

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/02**: Higher Tier

Mark Scheme for January 2011

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Marking instructions

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Work crossed out but not replaced should be marked.
4. **M** (method) marks are not lost for purely numerical errors.
A (accuracy) marks depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
B marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.
5. Two additional situations may appear in the mark scheme allowing the award of **A** marks or independent (**B**) marks:
 - i. Correct answer with no working
 - ii. Follows correctly from a previous answer whether correct or not (“ft” on mark scheme and on the annotations tool).
6. As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered, mark the poorer (poorest).
7. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate’s work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the **MR** annotation. **M** marks are not deducted for misreads.
8. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.
9. If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says ‘mark final answer’ or cao. If the answer is missing, but the correct answer is seen in the body allow full marks. If the correct answer is seen in working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would still be awarded.
10. Ranges of answers given in the mark scheme are always inclusive.
11. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work.

12. Award 0 if:
 - There is any attempt that earns no credit. This could, for example, include the candidate copying all or some of the question, or any working that does not earn any marks, whether crossed out or not.
13. Where a follow through mark is indicated on the mark scheme for a particular part question, you must ensure that you refer back to the answer of the previous part question if this is not shown within the image zone.
14. Anything in the mark scheme which is in square brackets [...] is not required for the mark to be earned, but if present it must be correct.

Abbreviations

The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- Where you see **oe** in the mark scheme it means **or equivalent**.
- Where you see **isw** in the mark scheme it means **ignore subsequent working** (after correct answer obtained), provided the method has been completed.
- Where you see **cao** in the mark scheme it means **correct answer only**.
- Where you see **soi** in the mark scheme it means **seen or implied**.
- Where you see **www** in the mark scheme it means **without wrong working**.
- Where you see **rot** in the mark scheme it means **rounded or truncated**.
- Where you see **seen** in the mark scheme it means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
- Where you see **figs 237**, for example, this means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.

Question			Marks	Guidance
1	(a)	360	2	M1 for $240 \times 24 \div 16$ oe eg $240 + 120$, 15×24
	(b)	410	3	M2 for $500 - \textit{their}$ $120 \times 12 \div 16$ oe or M1 for $(120 \times 12 \div 16)$ oe or $500 - \text{'a number'}$
2	(a)	4.45	2	B1 for 4.454(...) or 4.5
	(b)	$19.7 - 19.88$ or $15.3 + \textit{their}$ (a)	2	M1 for $2 \times 5.4 + 2 \times 2.25 + \textit{their}$ (a) or B1 for 15.3
	(c)	24.19(...) or 24.2	3	M2 for 5.4×2.25 or 12.15 and $\frac{(5.4 + 2.25) \times '3.15'}{2}$ or $12.04 - 12.05$ or for 5.4^2 or 29.16 and $\frac{'3.15'^2}{2}$ or 4.96(...) or M1 for 5.4×2.25 or 12.15 or $\frac{(5.4 + 2.25) \times '3.15'}{2}$ or $12.04 - 12.05$ or 5.4^2 or 29.16 or $\frac{'3.15'^2}{2}$ or 4.96(...)

	(d)	Correct choice of merchant supported by calculation	4	<p>4: Hardcore, sand and cement from A and slabs from B. Total cost £617.39</p> <p>3: Correct total (£617.39) with no choice or an incorrect choice of merchant or correct choice with a slip in the total cost or correct choice with all items costed correctly but not totalled</p> <p>2: Incorrect choice with correct totals for A (£628.64) and B (£621.50) or with one or both of the totals for A and B incorrect but attempt at comparison made.</p> <p>1: Correct choice with no calculations or wrong calculations or 1 correct total or comparison of cost of 1 item.</p>	A slip may be subtracting the delivery charge or adding a delivery charge for each item from A or omitting the delivery charge or an arithmetical slip.
3	(a)	$11x - 15$ as final answer	3	<p>B2 for $2x + 9x - 15$ or B1 for $2x + 3(3x - 5)$ or $11x$ or -15 seen</p>	
	(b)	(i) 15	3	<p>M1 for $11x - 15 = 150$ FT <i>their (a)</i> and M1 for $11x = 165$ and M1 for $x = 15$</p>	<p>eg $4x - 5 = 150$ or $2x = 150$</p> <p>FT their first step</p> <p>FT their second step</p>
		(ii) 40 cao	1		

