

Methods in Mathematics (Pilot)

General Certificate of Secondary Education

Unit **B392/01**: Foundation Tier

Mark Scheme for January 2012

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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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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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.

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 awarded for a correct final answer or a correct intermediate stage.

SC marks are for special cases that are worthy of some credit.

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.

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 $180 \times (\textit{their} '37' + 16)$, or FT $300 - \sqrt{(\textit{their} '5^2 + 7^2')}$. Answers to part questions which are being followed through are indicated by eg FT $3 \times \textit{their}$ (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.

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.

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

- **cao** means **correct answer only**.
- **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).
- **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**.

Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.

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).

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.

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.

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.

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

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.

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)	38, 35 12, 24 16, 25	1 1 2	B1 for 16 or 25 or M1 4×4 and 5×5 or + 3, +5, +7, +9			
	(b)	Subtract 3 [from previous number] oe	1			Accept 'Down by 3'	Condone $n - 3$
	(c)	square	1				
2	(a)	107 59 27	2	M1 for 2 correct entries			
	(b)	(i)	22 8 14			1	
		(ii)	3 9 5 in bottom layer with 9 in middle			1	
		(iii)	<i>their</i> 3 numbers correctly arranged to give largest number in layer 3			1	Accept correct arrangement without completion of wall.
		(iv)	Description eg 'biggest number in the middle'			1	
	(c)	(i)	$d + e + e + f$ (or $d + 2e + f$) $d + e \quad e + f$			1 1	
		(ii)	Explanation eg 'the middle number is doubled [so need biggest number in the middle]'			1	Accept an explanation that refers to the biggest number is used twice. If not scored in (b)(iv) allow SC1 for biggest number must be in the middle.

Question			Answer	Marks	Part Marks and Guidance
3	(a)	(i)	(1, 6)	1	
		(ii)	(5, 2)	1	
		(iii)	(3, 4)	1	
	(b)		(4, 3)	2	M1 for 1 coordinate correct or (3, 4)
	(c)		(8, 35)	2	M1 $(4 + 12)/2$ or $(20 + 50)/2$ or B1 for 8 or 35 in correct position or both transposed.
4*			Correct amount £23.94 supported by correct breakdown of calculation eg – [2 box] A £5.00, [2 box] B £5.98, [3 booklets] stamps £12.96 (accept 2A 2B 10.98 3 stamps 12.96 or 2 (×) 2.50 2 (×) 2.99 10.98 3 (×) 4.32 12.96)	5	4 for correct total but insufficient supporting evidence or error in total one error in calculations but supporting evidence for 2A 2B 3S given or ‘modified’ A B but correct S with supporting evidence eg 5A 12.50 3S 12.96 25.46 4A 1B 12.99 [or 10 + 2.99] 3S 12.96 25.95 3A 1B 13.48 [or 7.50 + 5.98] 3S 12.96 26.44 1A 3B 11.47 [or 7.50 + 5.98] 3S 12.96 24.43 4B 11.96 3S 12.96 24.92 3 for 2A 2B 10.98 (stamps omitted or wrong number booklets) or ‘modified’ total 25.95 26.44 24.43 24.92 24.21 but insufficient supporting evidence or ‘modified’ amounts with supporting calculations but one error or Stamps correct and 36 cards from 3B or 4A full boxes and part box (possibly using unit calculation) eg 4.5A 11.25 3S 12.96 24.21 2 for 2A 2B 3S stated with calculations omitted or more than one error in calculations or incorrect number of boxes A and B used but total cost for their boxes correctly calculated. (must involve A and B)

Question			Answer	Marks	Part Marks and Guidance	
					1 for attempt to solve problem evidenced by eg 2A 2B or cost of stamps £12.96.	
5	(a)		18.2	2	M1 for [division by] 1.5	
	(b)		13.824	1	Condone 13.8 or 13.82	
	(c)		[£]350	2	M1 for 50 or 2800 or 0.875 (not 87.5) or figs 35	

Question		Answer	Marks	Part Marks and Guidance	
6	(a)	[c] = 4 [d] = 3	1		
	(b)	53	3	M2 $4 \times 8 + 7 \times 3$ or $11 \times 8 - 7 \times 5$ or $11 \times 3 + 4 \times 5$. or M1 one correct area eg 4×8 or 7×3 or 11×8 or 7×5 21 33 20 32 88 35 are all possible evidence for M1 Accept 12 if 3 by 4 rectangle shown	
7	(a)	Tessellation with 5 or 6 more L shapes correctly positioned following pattern	2	B1 for minimum 6 shapes drawn with no gaps or 4 shapes drawn following pattern.	
	(b)	(i)	8	1	
		(ii)	Correct L shape	3	M2 for L shape with sides 6cm, 6cm or M1 for [SF] 3 recognised or any correct enlargement of the L shape or any L with perimeter 24 For M1 accept L shape with dimensions given, not necessarily accurately drawn
8		[a=] 132° [b=] 132° [c=] 146°	1 1 2	FT <i>their</i> angle a M1 $360 - (b + 48 + 34)$ or $180 - 34$ A1 146 or FT <i>their</i> obtuse b	
9	(a)	150	3	M2 $(30 \times 20)/(2 \times 2)$ or $30/2 \times 20/2$ or M1 15 or 10 or 30×20 or 600	
	(b)	120[yellow] 30[green]	2	M1 <i>their</i> (a)/5 or FT <i>their</i> (a) for 2 marks	

