

**Mathematics A**

General Certificate of Secondary Education

Unit **A501/01**: Mathematics A (Foundation Tier)

**Mark Scheme for November 2011**

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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 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**

- 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 awarded for a correct final 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.
- **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).
  - **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 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'.
  - 7 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).
  - 8 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.
  - 9 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.
  - 10 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
    - i mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.
    - ii 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.
    - iii 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.
  - 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.

1	(a)	44	1		
	(b)	18 or 45	1		
	(c)	18 and 35	1	Both required	
	(d)	16	1		
	(e)	13	1		
	(f)	35	1		
2	(a)	4 row by 2 column <b>dot</b> pattern drawn in any blank part of grid	1	Ignore lines between dots	Not 2 row by 4 column, nor gaps between rows/columns
	(b)	6, 8, 10	1		
	(c)	30	1		
	(d)	'even numbers' or 'two times table' or 'multiples of 2'	1		Not 'add 2', '2n', '×2'
3	(a)	5.4 indicated on line	1	Accept cross or arrow etc	Mark intent – must be in range $5.35 \leq \text{mark} \leq 5.45$
	(b)	(i) (1, 4)	1		
		(ii) (-3, 1) plotted	1	Condone no label if only one point plotted	If more than one point, correct point must be labelled

4	(a)	1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$	2	<b>M1</b> for (4 min =) 240 (secs) soi by eg $\frac{360}{240}$ or for 90° in 60 seconds	M0 for just 90° (in 1 minute)
	(b)	(i) 40 (accept 38 to 42)	1		
		(ii) 1200 (accept 1180 to 1220) or 2400 (accept 2360 to 2440)	2	<b>M1</b> for figs 12 or figs 118 to 122	Allow 2400 for those who know line is really a loop of wire twice as long
	(c)	(i) SE or South East	1	May be identified in list	
		(ii) Answer in range 39 to 50	2	<b>M1</b> for 15 to 20 [cm] or $37 \leq \text{ans} < 39$	
5	(a)	Leave 06:00 to 06:40 provided at least 2h before arrive Dover Arrive Dover 08:00 to 08:40 Ferry leaves 09:25 Ferry arrives 10:55 <b>or</b> Leave 06:00 to 07:35 provided at least 2h before arrive Dover Arrive Dover 08:00 to 09:35 Ferry leaves 10:20 Ferry arrives 11:50	5	<b>For part marks, mark in this order</b> <b>M2</b> for ferry leaving time 09:25 or 10:20 <b>A1</b> for ferry arrival time 10.55 or 11.50 respectively After M0A0, <b>B1</b> for their ferry arrival time = their ferry leaving time + 90 mins <b>M1</b> for arrive Dover time at least 45 mins before their ferry leaving time <b>M1</b> for leaving time at least 2h before <i>their</i> arrive Dover time but no earlier than 06:00	Condone inconsistent time notation such as a mixture of 6am, 7:00, 08:00 and 0900  Both <b>M1s</b> are not dependent on a correct ferry
	(b)	181.25 or 181.2 or 181.3 or 181 or 180	1		
	(c)	(i) Mar(ch)	1		
		(ii) 6	1		
		(iii) 5 to 5.5	1		

6	(a)	10a	1	Mark final answer in all parts.	
	(b)	(i) (b=)17	1	Not $17+3=20$	
	(b)	(ii) (c=)7/2 oe	2	<b>M1</b> for $2c = 7$ or for answer FT $2c = \textit{their k}$ <b>Or SC1</b> for final answer $2 \times 7/2 \text{ oe } -6=1$	ie one correct step ie correct embedded
7	(a)	63	2	<b>M1</b> for figs $756 \div 12$ soi by figs 63	
	(b)	2.31	2	<b>M1</b> for 77 or 0.77 or for figs 231	
8		2 m 42 cm	4	<b>M3</b> for 10 – <i>their</i> sum of three correct lengths in m or 1000 – <i>their</i> sum of three correct lengths in cm oe implied by 242 cm or 2.42 m seen in answer space Or <b>M2</b> for sum of three correct lengths in m or sum of three correct lengths in cm implied by 7 m 58 cm or 758 cm or 7.58 m Or <b>M1</b> for Use of 1 m = 100 cm soi	condone '2.42m 242 cm'  allowing equivs such as repeated subtraction from 10      eg implied by answer of 4 m 400 cm



