

Mathematics B (Linear)

General Certificate of Secondary Education

Component **J567/02**: Mathematics Paper 2 (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
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 $180 \times (\text{their '37'} + 16)$, or FT $300 - \sqrt{(\text{their '5}^2 + 7^2)}$. Answers to part questions which are being followed through are indicated by eg FT $3 \times \text{their (a)}$.

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 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)		pentagon	1		Condone incorrect spellings in all parts
	(b)		cone	1		Condone circle based pyramid
	(c)		scalene	1		
2	(a)		evens	1		
	(b)		certain	1		
3			correct reflection	2	B1 2 correct points	Mark intention, need not be ruled
4	(a)	(i)	34 – 38	1		
		(ii)	acute	1		
	(b)	(i)	27 [angles] [on a straight] line [total] 180	1 1		
		(ii)	173 [angles] [in a] quadrilateral [add to] 360	1 1		Condone 4 sided shape for quadrilateral
5	(a)	(i)	64	1		
		(ii)	19	1		
	(b)		4	1		Do not accept 8 ⁴
	(c)	(i)	414	2	M1 for 125 or 289	
		(ii)	193	1		
	(d)		9.057 9.07 9.507 9.705 9.75	2	B1 one value in wrong position or correct order reversed	Allow 9.070 and 9.750

Question			Answer	Marks	Part Marks and Guidance	
6	(a)		-3, 1	1		
	(b)		B plotted at (4, -2)	1		Accept not labelled if unambiguous
7	(a)		4.5 oe	2	M1 $6x = 29 - 2$ or better or FT $x = b/a$ or better	Accept 27/6 but not $27 \div 6$ ie $6x = 31$, $x = 31/6$ scores M1 In (a) or (b) penalise embedded answers 1 mark the first time.
	(b)		9	2	M1 $8y = 72$ or FT $y = b/a$ or better	
8			480	2	M1 $12 \times 8 \times 5$	
9	(a)	(i)	1200	1		
		(ii)	1	1		
		(iii)	80	2	M1 $120 \div 6$ soi by 20 or $120 \div 3 \times 2$ oe	
	(b)		1400	1		
10			642	4	SC3 for 660 or M1 $900 \div 6$ soi by 150 M1 0.12×900 soi by 108 M1 $900 - (\text{their } 150 + \text{their } 108)$	Allow use of 16.6% or better Accept fully correct non calculator methods, condone 1 arithmetic error 258 implies M2 May be done in stages Can be implied by their correct answer

Question			Answer	Marks	Part Marks and Guidance	
11	(a)	(i)	98	1		Accept £0.98 but not 0.98
		(ii)	4.12	3	M2 figs 412 or M1 8 × 36 soi by figs 288 M1 4 × 31 soi by figs 124	
	(b)		6	2	B1 27 or 21	Not 27x or 21y
12	(a)*		<p>Answer in the range 1175 -1450 km² with all correct working shown</p> <p>4 of the following</p> <ul style="list-style-type: none"> Evidence of counting shaded squares Can be rectangle(s) drawn if lead to the number of squares, not just the perimeter Number of squares 47 – 58 (This implies the first bullet point as well) Or if rectangles used, dimensions of rectangles with scale applied, if within range <i>Their</i> number of squares multiplied by 25 or evidence of 1 square = 25km² 1175 – 1450 nfww ... km² <p>2 of the bullet points</p> <p>No worthwhile work attempted</p>	<p>5</p> <p>4–3</p> <p>2–1</p> <p>0</p>	<p>3 of the bullet points</p> <p>1 of the bullet points</p>	

Question			Answer	Marks	Part Marks and Guidance	
	(b)		116.8[0]	2	M1 $7.3 \times 2 \times 8$ oe or figs 1168	
	(c)	(i)	102	1		
		(ii)	101.5	3	M1 attempt to add all 8 numbers soi by 812 in (ii) M1dep <i>their</i> total divided by 8 or SC1 758.6[.]	
	(d)	(i)	correct frequencies in frequency column	2	5, 7, 4, 6, 6 or M1 3 correct frequencies in frequency column or all tallies correct in tally column or all frequencies correct in tally column	
		(ii)	12	1	Or FT <i>their</i> (d)(i)	
13			73.30 nfww	4	B3 3 correct values with evidence of cost/number of packs or B2 2 correct values with evidence of cost/number of packs or B1 1 correct value with evidence of cost/number of packs	must be valid combinations see additional guidance

Question			Answer	Marks	Part Marks and Guidance	
14	(a)		4 correct sections on labelled pie chart (all sectors $\pm 2^\circ$)	4	B3 3 correct sectors labelled or 4 correct sectors without labels or incorrect labels B2 2 correct sectors labelled OR M2 5 correct sector values (69, 48, 42, 87, 114) (19%, 13%, 12%, 24%, 32%) B1 1 correct sector labelled OR M1 one correct sector value	Check next to table for M marks
	(b)		31.7	2	B1 31.6(6) M1 $38 \div 120$ soi by figs 317 or $114 \div 360$ isw	
15			4	2	B1 2 or 6 or 12 as answer	B1 for a common factor of 36 and 48 which is greater than 1 and either not a multiple of 3 OR not a prime number eg 2 or 6 or 12
16	(a)		$2 \times 3 \times 7$ [$\times 1 = 42$]	2	M1 for complete factor tree with at most one error or B1 for two of 2, 3 and 7 as factors with at most one error (these could be seen as branch ends on factor tree)	ignore 1 and 42 for M1 ignore 1 for B1 see additional guidance
	(b)		168	2	M1 for reduction of 24 to prime factors eg $2^3, 3$ or a list of at least 3 further multiples of either 24 or 42, or any multiple of 168	eg 48, 72, 96 or 84, 126, 168 eg 336, 504, 672, 840, 1008

