OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics B (Linear)

General Certificate of Secondary Education

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

Mark Scheme for March 2013

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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
	Benefit of doubt
	Follow through
	Ignore subsequent working (after correct answer obtained), provided method has been completed
	Method mark awarded 0
	Method mark awarded 1
	Method mark awarded 2
	Accuracy mark awarded 1
	Independent mark awarded 1
	Independent mark awarded 2
	Misread
	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 – √(*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 for example 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. 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. Ranges of answers given in the mark scheme are always inclusive.

12. 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.

13. 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)	4630	1	Mark final answer	
		(ii)	4600	1	Mark final answer	
	(b)	(i)	360	1	Mark final answer	
		(ii)	14.63	1	Mark final answer	condone 14,63
	(c)		13	2	**M1** for 52 ÷ 4 **oe** or showing 10% is 5.2 and 5% is 5.2 ÷ 2 and finding 5.2 + 5.2 + *their* '5.2 ÷ 2' if M0, **SC1** for an answer of 13%	*their* '5.2 ÷ 2' can be implied by 5% = 2.(…) after 10% = 5.2 seen
2	(a)		E3	1		Accept e3 etc but do not accept 3E
	(b)	(i)	E(ast)	1		Ignore other comments
		(ii)	S W or South West	1		Ignore other comments
	(c)		80 (accept 76 to 84 inclusive)	2	**M1** for 4 (3.8 to 4.2) **seen** or answer 60 to 100 (inclusive)	
	(d)		right, left, second, left, right	2	**B1** for 3 or 4 correct	
3	(a)		0.18 or 18cm clearly indicated	2	Mark final answer **M1** for attempt at 1.13 – 0.95 **oe** if M0, **SC1** for answer 18 (metres)	
	(b)		0.27 or 27cm clearly indicated	2	Mark final answer **M1** for attempt at 1.4[0] – 1.13 **oe** if M0, **SC1** for answer 27 (metres)	

Question			Answer	Marks	Part Marks and Guidance	
4	(a)		10 (minutes) past 11 or 11:10 or 11.10	1	accept in words	In all parts ignore am or pm etc; accept equivalents in 24 hour clock
	(b)		5 (minutes) past 4 or 4:05 or 4.05	1	accept in words	
	(c)		20 (minutes) to 5 or 4:40 or 4.40	1	accept in words	
5			24	3	**nfww** **M2** for 6 × 4 or 300 × 200 or 60000 or 3 ÷ ½ [= 6] **and** 2 ÷ ½ [= 4] **soi** or 300 ÷ 50 [= 6] **and** 200 ÷ 50 [= 4] **soi** Or **M1** for 3 × 2 [= 6] or 6m^2 or 2500 **soi** or 3m = 300 cm **or** 2m = 200 cm **soi** or 100 cm = 1 m **soi** or 3 ÷ ½ [= 6] **or** 2 ÷ ½ [= 4] **soi** or 300 ÷ 50 [= 6] **or** 200 ÷ 50 [= 4] **soi**	Can be implied by 6 **and** 4 or six 50s **and** four 50s seen appropriately on the diagram; this may be shown as a grid. Or by 3m = 6 **and** 2m = 4 seen elsewhere 6 on its own does not score No marks for 3 × 2 = 5; Can be implied by 6 **or** 4 or six 50s **or** four 50s seen appropriately on the diagram; this may be shown as a grid Or by 3m = 6 **or** 2m = 4 seen elsewhere.
6	(a)		37.9	1		
	(b)		38.6	1		
	(c)		0.9	1	Mark final answer	Accept 00.9
	(d)		Temperature **rises** **highest** temp at 3 or in the afternoon and then **drops**	1	Two out of three parts needed	See exemplars Ignore inaccurate figures read from the graph

