OCR
Oxford Cambridge and RSA

GCSE

Applications of Mathematics (Pilot)

Unit **A382/01:** Applications of Mathematics (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 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.

1. Annotations used in the detailed Mark Scheme.

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.

Subject-Specific Marking Instructions

2. **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.

3. 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.

4. 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.

5. 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.

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

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

7. 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'.

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. 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.

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

13. 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.

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.

MARK SCHEME

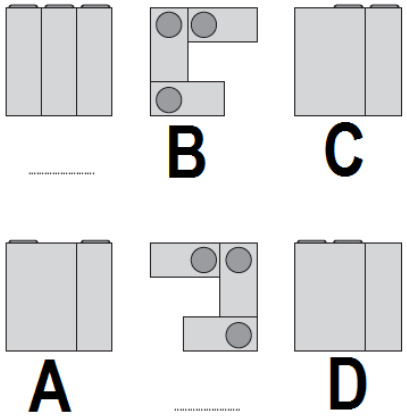
Question			Answer	Marks	Part marks and guidance	
1	(a)	(i)	Hotels	1		
		(ii)	7 to 9	1		
		(iii)	Hotels and warehouses	1		
	(b)	(i)	$\frac{2}{5}$ or equivalent fraction	1		
		(ii)	40	1FT	FT from part b(**i**)	
	(c)	(i)	5400	2	**M1** for 9 x 30 x 20 or figs 54 seen	
		(ii)	Jan, Feb and Dec	1		
		(iii)	(-) 24	1		
		(iv)	389	3FT	**M2** for 388.8 Or **M1** for 0.003 x t*heir* c(i) x t*heir* c(iii) If **MO** or **M1** then **B1** for a clear rounding of their answer to the nearest integer	0.003 x 5400 x 24
		(v)	22 because it occurs most often or is the mode oe	M1 A1		

Question			Answer	Marks	Part marks and guidance	
		(vi)	$\frac{17}{19}$ oe isw	2	**B1** for either correct numerator or correct denominator soi in decimal or percentage	
		(vii)	21600 to 21960 or 22000 or 22200	3	**M2** for (360 to 370) x 30 x 2 Or **M1** for correct product of two of the required values	
		(viii)	B2921	1		Condone 2921B
		(ix)	$18 \geq T \leq 22$ ☐ $18 < T < 22$ ✓ $18 > T < 22$ ☐ $T > 22$ ☐ $T \leq 18$ ✓ $T < 18$ ☐ $18 > T < 22$ ☐ $T \geq 22$ ✓	3	**-1 eeoo**	
		(x)	$F \geq 68$ (F =) 68	B1 B1		
	(d)		(A=) 20880 (U=) 12.80 to 12.81 (AU=) 267264 to 267473	1 1 1FT	 FT *their* A x *their* U	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Part marks and guidance</th><th></th></tr>
<tr><td></td><td>(e)</td><td></td><td>(x=) 5</td><td>3</td><td>M2 for two correctly evaluated trials rot to at least 2 d.p.

Or M1 for one correctly evaluated trial rot to at least 2 d.p.

Condone for full credit answer of 5 with 0.45 in middle column as last line of working</td><td>$2 \le x \le 9$

<table><tr><th>x</th><th>Value</th></tr><tr><td>3</td><td>0.833333</td></tr><tr><td>4</td><td>0.583333</td></tr><tr><td>5</td><td>0.45</td></tr><tr><td>6</td><td>0.366666</td></tr><tr><td>7</td><td>0.309523</td></tr><tr><td>8</td><td>0.267857</td></tr></table></td></tr>
<tr><td></td><td>(f)</td><td></td><td>  </td><td>4</td><td>B1 for each correct</td><td>A to D must appear once only</td></tr>
</table>

Question			Answer	Marks	Part marks and guidance	
	(g)*		104 to 125 cm oe with mention that allowance has been made for the mortar and that wall is 15 bricks high with 14 gaps	**4**	**3** for answer in range 104 to 125 cm with no mention of assumptions or for 104 to 125 with suitable assumption but no or incorrect units **2** for answer in range figs 104 to 125 with no assumption and with no or incorrect units **1** for figs 975 or 15 x figs 65 or 15 x *their* thickness of the mortar	Accept equivalent values in mm or m If either 15 bricks and 15 gaps or 14 bricks and 14 gaps are used then up to 3 marks can be achieved
2	**(a)**		1 3 1 5 6 **0 3 4 4 5 6 7 9** **2 2 2 6 7 7** 0 1 3 3 **5 7 8** 9	**3**	**M2** for up to 3 errors or omissions Or **M1** for correct values on branches but unordered or ordered with at most 5 or 6 errors or omissions	
	(b)	**(i)**	44 52 57	**1** **1** **1**		
		(ii)	same range **or** same median	**1FT**	**FT** *their* values in b(i)	

