GCSE

Mathematics B (Linear)

General Certificate of Secondary Education

Component **J567/02:** Mathematics Paper 2 (Foundation)

Mark Scheme for November 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 <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 − √(*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 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.   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.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		56 900	1		
	(b)		56 860	1		
	(c)		36	2	**M1** for 96 ÷ 8	
	(d)		3 squares shaded.	1		
	(e)		45	1		
	(f)		16.56	2	**M1** for 2.07 × 8	accept 16.56p
2	(a)		32	1		
	(b)		Add 6	1		needs quantity and direction may be on the sequence
3	(a)		143.7	2	**M1** for 54.5 + 89.2	
	(b)	(i)	⁻23	1		
		(ii)	324	1		not ⁻324
4	(a)		10712	1		
	(b)		6035	2	**B1** for 3466 or 2569 identified, with only 1 other	may be ringed in table
	(c)		3085	2	**M1** for 9255 ÷ 3 **oe**	not $\frac{1}{3}$ of 9255
5	(a)	(i)	right-angled	1	accept scalene	
		(ii)	14.2–14.8	2	**M1** for 2 of 5.1–5.3, 3.1–3.3, 6.0–6.2	

Question			Answer	Marks	Part Marks and Guidance	
	(b)		31.5 cm^2	1 1		
6	**(a)**		11 correct combinations listed	2	**M1** for 8 correct ignoring repeats or extras	
	(b)	**(i)**	$\frac{1}{4}$, 0.25, 25%	2	**M1** for $\frac{3}{12}$ **oe**	
		(ii)	Less than 6 and yellow with $\frac{5}{12}$ **oe** and $\frac{3}{12}$ **oe**	2	**M1** for $\frac{5}{12}$ **oe** or $\frac{3}{12}$ **oe**	Not with incorrect statement, e.g. $\frac{5}{12}$ cannot be with odd and blue For 2 marks, can accept both 5 (chances) and 3 (chances) as a statement. Statement may be ringed or ticked If ratio throughout can score 1 mark in **(b)(ii)**
7	**(a)**	**(i)**	C	1		
		(ii)	B	1		
		(iii)	E	1		
	(b)	**(i)**	N[orth] E[ast]	1		not East North or EN
		(ii)	W[est]	1		
	(c)	**(i)**	(0)930	1		accept half past 9, etc
		(ii)	45 minutes	1		
		(iii)	Line from (1115, 5) to (1145, 0)	1		no vertical sections

Question			Answer	Marks	Part Marks and Guidance	
8	(a)		64	1		
	(b)	(i)	4.5	1		
		(ii)	216	1		
		(iii)	1024	1		
		(iv)	⁻2	2	**M1** for 25 or 27	
	(c)		$\dfrac{23}{7}$	1		
9	(a)		Ray, Lucie, Eve, Sam, Charlie 2.02 1.98 1.63 1.6 1.06	2	**M1** for 4 correctly ordered or **B1** correct order reversed	ignoring 1 error the other 4 correctly ordered
	(b)		37.5 by 25	2	**M1** for × by 2.5 or **B1** for 37.5 or 25 as answer	
10	(a)		136	2	**M1** for 12 × 8	
	(b)		13	2	**M1** for 160 ÷ 12, implied by 13.3	
	(c)	(i)	144–148	1		
		(ii)	17.2–18.8	2	**M1** for 4.3–4.7 or *their* length × 4	length may be seen on diagram
		(iii)	Point indicated at 7.3–7.7 cm Bearing of 283°–287°	1 1		

	Question		Answer	Marks	Part Marks and Guidance	
11	**(a)**		[Angles on a] line add to 180°	1		
	(b)		20	5	**B1** for $6x + x + 3x + 20 + 180 - 2x$ **oe** or $6x + x + 3x + 20 + A = 360$ **oe** **M1** for $8x$ or 200 **FT** their expression **M1** for $8x + 200 = 360$ **FT** **M1** for $8x = 160$ **FT** $cx = k$ **A1** 20	Alternative method If use trial and improvement, must see all calculations leading to angles of quadrilateral are 360.
12	**(a)**		⁻10 2	1 1		
	(b)		5 points plotted Correct ruled line	1 1	**FT** table	from $x = ^-2$ to $x = 2$
	(c)		1.5	1	**FT** from ruled line only	
13	**(a)**	**(i)**	150	1		
		(ii)	3	2	**M1** 500 × 1.5 **soi** by 750	
	(b)		1240	2	**M1** for attempt to subtract 35 from 1315	accept equivalent forms but 1240 am scores **B1**

Question			Answer	Marks	Answer
	(c)*		Correct answer of 31 with all correct working seen.	5	
			Correct working with answer of 31.4[…] or 31 with 3 of the following $4.5^2 \times \pi$ implied by 63.617[…] to 63.63 63.617[…] to 63.63 × 11 implied by 699.789[...] to 700 22 × 1000 implied by 22000 22000 ÷ *their* 699.789[…] to 700	4 - 3	3 of : $4.5^2 \times \pi$ implied by 63.617[…] to 63.63 *Their* 63.617[…] to 63.63 × 11 implied by 699.789[...] to 700 22 × 1000 implied by 22000 22000 ÷ *their* 699.789[…] to 700 31 or 31.4 as answer or Answer of 28[.8] with all working shown from use of 12 not 11
			2 of : $4.5^2 \times \pi$ implied by 63.617[…] to 63.63 *Their* 63.617[…] to 63.63 × 11 implied by 699.789[…] to 700 22 × 1000 implied by 22000 22000 ÷ *their* 699.789[…] to 700 31 or 31.4 as answer	2 - 1	1 of : $4.5^2 \times \pi$ implied by 63.617[…] to 63.63 *Their* 63.617[…] to 63.63 ×11 implied by 699.789[…] to 700 22 × 1000 implied by 22000 22000 ÷ *their* 699.789[…] to 700 31 or 31.4 as answer
			No relevant working	0	