Question			Answer	Marks	Part Marks and Guidance	
7	(a)	(i)	**C** and **D**	1		
		(ii)	**B** and **D**	1		
		(iii)	**A** and **E**	1		
	(b)	(i)	Square	1		
		(ii)	Rhombus	1		
		(iii)	Kite	1		
8	(a)	(i)	19	1		not embedded
		(ii)	7	1		not embedded; not $\times 7$
	(b)	(i)	$9p$ **oe**	1		condone $p9$ but not p^9
		(ii)	$11x - 2y$ **oe**	2	Mark final answer **B1** for $11x$ or $(\pm)2y$	Accept $11x + {}^{-}2y$ $11x$ $2y$ gains one mark condone $x11$ etc
9	(a)	(i)	9 [°C]	1		accept $^{-}9$
		(ii)	$^{-}2$	1		
	(b)	(i)	$^{-}7$ and 3	2	Mark final answer **M1** for two numbers that multiply to give $^{-}21$ **or** add to give $^{-}4$ as final answer **or** evidence of a pair of numbers that are correctly multiplied to give $^{-}21$ **or** correctly added to give $^{-}4$ in working space	Numbers do not need to be integers
		(ii)	$^{-}2$ and $^{-}5$	1	Mark final answer	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Part Marks and Guidance</th><th></th></tr>
<tr><td>10</td><td>(a)</td><td>(i)</td><td>271.8</td><td>1</td><td>Mark final answer</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>32</td><td>2</td><td>Mark final answer
M1 for an answer of 30 to 40 (exclusive)
or attempt at 14 times table (up to 3) listed
or 3 × 14 = 42 soi
or figs 32</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>6732</td><td>3</td><td>Mark final answer
M2 for attempting 132 × 50 + 132 oe soi
with at most 2 arithmetic errors
or answer 6700 to 6864 (inclusive)

or ‘Napier’s bones’ diagram correct

Or M1 for 132 × 10 × 5 or 6600 seen
or answer 6600 to 7000 (inclusive)</td><td><table><tr><th></th><th>100</th><th>30</th><th>2</th></tr><tr><td>50</td><td>5000</td><td>1500</td><td>100</td></tr><tr><td>1</td><td>100</td><td>30</td><td>2</td></tr></table>Award M2 for above table with at least 4 entries correct

<table><tr><td>1</td><td>3</td><td>2</td><td></td></tr><tr><td>0 / 5</td><td>1 / 5</td><td>1 / 0</td><td>5</td></tr><tr><td>0 / 1</td><td>0 / 3</td><td>0 / 2</td><td>1</td></tr></table></td></tr>
<tr><td>11</td><td>(a)</td><td>(i)</td><td>$\frac{1}{5}$ oe or 0.2 or 20%</td><td>1</td><td>Mark final answer</td><td>Do not accept ratios in (a) except for SC1 in part (ii)
Accept $\frac{1}{5}$ with ‘unlikely’ on answer line, but $\frac{1}{5}$ and ‘impossible’ does not score
Accept $\frac{1}{5}$ with 1 in 5 etc on answer line</td></tr>
</table>

Question			Answer	Marks	Part Marks and Guidance	
		(ii)	$\frac{3}{5}$ **oe** or 0.6 or 60%	1	Mark final answer After **0** marks in (i), **SC1** for 1 **and** 5 in (i) and 3 **and** 5 in (ii) **seen**	Accept $\frac{3}{5}$ with 'likely' on answer line Accept $\frac{3}{5}$ with 3 in 5 etc on answer line
		(iii)	$\frac{1}{5}$ **oe** or 0.2 or 20%	1	**FT** from *their* (a)(i), providing it is an answer between 0 and 1 (exclusive) or 1 in 5 etc	
	(b)		8	2	**M1** for $\frac{2}{3}$ of 12 or for fraction equivalent to $\frac{2}{3}$ **seen**	
12	**(a)**	**(i)**	19	1	ignore further terms	
		(ii)	18	1	ignore further terms	
	(b)	**(i)**	5 16 8	3	Mark final answer **B1** for each term **FT** from *their* '5', providing it is odd **FT** from *their* '16'	
		(ii)	44, 7	2	**B1** for either correct	

Question			Answer	Marks	Guidance
13*			States Lizzie with a complete and clear explanation, with some attempt to interpret their results, involving **two** of the mean, median, mode or range with correct calculations and relevant language (mean, median, mode or range).	5	
			4A States Lizzie with an incomplete/unclear/no explanation involving **two** of the mean, median, mode or range with correct calculations, Or 4B States Lizzie with a complete and clear explanation involving **two** of the mean, median, mode or range with calculations that involve minor errors, Or 4C States Lizzie with a complete and clear explanation, interpreting their results, involving **one** of the mean, median or range with correct calculations.	4–3	For the lower mark: 3A States Lizzie with an unclear/no explanation involving **one** of the mean, median or range with correct calculations, Or 3B Comes to a correct conclusion involving **one** of the mean, median or range with calculations that involve errors, but have a sensible result, Or 3C Finds at least **one** of the mean for both girls, median for both girls or range for both girls with correct calculations but chooses Megan.
			2A States Megan **because** she has the fastest time, Or 2B States Lizzie and compares the modes, Or 2C Finds **one** of the mean for both girls, median for both girls or range for both girls with calculations that involve errors, Or 2D Finds a mean or median correctly for one set of data, Or 2E Compares five pairs of trials, showing evidence, and comes to a sensible conclusion.	2–1	For the lower mark: 1A Identifies that Megan has the fastest time (accept lowest), Or 1B Shows a correct method for finding a mean, median or range, does not need to be evaluated, Or 1C Identifies the mode correctly for one set of data, Or 1D Puts both sets of data in order of size, Or 1E Compares pairs of trials but work/explanation is unclear/incomplete.
			No relevant method.	0	Mean / Median / Mode / Range Lizzie 26.4 (132 ÷5) 26.3 26.3 0.5 Megan 26.5 (159 ÷ 6) 26.5 26.5 0.8

