RECOGNISING ACHIEVEMENT

GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/02:** Higher Tier

Mark Scheme for January 2013

Oxford Cambridge and RSA Examinations

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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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Annotations

Annotation	Meaning
✓	Correct
×	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign

These should be used whenever appropriate during your marking.

The **M**, **A, B**, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.
It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

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.

Subject-specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
   A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
   B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
   SC marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

   Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

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

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** 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.
   - **soi** means **seen or implied**.

6. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

   (i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

   (ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

   (iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

8. 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).

9. 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.

10. 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.

11. Ranges of answers given in the mark scheme are always inclusive.

12. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

13. 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.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		15	1		
	(b)	(i)	[…….. =] $2x - 11$	2	**M1** for $2(x - 3)$ or $2x - 6$ **seen** condone $(x - 3)2$ **seen** **SC1** for answer of $2x - 8$ or $x - 11$	Not $x =$ ….
		(ii)	[x =] 4	2	**FT** *their* **b(i)** **M1** for *their* $2x - 11 = -3$ or better or for $-3 + 5 \div 2 + 3$ [=2.5] **seen** **SC1** for $\frac{(x+5)}{2} + 3$	
2	(a)		500 and 3	1	Condone in any order	Condone 3.(000)
	(b)		5	1	**FT** *their* **(a)**	
3			21	3	**M2** for 0.6×35 (implied by 21) or 0.6×0.35 or 0.21 or 0.4×35 or 14 or 0.4×0.35 or 0.14 or *their* 35 – 0.4 × *their* 35 evaluated correctly **or** **M1** for 35% or 60% seen or *their* 35 – 0.4 × *their* 35	
4	(a)		50, alternate (angle)	1		Condone Z angle

Question			Answer	Marks	Part Marks and Guidance	
	(b)		68 + reasons	3	**B2** for $y = 68$ **OR** **B1** for BDC or EDF = 68 or BDE or DEG = 112 **and** **B1** for correct use of some of angles on a line, opposite angles, allied angles, corresponding angles, alternate angles, angles in a quadrilateral	Angles may appear on diagram Condone F and Z
5	**(a)**		96	2	**M1** for clear attempt to substitute (980) and (500) in the relevant formula	eg $\frac{980-500}{500}$ or $\frac{480}{500}$ [=0.96] or 480 or 979 or ⁻98.04 or 880 or **figs** 96 **seen**
	(b)		650	2	**M1** for clear attempt to substitute (30) and (500) in the relevant formula	eg $\frac{130\times500}{100}$ or 530 or 500.3 or better **seen** or **figs** 65 **seen**
6			0.70 or 70p	4	**M1** for 2.4×1.95 or 4.68 **and** **M1** for 20 – 12.66 – *their* 4.68 or 2.66 **and** **M1** for *their* $2.66 \div 3.8$	
7	**(a)**		68 – 68.2	2	**M1** for $\frac{620}{100}\times7.1$ or $\frac{310}{100}\times7.8$ **oe** or 44.02 or 24.18 If 0 scored allow **SC1** for 6820 or 66	Condone 44.02 and 24.18 rounded or truncated to 1 decimal place or an integer

Question			Answer	Marks	Part Marks and Guidance	
	(b)		7.3 − 7.33[…]	2	**FT** *their* **(a)** **M1** for eg $\frac{\textit{their}\ 68.2}{930}[\times 100]$ **oe**	
8	**(a)**		Bearing of 142° Distance of 160km (8cm)	1 1	Allow bearing ±2° Allow ±2 mm	
	(b)		253 - 257°	2	**M1** for 103 - 107°	
9			22	4	**M1** for number of girls = 64 or number of boys = 76 **and** **M1** for girls U = 18 ÷ 3 or 6 **seen** or boys U = 18 ÷ 3 × 2 or 12 **seen** or boys M = *their* 76 – 25 – *their* 12 **and** **M1** for girls Distinction = *their* 64 – 36 – *their* 6 or 140 – 25 – 36 – *their* 39 – *their* 12 – *their* 6	<table><tr><td></td><td>D</td><td>M</td><td>U</td><td></td></tr><tr><td>B</td><td>25</td><td>**39**</td><td>**12**</td><td>**76**</td></tr><tr><td>G</td><td>**22**</td><td>36</td><td>**6**</td><td>**64**</td></tr></table>
10			$x + 3y = 107.5(0)$ $2x + y = 90$ $2x + 6y = 215$ or $6x + 3y = 270$ $5y = 125$ or $5x = 162.5(0)$ $y = 25$ and $x = 32.5(0)$	B1 M1 M1 A1	Condone inclusion of units and the use of alternative letters Condone a maximum of one numerical error for the two method marks **SC3** for $y = 25$ and $x = 32.5(0)$ with no equations shown	Alternative method: **M1** for $y = 90 – 2x$ or $x = 107.5 – 3y$ **oe** or by using their x/y **M1** for $x + 270 – 6x = 107.5$ or $215 – 6y + y = 90$ **oe** or by using their x/y Condone a maximum of one numerical error for the two method marks

