OCR
Oxford Cambridge and RSA

GCSE

Mathematics A

Unit **A502/01:** Mathematics B (Foundation Tier) Paper 1

General Certificate of Secondary Education

Mark Scheme for November 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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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.
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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 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *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.

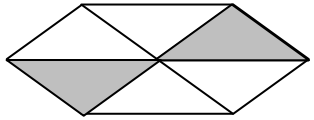
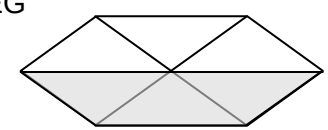
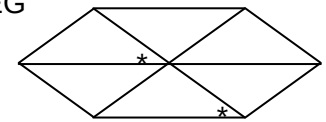
13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

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)		5.16	1		
	(b)		4.71	1		
	(c)		10[.0]	1		
	(d)		125	1		
	(e)		Fifth box indicated only	1	125 ÷ 2	Accept any clear indication. Must be one box only indicated (Could be all other crossed out)
2	(a)		76 58	1 1		
	(b)	(i)	73 7 has already been used oe	1 1	One card [that she needs] has already been used oe She can't use 7 twice oe	Do not accept: The cards add up to 9 or She can't follow step 1

Question			Answer	Marks	Answer
2		(iii)	**Guidance: Read the evidence and tick when each bullet point has been met.** Two correct and correctly worded rules and two correct explanations with two correct examples for each • Rule: 5 cannot be used as a unit digit (place). • Reason: If used as a unit she needs another 5 to make this up to 10 [and it has been chosen]. Oe • Two correct examples for the rule • Rule: 0 cannot be used. • Reason: If used as a ten then the number would be one-digit. • Two correct examples for the rule	**5**	Mark the sense of the rule and reason and accept corollaries Do not accept, Use 5 first but allow 5 in first place or position oe Examples (Counter examples not needed) 53 + 47 = 100 ✓ and 35 + 65 = 100 × 26 + 74 = 100 ✓ and 13 + 87 = 100 ✓ 08 + 92 = 100 × and 80 + 20 = 100 × 07 + 93 = 100 × and 06 + 94 = 100 × Accept one possible and one impossible example or two impossible examples . For the **units rule** allow Reason: if 0 used as a unit she would need to have another 0 to make this up to 10 [and it has already been chosen] Accept as a rule. 5 cannot be used as a ten if 0 or 4 or 6 is also chosen. (56 + 44 = 100 but only one 4)
			Four from • Correct rule for 5 • Correct rule for 0 • A recognised, correct impossible combination using 5 EG 45 + 55 = 100 • A different recognised, correct impossible combination using 0 EG 40 + 60 = 100 or 04 + 94 = 100 • A correct explanation as to why an example is impossible	**4 - 3**	Three from • Correct rule for 5 or 0 • A recognised, correct impossible combination using 5 EG 45 + 55 = 100 • A different recognised, correct impossible combination using 0 EG 40 + 60 = 100 or 04 + 94 = 100 • A correct explanation as to why an example is impossible
			Two from • A recognised, correct impossible combination using 5 EG 45 + 55 = 100 • A different recognised, correct impossible combination using 0 EG 40 + 60 = 100 or 04 + 94 = 100 • A correct explanation as to why an example is impossible	**2 - 1**	One from • A recognised, correct impossible combination using 5 or 0 • Any combination using 5 or 0

Question			Answer	Marks	Part Marks and Guidance	
3	(a)		3, 2	1		
	(b)		P	1		
	(c)		Fourth box indicated	1	$y = 3$	Accept any clear indication. Must be one box only indicated (Could be all others crossed out)
	(d)		1	1		
4	(a)		Acute	1		
	(b)		120	1		
	(c)		60	2	**M1** for 180 ÷ 3 oe soi	
	(d)		23	2	**B1** for 90 seen as angle in rectangle or **M1** for 90 – 67 oe	Mark answer then look at diagram for angle marked 90 in correct place. Accept symbol.
5			180	4	**M1** for 9.90 – 8.10 oe soi [£]1.80 And **M1** for 30 + 35 + 35 oe soi 100[hours] And **M1** for t*heir* 1.80 × *their* 100	Alternative method **M2** for 30 × 8.10 + 35 × 8.10 + 35 × 8.10 and 30 × 9.90 + 35 × 9.90 + 35 × 7.85 soi 243 + 283.5 + 283.5 + 297 346.5 + 346.5 or 990 – 810 **M1** for one correct product from above **M1** for difference between "before" and "after" amounts

