OCR
Oxford Cambridge and RSA

GCSE

Applications of Mathematics (Pilot)

Unit **A381/02:** Higher Tier

General Certificate of Secondary Education

Mark Scheme for June 2014

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
✓	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

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.

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 – $\sqrt{}$(*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.

   i. **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.
   ii. **isw** means **ignore subsequent working** (after correct answer obtained).
   iii. **nfww** means **not from wrong working**.
   iv. **oe** means **or equivalent**.
   v. **rot** means **rounded or truncated**.
   vi. **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.
   vii. **soi** means **seen or implied**.

6. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. 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).

8. 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.

9. 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.

10. 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'. Place the annotation ✓ next to the correct answer.

    If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

    If the correct answer is seen in the 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. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

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.

MARK SCHEME

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		175 ÷ 4.5 = 38, 39, or 38.8 to 38.9 **and** 125 ÷ 3.1 = 40[.3…] or 250 ÷ 6.2 = 40[.3…] **and** conclusion **OR** 450 ÷ 175 = 2.57[…] or 2.6 **and** 310 ÷ 125 = 2.48 or 620 ÷ 250 = 2.48 **and** conclusion **OR** Correct method for cost of 125/250ml based on 175ml or cost of 175ml based on cost of 125/250ml eg $\frac{4.50}{175} \times 250 = 6.4$ or 6.42 to 6.43 **oe** or $\frac{3.10}{125} \times 175 = 4.34$ **and** conclusion **OR** 175 ÷ 125 = 1.4 and 4.50 ÷ 3.10 = 1.45… **and** conclusion	2	**M1** for 175 ÷ 4.5 = 38(.8…) **and** 125 ÷ 3.1 = 40(.3…) or 250 ÷ 6.2 = 40(.3…) **OR** **M1** for 450 ÷ 175 = 2.57[…] **and** 310 ÷ 125 = 2.48 or 620 ÷ 250 = 2.48 **OR** eg **M1** for $\frac{4.50}{175} \times 250$ **oe** or $\frac{3.10}{125} \times 175$ **oe** **M1** for both calculations (condone one slip)	Amount per unit cost (ml/£) Allow one slip Cost per ml (p/ml) Condone rounding and truncation if clear Allow one slip Cost of 250ml at 175ml rate Cost of 175ml at 125ml rate M1 for two calculations involving X ml that compare the cost of 175ml with one other size (condone one slip)
	(b)		3.25 4.55 6.50	3	**B2** for any one correct **or** **M1** for $\frac{125}{750} \times 19.5[0]$ or $\frac{175}{750} \times 19.5[0]$ or $\frac{250}{750} \times 19.5[0]$	

Question			Answer	Marks	Part Marks and Guidance	
2	(a)	(i)	21	1		Condone 10^{21}
		(ii)	4	1		Condone 10^{4}
		(iii)	10	2	**B1** for 10000 or 10^4 nfww	
	(b)	(i)	14	2	**M1** for $800 \div 200$ or 4	
		(ii)	5000	2	**M1** for $-7 = 18 - \frac{h}{200}$ or better	Accept 5 km Allow M1 for substitution into rearranged formula condoning, one slip
		(iii)	1800	2	**M1** for $[h =] 9 \times 200$	Method must not be spoiled Eg $9 \times 200 \pm 18$ M1 Allow **complete** method for difference of heights for two points with temperature difference of 9
3	(a)		230	2	**M1** for 0.18×1000 or 180	
	(b)	(i)	930	2	**M1** for $2 \times 150 + 2 \times 200$ **oe** OR **SC1** for answer of 580	 from one each of £150 and £200
		(ii)	233	2FT	**M1** for $930 \div 4$ or 232.5 or 232 **A1** for 233 or **ft** their **(b)(i)**	

Question			Answer	Marks	Part Marks and Guidance	
3	(b)	(iii)	An answer of [£]1134 with all relevant stages of working shown or equivalent working following through from their **(b)(i)** with annotation at each step	4FT	**4:** 4 correct stages annotated Number of tickets: 3 × 215 = 645 [Expect to] sell 0.8 × 645 = 516 **oe** Money raised: 516 × 4 = 2064 Profit: 2064 – *their* 930 = 1134 **3:** 4 correct stages w/o annotation 3 correct stages annotated correct solution with annotation for four concerts (£1822) or correct solution with annotation for 645 tickets sold **2:** 3 correct stages 2 correct stages annotated **1:** 2 correct stages 1 correct stage annotated	Two or more calculations may be combined Accept 0.8 × 215 = 172 172 × 3 = 516 4 concerts 4 × 215 = 860 0.8 × 860 = 688 **oe** 688 × 4 = 2752 2752 – 930 = 1822 645 tickets 3 × 215 = 645 645 × 4 = 2580 2580 – 930 = 1650 For 1 or 2 marks condone omission of working
	(c)		53.4 to 53.5	3	**M2** for $\frac{51.56 - 6\times4}{51.56}$ (× 100) or $\frac{27.56}{51.56}$ **oe** OR **M1** for 51.56 – 6 × 4 or 27.56 or $\frac{6\times4}{51.56}$ soi by 0.465[…] or 46.5[…]	Mark at most accurate An answer rounded to 53 scores 3 marks if more accurate answer seen in working, otherwise award A0