Question			Answer	Marks	Part marks and guidance	
	(c)		No, with correct counter example given from top left quadrant or No, many results bottom left corner of graph, but results in top left quadrant	**2**	**M1** for no with attempt at reason or correct counter example, but no definite decision or lines drawn at x=60 and y=60 or x=60 or y=60 drawn with attempt at reason	No with no correlation M1 only Comments must be in context Correct counter examples are: (34, 68) (42, 63) (49, 81) (57, 64) (57, 76)
3	**(a)**		238	**1**		
	(b)		28 to 110 days nfww with full method **and** assumption stated	**4**	**M1** for suitable amount of hours per day to do the jigsaw – likely to be between 6 and 18 **and** **M1** for *their* hours per day x 60 **and** **M1** for 40000 ÷ *their* hours per day x 60 **and** **A1** for their sum correctly evaluated If **M1** or **M2** allow **SC3** if full correct method is shown with no assumption stated	Alternative methods are available such as 40 000 ÷ 60 = 666.66 … hours 666 .66 .. ÷ 24 = 27.777 .. days Mention that rest or equivalent needed so the 27.7 needs to be rounded up

Question			Answer	Marks	Part marks and guidance	
	(c)		Correctly drawn triangle with evidence of arcs	**3**	**M1** for side 8 cm (±0.2) **and** **M1** for side 5 cm (±0.2) **and** **M1** for evidence of compass arcs	
	(d)	**(i)**	10 to 14	**1**		
		(ii)	2.5 to 3.5	**1FT**	**FT** *their* d (i) × 0.25	
		(iii)	800 to 1100 rounded to nearest 50 or 100 i.e. 800 or 850 or 900 or 950 or 1000	**4**	**M3** for $\pi \times 30^2 \div$ *their* (d) (ii) **or** **M2** for $\pi \times 30^2$ **or** **M1** for *their* Area of circle ÷ *their* d (ii) If **M0** or **M1** then **also SC1** for their answer rounded to nearest 50 or 100	

Question	Answer	Marks	Part marks and guidance	
(e)*	Correct ratios straight: no straight given as A= 16:8 and B = 16:9 therefore jigsaw A is the easier. or clear statement that B has more 'in the middle' with the same number of straight pieces so A must be easier	4	**3:** Ratio correctly calculated 16:8 o.e. and 16:9 but no clear or incorrect conclusion or statement of 8 in middle in A and 9 in middle of B with correct conclusion	Allow fractions and statements of 16 straight and 8 non-straight to stand for the ratios.
			2: One correct ratio seen with correct conclusion or statement of 8 in middle of A and 9 in middle of B with no or incorrect conclusion	Need not be simplified
			1: One correct ratio seen in working or statement of 8 in middle of A or 9 in middle of B or statement of 16 straight in either A or B or correct conclusion of A or B following through their two ratios	

Question			Answer	Marks	Part marks and guidance	
	(f)	(i)	Box 1 Box 2 **B D E F** Box 3 **A** Box 4 Box 5 **C** Box 6	4	**B3** for 4 or 5 correct **or** **B2** for 3 correct **or** **B1** for 2 correct	A to F must appear only once in the boxes
		(ii)	(Box) 1 To fit must have more than one straight side and less than one straight side at the same time oe	1 1	Accept you can never get to Box 1	

Question			Answer	Marks	Part marks and guidance	
	(g)	(i)	100	3	**M1** for clear attempt to add the 11 values or 1100 seen in working **and** **M1 dep** for *their* 1100 ÷ 11	Must see at least nine values added
		(ii)	Probability (at least the mean) = $\frac{1}{11}$ oe Probability (getting £50+) = $\frac{6}{11}$ oe $\frac{6}{11}$ is about 50% so Jan is right	1FT 1 1FT	FT *their* mean FT from t*heir* mean and probabilities	Accept worded versions for their probabilities
	(h)	(i)	50p or £0.50	1	Must have “p” or “£” as appropriate	
		(ii)	Emart costs are £7.75 Electric Auction House = £7.50 So Electric Auction House the better deal	2 1 1FT	**M1** for either £4 insertion or 0.05 × 75 or £3.75 FT *their* two costs	

Question			Answer	Marks	Part marks and guidance	
	(i)		Two “numbers of pieces” chosen, their “scale factor” found, demonstrate that this does not fit price “scale factor” therefore cannot be directly proportional.	**3**	**M2** for a clear pair of values and prices chosen, “scale factors” found but no or incorrect conclusion **M1** for one “scale factor” found without reference to price comparison or a general statement showing understanding of direct proportionality.	i.e. without supporting numbers - effectively just giving the definition for direct proportion.
	(j)	**(i)**	5:30 [p.m]. or 17:30	**1**		
		(ii)	40	**1**		
		(iii)	The number [of correct pieces] went down Any suitable reason given for why the number of correctly fitted pieces went down	**B1** **B1**		

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