Question			Answer	Marks	Part Marks and Guidance	
	(c)		(t =) 5 and (m =) 4	2	B1 for correct answers reversed, or one answer correct, or (t =) 3 and (m =) 5, or (t =) 1 and (m =) 6 Or M1 for any correct method eg correctly subtracting 7s/15s from 95 and to reach either 35 or 60, or correctly listing at least 3 further multiples of both 7 and 15, or $[7 \times 5 =] 35$ and $[15 \times 4 =] 60$	See additional guidance
17	(a)		48	1		
	(b)		8 (ignoring any units)	2	M1 for diff DKK ÷ diff Pounds (can be implied eg 8x) isw	eg $80 \div 10$ or $\frac{4}{5}$ oe or a line on the graph going up from £1 to the line
	(c)		18.2[0] to 19.2[0]	2FT	Correct answer or FT <i>their</i> value in (b) M1 for partitioning 152, eg $80 + 72$ and attempt to read from the graph and add them, or $152 \div 2$ and 'reading at 76' $\times 2$, or $152 \div$ <i>their</i> '8', or $152 \times$ a reasonable figure from the graph for the value of 1DKK	eg (b) 0.8 (c) $152 \div 0.8 = 190$ scores 2 the reading must be 10DKK or above

Question			Answer	Marks	Part Marks and Guidance	
18	(a)		5.31[5.....] or 5.3[2]	3	M2 for $\sqrt{3.5^2 + 4^2}$ or better or M1 for $3.5^2 + 4^2$ or better eg 28.25	accept 5 if correct working seen
	(b)		rectangle 8 cm by 14 cm with any line joining the 8 cm sides	1	in both parts allow ± 4 mm BOD faint, dotted or freehand lines	use overlay for guidance for perimeter, need an internal line, accuracy by eye
19			$6n + 11$	2	M1 for $6n$ seen, allow $6 \times n$ or $n6$	n (or x) = $6n + c$ scores M1 but $6n^{+11}$ or 6^n scores 0 Note: n th or $u_n = 6n + 11$ for 2
20	(a)		71.9[5.....] or 72 nfw	4	B1 for midpoints soi eg three from 63, 70, 77, 84 M1 for attempt at Σmf (3094) M1 <i>their</i> '3094' $\div$ <i>their</i> ' Σf ' (43) or SC3 for answer of 68.9[5...] or 74.9[5...] or SC2 for $[630+1050+1078+336 \div 43 =]$ 2765[.8...] or for use of a 'midpoint' of 6 with all working correct	B1 can be implied by three from 630, 1050, 1078, 336 m can be any value within the group so can be implied by four figures added in ranges 600 – 660, 1005 – 1095, 1036 – 1120 and 324 – 348 see additional guidance
	(b)		$\frac{25}{43}$ isw or 0.58[1.....] or 58.[1....]% oe	2	B1 for either 25 as a numerator or 43 as a denominator in a proper fraction, or correct answer in the wrong form eg 25 in 43	isw cancelling or conversion after correct answer seen and ignore any words

Question			Answer	Marks	Part Marks and Guidance				
21			30.85 to 31	4	B1 for 12^2 soi eg 12×12 or 144 and M2 for $\pi \times 6^2$ (accept 113 to 113.15) or M1 for an expression involving π and 6	ignore quartering or halving of areas to award the M or B marks			
						after M0 allow SC1 for $\pi \times 12^2$ (implied by 452[...])			
22			3.8 one mark for each correct trial in the range $3 < x < 4$, to a maximum of 2 , whose results rot to at least 1sf	B1 M1 M1	If answer line blank condone 3.8 clearly indicated (may be in table) use the list on the right but allow any correct trial for any value of x between 3 and 4 do not penalise over-accuracy after 0 , SC1 for 3.80 as answer			3.7	-3.037
						3.1	-19.819	3.71	-2.699
						3.2	-17.472	3.72	-2.359
						3.3	-14.953	3.73	-2.017
						3.4	-12.256	3.74	-1.673
						3.5	-9.375	3.75	-1.328
						3.6	-6.304	3.76	-0.980
						3.7	-3.037	3.77	-0.630
						3.8	0.432	3.78	-0.278
						3.9	4.109	3.79	0.075
								3.8	0.432

APPENDIX

Exemplar responses for Q17(b)

Response	Mark
8	2
1 pound = 8DKK	2 BOD
8DKK	2
£8	2
8/1	2 BOD
8%	M1 BOD
8x	M1
$y = 8x + c$	M1
0.8	M1
$y = .8x + c$	M1
$y = x + 8$	0
1/8	0

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

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Facsimile: 01223 552553

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