

GCSE

Mathematics A

Unit **A501/01**: Mathematics A (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.

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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 $180 \times (\textit{their '37'} + 16)$, 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)	(i)	3.2	1		
		(ii)	arrow pointing to -2.7	1	clearly between -2.6 and -2.8	
	(b)	16.28	1			
	(c)	25	1			
2	(a)	2 nfw	3	B2 for 32 or M1 for $2 \times 6 + 2 \times 10$ Or After 0 scored SC1 for $3 \times 6 + 2 \times 10$ or 38 followed by 8 as ans or for $2 \times 6 + 2 \times 11$ or 34 followed by 4 as ans		
	(b)	(i)	19	1		
		(ii)	bar 1 high drawn in correct position	1	mark intent of $\frac{1}{2}$ way to first gridline	ignore width of bar provided strictly between tick marks on horizontal axis
(c)	94.3(...) nfw	3	M1 for attempting at adding the six values (566 if correct) and M1 for $\div 6$ allow A1 for 94 or 95 only if correct method seen ans of 40(.16...) implies M2		(ans from forgetting to press = before dividing)	
3		cm	1	accept full words or abbreviations		
		grams	1			
		litres	1			
		tonnes	1			

Question		Answer	Marks	Part Marks and Guidance	
4	(a)	44, 41, 38	2	B1 for 2 correct, allowing ft from one error	
	(b)	no with full correct explanation eg $47 - 21 = 68$ which is not a multiple of 3	2	B1 for partial explanation – may be relevant working in work space	0 for yes see appendix for exemplars
5	(a)	-4, -5	1		
	(b)	4, -3	2	B1 each or M1 for B marked in correct position on diagram	
6	(a)	8c	1		Not 8xc
	(b)	3.5 oe	2	M1 for $2y = 7$	Condone embedded

Question		Answer	Marks	Part Marks and Guidance				
7		1 kg = 1000 g soi	M1		kg	L	P	C
		needs 1.9 [kg] or 1900 [g] more	B2	M1 for attempt to add weights [2.6 kg if correct] [may be earned at a later stage for attempt to add total weight of veg bought and what J already has]	1	£2.90	£1.60	£1.80
		choice of at least courgettes and parsnips max 1 kg each, and total weight 1.9 kg or FT 4.5 – their 2.6	M1	if total needed is clearly stated, they do not have to add their weights, if correct FT	0.9	£2.61	£1.44	£1.62
		correct costs for their weights	M1 dep	dep on previous M1	0.8	£2.32	£1.28	£1.44
		all costs correct, including total, and < £3.50	A1	eg cheapest soln 1 kg parsnips, 0.9 kg courgettes = £1.60 + 1.62 = £3.22	0.7	£2.03	£1.12	£1.26
				After M0 for choice of weights allow SC1 for a correct combination of at least 2 vegetables' weights and costs with both weights ≤1 kg and total cost ≤£3.50; instead of SC1 allow SC2 if total weight of Js veg then > 4.5 kg	0.6	£1.74	£0.96	£1.08
					0.5	£1.45	£0.80	£0.90
					0.4	£1.16	£0.64	£0.72
					0.3	£0.87	£0.48	£0.54
					0.2	£0.58	£0.32	£0.36
					0.1	£0.29	£0.16	£0.18
8	(a)	median 26.5	2	M1 for at least one of 26 and 27 identified; may be on diagram				
		range 30	1					
	(b)	Brian and smaller range	2FT	M1 for comment about range only; or for correct statement with additional distracting info				

Question		Answer	Marks	Part Marks and Guidance	
	(c)	adv eg results likely to be more reliable with bigger sample disadv eg more work to do/may not be enough beans available	1 1	0 for 'more accurate'	see appendix for exemplars: accept measuring or recording or calculating taking a long time <u>not</u> for growing or making mistakes
9	(a)	(i)	336 to 342	1	Common
		(ii)	1.9 to 2.1 nfw	2	M1 for 7.7 to 8.1 [may be on map] or for their distance FT from their stated measurement Common
	(b)	(i)	completed footpath going along 8 squares and up 3.5 squares	2	M1 for one measurement correct Allow clear intent for 3.5
		(ii)	angle 22 to 25 length 85 to 89	1FT 2FT	Allow FT, tol 1° or 1 mm from their drawing, after at least M1 gained in (b)(i) M1 for 8.5 to 8.9
10	(a)		$\frac{5}{11}$	2	M1 for $\frac{250}{550}$ seen, or implied by a correct partial simplification or M1 for 5 : 11 Common
	(b)		153 nfw	3	M2 for $85 \times \frac{9}{5}$ oe or M1 for $85 \div 5$ or 17 Common allow SC1 for 68 allow M1 for $17 \times 5 = 85$

