

GCSE

Mathematics B (Linear)

Component **J567/01**: Mathematics Paper 1 (Foundation)

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.

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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

- 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.
- 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.
 - **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. 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 \checkmark 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.

MARK SCHEME

Question		Answer	Marks	Part marks and guidance	
1	(a)	23.65	2	M1 for $7.45 + 7.45 + 8.75$ oe Or 14.9[0] seen or figs 2365	Accept [£]23.65p
	(b)	16.35	2FT	FT from <i>their</i> part (a), providing it is less than 40 and not a whole number M1 $40 - \text{their } 23.65$ Or B1 for answer k.35 where $10 < k < 20$	Accept [£]16.35p
2	(a)	1750 or 1.75[0] l	2	M1 for 250×7 oe	
	(b)	20	3	B1 for 6000 or 0.3[00] seen and M1 for <i>their</i> $6000 \div 300$ or $6 \div \text{their } 0.3[00]$	Accept equivalent methods including repeated addition
3	(a)	(i)	1	(1, 3)	
		(ii)	1	(-4, 2)	
	(b)	(i)	1	(4, 3)	If both coordinates in (a) are reversed condone (3, 4)
		(ii)	1	3	

Question			Answer	Marks	Part marks and guidance													
4	(a)	(i)	B	1														
		(ii)	D	1														
		(iii)	C	1														
		(iv)	A, E	1														
	(b)	(i)	<table border="1"> <tr> <td>hex</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>match</td> <td>6</td> <td>11</td> <td>16</td> <td>21</td> <td>26</td> </tr> </table>	hex	1	2	3	4	5	match	6	11	16	21	26	1		
hex	1	2	3	4	5													
match	6	11	16	21	26													
		(ii)	41	1														
		(iii)	$\times 5$ $+ 1$	2	1 mark for each													
		(iv)	20	1	FT from their (b)(iii)	FT dep on 2 operations and an integer answer												
5	(a)		65	2	M1 for $260 \div 4$ soi													
	(b)		$\frac{7}{12}$ final answer	2	M1 for $\frac{210}{360}$ oe fraction seen Or SC1 for <i>their</i> fraction seen written in simplest form	Both simplified and unsimplified fractions seen												
	(c)	(i)	14 [%]	1														
		(ii)	156	2	M1 for 60% soi													

Question		Answer	Marks	Part marks and guidance	
6	(a)	10g final answer	1		
	(b)	$6x - 3y + 4$ final answer	2	M1 for one term correct	$6x + -3y + 4$ scores M1 only.
7	(a) (i)	25	1		
	(ii)	40	1		
	(b)	30	2	M1 for $42 \div 7$ soi	Can be implied by 6 seen
8	(a) (i)	1 hour 55 minutes	1		
	(ii)	10.08	1		Accept 10:08
	(b)	5 correct rows with no errors or repeats	2	B1 for 3 more correct, ignore repeats or extras	Condone repeat H, P, Z
9	(a)	$9\frac{1}{2}$ or 9.5	2	B1 for area x such that $8 \leq x < 11$	Do not award marks for perimeters
	(b)	40	3	M1 for a factor pair of 32 soi And M1 for $3 \times$ their length of Q + $4 \times$ their width of Q oe	Can be awarded if labelled on either diagram
10	(a) (i)	Scotland	1		Mark clear indication of country
	(ii)	4.6	1		Condone -4.6
	(b) (i)	-42	1		
	(ii)	9	1		

Question			Answer	Marks	Part marks and guidance	
11	(a)	(i)	4.5	1		
		(ii)	14.6	1		
	(b)		750	2	B1 for 75000 seen	
	(c)		S[outh] E[ast]	1		Do not accept ES
12	(a)		6	2	M1 for 'magic number' 30 soi	Working may be on diagram
	(b)		2	2	M1 for $2m + p = 14$ soi	FT <i>their</i> 6 Working may be on diagram or in part (a)
13	(a)	(i)	346.6	1		Do not accept 346.60....
		(ii)	350	1		Do not accept 350.00....
	(b)		12000	2	M1 for 30 and 400 used as an estimate Or B1 for $29 \times 400 = 11600$ or $30 \times 420 = 12600$	0 marks for calculation of 29.2×417 even if later rounded
14	(a)		Correct net	2	B1 3 correct extra faces in correct position Or SC1 for correct net with missing internal lines	Mark clear intention See overlay
	(b)		Second net circled	1		

Question			Answer	Marks	Part marks and guidance	
15	(a)	(i)	$\frac{4}{13}$	1	Accept $\frac{4}{13}$ with 'unlikely' on the answer line $\frac{4}{13}$ with 4 in (out of) 13 on the answer line	ISW Do not accept a ratio
		(ii)	0	1	Do not accept 'impossible' or 'none' alone. Accept 0 with eg 'no chance' on the answer line 0 with 0 in (out of) 13 on the answer line	Do not accept a ratio Condone $\frac{0}{13}$
	(b)		apples 10 pears 6	2	B1 for 6 pears Or M1 for a fraction equivalent to $\frac{3}{8}$ or $\frac{2}{7}$ soi	

