GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/02:** Higher Tier

Mark Scheme for January 2011

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 $500 -$ *their* $120 \times 12 \div 16$ **oe** **or** **M1** for $(120 \times 12 \div 16)$ **oe** or $500 -$ 'a number'	
2	(a)		4·45	2	**B1** for $4.454(\ldots)$ or 4.5	
	(b)		$19 \cdot 7 - 19.88$ or $15.3 +$ *their* **(a)**	2	**M1** for $2 \times 5.4 + 2 \times 2.25 +$ *their* **(a)** **or** **B1** for 15.3	
	(c)		$24.19(\ldots)$ or 24.2	3	**M2** for 5.4×2.25 or 12.15 **and** $\dfrac{(5.4 + 2.25) \times \text{'}3.15\text{'}}{2}$ or $12.04 - 12.05$ **or** for 5.4^2 or 29.16 **and** $\dfrac{\text{'}3.15\text{'}^2}{2}$ or $4 \cdot 96(\ldots)$ **or** **M1** for 5.4×2.25 or 12.15 or $\dfrac{(5.4 + 2.25) \times \text{'}3.15\text{'}}{2}$ or $12.04 - 12.05$ or $5 \cdot 4^2$ or 29.16 or $\dfrac{\text{'}3.15\text{'}^2}{2}$ or $4 \cdot 96(\ldots)$	

	(d)		Correct choice of merchant supported by calculation	4	**4**: Hardcore, sand and cement from A and slabs from B. Total cost £617.39 **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 **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. **1**: Correct choice with no calculations or wrong calculations **or** 1 correct total **or** comparison of cost of 1 item.	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	**B2** for $2x + 9x - 15$ **or** **B1** for $2x + 3(3x - 5)$ or $11x$ or $^-15$ seen	
	(b)	**(i)**	15	3	**M1** for $11x - 15 = 150$ **FT** *their* **(a)** **and** **M1** for $11x = 165$ **and** **M1** for $x = 15$	eg $4x - 5 = 150$ or $2x = 150$ **FT** their first step **FT** their second step
		(ii)	40 cao	1		

4			$3\frac{17}{20}$ **oe** mixed number	3	**M2** for $4 - \frac{3}{20}$ or $4\frac{32}{20} - \frac{15}{20}$ or $\frac{77}{20}$ **or** **M1** for conversion of both fractions to a common denominator $\frac{12}{20}$, $\frac{15}{20}$ **or** $\frac{112}{20}$, $\frac{35}{20}$ **oe** with at least one correct or $\pm\frac{3}{20}$.	**SC2** $4\frac{17}{20}$ or 3.85 **or** **SC1** $4\frac{3}{20}$ Both denominators must be the same.
5			60	2	**M1** for 12, 24, 36, 48, 60, 72, … or 10, 20, 30, 40, 50, 60, … **or** **SC1** for multiple of 60 as final answer	Condone 1 minute for **2** marks Condone multiples of 1 minute for **1**

6	(a)		$3\frac{1}{4}$ **www**	3	**M1** for $6x - 9 = (2x + 4)$ or
					      $2x - 3 = \frac{2}{3}x + \frac{4}{3}$
					 and
					 M1 ft for $6x - 2x = 13$ or $4x = 4 + 9$ or
					    $1\frac{1}{3}x = \frac{4}{3} + 3$ or $2x - \frac{2}{3}x = 4\frac{1}{3}$
					 and
					 M1 correct or **FT** from *their* $4x = k$ or
					    $kx = 13$ or $1\frac{1}{3}x = k$ or $kx = 4\frac{1}{3}$
						M marks are for **correct** steps; **first M1** is for correct expansion of brackets or for correct division by 3.
						
						 Second M1 is for correct collection of terms ft their equation with either x terms or constants simplified.
						
						 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.

	(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** $t = \dfrac{155 - 3c}{2}$ **oe** Condone 1 error **M1** for $3\dfrac{155 - 3c}{2} + 4c = 215$ **oe**
7	**(a)**		18 450	**2**	**M1** for 1·12 seen	
	(b)		42 924 or 42 925 or 42 900	**3**	**M2** for $27\,500 \times 1.16^3$ or $37\,004 \times 1.16$ **or** **M1** for $27\,500 \times 1.16$ or $31\,900$	42924.6 scores **M2** 40 700 implies **M1**
8	**(a)**		1	**1**		
	(b)		$\dfrac{1}{7}$ 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			12 705	**4**	**M3** for $2 \times \frac{1}{2}(140 + 70) \times 60{\cdot}5$
					    or $140 \times 121 - 4 \times (35 \times 60{\cdot}5) \div 2$
					 or
					 M2 for $\frac{1}{2}(140 + 70) \times 60{\cdot}5$
					    or 140×121 **and** $(35 \times 60{\cdot}5) \div 2$
					 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°	1	Allow both bearings ±2°	
			Bearing of 305°	1		
			Position of L marked	1	**FT** their bearings (accept dot)	
	(b)		12.0 - 12.6	**B1**	**FT** *their* L ± 0.2cm	
			LQ = 48.0 – 50.4(km)	**M1**	**FT** 4 × *their* measurement for LQ	
			1h 55m - 2h 01m	**2**	**M1** for *their* LQ ÷ 25	
11			158.7(…) or 159 or 160 supported by working	**4**	**M3** for $\left(\sqrt[3]{2}\right)^2$ 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, 2nd cube has side 6.3 would imply **M2**. $\left(\dfrac{6.3}{5}\right)^2$ would imply **M3**

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