Question			Answer	Marks	Part Marks and Guidance	
11			Complete and correct solution showing all five steps supported by correct calculations and clearly explained.	6	**B5** for five correct steps not fully explained or 4 correct steps fully explained **or** **B4** for four correct steps not fully explained or three correct steps fully explained **or** **B3** for three correct steps or two correct steps with at least three steps fully explained **or** **B2** for two correct steps or one correct step with at least three steps fully explained **or** **B1** for one correct step If 0 scored allow **SC1** for either correct cost **seen**	Step 1 Cost = 1500 ÷ 1.25 = 1200 Step 2 Cost = 1500 ÷ 0.75 = 2000 Step 3 Total CP = *their* 3200 and total SP = *their* 3000 or Loss = *their* 500 and profit = *their* 300or [overall] loss/profit = *their* 200 Step 4 Loss(profit) = $\frac{\textit{their}\ 200}{\textit{their}\ 3200}$ [$\times 100$] Step 5 *Their* answer of 6.25% Values used in steps 3, 4, 5 should be consistent with their two costs but not from costs of 1125 and 1875 Condone 1200 $\times$ 0.25 = 300 and 2000 $\times$ 0.25 = 500 for steps 1 and 2
12			$\frac{25}{9}$ or better	2	**M1** for 25 or 9 or $\frac{5}{3}$ or answer of 2.77[...] or 2.78	
13	(a)		$\frac{1}{4} \times \frac{2}{3}$ or $\frac{2}{12}$ $\left[= \frac{1}{6}\right]$	2	**M1** for $\frac{k}{4} \times \frac{2}{3}$	Accept use of values for AB and AD, eg AB = 4*m* and AD = 3*n* **M1** [area ABCD =] 12*mn* or [area PBQT =] 2*mn*

Question			Answer	Marks	Part Marks and Guidance	
	(b)		$1\frac{1}{2}$	4	**M1** for $\frac{1}{3} \times \frac{3}{4}$ $\left[=\frac{3}{12}\right]$ **oe** **AND** **M2** for *their* $\frac{3}{12} \times 6$ **or** **M1** for *their* $\frac{3}{12} \div \frac{1}{6}$	Alternative method: AB = 4*m* and AD = 3*n* **M1** [area DSTR =] 3*mn* **M1** [area PBQT =] 2*mn* **M1** $\frac{3mn}{2mn}$
	(c)		36	3	**M2** for AB = 4 and BC = 9 or [Area =] 4 × *their* AD or 9 × *their* AB correctly evaluated **or** **M1** for AB = 4*k* or BC = 9*k* where *k* is an integer	Alternative method: **M2** for 4AD = 9AB or **M1** for ¾AB = ⅓AD
14	(a)		801 - 802 or 800	3	**M2** for $488 \times \left(\frac{11.8}{10}\right)^3$ **oe** **or** **M1** for $\left(\frac{11.8}{10}\right)^3$ or 1.6[4…] or $\left(\frac{10}{11.8}\right)^3$ or 0.608 - 0.61	
	(b)		5.59 - 5.6 or 5.6 - 5.62 (from calories)	2	**FT** *their* **(a)** with working seen **M1** for $9.2 \times \left(\frac{10}{11.8}\right)^3$ **oe** or $9.2 \times \frac{488}{\textit{their}\ (a)}$ or $\frac{4489.6}{\textit{their}\ (a)}$	

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