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th colspan="2">Part Marks and Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>45</td><td>2</td><td>M1 for 360 ÷ 8
If 0 scored
SC1 for answer of 135</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>126</td><td>4</td><td>B1 for 90 seen
And
M1 for 360 ÷ 10 soi 36
And
M1 for their 90 + their 36</td><td>Do not award if 90 is clearly not the angle in the square</td></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>One of each middle triangle shaded only</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>One triangle above middle line and one below rotational symmetry order 2</td><td>1</td><td>EG  </td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Correct trapezium indicated</td><td>1</td><td>EG  </td><td></td></tr>
<tr><td></td><td></td><td>(iv)</td><td>Two corresponding angles indicated only</td><td>1</td><td>EG  </td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Completely correct table.
<table><tr><td>Number of sides</td><td>Name of polygon</td><td>Length of one side</td></tr><tr><td>5</td><td>Pentagon</td><td>2a</td></tr><tr><td>10</td><td>Decagon</td><td>[1]a</td></tr></table></td><td>4</td><td>B3 for 3 or 4 correct
Or
B2 for 2 correct
Or
B1 for 1correct</td><td>If first polygon is not pentagon, then accept correct number of sides for their polygon. EG
<table><tr><td>Number of sides</td><td>Name of polygon</td><td>Length of one side</td></tr><tr><td>✓6 FT</td><td>Hexagon ×</td><td>3a ×</td></tr></table></td></tr>
</table>

Question			Answer	Marks	Part Marks and Guidance	
8			x > 7	**2**	**B1** for [x =] 7 Or **M1** for first correct step	$x \geq 7$ scores 1 mark For method marks, condone = for > 2x > 19 – 5 or $x + \frac{5}{2} > \frac{19}{2}$
9	**(a)**	**(i)**	6 points correctly plotted	2	**B1** for 4 or 5 correct	Tolerance 2mm Ignore any joining lines
		(ii)	[Increases], decreases then increases [decreases]	1		Ignore extra detail provided it doesn't contradict
	(b)		9 peaks 100 ÷ 9 or 100 ÷ 10 11[.1..] or 10 which is approx 11	**B1** **M1** **A1**	soi by correct calculation	10 scores **B0** 'Each line = 5 and there's a peak every 2 lines' **B1**
10	**(a)**		A indicated only	**1**		
	(b)				Comments may refer to what graphs show or do not show so mark to advantage	
			B shows him getting £8 for any time up to 1 hour oe	**1**	Accept the following It does not start at 0 He isn't paid £8 for 0 hours (or before 1 hour) From 0 to 1 it stays the same	Ignore any comments about Graph A
			C shows him getting £8 no matter how long he works oe	**1**	It does not increase oe It should increase oe He isn't paid £8 all day / he only gets £8 Any suggestion of pay increasing or staying the same	Do not accept It shows him being paid £8 every hour
			D It is not a line graph oe	**1**	It does not show values between whole hours oe Any correct comment referring to style of graph	

Question			Answer	Marks	Part Marks and Guidance	
11	(a)		$\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $1\frac{1}{4}$ oe	3	**M1** for attempt to change to a common form and **A1** for 2 or more fractions correctly converted If 0 scored **SC1** for $\frac{1}{2}$ as smallest and $1\frac{1}{4}$ as largest or for 3 in correct order or for correct order reversed	eg common denominator, decimal, percentages
	(b)	(i)	3.142 857	1	Allow 'Jewish'	
		(ii)	0.0016	2	**B1** for 0.001593 or 0.00159 or figs 16	

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