

**GCSE**

**Mathematics A**

Unit **A502/01**: Unit B (Foundation Tier)

General Certificate of Secondary Education

**Mark Scheme for June 2016**

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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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## Annotations

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)	$\frac{1}{16}$ oe	1		[0].0625 or 6.25%
	(b)	$\frac{5}{8}$ oe	2	M1 for common denominator	EG $\frac{\dots}{16}$ [+] $\frac{\dots}{16}$ [0].625 or 62.5% score 2 marks
	(c)	4 oe	2	M1 for $[\frac{1}{2}] \times \frac{8}{[1]}$ or $\frac{4}{8} \div \frac{1}{8}$	Accept $\frac{8}{2}$ for 2 marks
	(d) (i)	30	2	M1 for $180 \div 6$ or $360 \div 12$	
	(ii)	$\frac{1}{12}$ or $\frac{\text{their}(angle a)}{360}$ oe	1		Ignore attempts to cancel once correct answer seen
2	(a) (i)	4	1		
	(ii)	4 lines drawn and no extras	1		Accept good freehand and mark for intention
	(iii)	150	3	B1 for 90 or 60 seen and M1 for $360 - \text{their } 90 - 2 \times \text{their } 60$	May be on diagram. Can be symbol. Allow the mark unless clearly for the wrong angle.  Angles must clearly be understood to be for the square and triangle
	(b)	Rhombus only indicated	1		
3	(a)	33 nfww	2	M1 for $30 \times [0.1 \text{ or } 1.1]$ oe soi 3	

Question		Answer	Marks	Part Marks and Guidance
3*	(b)	<p>Fully correct solution with working shown and including <b>all</b> of</p> <ul style="list-style-type: none"> <li>• 20% [of 18 is] 3.6</li> <li>• One correct, relevant calculation</li> </ul> <p>And</p> <ul style="list-style-type: none"> <li>• This is not a whole number oe</li> </ul>	<b>3</b>	<p>Examples of relevant calculations are</p> $18 \div 10 = 1.8 \text{ or } 1.8 \times 2 = 3.6$ $18 \div 5 \text{ or } 18 \times 0.2 \text{ or } 18 \times \frac{1}{5} \text{ or } \frac{18}{5} = 3.6$ $18 + 3.6 = 21.6$ <p>Accept recognition that a non integer number of eggs is impossible</p>
		<p>Correct method with one of</p> <ul style="list-style-type: none"> <li>• 10% [of 18 is] 1.8 or 20% [of 18 is] 3.6</li> <li>• One correct, relevant calculation</li> </ul> <p>And</p> <ul style="list-style-type: none"> <li>• This is not a whole number oe</li> </ul>	<b>2 - 1</b>	<p>One from</p> <ul style="list-style-type: none"> <li>• 1.8 or 3.6 or 21.6 seen</li> <li>• One correct, relevant calculation</li> <li>• This is not a whole number oe</li> </ul>

**APPENDIX 1**

Exemplar responses for question 3b

Response	Mark awarded
Decimal place shows Ajit's[statement] is incorrect	correct
It cannot be true as they cannot lay <b>half</b> and egg	Allow as correct
It is not possible as a chicken cannot lay 21.6 eggs	Allow as correct



Question		Answer	Marks	Part Marks and Guidance	
4	(a)	90	1		
	(b)	125	1		
	(c)	55	1FT	180 – <i>their</i> (b)	
	(d)	35	3FT	<p><b>M2</b> for 180 – <i>their</i> (c) – 90 or <b>B1</b> for 55 or <i>their</i> (c) marked as bottom-left angle in either triangle and <b>B1</b> for 90 or <i>their</i> (a) marked as bottom-right angle in either triangle</p>	<p>Check using their values</p> <p>Accept symbol</p>
5	(a)	41.04 oe	2	<p><b>B1</b> for 5.13 Or <b>M1</b> for (5.13 or 5.03 or 4.98) × 8 oe Soi 40.24 or 39.84</p>	May be by repeated addition
	(b)	1.33 or 133p	3	<p>Accept 133 p but not 133 or 1.33p <b>M2</b> for 6.31 – 4.98 oe or <b>B1</b> for 6.31 oe or 4.98 oe seen</p>	May be in pence
6	(a)	Correct reflection	1		Use overlay vertices within circles Lines should be ruled or very good freehand
	(b)	Correct enlargement	2	<p><b>B1</b> for correct enlargement and incorrect scale factor or two points correct or correct size but incorrect orientation</p>	<p>Use overlay vertices within circles</p> <p>Triangle must be appropriate with correct orientation</p> <p>Lines ruled or very good freehand</p>

Question		Answer	Marks	Part Marks and Guidance
	(c)	Angles only indicated	1	Accept any clear indication
7	(a)	4 nfw	2	M1 for $2^2$ oe = 4 or $1^2$ oe = 1 or $4 \times [ ]$ or $[ ] \times 1$
	(b)	positive square root indicated	1	Accept any clear indication

