

**GCSE**

**Mathematics A**

Unit **A502/02**: Mathematics B (Higher Tier) Paper 4

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.

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## 12. Annotations used in the detailed Mark Scheme.

Annotation	Meaning
	Correct
	Incorrect
<b>BOD</b>	Benefit of doubt
<b>FT</b>	Follow through
<b>ISW</b>	Ignore subsequent working (after correct answer obtained), provided method has been completed
<b>M0</b>	Method mark awarded 0
<b>M1</b>	Method mark awarded 1
<b>M2</b>	Method mark awarded 2
<b>A1</b>	Accuracy mark awarded 1
<b>B1</b>	Independent mark awarded 1
<b>B2</b>	Independent mark awarded 2
<b>MR</b>	Misread
<b>SC</b>	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**

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

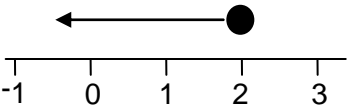

For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

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.
  - **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 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. In questions with a final answer line:
  - (i) If one answer is provided on the answer line, mark the method that leads to that answer.
  - (ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.
  - (iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.
9. In questions with no final answer line:
  - (i) If a single response is provided, mark as usual.
  - (ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.
10. 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.

11. 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.
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.

Question		Answer	Marks	Part Marks and Guidance	
1	(a)	Ruled line of best fit	1	Within limits of overlay	
	(b)	11 or 12 only	1		
	(c)	Positive	1		Ignore 'strong' etc
2	(a)	5 points correct	2	<b>B1</b> for at least 2 points correct	$\pm 1$ whole square Ignore any connecting lines
	(b) (i)	1146 to 1159	1		
	(ii)	106 to 119	1		
3	(a)	Translation $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$	1 2	<b>B1</b> for one component correct or $\begin{pmatrix} 2 \\ -4 \end{pmatrix}$ or $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$ or $x-2, y+4$	Allow 2 left, 4 up for <b>B2</b> Condone other unconventional notations that imply the correct vector eg -2,4 for <b>B1</b>
	(b)	Correct reflection	2	<b>B1</b> for reflection in $y = 1$ or reflection in any vertical line	Overlays available Condone freehand
	(c)	Correct shape	3	<b>B2</b> if wrong centre used or correct intention for 2 points Or <b>B1</b> if wrong SF used	Overlay available Condone freehand
4		0.458	2	<b>M1</b> for attempt to subtract soi by 0.4(...)	

Question		Answer	Marks	Part Marks and Guidance	
5	(a)	$x > 1.5$ oe isw	2	<b>M1</b> for $7x - 3x > 6$ or better Or <b>SC1</b> for 1.5 oe seen nfw	
	(b)		2	1 for hollow circle, dot or line/arrow too short	Line/arrow extending past 0 for <b>2</b> Condone a line rather than an arrow
6	(a)	(i) Angles meeting at a point completing $360^\circ$ eg 	1		0 if not clearly 4 angles
		(ii) Sum to 360 oe	1		Condone '= 360'
	(b)	130 nfw	4	<b>M3</b> for $\frac{720 - 90 - 90 - 70 - 210}{2}$ or better Or <b>M2</b> for $\frac{(their\ 720) - 90 - 90 - 70 - 210}{2}$ Or <b>M1</b> for a correct method for internal angles of a hexagon AND If no more than <b>M1</b> scored then <b>SC1</b> for $90 + 90 + 70 + 210$ or better	Following a correct method for internal angles of a hexagon



Question		Answer	Marks	Part Marks and Guidance	
7	(a)	Correct ruled line, on grid, for $-1 \leq x \leq 6$ with axes scaled	3	<b>B2</b> for 2 correct points plotted with axes scaled or correct ruled line any length with axes scaled Or <b>B1</b> for 2 correct points calculated	eg in a table or on a graph
	(b)	-2	2FT	<b>M1</b> for (vertical change) / (horizontal change) soi or 2 or -1/2 nfw	FT <i>their</i> line
	(c)	$y = \frac{-1}{\text{their} - 2}x + c$	2 FT	<b>B1</b> for $\frac{-1}{\text{their} - 2}$	FT <i>their</i> line Allow 'c' or any numerical c including 0