Question			Answer	Marks	Part Marks and Guidance	
14			**attempt** to extend the straight line from (9.10, 14) with a similar gradient	M1	Within blue lines on overlay	Allow alternative methods by applying e.g. **M1** for a correct and appropriate reading from the graph, **A1** for a correct figure from which they can use to answer the question, usually time or speed and **A1** for a fully correct response from all their work or
			correct ruled line or a sequence of correct points plotted e.g. every 10 minutes, within tolerance	A1	must be up to either the time=10.00 or the distance=70 lines and tolerance is between the red lines on the overlay for first 2 marks mark to the candidates advantage	**M1** for 6 km in 5 minutes or $\frac{6}{5}$, **A1** for 72 kmph **oe** and **A1** for arrives just before 1 hour [as 72 > 70] or
			fully correct response using **all** their evidence and a clear decision given	A1	tolerance $\pm\frac{1}{2}$ small square if 0 scored **SC1** for yes it arrives at either 9.45 to 9.55 or 5 to 15 minutes early	**M1** for 14 km in 10 mins or $\frac{14}{10}$ **oe** **A1** for 50 **A1** for e.g. arrives just before 1 hour or at 9 50
15			6.21	2	**B1** for 6.20[5…] or 35.99 seen	

Question			Answer	Marks	Part Marks and Guidance	
16			24	3	**M2** for $(\frac{31}{25} - 1) \times 100$ **oe** or **M1** for $\frac{31 - 25}{25}$ or $\frac{6}{25}$ **oe** or $\frac{31}{25}$ or 1.24 **oe** and **M1** for $\frac{their\ 6}{25} \times 100$ or **SC2** for answer of 124 or **SC1** for answer 19.3… or 19.4	e.g. $(\frac{31}{25}) \times 100 - 100$ not $\frac{6}{31}$
17	**(a)**		38.6 or 39	4	**B1** for at least 4 mid-points seen (from 5, 15, 25, 35, 45, 55) or implied by products **M1** for Σ*mf* where *m* is a value within each group allow one error **M1dep** for *their* '965' ÷ Σ*f* (25)	**isw** rounding 39 must not come from wrong working ie [0] + 45 + 75 + 210 + 360 + 275 = 965
	(b)	**(i)**	December **and** it has a higher mean	1	accept any correct statement	condone numbers for mean and implied statement
		(ii)	November **and** it has a higher range	1	accept any correct statement	condone numbers for range and implied statement

Question			Answer	Marks	Part Marks and Guidance	
18			ruled perpendicular bisector of AB with at least one pair of correct arcs and then an intended route due West, which is always between 1 cm and 2 cm from the coast, it must be a joined up line	4	**B1** for correct ruled line between A and B going through and beyond the midpoint of AB, condone extension of bisector towards coastline **B1** for at least one intersection of one pair of correct arcs **B1** for an intended route due west **B1** for a route always within 1 cm and 2 cm of coast	on or between the two V lines route parallel to coastline (due West) by eye, could be anywhere on diagram must remain between the two parallel lines for its length which has to be at least 5 mm by eye
19			full correct argument e.g. $14.7^2 + 11.5^2 \ [=] \ 19.4^2$ $348.34 \neq 376.36$ use of appropriate symbol ($\neq$) or a statement that these two numbers are not the same	3	**M1** for an appropriate method e.g. $\sqrt{19.4^2 - 11.5^2}$, $\sqrt{19.4^2 - 14.7^2}$, $\sqrt{11.5^2 + 14.7^2}$ **oe** or cosine rule for angle B **A1** for correct result to compare e.g. 15.6…, 12.6…, 18.6… or 18.7 or B = 94.7 **A1** for a statement that the result does not equal the actual figure	accept any correct method including a drawing tolerance ±2 mm, **M1** for a triangle with one side correct **A1** for all three sides correct **A1** for measuring *their* angle accurately ±2° or stating clearly it is not 90° e.g. another equivalent method would be $11.5^2 + 14.7^2 = 18.6…^2$ for **M1 A1** allow these results rounded

APPENDIX

Exemplar responses for (2b)

Response	Mark
Going up in 6's	**1**
+6	**1**
$6n + 2$	**1**
Going up in 6x table	**0**
6,s	**0**

Exemplar responses for (17bi)

Response	Mark
December and the mean was 39.7 and it was only 34.2 in November	**1**
December as 39.7 > 34.2	**1**
December because it has a higher mean	**1**
December it has the greatest mean	**1**
December as the mean is greater by 6.5 (BOD 'greater' is enough)	**1**
December because the mean is higher and the range is smaller / lower	**0**
December because the mean is big (no comparison)	**0**
December if you sum the mean and range it is larger	**0**
December as it has a lower range	**0**
December as it has a higher mean and a higher range	**0**

Exemplar responses for (17bii)

Response	Mark
November has a higher range	**1**
67.4 > 43.8 so November	**1**
November the range is wider	**1**
November the range is bigger and the mean is bigger	**0**
November the range is bigger and the mean is smaller	**0**
November the range is big (no comparison)	**0**
November the range is more spread out	**0**

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