Question		Answer	Marks	Part Marks and Guidance	
11	(a)	$2^2 \times 3 \times 7$ oe	2	<p>must be product but need not use indices</p> <p>M1 for factor tree with at most one error or omission, or successive division of 84 by primes, with at most one error</p> <p>or B1 for 2, 2, 3, 7 found but not written as product</p>	<p>Common</p> <p>M0 if only get as far as 2, 2, 21 oe</p>
	(b)	420	3	<p>M1 for $30 = 2 \times 3 \times 5$ or for 'Venn diagram' showing all the correct prime factors of 30 and 84 (need not be in correct regions)</p> <p>and M1 for $LCM = 2^2 \times 3 \times 5 \times 7$ oe</p> <p>or</p> <p>M2 for lists of common multiples up to and including 420; M1 if one error ft so misses 420</p>	Common
12	(a)	29.7	1		Common
	(b)	[c =] $2M - f$ nfw, as final answer	2	M1 for correct first step eg $2M = c + f$ or for their final step FT their first error	

APPENDIX

Exemplar responses for Q4(b)

Response	Mark
No because the terms I have found have a remainder of 2 when divided by 3, but -21 doesn't	2
No because if you keep taking 3 away, -22 is in there but -21 isn't	B1
No because -19 and -22 are in there but -21 isn't	B1
No because 21 isn't in the sequence so -21 won't be	B1
No because 21 is part of the multiples of 3 and this sequence isn't so it will miss 21	B1
No because this sequence isn't in the 3 times table	B1
eg 35, 32, 29, 26 found then No and 'from 47 taking way 3 will not get you to -21	B1
No 21 is not there in the positives so it wont be in the negatives	B1
21 isn't in the sequence so -21 won't.	B1
21 is part of the multiples of 3 whereas the sequence isn't so it will miss 21.	B1
-22 and -19 would be. Although 21 is in the 3 times table it's not in the sequence.	B1
21 isn't in the sequence so -21 won't be. It will skip it by 1.	B1
None of the three numbers are a multiple of 3.	B1
No because it would only be in the sequence if the sequence were the 3 times table	B1 bod
No because you are subtracting 3 each time	0 not sufft for B1
Because -21 is an odd number. Taking away 3 at a time wouldn't bring you that.	0
21 is a multiple of 3.	0
it's a negative number.	0
21 is in the 3 times table.	0
you work out the nth term and like that you can tell.	0
the numbers by taking way three each time brings it to even so it goes to -2 not to -21 because it goes even, odd, even, odd so it will not go to -21.	0
the sequence goes from one odd number to one even number which means that the next will be even.	0

Exemplar responses for Q8(c)

Advantages	
Response	Mark
There would be more evidence to support their answers of whose beans have a better consistent length.	1
You get a clearer view of what more beans measure	1
The sample to measure is bigger and therefore more reliable than a smaller sample of 30.	1
... will be better as this means we will have more evidence and information making it more reliable.	1
More data to compare.	1 bod
A large sample	0
Could give a more accurate result to the test because more are being tested.	0
Will give a clearer evidence to which runner beans were more consistent.	0
There would but more so they would have a more accurate score.	0
There would be more beans and more measurements and it is an even number.	0
100 beans each would give more of a difference towards the end of the results.	0
You will get a more accurate answer.	0
You can compare your beans and it's fair.	0
It would be more consistent and a better result because there are more beans to [illegible] and grow.	0
100 beans would be much easier to measure.	0
The answer is more likely to be right as they have done it 100 times.	0
More average answers.	0
There would be more so easier to judge the longest.	0

Disadvantages	
Response	Mark
There is too many numbers to be working with so it will be harder to work out answers and will take up much more of their time.	1
It will take time.	1
it would be too much effort	1
Will take longer to show evidence of who runner beans were more consistent.	1 bod
Some may die and not grow to the potential as there is too many and it will take a long time.	1 bod
You can get mixed up from having to measure 100 instead of 30.	0
... will be a disadvantage as 100 is very many making it easier to get muddled up and make mistake in the results.	0
It's harder to get all your beans at a more consistent length with 100 beans instead of 30.	0
It will take a long time to grow 100 beans.	0
It could be less consistent because they all grow at different times and need different spaces.	0
More variation of sizes and a bigger range, less accurate data.	0
Some might die before they're ready to be measured.	0
Might get wrong total due to too many beans.	0
More calculations gives less chance on the result being accurately given.	0
More to work out the answers they are looking for.	0
More of them could turn out the same length.	0
too many beans would be recorded and might lose count or have a very long list	0
the results could be more inconsistent since you get more beans to measure	0

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