9	(a)	(i) 280	2	<b>M1</b> for 140 or for $420 \div 3$	
		(ii) 540	2	<b>M1</b> for 180 or for $360 \div 2$	
	(b)	13 : 8 or $13/8 : 1$ oe or $1 : 8/13$ as final answer	2	<b>M1</b> for 26 : 16 or 130 : 80 or 13g : 8g or other correct partial simplification or for 13 and 8 seen	Allow <b>2</b> marks for 1.625 : 1 or $1 : 0.615(\dots)$ Allow <b>M1</b> for 1.62 : 1 or 1.63 : 1 or $1 : 0.61$ or $1 : 0.62$
10		<p>Circle or arc centre A that crosses the position of a line through AB</p> <p>Radius 6 cm and compass-drawn, at least the part of the arc bounded by the correct perp bisector)</p> <p>Attempt at perpendicular bisector of AB</p> <p>Accurate attempt with correct compass arcs</p> <p>Shading of minor segment of circle centre A cut off by perp bisector</p>	<p><b>M1</b></p> <p><b>A1</b></p> <p><b>M1</b></p> <p><b>A1</b></p> <p><b>B1</b></p>	<p>Condone hand-drawn since interpretation required for this <b>M1</b></p> <p>Tolerance 2 mm</p> <p>Passing within 5mm of centre of AB and making an angle of <math>80^\circ</math> to <math>100^\circ</math> with AB</p> <p>Must pass between parallel lines on overlay</p> <p>FT <i>their</i> circle/arc centre A and line</p>	<p>Use overlay</p> <p>scoris tip: find out how the tolerance relates to the size of the overlay circles on your screen setting</p> <p>2<sup>nd</sup> M not earned for just two sets of arcs or two circles with no line</p> <p>NB be alert for spurious arcs added after drawing line – <b>A0</b></p> <p><b>B0</b> for overlap of two circles</p>

<p><b>11</b></p>	<p><b>(a)</b></p>	<p>Plots at midpoints of intervals</p> <p>All seven heights correct (7, 10, 14, 9, 5, 3, 2)</p> <p>All plots joined with ruled straight line segments</p>	<p><b>1</b></p> <p><b>1</b></p> <p><b>1FT</b></p>	<p>Condone one error/omission</p> <p>Tolerance 1 mm</p> <p>Within 1 mm of points; FT for at least six points plotted</p>	<p>Use overlay</p> <p>As well as correct, allow heights mark for bars or for plots not at midpoints but elsewhere in correct interval</p> <p>Ignore joins to axes from endpoints, but last mark not earned if endpoints are joined; bod if only one segment not clearly ruled</p> <p>Ignore bars if a frequency polygon also seen; otherwise bars can earn the mark for heights correct</p>
	<p><b>(b)</b></p>	<p>Midpts 25, 75, 125... seen or implied</p> <p><math>f \times x</math> attempted</p> <p>(<i>Their</i> sum of <math>f \times x</math>) <math>\div</math> 50 soi</p> <p>137</p>	<p><b>M1</b></p> <p><b>M1</b></p> <p><b>M1</b></p> <p><b>A1</b></p>	<p>For 3 or more correct; need not be used</p> <p>Sum seen or at least 3 products seen FT <i>their</i> 'midpts'; their 'midpoints' need to be in the correct class; Eg 175, 750, 1750, 1575, 1125, 825, 650</p> <p>If correct: <math>6850 \div 50</math></p> <p>Allow <b>B4</b> for 137</p> <p><b>SC2</b> for 162 or 112</p>	<p>Eg may be seen by table</p> <p>Eg allow 2<sup>nd</sup> <b>M1</b> for use of endpts not midpts; 6850 implies first two Ms; working for 2<sup>nd</sup> <b>M1</b> may be by table</p> <p>First two <b>M1</b>s may be earned for correct work seen even if not then used in the final answer</p> <p>May be earned even if their 'midpoints' are not in the correct class. Eg Midpt used as 50 throughout earns <b>MOMOM1</b> (<i>their</i> <math>fx = 350, 500, 700</math> etc then <math>2500 \div 50</math>)</p>

## Q8 Examples

1

$$10 - 4 - 2 = 4$$

$$34 + 41 + 83 = 158$$

$$4 - 1 = 3$$

$$\underline{3} \text{ m } \underline{58} \text{ cm [4]}$$

M1 implied by 158 (cm) split into 1 m and 58 cm.

No further M marks because neither addition nor subtraction is completed consistently

2

What length of ribbon does she have left?  
Give your answer in metres and centimetres.

3 m 58 cm [4]

This gets 0 – no working shown.

3

100 cm = 1m

3.25m

2.80 m 380 cm [4]

No marks – no use of conversion and 2.8 m is NOT 380 cm.

4

$$\begin{array}{r}
 100 \\
 - 83 \\
 \hline
 17 \\
 \text{---} \\
 17.41 \\
 - 4.34 \\
 \hline
 13.07
 \end{array}$$

$$\underline{10} \text{ m } \underline{25} \text{ cm [4]}$$

M1 for conversion for either 2.41 or 4.34.

5

$$10\text{m} - 83\text{cm} - 2\text{m} - 41\text{cm} - 4\text{m} - 34\text{cm} =$$

$$\underline{\cancel{6}} \text{ m } \underline{56} \text{ cm [4]}$$

No marks scored. No conversion seen. Must subtract in consistent units, i.e. all in m or all in cm to score M3 or M2.

6

$$10\text{m} = 1000\text{cm}$$

$$10\text{m} - 2\text{m} - 4\text{m} = 4\text{m}$$

$$1000\text{cm} - 41\text{cm} - 34\text{cm} - 83\text{cm} = 842$$

$$\underline{4} \text{ m } \underline{842} \text{ cm [4]}$$

M1 only. Two separate subtractions, neither of which is complete.

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