



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.

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Annotations used in the detailed Mark Scheme.

Annotation	Meaning
✓	Correct
×	Incorrect
	Benefit of doubt
	Follow through
THE W	Ignore subsequent working (after correct answer obtained), provided method has been completed
MO	Method mark awarded 0
HI	Method mark awarded 1
	Method mark awarded 2
TAL .	Accuracy mark awarded 1
	Independent mark awarded 1
-12	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

- M marks are for <u>using a correct method</u> and are not lost for purely numerical errors.
 A marks are for an <u>accurate</u> answer and depend on preceding M (method) marks. Therefore M0 A1 cannot be awarded.
 B marks are <u>independent</u> of M (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
 SC marks are for <u>special cases</u> 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 <u>not from wrong working</u> **full marks** should be awarded.

Do <u>not</u> award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen <u>and</u> 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 – $\sqrt{(their \cdot 5^2 + 7^2)}$. 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.

Mark Scheme

- 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.

C	Quest	ion	Answer	Marks	Part Marks and	l Guidance
1	(a) (i) 4630		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 + <i>their</i> '5.2 ÷ 2' if M0, SC1 for an answer of 13%	<i>their</i> '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	d 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 $3 \div \frac{1}{2}$ [= 6] and $2 \div \frac{1}{2}$ [= 4] soi or $300 \div 50$ [= 6] and $200 \div 50$ [= 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 $3 \div \frac{1}{2}$ [= 6] or $2 \div \frac{1}{2}$ [= 4] soi or $300 \div 50$ [= 6] or $200 \div 50$ [= 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

C	luesti	ion	Answer	Marks	Part Marks and 0	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 ×7
	(b)	(i)	9p oe	1		condone p 9 but not p 9
		(ii)	11 <i>x</i> – 2 <i>y</i> oe	2	Mark final answer	Accept $11x + 2y$
					B1 for 11 <i>x</i> or (±)2 <i>y</i>	11 <i>x</i> 2 <i>y</i> gains one mark condone <i>x</i> 11 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	

Q	uesti	on	Answer	Marks	Part Marks and	Guidance			
10	(a)	(i)	271.8	1	Mark final answer				
		(ii)	32	2	Mark final answer M1 for an answer of 30 to 40 (exclusive) or attempt at 14 times table (up to 3) listed or $3 \times 14 = 42$ soi or figs 32				
	(b)		6732	3	Mark final answer				
					M2 for attempting $132 \times 50 + 132$ oe soi		100	30	2
					with at most 2 arithmetic errors or answer 6700 to 6864 (inclusive)	50	5000 100	1500 30	100 2
						Award N	12 for abcentries con	ve table	
					or 'Napier's bones' diagram correct	1 0 0	3 1 5 5 0 1 3	2 1 0 0 2	5
					Or M1 for $132 \times 10 \times 5$ or 6600 seen or answer 6600 to 7000 (inclusive)				
11	(a)	(i)	$\frac{1}{5}$ oe or 0.2 or 20%	1	Mark final answer		ccept rat in part (ii)		except
						Accept	1 with 'uı 5	nlikely' or	n answer
						line, but	$\frac{1}{5}$ and 'ii	mpossible	e' does
						not scor	e		
							1 with 1 i 5	n 5 etc o	n
						answer	ine		

(Quest	ion	Answer	Marks	Part Marks and C	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 <i>their</i> (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 <i>their</i> '5', providing it is odd FT from <i>their '</i> 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. 		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	MeanMedianModeRangeLizzie26.4 (132 ÷5)26.326.30.5Megan26.5 (159 ÷ 6)26.526.50.8		

Q	uesti	on	Answer	Marks	Part Marks and G	uidance
14	(a)	(i)	0.7(0)	1	Mark final answer	
		(ii)	0.75	1	Mark final answer	
	(b)		(ii) 0.75 $\frac{1}{3} \text{ and}$ 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		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 <mark>1 15 oe</mark>	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	

Q	uestion	Answer	Marks	Part Marks and G	Buidance
15	(a)	$3a + a^2$ final answer	1		Condone <i>a</i> ×3 and <i>a</i> 3 for 3 <i>a</i> [not <i>a</i> ³]
	(b)	4(b-3) final answer	1	Accept 2(2b – 6) as final answer	Condone missing final bracket
	(c)	<i>x</i> < 5 final answer	3	nfww M1 for collecting <i>x</i> terms or constants on one side 3x - x - 6 < 4 or $3x < x + 4 + 6ANDM1 dep for collecting constants or x termson the other side3x - x < 4 + 6ANDM1 for x < \frac{b}{a} after ax < b seenmax 2 marks if answer incorrectOr SC2 for answer 5 or x 5 with anyincorrect equality or inequality symbolor answer 3 \times 5 - 6 < 5 + 4$	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

Q	uestion	Answer	Marks	Part Marks and G	uidance
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 <i>their</i> 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 ≤ 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 $9000 \le s$ $< 10\ 000$ 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 7.49	1		7.49 scores 0

Q	uestion	Answer	Marks	Part Marks and G	uidance
17			4	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 <i>their</i> ' $3n + 3' = their$ ' $6(n - 5)'$ 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	n K L n K L 1 6 -24 11 36 36 2 9 -18 12 39 42 3 12 -12 13 42 48 4 15 -6 14 45 54 5 18 0 15 48 60 6 21 6 16 51 66 7 24 12 17 54 72 8 27 18 18 57 78
18		Correct enlargement (all points within 2mm)	3	numbers substituted correctly evaluating end number for Kate and/or Leo 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	93024196084103330206390Allow use of any value including negatives and non-integers
				position parallel to original or one correct point or correct enlargement centre C with a different Scale Factor	

Q	uesti	on	Answer	Marks	Part Marks and	Guidance
19	(a)	(i)	С	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 <i>their</i> triangle And M1 for 0.5 × 6 × <i>their</i> height	Answer nfww This mark is for using area of a triangle formula, may be implied by 3 × <i>their</i> height <i>their</i> height is FT triangle drawn in (a), condone 6 for <i>their</i> height
					And M1 for area of square base = 36 soi	May be implied by $6 \times 6 = 36$ seen but not by $6 \times 6 \times 6 = 216$ 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 Q6(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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