Question	Answer	Marks	Guidance
<p>16*</p>	<p>$x = 106^\circ$ with correct and clearly laid out solution. All required angles clearly identified in working with a correct reason given for each angle found.</p> <p>4a correct answer of $x = 106^\circ$ with at least two correct angles and at least two correct reasons 4b correct answer of $x = 106^\circ$ with three correct angles and at least one correct reason 4c complete solution with full reasons and maximum one arithmetic slip to reach incorrect value for x 4d correct answer of $x = 106$ with $z = 42$ identified and exterior angles of a triangle [= sum of interior opposite angles] stated</p> <p>2a one relevant angle stated and a correct reason that need not be linked, allow FT 2b two relevant angles found, may be indicated in correct position on diagram, allow FT 2c two relevant reasons stated, need not be linked with appropriate angles</p> <p>No correct angles or reasons</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Correct angles: either marked on the diagram or clearly identified $z = 42$ $y = 74$ $w = 32$ $x = 106$</p> </div>	<p>5</p> <p>4-3</p> <p>2-1</p> <p>0</p>	<p>See exemplars</p> <p>For lower mark 3a correct answer of $x = 106^\circ$, with at least z identified as 42 3b at least two relevant angles stated and two correct reasons that need not be linked, allow FT</p> <p>For lower mark 1a one relevant angle found, may be indicated on diagram, allow FT 1b one relevant reason stated, need not be linked with appropriate angle</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Acceptable reasons: [angles in a]triangle [add up to]180 (only count once) [angles on a straight] line [add up to] 180 [angles in an] isosceles [triangle] [are] equal can be implied by: $z = 42$, isosceles [triangle] Exterior angles of a triangle [= Sum of interior opposite angles] 180 may be implied in above reasons by a correct calculation</p> </div>

Question		Answer	Marks	Part Marks and Guidance	
17	(a)	Point (16, 9) indicated	1		
	(b)	Ruled line of best fit 13 to 14	B1 B1		Ruled line of best fit passing between (6, 7) to (6, 10) and (18, 18) and (18, 20), line from (0, 0) to (20, 20) scores B0 Second B1 is independent
18	(a)	(i)	36	1	
		(ii)	-6	2	M1 for -15 seen or $[+]9$ seen or for $5 \times -3 + (-3)^2$
	(b)	$x = 8$	3	M2 for $7x - 4x = 15 + 9$ or better Or M1 for $7x - 4x - 9 = 15$ or for $7x = 4x + 15 + 9$ AND M1 for $x = \frac{b}{a}$ after $ax = b$ seen Max 2 marks if answer incorrect	Correct collection of x terms Correct collection of constants $b \neq 0, a \neq 1$
19		Circle radius 4 cm, centre A Circle radius 5 cm, centre B Correct region shaded	1 1 1	FT intersection of <i>their</i> two arcs	For first two marks, allow tolerance of $\pm 2\text{mm}$ Arcs must be at least one quarter circle by eye Condone freehand arcs

Question		Answer	Marks	Part marks and guidance											
20	(a)	<table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td>0 1 6 8 9</td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td>1 1 5 6 7 9</td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">4</td><td>0 1 2 7 8</td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">5</td><td>3 7</td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">6</td><td>2 5</td></tr> </table>	2	0 1 6 8 9	3	1 1 5 6 7 9	4	0 1 2 7 8	5	3 7	6	2 5	3	<p>M2 for ordered diagram with one error, omission or extra or for unordered diagram with all 20 values in correct rows and no extras OR M1 for [un]ordered diagram with no more than two errors, omissions or extras</p>	Give bod for unclear numbers if crossed out as part of median calculation If two diagrams, mark better
2	0 1 6 8 9														
3	1 1 5 6 7 9														
4	0 1 2 7 8														
5	3 7														
6	2 5														
	(b)	38	2	<p>M1 for 37 and/or 39 as answer or identified in table or working or for 8 as answer or FT middle value(s) from <i>their</i> ordered stem and leaf identified</p>	e.g. accept 7 and/or 9 ringed in 30 row in table for M1 or ordered list of at least first/last 11 values But M0 for 0 1 6 8 9 1 ... without further clarification										
	(c)	25	2	<p>M1 FT for $\frac{\textit{their} 5}{20}$ oe seen</p>	<i>Their</i> 5 is number in first row of <i>their</i> stem and leaf										
21		19.75	4	<p>B1 for 500g or 2 bags [cashews] soi and 300g or 3 bags [almonds] soi and 200g or 2 bags [cranberries] soi</p> <p>M2 for $2 \times 4.75 + 3 \times 2.15 + 2 \times 1.90$ soi</p> <p>OR</p> <p>M1 for one of $2 \times 4.75, 3 \times 2.15, 2 \times 1.90$ soi</p>	<p>$9.50 + 6.45 + 3.80$ Clear attempt to add cost of 2 bags cashews, 3 bags almonds, 2 bags cranberries may include arithmetic slips</p> <p>9.50 or 6.45 or 3.80 or may be implied by calculations leading to 17.60 seen</p>										

Question		Answer	Marks	Part marks and guidance	
22	(a)	0.1	1		Condone 0.111[1111] Allow any clear indication of recurring notation
	(b)	$\frac{8}{15}$ oe	2	M1 for $\frac{4}{3} \times \frac{2}{5}$ oe	Accept eg $\frac{120}{225}$ for 2 marks and $\frac{20}{15} \times \frac{6}{15}$ for M1 ISW for incorrect cancellation after $\frac{8}{15}$ oe evaluated

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