Question			Answer	Marks	Part Marks and Guidance	
4	(a)	(i)	[0]55	1	Allow ± 2º	
		(ii)	333	1	Allow ± 2º	
	(b)	(i)	39	2	**M1** for 26 × 1.5 **oe**	Condone 26 × 1.3[0] and 26 × 1h 30[m] for M1
		(ii)	4.87 to 5.13	2FT	**M1** for 7.8 ± 0.2 [cm] **A1** for 4.87 to 5.13 or **ft** *their* (b)(i) ÷ 7.8 ± 0.2	Accept rounded to 1dp If no working shown follow through for 7.8
		(iii)	108 to 111.5 nfww	5	**M2ft** for *their* 5 × (12.6 to 13) Or **M1** for 12.6 to 13 And **M2FT** for (*their* distance ÷ 35) × 60 **oe** Or **M1FT** for (*their* distance ÷ *their* 35)	For M2/M1 condone *their* 39 for their distance and $\frac{7}{12}$, 0.58 for time in hours For M1 condone *their* 12.6 to 13 for *their* distance
5	(a)	(i)	3150	2	**M1** for 113.40 ÷ 36	M1 implied by 3.15 or answer of 3141.18 to 3152.52 Accept 113.4 × 27.7 to 27.8 or 28 with evidence
		(ii)	4035 to 4036 or 4040	3	**M2** for 36000 ÷ 8.92 or 36 ÷ 0.00892 Or **M1** for **figs** 36 ÷ 8.92 or 36 ÷ figs 892	Figs 4035 to 4036 and 404
	(b)		2.14	3	**M2** for 1.8[0] × 1.06^3 or 2.02[…] × 1.06 Or **M1** for 1.8[0] × 1.06 or 1.9 to 1.91 If 0, then **SC1** for 1.8 × 1.06^4 [= 2.27…]	

Question			Answer	Marks	Part Marks and Guidance	
6	(a)		1420	2	**B1** for 1417.5 or 1417 or 1418 or for rounding their answer (seen) correctly to 3sf	
	(b)		17	3	**M2** for $25.5 \times \sqrt{\frac{320}{720}}$ **oe** Or **M1** for $25.5 \times \left(\frac{320}{720}\right)^n$ **oe** or $25.5 \div \left(\frac{720}{320}\right)^n$ **oe**	For M2 accept $25.5 \times \sqrt[3]{\frac{420}{their\ (a)}}$ **oe** and for M1 accept $25.5 \times \left(\frac{420}{their\ (a)}\right)^n$ or $25.5 \div \left(\frac{their\ (a)}{420}\right)^n$ $\frac{320}{720} = \frac{4}{9} = 0.44[4\ldots]$ $\frac{720}{320} = \frac{9}{4} = 2.25$ n = 1, ½, 1/3, 2, 3

Question			Answer	Marks	Part Marks and Guidance	
7	(a)	(i)	90	3	**M1** for multiples of 18 (first 5 correct) **M1** for multiples of 10 (first 9 correct) **OR** **M1** for prime factors of 18 ($2 \times 3 \times 3$) **and** prime factors of 10 (2×5) **M1** for $2 \times 3 \times 3 \times 5$	
		(ii)	810	2	**M1** for two of *their* $90 \div 18$ [= 5] or *their* $90 \div 10$ [= 9], or *their* $90 \div 5$ [=18] or *their* $90 \times 90 \times 90$ [= 729000] or $18 \times 10 \times 5$ [= 900]	Must have clear evidence for the numbers 5, 9, 18
	(b)		36 by 30 by 40 (any order)	3	**M1** for any product of three numbers giving 48, e.g. $2 \times 2 \times 12$, etc. **M1 dep** for size of box based on their product, e.g. 36 by 20 by 60, etc. **OR** **B2** for two correct dimensions **or** **B1** for one correct dimension **OR** **M1** for $48 \times 18 \times 10 \times 5$ [= 43200] **M1** for product of 3 numbers giving *their* 43200	

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