4		$3\frac{17}{20}$ oe mixed number	3	<p>M2 for $4 - \frac{3}{20}$ or $4\frac{32}{20} - \frac{15}{20}$ or $\frac{77}{20}$</p> <p>or</p> <p>M1 for conversion of both fractions to a common denominator</p> <p>$\frac{12}{20}, \frac{15}{20}$ or $\frac{112}{20}, \frac{35}{20}$ oe with at least one correct or $\pm\frac{3}{20}$.</p>	<p>SC2 $4\frac{17}{20}$ or 3.85</p> <p>or</p> <p>SC1 $4\frac{3}{20}$</p> <p>Both denominators must be the same.</p>
5		60	2	<p>M1 for 12, 24, 36, 48, 60, 72, ... or 10, 20, 30, 40, 50, 60, ...</p> <p>or</p> <p>SC1 for multiple of 60 as final answer</p>	<p>Condone 1 minute for 2 marks</p> <p>Condone multiples of 1 minute for 1</p>
6	(a)	$3\frac{1}{4}$ www	3	<p>M1 for $6x - 9 = (2x + 4)$ or $2x - 3 = \frac{2}{3}x + \frac{4}{3}$</p> <p>and</p> <p>M1 ft for $6x - 2x = 13$ or $4x = 4 + 9$ or $1\frac{1}{3}x = \frac{4}{3} + 3$ or $2x - \frac{2}{3}x = 4\frac{1}{3}$</p> <p>and</p> <p>M1 correct or FT from <i>their</i> $4x = k$ or $kx = 13$ or $1\frac{1}{3}x = k$ or $kx = 4\frac{1}{3}$</p>	<p>M marks are for correct steps; first M1 is for correct expansion of brackets or for correct division by 3.</p> <p>Second M1 is for correct collection of terms ft their equation with either x terms or constants simplified.</p> <p>Third M1 is for correctly obtaining x ft their simplified equation. Do not accept $k/4$ or $13/k$ unsimplified if equivalent to an integer.</p>

	(b)	$2t + 3c = 155$ $3t + 4c = 215$ $6t + 9c = 465$ ($8t + 12c = 620$) $6t + 8c = 430$ ($9t + 12c = 645$) $c = 35$ ($t = 25$) $t = 25$ ($c = 35$) Tea 25p, Cake 35p cao	B1 M1 M1 A1	Condone 1 error Subtracting to eliminate c	Substitution method: M1 $t = \frac{155 - 3c}{2}$ oe Condone 1 error M1 for $3 \frac{155 - 3c}{2} + 4c = 215$ oe
7	(a)	18450	2	M1 for 1-12 seen	
	(b)	42924 or 42925 or 42900	3	M2 for $27\,500 \times 1.16^3$ or $37\,004 \times 1.16$ or M1 for $27\,500 \times 1.16$ or 31900	42924.6 scores M2 40700 implies M1
8	(a)	1	1		
	(b)	$\frac{1}{7}$ or 0.142(8...) or 0.143	2	B1 for square root or dealing with reciprocal Accept decimal rounded or truncated to 3 d.p. or more.	
	(c)	25	2	M1 for 5^2	
9		12705	4	M3 for $2 \times \frac{1}{2} (140 + 70) \times 60.5$ or $140 \times 121 - 4 \times (35 \times 60.5) \div 2$ or M2 for $\frac{1}{2} (140 + 70) \times 60.5$ or 140×121 and $(35 \times 60.5) \div 2$ or M1 140×121 or 16940 or 70×121 or 8470 or for use of 60.5 or 35	Accept $70 \times 121 + 2 \times (121 \times 35) \div 2$ Accept 70×121 and $(121 \times 35) \div 2$

10	(a)	Bearing of 255° Bearing of 305° Position of L marked	1 1 1	Allow both bearings $\pm 2^\circ$ FT their bearings (accept dot)	
	(b)	12.0 - 12.6 LQ = 48.0 – 50.4(km) 1h 55m - 2h 01m	B1 M1 2	FT <i>their</i> L ± 0.2 cm FT 4 \times <i>their</i> measurement for LQ M1 for <i>their</i> LQ $\div 25$	
11		158.7(...) or 159 or 160 supported by working	4	M3 for $(\sqrt[3]{2})^2$ or 1.58(7...) or 1.59 or M2 for $\sqrt[3]{2}$ or 1.25(9...) or 1.26 or M1 for volume sf = 2	Candidates may assume measurements for the cubes. Check working for the given scale factors. eg First cube has side 5cm, 2 nd cube has side 6.3 would imply M2 . $\left(\frac{6.3}{5}\right)^2$ would imply M3

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