Question		Answer	Marks	Part Marks and Guidance	
10	(a)	175	2	M1 87.5 or 0.2×875	
	(b)	16 %	3	M2 for $4 \div 25$ or 0.16 or $29 \div 25$ or 1.16 or $4 \div 0.25$ oe or M1 for 4 used or 1% of 25 = 0.25	eg $4 \div 29$ 4 used could be 29 – 25 as a numerator but an answer of 4% scores 0
11	(a)	65, 170	2	B1 for 65 or 170	
	(b)	Points plotted Correct straight line from (1,35) to (10,170)	1 1	FT <i>their (a)</i> Accept 3 points correct within the 2mm square	Award points mark if the line is through correct points.
	(c)	Reliable motors by £36	4	M1 Reliable motors [£]140 (or FT graph) and M2 [£]176 or M1 66/3 or 22 A1 Reliable and £36 or A1 FT (dependent on at least M1) difference between HH and Reliable with correct company chosen	Any other hire period may score M1M1 only
12		96 cm ³	2 1	M1 $8 \times 3 \times 4$ independent	
13	(a)	(i)	1		
		(ii)	2	M1 $\angle ABC = x$	Condone x marked on diagram

Question		Answer	Marks	Part Marks and Guidance	
	(b)	Exterior angle $180 - x$ Sum of two opp. interior angles is $180 - 2x + x = 180 - x$	2	M1 either 'exterior angle $180 - x$ ' or 'sum of two opp. interior angles is $180 - 2x + x$ ' or B1 $180 - 2x + x = 180 - x$	Exterior angle $180 - x$ may be implied by $\angle ACD = 180 - x$ Sum of two opposite interior angles may be implied by $\angle BAC + \angle ABC$
14	(a)	5, 11	2	B1 for 5 or 11 or for -1 and 5 (using $n = 0$ and 1)	
	(b)	16	3	M2 for 16.8[333...] or 101/6 seen or at least one value of n over 16 tried along with at least one below 16 (not 1 or 2) or M1 for $6n - 1 = 100$ or $6n - 1 < 100$ or at least two values of n tried (not 1 or 2) or SC2 for 17 following -1 and 5 in part (a)(i) After M0 award SC1 for answer of 17	Solution by T&I is fine.
15	(a)	$\sqrt{2^2 + 3^2} = \sqrt{13} = 3.6(0555)$	3	M2 for $\sqrt{2^2 + 3^2}$ or M1 for $2^2 + 3^2$ or right angled triangle with 2 and 3 shown or Pythagoras using 2 and 3 and	Note: answer given in question so working must be seen.

Question		Answer	Marks	Part Marks and Guidance	
				A1 for 3.60.....or 3.61 (at least 2dp)	For A1, must score at least M1
	(b)	11.3 to 11.33	2	M1 for $3.1... \times 3.6$ or for $3.1... \times \textit{their (a)}$	
16	(a)	26.5	2	M1 for $15.9 \div 6$ or $15.9 \div 3$ oe soi by 2.65 ($\times 10$) or 5.3 ($\times 5$)	
	(b)	8	2	FT <i>their</i> 26.5 for M1 A1 M1 for $23 \div 2.65$ oe or 9 or 8.679... or $23 \div (\textit{their } 26.5/10)$	eg $23 \times 6 \div 15.9$ scores M1
17		Correct answer (250) with complete correct working eg $(4 + 1) \times 5 \times 10$.	4	<p>Working correctly communicated in stages is acceptable for 4 marks eg $4 + 1 = 5$, $5 \times 5 = 25$, $25 \times 10 = 250$. Full written explanation is also acceptable.</p> <p>3: The working is correct but no final answer stated $(4 + 1) \times 5 \times 10$ or the working is poorly communicated but is clear eg $4 + 1 = 5 \times 5 = 25 \times 10 = 250$ or number greater than 200 with complete correct working.</p> <p>2: 250 with no (or incomplete) working or for acceptable number over 200 with poorly communicated working</p> <p>1: Acceptable number greater than 200 with no, or incomplete, working or for $(4 \times 5) \times 10$ [$\times 1$] condoning error in calculation or for two trials leading to numbers below 200 (condone poor communication). or acceptable calculation with their answer minimum 200 but error in evaluation</p>	

Question			Answer	Marks	Part Marks and Guidance
					0: 200 with no working gets zero For 1 or 2 marks 'acceptable' implies number, minimum 200, that can be made.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

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Telephone: 01223 553998

Facsimile: 01223 552627

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