RECOGNISING ACHIEVEMENT

GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A382/01:** Foundation 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.

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

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)		1797	1		
	(b)		[£]25 000	2	**M1** for 500 × 50 **seen**	
	(c)		[5 10 20 20] [5 50]	3	**M2** for *their* [£]55 **seen** **or** **M1** for [£]110 seen or clear attempt to add all six values	
	(d)	(i)	£20	1		
		(ii)	500 cm or equivalent height units eg 5 m or 5000 mm	3	**M2** for **figs** 5 as answer **OR** **M1** for 1 000 000 ÷ 20 **soi** **and** **M1** for [1 000 000 ÷ 20] × 0.1	
		(iii)	Weight of £1 000 000 in £20 notes is 50 kg which is high given average weight lifted comfortably is about (10 to 50) kg	3	**M2** for 50 000g or 50kg **OR** **M1** for 1000 000 ÷ 20 **or** 50 000 **and** **M1** for comparing "50 000" g or "50" kg with a reasonable weight to comfortably carry of (10 to 50) (kg) **or** just (10 to 50) kg seen i.e. reasonable estimate with correct units.	Allow any relevant weight comparison

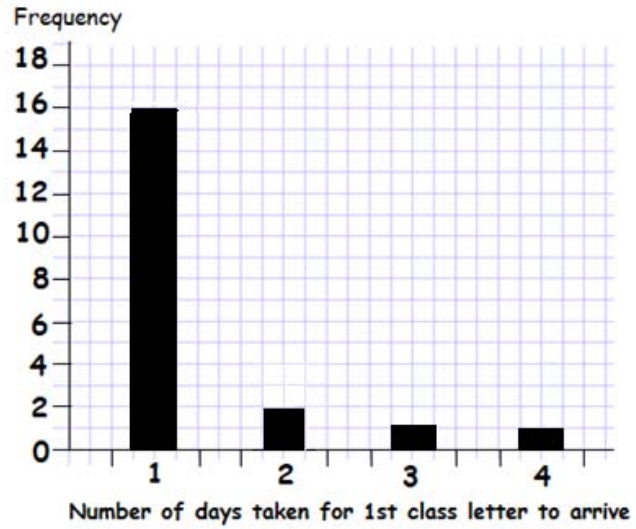
Question			Answer	Marks	Part Marks and Guidance	
	(e)		Total value of banknotes in circulation is £49 000 [million] which is more than the £3700 [million] in coins **oe nfww**	3	**M2** for [£]49000 **OR** **M1** for any three of these seen: 300 × 5 [= (£) 1500 (million)] 650 × 10 [= (£) 6500 (million)] 1550 × 20 [= (£) 31000(million)] 200 × 50 [= (£) 10 000 (million)] or for correct banknote total of 2700 **and** **M1** for correct comparison of *their* (£)49 000 (million) with (£)3700 (million)	Full credit for showing that one "note bar" is more than £3 700 million with appropriate comment If 2700 becomes [£]2700 million then can score last **M1**
	(f)	**(i)**	Very unlikely	1		
		(ii)	$\frac{3}{10000}$ $\frac{9997}{10000}$	1 1	**M1** for a second response which is 1 – **(ii)**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th colspan="2">Part Marks and Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td>(i)</td><td>800</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>200</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>$\frac{1}{5}$ of 1000 = 200 oe

200 were late, yes</td><td>2</td><td>M1 for attempt to calculate $\frac{1}{5}$ of 1000 eg 1000 ÷ 5</td><td>1000 = a(i) + a(ii)

Condone comparison with “200” Must be an overt comparison.</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><th>Number of days for 1st class letter to arrive</th><th>Tally</th><th>Frequency</th></tr><tr><td>1</td><td>𝍸 𝍸 𝍸 I</td><td>16</td></tr><tr><td>2</td><td>II</td><td>2</td></tr><tr><td>3</td><td>I</td><td>1</td></tr><tr><td>4</td><td>I</td><td>1</td></tr><tr><td></td><td>Total</td><td></td></tr></table></td><td>2</td><td>2 for the all 4 frequency cells correct

1 for 2 or 3 of the 4 frequency cells correct or for the 4 correct frequencies seen in the tally column or the 4 correct tallies in the table</td><td></td></tr>
</table>

Question			Answer	Marks	Part Marks and Guidance	
		(ii)		2	As a minimum **1** for 4 correct heights **FT** *their* heights **1** for four bars/sticks of equal width	Condone touching bars
		(iii)	Yes with sight of $\frac{1}{5}$ **oe**	1	**FT** *their* values	

Question			Answer	Marks	Part Marks and Guidance	
3	(a)		S T R	2	**1** for R and T reversed	
	(b)	(i)	Correct net drawn	3	**M2** for two correctly sized pairs of correctly placed rectangles **or** **M1** for one correctly sized pair of correctly placed rectangles or six connected rectangles drawn	Mark for intent ie condone "straight" lines with a slight wobble in, say ±2 mm Ignore any flaps
		(ii)	9.89 ... or 9.9 or $\sqrt{98}$ or $7\sqrt{2}$	2	**M1** for 98 **seen** **or** **M1** for 16 and 81 both **seen**	