Question			Answer	Marks	Part Marks and Guidance	
14	(a)	(i)	0.7(0)	1	Mark final answer	
		(ii)	0.75	1	Mark final answer	
	(b)		$\frac{1}{3}$ **and** either $\frac{10k}{30k}$ **and** $\frac{9k}{30k}$ **seen**, for some integer k or $\frac{1}{3}=\frac{3}{9}$ (ignore other fractions) or 0.33(3…) **and** 0.3 **seen** or $\frac{1}{3}=\frac{33}{100}$ (33%) **and** $\frac{3}{10}=\frac{30}{100}$ (30%) or for example $\frac{1}{3}$ of 30 =10 **and** $\frac{3}{10}$ of 30 = 9 etc	2	**M1** $\frac{10k}{30k}$ **or** $\frac{9k}{30k}$ **seen**, for some integer k or [$\frac{1}{3}$ =] 0.33(…) **or** [$\frac{3}{10}$ =] 0.3 **seen** or 33(…)% **or** 30% **seen** or answer $\frac{3}{10}$ with $\frac{1}{3}$ of 30 =10 **and** $\frac{3}{10}$ of 30 = 9 etc	Do not accept diagrams unless they are accurate
	(c)		$4\frac{1}{15}$ **oe**	3	Mark final answer **M2** for $\frac{16}{15}$ **oe seen or** $\frac{51}{15}+\frac{10}{15}$ **or** $\frac{61}{15}$ or $3\frac{16}{15}$ **oe** Or **M1** for $\frac{6}{15}$ or $\frac{10}{15}$ or $\frac{17}{5}$ or $\frac{51}{15}$ **seen** or $\frac{12}{30}+\frac{20}{30}$ etc	

Question			Answer	Marks	Part Marks and Guidance	
15	**(a)**		$3a + a^2$ final answer	1		Condone $a\times3$ and $a3$ for $3a$ [not a^3]
	(b)		$4(b - 3)$ final answer	1	Accept $2(2b - 6)$ as final answer	Condone missing final bracket
	(c)		$x < 5$ final answer	3	**nfww** **M1** for collecting x terms or constants on one side $3x - x - 6 < 4$ or $3x < x + 4 + 6$ AND **M1 dep** for collecting constants or x terms on the other side $3x - x < 4 + 6$ AND **M1** for $x < \frac{b}{a}$ after $ax < b$ seen **max 2 marks if answer incorrect** Or **SC2** for answer 5 or x … 5 with any incorrect equality or inequality symbol or answer $3 \times 5 - 6 < 5 + 4$	eg $3x - x < {}^{-}2$ implies **M1** $3x - 6 - 4 < x$ implies **M1** Dependent on first **M1** $2x < 10$ implies **M2** $a \neq 1$, $b \neq 0$ Condone use of = or incorrect inequality symbol for < for method marks

Question			Answer	Marks	Part Marks and Guidance	
16	(a)		Linear scale on vertical axis	1		Condone zero not marked, but scale must start from 0
			Six heights correct [3, 4, 6, 8, 7, 2]	1	**FT** *their* linear scale or implied linear scale if no scale indicated	Bar chart scores max **2** for scale and heights If frequency polygon and bar chart shown, mark best
			Plots at midpoints and joined with straight lines	1	Condone one missing plot	Ignore lines joining to origin or first point to last
	(b)		$9000 \leq s < 10\,000$	1		Condone incorrect notation eg $9000 < s < 10000$, 9000 – 10000 etc Condone slip in number of zeros eg $9000 < s < 1000$ Do **not** accept answer $9000 \leq s < 10\,000$ **and** 8 (choice)
	(c)		30	2	**B1** for 9 **and** 30 seen **SC1** for answer 70	For **B1** condone 28, 29, or 31 in place of 30
	(d)		7.5 or 7.499(99…) or $7.4\dot{9}$	1		7.49 scores 0

