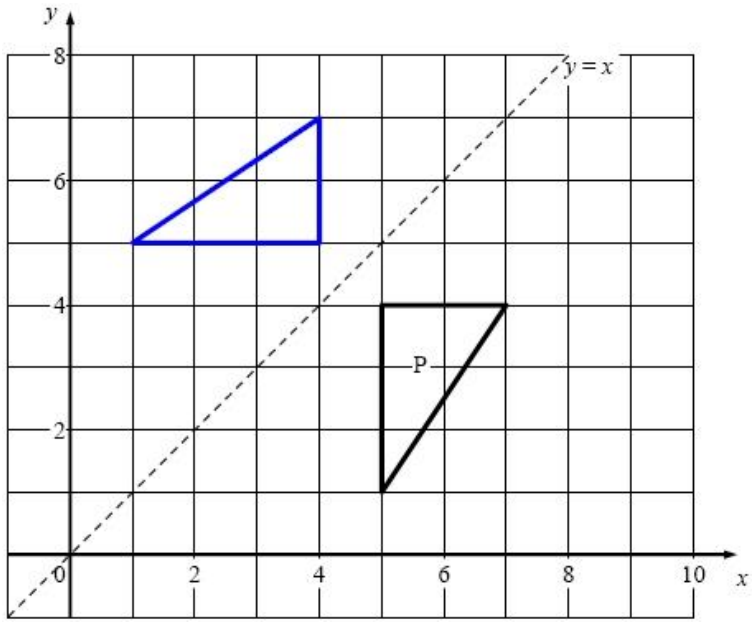
5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
		Rotation, 90° clockwise centre (1,4)	3	B1 for rotation B1 for 90° clockwise or 270° anticlockwise B1 for (1,4) NB Award B0 if more than one transformation given

Q2.

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
(a)		Triangle with vertices at (–3, 3), (–3, 4) and (–1, 4)	2	B2 for a triangle with vertices at (–3, 3), (–3, 4), (–1, 4) (B1 for triangle in correct orientation and size or rotated 90° clockwise about centre *O* or three correct vertices without joining)
(b)		Reflection in line $y = x$	2	B1 for reflection B1 for (in the line) $y = x$ Note: award no marks if more than one transformation is given

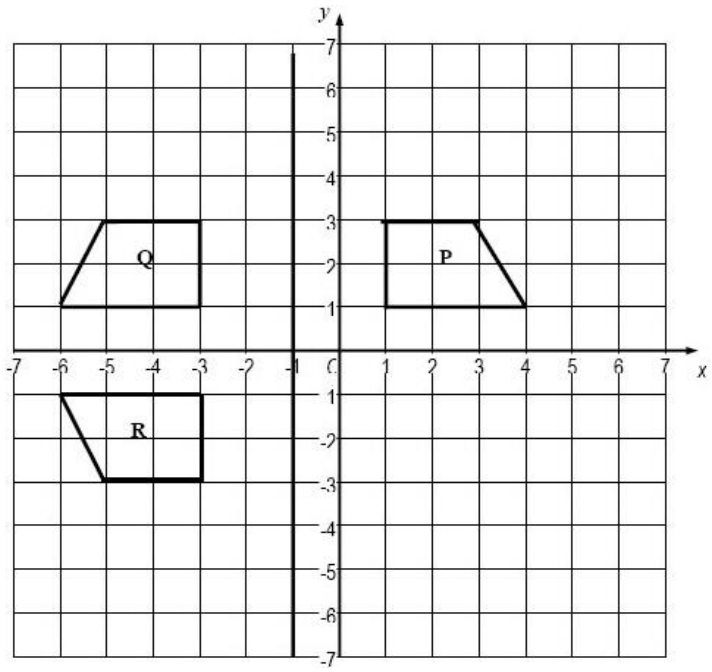
Q3.

Question		Working	Answer	Mark	Notes
	(a)		Triangle with vertices (1, 5) (4, 5) (4,7)	2	B2 correct reflection (B1 a translation of the correct answer with the final shape above $y = x$ **or** any two correct vertices) SC : B1 for a triangle with vertices at (2, 5) (4, 5) (4, 8)
	(b)		Translation by $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$	2	B1 Translation B1 $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$ NB. Award no marks for a combination of transformations



Q4.

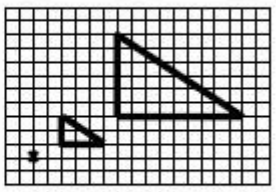
		Working	Answer	Mark	Notes
		Q at (– 3, 1), (– 6, 1) (–5, 3) (– 3, 3) **R** at (–3, – 1), (–6, – 1), (–5, – 3) (–3, –3)	Rotation 180° about (–1, 0)	3	M1 for showing **R** correctly on the grid without showing **Q or** for showing **Q and R** correctly on the grid A1 for rotation of 180° A1 for (centre) (–1, 0) **Or** M1 for showing **R** correctly on the grid without showing **Q or** for showing **Q and R** correctly on the grid A1 for Enlargement Scale Factor –1 A1 for centre (–1, 0) **NB** Award no marks for any correct answer from an incorrect diagram or any Accuracy marks if more than one transformation is given



Q5.

		Working	Answer	Mark	Notes
			enlargement, scale factor 2, centre (6, −5)	3	B1 for enlargement B1 for (scale) factor 2 or ×2 or sf 2 B1 for (6, −5) NB: award 0 marks for an explanation that includes reference to more than one transformation.

Q6.