Question			Answer	Marks	Part Marks and Guidance	
4	(a)		Andy (£)540 and Drew: (£)720 **nfww**	3	**B2** for money in wrong order or one sum correct (ie 540 or 720) **or** **M1** for 180 or 1260 ÷ 7 **OR** **M2** for Andy [£]560 and Drew [£]700 **or** **M1** for 140 or 1260 ÷ 9	Andy [£]720 & Drew: [£]540
	(b)		Temperature drops by 5° [C] So temperature is 12° [C] Appropriate comment answering the question using the 12°C	1 1 1	**M1** for 0.005 × 1000 **M1** for 17 – *their* 5	Accept any suitable relevant comment for temperature and coat
	(c)		8 mph = 3.576 m/s or 4 m/s = 8.948 mph Safe speed for flying	2	**M1** for 3.576 or 8 × 0.447 or 8.948 or 4 × 2.237	Conversion may be either way
	(d)		There are bound to be speeds greater than the average or other suitable comment	1		

Question			Answer	Marks	Part Marks and Guidance	
	(e)*		Full correct relevant consistent calculations seen with correct conclusion Julie is incorrect or hot air balloon [4 – 5 times] more risky **oe**	4–3	For lower mark a pair of correct calculations correctly evaluated with incorrect conclusion or a pair of correct calculations with an error in with correct conclusion or three consistent calculations with at least two evaluated correctly with no or incorrect conclusion or a pair of correctly evaluated calculations and a comparison with no or incorrect calculations	Answers **rot** to 1 sig fig if calculations shown or 2 sig figs if no calculations 3760 ÷ 50345000= .00007468.. 39 ÷ 116700 = 0.00033(419..) 0.00007468.. ÷ 2 ≠ 0.00034. **oe** 0.00033.. ÷ 0.000074…= 4 .47 3760 ÷ 39 = 96.4… 50345000 ÷ 116700 = 431.4… 431.405.. ÷ 96.4.. = 4.47…
			Two consistently evaluated calculations (may not be correctly evaluated) with no or incorrect conclusion	2–1	For lower mark at least one relevant calculation (answer may be incorrect or may not be evaluated)	39 x 431.4.. = 16824.8.. 16824.8.. ÷ 3760 = 4.47… 50345000 ÷ 3760 = 13389.6… 116700 ÷ 39 = 2992.3… 13389.6 .. ÷ 2992.3 = 4.47..
	(f)	**(i)**	SW or South West	1		Condone WS S/W
		(ii)	10 to 18[miles] **seen**	2	**M1** for 5 to 9[cm] **soi**	
		(iii)	2.5 to 4.5 [miles per hour]	2	**FT** **M1** for *their* distance ÷ 4 **soi**	If working in minutes they need to change units to gain full marks
	(g)	**(i)**	1250 $\pm$ 5	1		
		(ii)	10	1		
		(iii)	70 to 80 minutes **oe**	1		

Question			Answer	Marks	Part Marks and Guidance	
	(h)	**(i)**	(1.315, 52.32[0])	1		
		(ii)	(1.31, 52.325) plotted	1		
	(i)		650 to 750	3	**M1** for angle drawn 35°±2° **and** **M1** for multiplying *their* height by 100 seen or implied or for height between 6.5 to 7.5	
	(j)		$B - A \geq 70$ **oe**	2	**M1** for $B - A > 70$ **oe** or $B - A \leq 70$ **oe**	

Question			Answer	Marks	Part Marks and Guidance	
5	(a)		Showing that the mean or median is [£]1.50	3	**M2** for correctly arranging all five values in order and attempt at median **or** **M1** for correctly arranging all five values in order **OR** **M1** for 1.5+2.4+.0.5+.0.75+2.35 [= [£]7.5] or correct in pence **and** **M1dep** for *their* [£]7.5 ÷ 5	Ignore labels of each average
	(b)	(i)	630	2	**M1** for 0.05 × 12600 **oe**	
		(ii)	1 mark for any comment relating to the following (maximum 2) Disproportionate given age bands Proportion of teenagers No children under 13 etc	2	Not fair because nobody under 13 Not fair over half 40 years old or above About a third in their thirties No children asked Only 4% (504) were in their teens + other pertinent statements + numerical support.	No comparisons involving gender

Question			Answer	Marks	Answer
	(c)*		The advert is correct, the ball point can write for about 2000m (or equivalent) which is more than a mile (or equivalent) supported by appropriate clear working.	4–3	Clear attempt at a correct calculation eg length = $\frac{200}{0.1\times 0.001}$ and condoning one slip in converting the various metric units when comparing with 1600m with correct conclusion for their value or correct calculations with either no or incorrect conclusion
			A consistent conclusion is made but on the basis of two or three errors as a result of mixing the various metric units or two relevant calculations such as figs $16 \times 0.1 \times 0.001$	2–1	One relevant calculation such as 0.1×0.001

