OCR
Oxford Cambridge and RSA

GCSE

Mathematics A

Unit **A501/01:** Unit A (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 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 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 – $\sqrt{}$(*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.

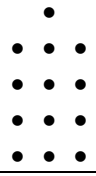
11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or 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)		28	1		
	(b)		18	1		
	(c)		39 and 25	1	Accept in either order	
	(d)		17	1		
2	(a)		340	1		
	(b)		1.16(0) kg or 1160 g FT from (a)	2 FT	**B1 FT** for *their* digits 116 or for 1 kg = 1000 g soi	
3	(a)		14.4 to 14.8	2	**M1** for 7.3 [cm] or 73 [mm] tol 1 mm	
	(b)		rectangle *a* cm by *b* cm $2<a<2.5$ and $1.5<b<2$ at least 0.5 cm from all sides of room	1 1	 ft *their* rectangle	accept 90° drawn by eye if sides in tolerance
4	(a)	(i)	13, 5, 9, 2, 4	1		
		(ii)	Bars the correct height bars same width, equal gaps and colours labelled (e.g. R B G O)	1 FT 1		
	(b)		8 <u>silver</u> **or** 8 **and** 10 seen the rest [9 or 10] could all have been the same third colour oe	1 1		may be seen next to question 8 must not be associated with any other colour, e.g. 8 red scores 0 see exemplars

Question			Answer	Marks	Part Marks and Guidance	
5	(a)	(i)		1		
		(ii)	31 because 3 added on each time	1 1	or *n*th term is 3*n* + 1 oe	ignore extra non-contradictory statements see exemplars
	(b)		2*b* + 14*c* as final answer	2	**B1** for one term correct in final answer or for correct answer seen in working then spoilt	
6	(a)		33.80	2	**B1** for 33.8 or 26 or 23.8 or 17.8 or **B1** for any two of 16, 10, 7.8 or **M1** for any two of 2 x 8, 2 × 5, 4 × 1.95	
	(b)		1 h 15 [min] or 1 ¼ h or 75 min or 1.25 h	1	0 for 1:15 h or 1.15 h	units are needed

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Part Marks and Guidance</th><th></th></tr>
<tr><td></td><td>(c)</td><td></td><td>fully correct plan meeting all 3 wants; (lower mark if one slip in time or distance)
<table><tr><td>Activity</td><td>Start</td><td>End</td></tr><tr><td>walk Exm to L</td><td>2:00 pm</td><td>2:50 pm</td></tr><tr><td>walk L to Ext</td><td>2:50 pm</td><td>3:20 pm</td></tr><tr><td>train Ext to T</td><td>15:31</td><td>15:36</td></tr></table>Total dist = 4 miles</td><td>6-5</td><td>or
<table><tr><td>Activity</td><td>Start</td><td>End</td></tr><tr><td>train Exm to L</td><td>14:24</td><td>14:28</td></tr><tr><td>walk L to Ext</td><td>14:28</td><td>14:58</td></tr><tr><td>walk Ext to T</td><td>14:58</td><td>15:38</td></tr></table>Total dist = 3.5 miles

or
<table><tr><td>Activity</td><td>Start</td><td>End</td></tr><tr><td>train Exm to L</td><td>14:24</td><td>14:28</td></tr><tr><td>walk L to Ext</td><td>14:28</td><td>14:58</td></tr><tr><td>walk Ext to L</td><td>14:58</td><td>15:28</td></tr><tr><td>train L to T</td><td>15:28</td><td>15:36</td></tr></table>Total dist = 3 miles</td><td>a “correct plan” is one that starts at Exmouth and ends at Topsham

the words “walk” and “train” can be implied by correct distance/time for stated start and end points

times may be in 12 or 24 hr clock or mixture; condone omission of am/pm

consecutive walking stages may be shown separately or combined</td></tr>
<tr><td></td><td></td><td></td><td>correct plan meeting 2 wants; (lower mark if one slip in time or distance)

