

# **Applications of Mathematics (Pilot)**

General Certificate of Secondary Education

Unit **A381/01**: Foundation Tier

## **Mark Scheme for January 2013**

---

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2013

## 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

- 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  $180 \times (\textit{their} '37' + 16)$ , 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.

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.
- **nfw** 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)	(i)	Point (7, 10) clearly indicated	1	Ignore extensions or other additions	
		(ii)	"Straight line" joining (0, 0) and (5, 5)	1	Ignore extensions or other additions but must have straight line joining (0, 0) and (5, 5)	Straight line joining (0, 0) and (5, 5) gets the mark, but if line extended need to have (5, 5) indicated in some way eg cross, point
	(b)		Circle (2, (... , )) Circle ( ....., (10, 3))	2		ie 1 each for radius and centre
2	(a)	(i)	12000 [g]	1		
		(ii)	9 [kg]	1		
	(b)	(i)	50°	1		
		(ii)	70°	2	<b>M1</b> for angle ÷ 2	Sight of any angle divided 2
		(iii)	<i>r</i> is not 40° <b>oe</b>	2	<b>M1</b> for what is effectively a definition of a parallelogram without reference to the figure in question	Words parallel and opposite or equal and opposite (sides/angles) must be stated (or their converses) for the <b>M1</b> .
	(c)		Two correct, and no other, shapes ticked	2	1 for each correct and no errors or 1 for 1 correct and one error or 1 for 2 correct and one error	Condone if unambiguously indicated
	(d)	(i)	30p or £0.30	2	Condone £0.30p <b>B1</b> for fig 3 (this covers £0.3)	Second mark is essentially for correct money notation dependent on correct number.

Question		Answer	Marks	Part Marks and Guidance
	(ii)	43 to 47 [mm]	1	Accept equivalent answer in cm if cm are <u>clearly</u> stated, so 4.6 for example gains no credit.
		<b>Answer</b>	<b>Marks</b>	<b>Answer</b>
(e)	(i)	3.6 [bars], correctly converting this to 50.4 [psi] and stating this needs to be increased by 9.6 [psi] or equivalent.  Correct reading of scale and relevant calculation for conversion seen	4–3  2–1	For the lower mark there may only be one arithmetical error, but with correct conclusion based on working through on this or 1 for each of key numbers 3.6/50.4/9.6 seen or implied (or equivalent if working in bars – in which case don't get the 9.6).  For the lower mark at least one of these three elements present: correct reading of scale or incorrect reading of scale but correct process to convert or correct process to convert psi into bars ( $\div 14$ ) or vice versa i.e. correct process to convert bars to psi ( $\times 14$ )

Question		Answer	Marks	Part Marks and Guidance	
	(e)	(ii)	20° to 24°	1	
		(iii)	5.05	2	<b>M1</b> for 81 or better seen eg 4.05 or 1.9
		(iv)	5	1	<b>FT</b> from part (iii), condone 5.0(0 ...)
3	(a)	(i)	351 or 350	1	
		(ii)	1858	1	
		(iii)	14 to 22 <b>and</b> 0.6 to 1 or 42 to 66 <b>and</b> 2 to 3  At least one correct unit attached (m or ft as applicable)	1+1  1	1 for any number in bracket seen, second mark for corresponding second number correct  Correct units must follow correct number
		(iv)	7 [billion]	1	Condone repeat of billion and also 7 followed by more than 4 zeroes – as testing halving rather than place value etc.
	(b)	(i)	5 [%]	1	
		(ii)	$\frac{7}{10}$ <b>isw</b>	2	<b>M1</b> for $\frac{70}{100}$ <b>oe seen</b> <b>M1</b> may arise from incorrect or no simplification
4	(a)	(i)	1800	2	<b>M1</b> for $150 \times (11 \text{ or } 13)$ <b>soi</b> or use of 12 (may be implied by 60 <b>seen</b> in working) <b>M1</b> allowing for minor miscount (1650 or 1950)
		(ii)	5 $\times$ <i>their</i> 1800 (9000)	2	<b>M1</b> for 5 $\times$ a number <b>seen</b>