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Part Marks and Guidance</th></tr>
<tr><td>17</td><td></td><td></td><td>11
36</td><td>4</td><td>B3 for 11 or 36 in correct position
or 11 and 36 positioned incorrectly
OR
M1 for 3n + 3 oe seen
AND
M1 for 6(n – 5) oe seen
AND
M1 for their ‘3n + 3’ = their ‘6(n – 5)’ correctly simplified to ax = b

Alternative method
M1 for trial with same start number correctly evaluating end number for both Leo and Kate
AND
M1 for another trial with same start number and correctly evaluating end number for both Leo and Kate

After M0, award M1 for two starting numbers substituted correctly evaluating end number for Kate and/or Leo</td><td>Accept any letter used for n

<table><tr><th>n</th><th>K</th><th>L</th><th></th><th>n</th><th>K</th><th>L</th></tr><tr><td>1</td><td>6</td><td>-24</td><td></td><td>11</td><td>36</td><td>36</td></tr><tr><td>2</td><td>9</td><td>-18</td><td></td><td>12</td><td>39</td><td>42</td></tr><tr><td>3</td><td>12</td><td>-12</td><td></td><td>13</td><td>42</td><td>48</td></tr><tr><td>4</td><td>15</td><td>-6</td><td></td><td>14</td><td>45</td><td>54</td></tr><tr><td>5</td><td>18</td><td>0</td><td></td><td>15</td><td>48</td><td>60</td></tr><tr><td>6</td><td>21</td><td>6</td><td></td><td>16</td><td>51</td><td>66</td></tr><tr><td>7</td><td>24</td><td>12</td><td></td><td>17</td><td>54</td><td>72</td></tr><tr><td>8</td><td>27</td><td>18</td><td></td><td>18</td><td>57</td><td>78</td></tr><tr><td>9</td><td>30</td><td>24</td><td></td><td>19</td><td>60</td><td>84</td></tr><tr><td>10</td><td>33</td><td>30</td><td></td><td>20</td><td>63</td><td>90</td></tr></table>Allow use of any value including negatives and non-integers</td></tr>
<tr><td>18</td><td></td><td></td><td>Correct enlargement (all points within 2mm)</td><td>3</td><td>M2 for two or three correct points
or correct enlargement not centre C
or a ‘spider’s web’ enlargement (sf 3) but inaccurate

M1 for a line of correct length in any position parallel to original
or one correct point
or correct enlargement centre C with a different Scale Factor</td><td></td></tr>
</table>

Question			Answer	Marks	Part Marks and Guidance	
19	(a)	(i)	C	1		
		(ii)	Correct net of a cube (not congruent to C if C given as answer in (i))	1	Must be 6 squares (of any size)	
	(b)	(i)	Four equilateral triangles, correct size and position	2	**M1** for one correctly sized triangle Or for four triangles correctly placed	Use overlay, triangles should be correct by eye Ignore flaps
		(ii)	96 – 100.8	4	**M1** for [height] 5.0 – 5.4 seen or **FT** measuring *their* triangle And **M1** for 0.5 × 6 × *their* height And **M1** for area of square base = 36 **soi**	**Answer nfww** This mark is for using area of a triangle formula, may be implied by 3 × *their* height *their* height is **FT** triangle drawn in (a), condone 6 for *their* height May be implied by 6 × 6 = 36 seen but not by 6 × 6 × 6 = 216 Condone use of Pythagoras with correct surds eg answer 36 $(1 + \sqrt{3})$ **oe** scores 4 **M1** for height $\sqrt{27}$ **oe** **M1** for 0.5 × 6 × $\sqrt{27}$

APPENDIX

Exemplar responses for Q**6(d)**

Response	Mark
Olivers temperature went up then down	**1**
Oliver's temperature wasn't as high early in the day and late at night as it was during the day	**1**
It raised to a peak of 38.6 at 3pm and then returned to 37.4 at 9pm.	**1**
It rose (in the morning and the evening) and lowered (at night)	**1**
It got higher as the day went on and started dropping after 3pm	**1**
High temperature to 3pm and then started to cool down towards 6 and 9pm	**1**
Olivers temperature began at an average temperature then progressed to its highest at 36.9 and began to go back down	**1**
In the afternoon his temperature was hot than the mornings or evenings	**1**
Positive and negative correlation	**0**
Olivers temperature went up during the afternoon	**0**
Because the room in the hospital might have been too warm	**0**

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