eg (walk not far enough)
<table><tr><td>Activity</td><td>Start</td><td>End</td></tr><tr><td>walk Exm to L</td><td>2:00 pm</td><td>2:50 pm</td></tr><tr><td>train L to T</td><td>14:57</td><td>15:03</td></tr><tr><td></td><td></td><td></td></tr></table>Total dist = 2.5 miles</td><td>4-3</td><td>allow B2 for train all the way with correct train times 14:24 to 14:36 or 14:53 to 15:03 or 15:24 to 15:36
(no walk, distance or time calcn)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>correct plan meeting 1 want
eg (walk OK but late and no train)
<table><tr><td>Activity</td><td>Start</td><td>End</td></tr><tr><td>walk Exm to L</td><td>2:00 pm</td><td>2:50 pm</td></tr><tr><td>walk L to Ext</td><td>2:50 pm</td><td>3:20 pm</td></tr><tr><td>walk Ext to T</td><td>3:20 pm</td><td>4:00 pm</td></tr></table>Total dist = 6 miles</td><td>2</td><td>or M2 for two of
• at least one correct distance calculation seen
• at least one time calculation seen
• correct reading of train times compatible with their plan
or M1 for one of these</td><td>must specify where they start and end</td></tr>
</table>

Question			Answer	Marks	Part Marks and Guidance	
7	(a)	(i)	10 904	2	**M1** for correct order seen	
		(ii)	10 515	2	nfww **M1** for attempt at sum of all five [= 52 575 if correct] Or **SC1** for answer of 43577(.4)	[Answer from forgetting to press = before dividing]
	(b)	(i)	191 079	2	**M1** for attempt at multiplying "$x \times f$" for all categories or at least two correct of 17 931, 136 188, 30 450, 6510	
		(ii)	21.81 to 21.82 or 21.8(0)	2	**M1** for *their* (i) ÷ 8760 (may be implied by answer)	
8			6 million or 6 000 000 with correct working seen	4	**B3** for 5 529 600 **or** **M2** for 64 × 24 × 60 × 60 soi **or** **M1** for three of these multiplied **and** **B1** ft for their unrounded value seen and correctly rounded to nearest million if > 1 million	eg **M1** for 230400 [sold in one hour] or for 86 400 [secs in 1 day]

Question			Answer	Marks	Part Marks and Guidance	
9			3.75 ÷ 3 or 1.25 or 6.25 10.75 – 5 × *their* 1.25 or 4.5[0] their 4.5[0] ÷ 2 2.25	**M1** **M1** **M1** **A1**	 dep dep allow **B4** for 2.25 obtained from trials and shown to be correct **B2** for 2.25 with no or insufficient working	 may use other strategies such as 'word' simultaneous equations eg **M1** for equiv of 15*t* + 6*c* = 32.25 and 15*t* = 18.75 (condone one error) then **M1** for 6*c* = *their* 32.25 – 18.75 or = 13.50, then **M1** for *their* 13.50 ÷ 6
10	**(a)**		348	**2**	**M1** for 48 + 12 × 25	Common
	(b)		*C* = 20 + 16*n* as final answer	**2**	**M1** for 16*n* isw condone *P* instead of *C*	Condone poor notation such as *n*16 etc ; condone inclusion of £ Common

Question			Answer	Marks	Part Marks and Guidance	
	(c)		48 + 12*n* = *their* (20 + 16*n*)	**M1 FT**	must see this equation or simultaneous equations in *C* or *P* and *n* and subtracting	Common
			7 cao	**2**	**M1** for 28 = 4*n* or FT provided their (b) is of form *a* + *bn* with both *a* and *b* non-zero	the correct answer without an equation can earn 2 marks only (eg from trials); ignore inclusion of £ anywhere
				or	allow **M0 SC1** for 328 = 16*n* or FT after 348 or *their* (a) = *their* (20 + 16*n*)	
			or, for those attempting simultaneous equations in *C* or *P* and *n* and eliminating *n*:			
			multiplying to eliminate *n* and subtracting, with at most one error	**M1**		bod **M1** if using both *P* and *C* but treating as same in multiplying etc
			7 cao	**2**	eg 16*P* = 768 + 192*n* and 12*P* = 240 + 192*n* then 4*P* = 528 or, eg 4*C* = 192 + 48*n* and 3*C* = 60 + 48*n* then *C* = 132, with at most one error **M1** FT for obtaining cost [132 if correct] **and** reaching *their* cost – 20 = 16*n* or *their* cost – 48 =12*n*	
11			2000 nfww	**2**	**B1** for 1752. ... rot to 3 or more sf or for 2000.0 or more decimal zeros nfww	Common 0 for just 1800
12	**(a)**		angle BCD = 103 to 107°	**1**		Common
			AD = 11.5 to 11.9 with arc and quadrilateral completed	**2**	**B1** for AD = 11.5 to 11.9 with no arc	NB two possible quadrilaterals use angle measurer and ruler to mark this qn