Question		Answer	Marks	Part Marks and Guidance															
	(b)	<table style="border: none; margin-left: 20px;"> <tr> <td style="padding-right: 10px;">✓</td> <td style="padding-right: 10px;">✓</td> <td style="padding-right: 10px;">x</td> </tr> <tr> <td style="padding-right: 10px;">x</td> <td style="padding-right: 10px;">✓</td> <td style="padding-right: 10px;">x</td> </tr> </table>	✓	✓	x	x	✓	x	<p>1</p> <p>1</p>	<table style="border: none; margin-left: 20px;"> <tr> <td style="padding-right: 10px;">Condone</td> <td style="padding-right: 10px;">1</td> <td style="padding-right: 10px;">2</td> <td style="padding-right: 10px;">0</td> </tr> <tr> <td style="padding-right: 10px;">Condone</td> <td style="padding-right: 10px;">0</td> <td style="padding-right: 10px;">2</td> <td style="padding-right: 10px;">0</td> </tr> </table>	Condone	1	2	0	Condone	0	2	0	<p>IF blanks always correspond to crosses and ticks correct for both parts award full credit.</p> <p>Condone number lines of reflection or order of rotation symmetry – each line considered separately.</p>
✓	✓	x																	
x	✓	x																	
Condone	1	2	0																
Condone	0	2	0																
	(c)	1(%)	1																
	(d)	0 or zero or no (lines of reflection)	1																
		4 or four (order of rotation symmetry)	1																
5	(a)	<table style="border: none; margin-left: 20px;"> <tr> <td style="padding-right: 10px;">12</td> <td style="padding-right: 10px;">(eggs)</td> </tr> <tr> <td style="padding-right: 10px;">240</td> <td style="padding-right: 10px;">(g sugar)</td> </tr> <tr> <td style="padding-right: 10px;">1200</td> <td style="padding-right: 10px;">(ml single cream)</td> </tr> <tr> <td style="padding-right: 10px;">15</td> <td style="padding-right: 10px;">(ml vanilla)</td> </tr> </table>	12	(eggs)	240	(g sugar)	1200	(ml single cream)	15	(ml vanilla)	3	<p><b>M2</b> for two or three correct</p> <p>or</p> <p><b>M1</b> for one correct</p>							
12	(eggs)																		
240	(g sugar)																		
1200	(ml single cream)																		
15	(ml vanilla)																		
	(b)	47	3	<p><b>B2</b> for 46</p> <p>or</p> <p><b>B1</b> for figs 18..... seen</p> <p>or</p> <p><b>M1</b> for 65[p] or [£]0.65 seen</p>															
	(c)	(-) 3 [°C]	1																
	(d)	(i)	96	2	<p><b>M1</b> for clear attempt to substitute [980] and [500] in the relevant formula</p> <p>eg <math>\frac{980 - 500}{500}</math> or <math>\frac{480}{500}</math> [=0.96]</p> <p>or 480 or 979 or -98.04 or 880 or <b>figs 96 seen</b></p>														

Question			Answer	Marks	Part Marks and Guidance	
		(ii)	650	2	M1 for clear attempt to substitute (30) and (500) in the relevant formula	eg $\frac{130 \times 500}{100}$ or 530 or 500.3 or better <b>seen</b> or <b>figs 65 seen</b>
6	(a)		500 and 3	1	Condone in any order	Condone 3.(000)
	(b)		5	1	<b>FT their (a)</b>	
7	(a)		15	1		
	(b)	(i)	[ ..... = ] $2x - 11$	2	M1 for $2(x - 3)$ or $2x - 6$ <b>seen</b> condone $(x - 3)^2$ <b>seen</b> SC1 for answer of $2x - 8$ or $x - 11$	Not $x = \dots$
		(ii)	[x=] 4	2	<b>FT their b(i)</b>  M1 for <i>their</i> $2x - 11 = -3$ or better or for $-3 + 5 \div 2 + 3$ [=2.5] <b>seen</b>  SC1 for $\frac{(x+5)}{2} + 3$	

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

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations  
is a Company Limited by Guarantee  
Registered in England  
Registered Office; 1 Hills Road, Cambridge, CB1 2EU  
Registered Company Number: 3484466  
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

© OCR 2013