		Working	Answer	Mark	Notes
				3	B3 for fully correct triangle (B2 for 2 vertices correct or enlargement scale factor 3 in wrong position or enlargement, centre *A*, with different scale factor) (B1 for 1 vertex correct or enlargement, not from *A*, different scale factor)

Q7.

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
			Translation $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$	2	B1 for translation B1 for $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$ NB No marks if more than one transformation given.

Q8.

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
			Triangle with vertices at (−1,−4), (−1,−5), (−3,−4.5)	2	M1 for correct shape and size and the correct orientation in the wrong position or two vertices correct A1 cao

Q9.

PAPER: 1MA0_1F					
Question		Working	Answer	Mark	Notes
	(a)		Shape with vertices at (−1, 3), (0, 6), (2, 6), (1, 3)	1	B1 for correct shape in correct position
	(b)		Rotation centre (0,0) 90° anticlockwise	3	B1 Rotation B1 (centre) (0,0) or *O* or origin B1 90° anticlockwise or 270° clockwise Note: award no marks if more than one transformation is given

Q10.

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)

Q11.

5MB1F/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
(a)		3:1	2	M1 for 48 : 16 or 24 : 8 or 12 : 4 or 6 : 2 or 1 : 3 A1 cao
(b)		3:2	2	M1 for 48 ×2 (= 96) or 16 × 4 (=64) or answer given as 2 : 3 oe A1 for 3 : 2 oe or M1 for "3" × 2 or 6 stated and "1" × 4 or 4 stated or answer given as 2 : 3 oe A1 for 3 : 2 oe

Q12.

Paper_5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*			4	4	M1 for 200 ÷ (1 + 9) (= 20) M1 for 750 ÷ 20 (= 37.5) A1 for 3.7(3….) or $3\frac{11}{15}$ or 37.5 **and** 150 C1 ft (dep on M1) for clear statement of 4 bottles with working shown **OR** M1 for 750 × 10 (= 7500) M1 for 200 × 140 (= 28 000) A1 for 3.7(3….) or $3\frac{11}{15}$ or 28000 **and** 30000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown **OR** M1 for 200 × 140 (= 28 000) M1 for 28 000 ÷ (9 + 1) (= 2800) A1 for 3.7(3….) or $3\frac{11}{15}$ or 2800 **and** 3000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown **OR** M1 for 200 ÷ (1 + 9) (= 20) M1 for 140 × "20" = 2800 A1 for 3.7(3….) or $3\frac{11}{15}$ or 2800 **and** 3000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown

Q13.

Question		Working	Answer	Mark	Notes
		66 ÷ 2 = 33 ± (6 ÷2) *P* = 30 and *T* = 36 Ages = 30 : 36 = 5 : 6 770÷11=70 each part 5 × 70 = £350 6 × 70 = £420	350 420	5	M1 66 ÷ 2 = 33 ± (6 ÷2) or (66-6)÷2 or for at least 3 trials with a total of 66 or a difference of 6 or for *x* + *x* + 6 = 66 or *x* + *x* – 6 = 66 oe A1 for 30 and 36 seen or 5 and 6 oe M1 for 770 ÷ '11' or 770 ÷ 66 M1 for '770÷66'×'30', where '30' is a ft from their previous answer or '770÷66'×'36', where '36' is a ft from their previous answer or '770÷11'×5 or '770÷11'×6 oe A1 for *P* = 350 and *T* = 420

Q14.

Question	Working	Answer	Mark	Notes
(a)	$^{15}/_{100} \times 2400 = 360$ 2400 – 360 = 2040 2040 ÷ (1 + 2 + 5) = 255 255 × 1, 255 × 2, 255 × 5	Cement = 255 Sand = 510 Stone = 1275	4	M1 for $^{15}/_{100} \times 2400$ or $^{85}/_{100} \times 2400$ M1 for '2040' ÷ (1 + 2 + 5) M1 (dep on previous M1) for '255' × 1 or '255' × 2 or '255' × 5 either explicitly or with answer(s) on the answer line. A1 for all 3 correct masses
(b)*	255 × 30 – 6500 = 1150 so not enough OR 6500 ÷ 255 = 25.5 m^3 worth of cement Which is less than 30 so not enough OR 6.5 tonnes of concrete gives 6.5 × 8 = 52 tonnes of dry mixture 30 m^3 of concrete requires 30 × 2400 × 0.85 kg of dry mixture = 61200kg of dry mixture (=61.2 tonnes)	No, with justification	3	B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for '255' × 30 C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations. OR B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for 6500 ÷ '255' C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations OR M1 for 6.5 × 8 and 30 × 2400 × 0.85 B1 for a correct between kg and tonnes e.g. 61200 kg = 61.2 kg (but not 1 tonne = 1000 kg) C1 (dep on M1) for an answer of No (Yes), supported by (ft) calculations.

Q15.

		Working	Answer	Mark	Notes
		250 ÷ 100 = 2.5 300 ÷ 50 = 6 600 ÷ 120 = 5 60 ÷ 15 = 4	40	3	M1 for 250 ÷ 100 or 300 ÷ 50 or 600 ÷ 120 or 60 ÷ 15 M1 for 250 ÷ 100 **and** 16 × '2.5' or 2.5 oe seen **and** 16 × '2.5' A1 cao **SC** M2 (16+16+16÷2) oe A1 cao **SC** M2 (250÷ $^{100}/_{16}$) oe A1 cao

Q16.

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
			375 25 1250 500	3	M1 for 15 ÷ 6 (= 2.5) oe (can be implied by one answer correct) A1 for two answers correct B1 all correct