Question			Answer	Marks	Part Marks and Guidance	
6	(a)		Queen Mary is the largest with an area of 2.2 to 2.6[km^2] **nfww**	3	**M1** for clear attempt to count squares on any of the reservoirs or for multiplying "a square count" by 0.1 in order to calculate the area. **A1** for Queen Mary 2.2 to 2.6	Numbering/ticking about 75% of squares in any one reservoir is sufficient

Question			Answer	Marks	Answer
	(b)*		Statement to the effect that cost of hiring a year is (20 – 30) × 40 = [£](800 to 1200) set against the indicated cost of buying which is [£](79.90 + 839) = [£]918.90.	4–3	Two sets of costs to be compared clearly indicated, with only one of them correct (800 to 1200 or 915 to 920) and appropriate decision made or correct calculations with either no or incorrect conclusion They may consider wetsuits and equipment separately
			At least one correct costing seen in working and an attempt to compare apparent in some numerical work or two sets of costs to be compared clearly indicated, with only one of them correct (800 to 1200 or 915 to 920) with no conclusion or incorrect conclusion	2–1	One correct costing (see above) hidden in working, but no attempt to compare and so answer the stated question.

Question			Answer	Marks	Part Marks and Guidance	
7			Circles centre Huddersfield radius 2.5cm ± 2mm and 5cm ± 2mm and Perpendicular bisector of line joining Liverpool and Birmingham and Correct area shaded or correctly indicated	5	**M2** for circles centre Huddersfield radius 2.5cm ± 2mm and 5cm ± 2mm **or** **M1** for one correct or two freehand concentric circles **AND** **M2 f**or perpendicular bisector of line joining Liverpool and Birmingham **or** **M1** for clear attempt at perpendicular bisector or correct pair of arcs but no line If **M3** scored then award **A1** for t*heir* correct area shaded **SC3** for *their* correct area shaded based on two freehand concentric circles and clear attempt at perpendicular bisector	For circles allow correctly placed major arcs for both marks Clear attempt means a line that would cross between Birmingham & Liverpool
8	**(a)**	**(i)**	Straight [line]	1		Condone $y = x + 2.5$ **oe** in words Allow gradient stays the same or gradient is constant or gradient is 1 Do not allow gradient is positive or gradient goes up or line is constant or it's a line or consistent scales
		(ii)	[UK size] + 2.5 [= American shoe size] **oe**	1		Condone $y = x + 2.5$ **oe** in words For 2.5 allow **oe** eg +3 – 0.5
	(b)		9	2	**M1** for $(43 - 32) \times 0.8$ or 8.8 If **M0** scored then **SC1** for 8.5 or 17.4 or 17.5	May be done in stages

APPENDIX 1

Exemplar responses for Q.**1(d)(iii)**

Response	Mark
1g × 500000 = 50kg 1000000 ÷ 20 = 50 An average person weighs around 60-70 kg so it would be too heavy as it's over ¾ of their body weight.	**3**
50000g. Yes because an average person would find 250g too heavy to carry so 50000g is way heavier.	**2**
1 × 50000 = 50000g. It would be too heavy.	**2**
1000000g = 10kg. I think they would be able to carry it as an average person can lift over 10kg.	**1**
5000 × 1 = 5000g still very high number in kg. There are so many £20 notes not only the weight is too much but also the quantity.	**0**

Exemplar responses for Q.**4(b)**

Response	Mark
d = 5 so 17 – 5 = 12. No she does not need a coat.	**3**
0.005 × 1000 = 5ºC 17 – 5 = 12ºC. Julie is not correct as it is only a drop of 5ºC making it 12ºC which isn't very cold.	**3**
0.005 × 1000 = 5ºC 17 – 5 = 12ºC.	**2**
Yes as 5ºC is very cold plus it will be colder as the wind picks up	**1**
0.005 × 1000 = 5 so she would need to wear a coat.	**1**

Exemplar responses for Q.**4(d)**

Response	Mark
It's just an average. There will be higher and lower wind speeds.	**1**
3.6m/s is an average so the wind speed could be above 4m/s or less than 4m/s	**1**
Because its an average he does not know that it will be 3.6m/s every day of the month	**1**
Because that is only 0.4m/s less than the maximum	**0**
The weather changes every day	**0**

Exemplar responses for Q.5(b)(ii)

Response	Mark
(Only) 4% were teens	**1**
They used different percentages of age groups	**1**
No children under 13 included	**1**
The %age of age groups should have been 20% each.	**1**
Percentages did not add up to 100	**0**
49.9% were males- should be 50%	**0**
A percentage needs to be a whole number	**0**

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