Question		Answer	Marks	Answer
8	(a)	Answer of $14\frac{2}{5}$ , 14.4 or 15 with clear, correct working	3	eg $15 \times 1\frac{1}{4} = 18\frac{3}{4}$ or $14 \times 1\frac{1}{4} = 17\frac{1}{2}$ so 1 more month needed or $18 \div 1\frac{1}{4} = 18 \times \frac{4}{5} = 14\frac{2}{5}$ isw if candidate goes on to try and convert to weeks and or days
		As above but there may be any of <ul style="list-style-type: none"> <li>a single error in their calculations</li> <li>lack of clarity eg <math>15 \times 1\frac{1}{4} = \frac{75}{4}</math></li> <li><math>14 \leq \text{their answer} &lt; 15</math></li> </ul>	2-1	For the lower mark, any correct calculation with $1\frac{1}{4}$ or 1.25 eg $1\frac{1}{4} \times 4 = 5$
		Nothing of any worth	0	

Question		Answer	Marks	Part Marks and Guidance	
	(b) (i)	$\frac{1}{t}$	1		
	(ii)	1 cao	1		
9	(a)	110	1		
	(b)	$4c + 2m = 378$  $c = 79$ $m = 31$ nfw	1  3	<p><b>M1</b> for multiplying one (or both) equation(s) to get either coefficient equal (allow 1 error) eg  <math>4c + 4m = 440</math>    <math>2c + 2m = 220</math>  or  <math>4c + 2m = 378</math>    <math>4c + 2m = 378</math></p> <p><b>M1</b>(dep) for adding or subtracting as appropriate (allow 1 error) eg <math>2m = 62</math> or <math>2c = 158</math></p> <p>Or if substitution used  <b>M1</b> for rearranging to find <math>m</math> or <math>c</math> eg <math>m = 110 - c</math> or (allow 1 error if harder equation used)  <b>M1</b> (dep) for substituting eg <math>4c + 2(110 - c)</math> or better (allow 1 error)</p>	<p>If separate attempts made to eliminate <math>x</math> and <math>y</math> mark to the candidate's benefit</p> <p>Correct <math>m</math> or <math>c</math> with no working implies <b>M2</b></p> <p>Correct answer with no working scores <b>3</b></p>

Question			Answer	Marks	Part Marks and Guidance	
10	(a)	(i)	3 cao	1		
		(ii)	7 cao	1		
		(iii)	1 cao	1		

Question		Answer	Marks	Answer
10	(b)	<p>eg <math>6^{-1} = \frac{1}{6}</math> then appropriate division leading to 0.166 ...</p> <p>(at least 3 dp) so answer = <math>0.1\dot{6}</math></p> <p>As above but there may be any of</p> <ul style="list-style-type: none"> <li>• an error in their calculation</li> <li>• lack of clarity</li> <li>• no sight of <math>\frac{1}{6}</math> or <math>1 \div 6</math></li> <li>• poor notation eg <math>0.1\ddot{6}\ddot{6}</math> or <math>0.16\dot{6}</math> or 0.16r etc</li> </ul> <p>Nothing of any worth</p>	<p>3</p> <p>2-1</p> <p>0</p>	<p>For lower mark, sight of <math>\frac{1}{6}</math> or 0.16[66...] with no recurring dot or attempt at a division leading to a decimal</p>

Question		Answer	Marks	Part Marks and Guidance	
11		27 Angle in a semicircle = $90^\circ$ Angles (in a) triangle = $180^\circ$	1 1 1	<b>M1</b> for $180 - 90 - 63$	Condone 'Angles from a diameter [on or to the circumference]'
12	(a)	82	1		
	(b)	$6 - 7x$	2	<b>B1</b> for 6 or $-7x$	
13		25%	4	<b>M3</b> for $\frac{\sqrt{10}}{\sqrt{160}} \times \frac{\sqrt{160}}{\sqrt{160}} \times 100$ or $\frac{\sqrt{10}}{4\sqrt{10}} \times 100$ or better Or <b>M2</b> for $\frac{\sqrt{10}}{\sqrt{160}} \times \frac{\sqrt{160}}{\sqrt{160}}$ or $\frac{\sqrt{10}}{4\sqrt{10}}$ or better Or <b>M1</b> for $\frac{\sqrt{10}}{\sqrt{160}}$ or $\frac{\sqrt{160}}{\sqrt{10}}$ or better or $4\sqrt{10}$	eg $\frac{1}{4}$  eg 4

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