Question			Answer	Marks	Part Marks and Guidance	
	(b)		Bisector of angle ABC drawn with correct compass arcs or perp bisector of AC drawn with correct compass arcs	**2**	tol 1°; must be ruled; condone bisector dashed one pair of arcs centres A and C crossing once then joined to B is sufficient; **B1** for acceptable bisector without correct compass arcs;	Common since AB = BC, allow arcs on AB and BC drawn from B or from A and C use angle measurer set at 50°

APPENDIX

Exemplar responses for Q4(b)

Response	**Mark**
4 = black 8 = silver still 10 left. There were still 10 cars left and they may all of been of the same colour so he could be wrong	**1 1**
if there was 22 cars in total 4 black and 8 silver this would 10 cars of other colours this could 10 cars of one colour or 10 of mixture of colours - therefore Ali could be wrong	**1 1**
because if theres 8 silver and 4 black thats 12 if theres 22 that's 10 left, there might be 10 of a different colour	**1 1 bod**
8 silver there could be a car with a different colour with a higher number than silver	**1 1 bod**
22 black were 4 18 left 8 silver that leave 10 left he doesn't know the other colour cars	**1 0**
there are only 8 silver cars but there is 22 cars in total. 10 left in car park with no colour given	**1 0**
because there are 22 cars and there are only 8 that are silver, he didn't specify the colour of the 10 cars left in the car park	**1 0**
8 silver cars this is wrong because he hasn't counted the other coloured cars he has only counted 12 cars out of 22	**1 0**
because 4 x 2 is 8 and there were 22 cars only 8 were silver leaving **12** a different colour	**1 0**
22 – 4 – **8** = **10** she may be wrong because she hasn't told us the colour frequency of the other 10 cars	**1 0**
because theres only 8 silver cars and different 10 cars which would be under 'others' 10 others	**1 0**
Ali might be wrong because out of the 22 cars there 8 silver cars and there's 10 remaining so we don't know the color	**1 0**
Ali is wrong because the double of the black cars is 8 while there is still 10 cars in the parking lot	**1 0**
(8 is seen by third bullet point) Ali is wrong because 4 x 2 is 8 and Ali said "there were twice as many silver cars as black cars"	**1 bod 0**
because twice as many would be 8, and 8 and 4 doesn't add up to 22 so they may be more of one other colour	**0 1**
there are still ten other cars which could be the same colour	**0 1 bod**
22 – 8 = 14 because there could be more red and green cars since there are 14 left	**0 0**
22 – 12 = 10 he is wrong because there is still 10 more cars	**0 0**
Ali could be wrong because there is still a remaining 14 cars in the car park	**0 0**
Ali is wrong as there are other colours as well, not just black and silver as Ali did miss out the other 12 cars left	**0 0**
he is wrong because there are 13 silver cars and half of that is not 4 (refers to part a)	**0 0**

Exemplar responses for Q5(a)(ii)

Response		**Mark**	
31	you keep adding 3	**1**	**1**
31	each one is 1 more than 3 times the number pattern	**1**	**1**
31	you add on 3 every time, and 3 x 6 to get to 10 is 18	**1**	**1**
31	you are adding on one dot to each line of the pattern every time (bod referring to vertical lines)	**1**	**1**
31	because you are adding on 3 more dots each time	**1**	**1**
31	you go up in the 3 times table and 10 x 3 = 30 plus the separate dot at the top makes 31	**1**	**1**
31	there is 10 lines of 3 and 1 line of 1	**1**	**1**
31	it goes up by 3 dots each pattern	**1**	**1**
31	dots increase by 3	**1**	**1**
31	because each row has 3 new dots and one dot at the top	**1**	**0**
31	the sequence is going in 3s [up or down?]	**1**	**0**
31	add 3 [not quite far enough]	**1**	**0**
31	increase by 3 not quite far enough]	**1**	**0**
34	add 3 each time	**0**	**1**
34	add 3	**0**	**0**
32	pattern 5 has 16 dots so double 16 is 32 giving me pattern 10	**0**	**0**
36	it's going up in the 4 times table	**0**	**0**
11	it goes up by 2 dots	**0**	**0**
30	it goes up in the 3 times table	**0**	**0**

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