Question		Answer	Marks	Answer
7*	(c)	<p>Fully correct solution with working shown and including <b>all</b> of</p> <ul style="list-style-type: none"> <li><math>4^3</math> or <math>4 \times 4 \times 4 = 64</math></li> <li><math>4^2</math> or <math>4 \times 4 = 16</math></li> <li><math>64 \div 16 = 4</math></li> <li>Liam is incorrect oe</li> </ul>	3	<p>May be in one calculation <math>\frac{4 \times 4 \times 4}{4 \times 4} = 4</math> with cancelling shown</p> <p>May be <math>4 \times 4 = 16 \times 4 = 64</math> oe</p> <p><math>64 \div 4 [=16] \div 4 = 4</math> counts as second and third bullet points</p> <p><math>4^3 \div 4^2 = 4^{(3-2)} = 4^{[1]}</math> counts as first three bullet points</p> <p>Condone <math>16 \div 64 = 4</math> only</p>
		<p>4 and Liam is incorrect oe but no working</p> <p>OR</p> <ul style="list-style-type: none"> <li><math>\frac{4 \times 4 \times 4}{4 \times 4} = 4</math> without cancelling shown or</li> <li><math>4^3 \div 4^2</math> or <math>64 \div 16 = 4</math></li> </ul> <p>and Liam is incorrect oe</p> <p>OR</p> <p><b>Three</b> from</p> <ul style="list-style-type: none"> <li><math>4^3</math> or <math>4 \times 4 \times 4 = 64</math></li> <li><math>4^2</math> or <math>4 \times 4 = 16</math></li> <li><i>Their</i> <math>64 \div</math> <i>their</i> 16 attempted</li> <li>Liam is incorrect oe</li> </ul>	2 - 1	<p><b>One</b> from</p> <ul style="list-style-type: none"> <li><math>4^3</math> or <math>4 \times 4 \times 4 = 64</math></li> <li><math>4^2</math> or <math>4 \times 4 = 16</math></li> <li><i>Their</i> <math>64 \div</math> <i>their</i> 16 attempted</li> <li><math>4^3 \div 4^2 = 4</math></li> </ul>

Question		Answer	Marks	Part Marks and Guidance	
<b>8</b> <b>C</b>	(a)	4 correct points	2	<b>B1</b> for 1 point correct	$\pm$ one small square Overlay available Ignore any joining or extra points
<b>C</b>	(b)	Positive	1		Ignore strong etc
<b>C</b>	(c)	Correct straight line	1		Within overlay $4.5 \leq \text{teams} \leq 11.5$ Condone good freehand
<b>C</b>	(d)	76, 80, 84, 88 or 92 cao consistent with their number of rolls and with all correct supporting working	4	<b>M1</b> for 115 to 140 or <i>their</i> number of rolls  <b>M1</b> for $(115 \text{ to } 140) \div 6$ or <i>their</i> number of rolls $\div 6$  <b>M1</b> for $(19, 20, 21, 22, 23 \text{ or } 24) \times 4$ or <i>their</i> integer quotient $\times 4$  If 0 scored <b>SC1</b> for 76, 80, 84, 88 or 92 without supporting working.	FT <i>their</i> line if outside range (may be a curve) $\pm 1$ small square  soi by 19 to 24 used in a calculation but nor $6 \times 4 = 24$ May be rounded to multiple of 6
<b>9</b> <b>C</b>	(a)	Correct ruled line from (1, 60) to (7, 300)	2	<b>B1</b> for 3 points correct	$\pm 1$ small square Condone freehand line for max 1 mark
<b>C</b>	(b)	20 40	1 1		

Question		Answer	Marks	Part Marks and Guidance																	
	(c)	420 nfww	2FT	<b>FT</b> <i>their</i> $40 \times 10 + \textit{their} 20 M1 for their 40 \times 10 soi 400                     or for a multiple of 40 + their 20                     or for 300 + 3 \times \textit{their} 40 oe                 $																	
10	(a)	$y = 2$ oe	1	Accept any clear indication																	
	(b) (i)	1	1																		
	(ii)	30	1	Allow 30, 29 as coordinates																	
	(c)	Correct line ruled from $x = -2$ to $x = 4$	3	<b>B2</b> for correct line but not reaching $x = -1.5$ or $x = 3.5$ and spanning 10 small squares horizontally or <b>B1</b> for intended correct line but out of accuracy or <b>B1</b> for straight line through (0, -1) or line with gradient =2 or <b>B1</b> for two correct points plotted  OR <b>M1</b> for two correct pairs of coordinates  And <b>B1</b> for correctly plotting two of <i>their</i> points and drawing one straight line through them																	
				Allow from $x = -1.5$ to $x = 3.5$ Condone good freehand Whole of line from -1.5 to 3.5 must be within 1 small square at all points  Points may be implied by line.																	
				<table border="1"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>y</td> <td>-5</td> <td>-3</td> <td>-1</td> <td>1</td> <td>3</td> <td>5</td> <td>7</td> </tr> </table>		x	-2	-1	0	1	2	3	4	y	-5	-3	-1	1	3	5	7
x	-2	-1	0	1	2	3	4														
y	-5	-3	-1	1	3	5	7														
				Coordinates must be seen																	

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