

# **GCSE**

## **Methods in Mathematics**

Unit **B391/01**: Methods in Mathematics 1 (Foundation Tier)

General Certificate of Secondary Education

### **Mark Scheme for November 2015**

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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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1. 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
^K	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

2. **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.
3. 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.

4. 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  $\times$  (*their* '37' + 16), or FT 300 –  $\sqrt{(\text{their} \text{ } '5^2 + 7^2)}$ . Answers to part questions which are being followed through are indicated by eg FT 3  $\times$  *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.

5. 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.
6. 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**.

7. 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'.
8. 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).
9. 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.

10. 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.

11. 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 mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.

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.

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.

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.

## MARK SCHEME

Question		Answer	Marks	Part marks and guidance	
1		<p>rectangle radius trapezium parallelogram circumference</p>	3	<b>B2</b> for 3 correct <b>B1</b> for 2 correct	
2	(a)	(i) 13.8	1		
	(ii)	192	1		
	(b)	72 $\times$ 7 (=504) or 504 $\div$ 72 (=7)	1		

Question			Answer	Marks	Part marks and guidance
3	(a)	(i)	x and y such that $x-y=3$	1	Condone 3 and 0 May not be whole numbers
		(ii)	x and y such that $x \times y = 18$	1	1, 18 or 2, 9 or 3, 6 either way round May not be whole numbers
	(b)		+ - +	2	<b>B1</b> for + in front of $5a$ <b>B1</b> for + in front of $6b$ <b>and</b> - in front of $4b$
4	(a)		Triangle indicated	1	
	(b)	(i)	$\frac{2}{6}$ oe	1	
		(ii)	0	1	Accept nought, nil, zero, $\frac{0}{6}$
5	(a)		5	1	
	(b)		22	1	
	(c)		4	2	<b>M1</b> $3x=12$ or $x+2=6$

Question	Answer	Marks	Part marks and guidance
6*	ABDCE and 97, showing all routes with correct values and correctly evaluated	4	<p><b>3</b> As 4 marks but makes no or an incorrect decision <b>or</b> as 4 marks but makes one arithmetic error and makes the correct ft decision <b>or</b> shows correct working out for at least two routes and gives the correct final answer</p> <p><b>2</b> Working is clear but there are several arithmetic errors and makes correct ft decision <b>or</b> working is unclear but at least 3 correct totals are seen for method 1 <b>or</b> at least 2 correct totals are seen for method 2 <b>or</b> correct final answer with no other routes shown</p> <p><b>1</b> working is unclear but 2 correct totals are seen for method 1 or 1 correct total is seen for method 2</p> <p><b>Method 1</b>  <math>ABD\ 25+14=39</math>   <math>ACD\ 18+23=41</math>  So ABD shorter  <math>DBE\ 14+52=66</math>   <math>DCE\ 23+35=58</math>  So DCE shorter  Therefore ABDCE shortest route.</p> <p><b>Method 2</b>  <math>ABDBE\ 25+14+14+52=105</math>  <math>ABDCE\ 25+14+23+35=97</math>  <math>ACDCE\ 18+23+23+35=99</math>  <math>ACDBE\ 18+23+14+52=107</math>  Therefore ABDCE shortest route.</p>

Question		Answer	Marks	Part marks and guidance
7	(a)	(i) 3 squares shaded	1	
		(ii) 4 squares shaded	1	
	(iii)	$\frac{7}{12}$ oe fraction	2	<b>B1</b> for $\frac{3}{12}$ oe fraction or $\frac{4}{12}$ oe fraction <b>Or M1</b> for attempt to change both fractions into a common denominator No working in decimals
	(b)	6	1	
	(c)	$\frac{2}{21}$ cao	2	<b>B1</b> for $\frac{6}{63}$ <b>Or M1</b> for correct cancelling of 6 and 9 seen
8	(a)	Red paint 2 No paint 9-13 inclusive A total of 16	1 1 1Dep	Dependent on getting at least 1 of the previous 2 marks
	(b)	24	2	<b>M1</b> for stating total must be a multiple of 8 (implied by answer) <b>Or M1</b> for stating that max number with paint is 14 or the max total is 29 <b>Or M1</b> for 3, 6, 15 seen

Question		Answer	Marks	Part marks and guidance	
9	(a)	$\frac{1}{5}$ and $\frac{2}{10}$ indicated with no others	2	<b>M1</b> at least 3 fractions given in comparable forms eg decimals, numerator of 1 etc	ie could be one already given and 2 others converted
	(b)	50 $\times$ 10 and 0.5 $\times$ 1000 indicated with no others	2	<b>M1</b> at least 2 correctly evaluated or at least 3 correct comparable multiplications shown eg all 50 $\times$ ..... or all ..... $\times$ 10 etc	Must be sure they relate to the correct multiplication
	(c)	$2a+b$ and $a+a+b$ indicated with no others	1		
	(d)	$\frac{1}{4}$ and 0.25 indicated with no others	1		
	(e)	2.4 $\div$ 0.3 and 24 $\div$ 3 indicated with no others	2	<b>M1</b> for at least 2 correctly evaluated or at least 3 correct comparable divisions shown eg all 24 $\div$ ..... or all ..... $\div$ 3 etc	
10	(a)	9	1		
	(b)(i)	54	2FT	<b>FT</b> is 6 $\times$ their (a) correctly evaluated <b>M1</b> 6 $\times$ their (a)	
	(b)(ii)	27	1		
11	(a)	$2^2 \times 3 \times 5 \times 7$	2	<b>M1</b> for 2 correct steps in factor tree or ladder	May not be first 2.
	(b) (i)	$2^2 \times 3 \times 5$	1		Condone answer evaluated
	(ii)	$2^3 \times 3 \times 5^2 \times 7$	1		Condone answer evaluated

Question		Answer	Marks	Part marks and guidance	
12	(a) (i)	Triangle at $(-2, 3), (0, 3), (-2, 4)$	2	<b>B1</b> for $x$ or $y$ movement correct	
	(ii)	Triangle at $(3, 3), (9, 3), (3, 6)$	2	<b>B1</b> for enlargement sf 3 with wrong centre Or enlargement with centre $(0, 0)$ wrong sf	
	(b)	Y Y N N	3	<b>B2</b> for 3 correct <b>B1</b> for 2 correct	
13	(a)	<p>F                           S</p> <p>(2) 8 4      (1) 16</p> <p>(3) (5) (7) (10) (11) (13) (15) 6      12      14</p>	3	<b>B2</b> for 1 or 2 misplaced or omitted <b>or</b> for all correct but up to 2 extras <b>B1</b> for 3 or 4 misplaced or omitted or for F or S completely correct seen	Eg listed  Condone repeats in the correct place
	(b)	1, 4, 16	1FT		

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