OCR
Oxford Cambridge and RSA

GCSE

Mathematics B (Linear)

Component **J567/02:** Mathematics Paper 2 (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.

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 × (*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.

   i. **cao** means **correct answer only**.
   ii. **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.
   iii. **isw** means **ignore subsequent working** (after correct answer obtained).
   iv. **nfww** means **not from wrong working**.
   v. **oe** means **or equivalent**.
   vi. **rot** means **rounded or truncated**.
   vii. **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.
   viii. **soi** means **seen or implied**.

6. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. 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).

8. 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.

9. 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.

10. If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.

    If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

    If the correct answer is seen in the working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

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.

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)**	**(i)**	40	**1**		
		(ii)	700	**1**		
	(b)	**(i)**	465	**1**		
		(ii)	8.23	**2**	**B1 for** 8.225 or 8.22	
	(c)		11	**2**	**M1 for** 10 ÷ 0.85 oe soi by 11. 76[4…]	
2	**(a)**		Octagon	**1**		
	(b)		Cylinder	**1**		
	(c)		Equilateral [Triangle]	**1**		
3			Correct reflection	**2**	**M1 for** 4 correct lines	Condone freehand
4	**(a)**		Evens	**1**		
	(b)		Impossible	**1**		
	(c)		Unlikely	**1**		
5	**(a)**	**(i)**	21	**1**		
		(ii)	Add 4	**1**		Need direction and quantity, may be on diagram
	(b)		45	**2**	**M1 for** 12 × 4 soi by 48	
6	**(a)**		[0].07	**1**		
	(b)		46	**1**		

Question			Answer	Marks	Part marks and guidance	
7	(a)		4	1		
	(b)		1521	1		Accept standard time formats
	(c)		1 [hour] 15 [minutes]	1		
	(d)		1032	1		Accept standard time formats
8	(a)		350 km	1		
	(b)		3 l(itres)	1		
	(c)		240 cm	1		
9	(a)		117	1		±2º
	(b)		Obtuse	1		
10	(a)		9 + 7 + 2 + 4 + 8 = 30 30/5 = 6	2	**M1** Description of mean or attempt to add the numbers and divide by 5,mean is 6	
	(b)		Correct ordered list showing 6 as median	2	**M1 for** Description of median or ordered list without stating median or middle number is 6 without a list	
11	(a)		1,2,4 or 8	1		Allow more than 1 if all correct
	(b)		41,43 or 47	1		Allow more than 1 if all correct
	(c)	(i)	16	1		
		(ii)	− 57	2	**M1 for** 343 or 400	
	(d)		6.24, 6.284, 6.4, 6.48, 6.842	2	**M1 for** 4 in correct order **SC1** for completely correct but reversed	

Question			Answer	Marks	Part marks and guidance	
12	(a)	(i)	200	1		
		(ii)	15	1		
		(iii)	1.2[0]	2	**B1 for** 1200	
	(b)		No, he needs 437.5g oe	3	**M2 for** $\frac{175}{4}$ **×**10 or $\frac{400}{175}$ ×4 oe **OR** **M1 for** $\frac{175}{4}$ soi by 43.75 or $\frac{400}{175}$ **OR** **B1** for 2.5	Needs 37.5g more, allow 37 or 38
13	(a)		Anticlockwise arrow around the lake	1		Do not allow vertical or horizontal arrows
	(b)		285	1		±2°
	(c)		D 310° from A D 5cm from A	1 1		±2° ± 2mm
14	(a)		120	1		
	(b)		Use \$75 and multiply by 10 oe	1		
	(c)		Correct ruled line	1		Tolerance half square

Question			Answer	Marks	Part marks and guidance	
15	(a)	(i)	179	2	**M1 for** 24 × 7 soi by 168	
		(ii)	12	3	**M2 for** *their* (300 – 11) ÷ 24 **OR** **M1** for 300 – 11 soi by 289 If zero scored **SC1** for 300 – 11 ÷ 24	Could use T&I approach leading to 12 × 24 = 288 or repeated addition of 24 to 179.
	(b)		49.28	3	**M2 for** 56 × 0.88 **OR** **M1 for** 56 × 0.12 soi by 6.72	Allow fully correct non calculator method with one arithmetic error in addition for M2
16	(a)	(i)	7	1		
		(ii)	2.5 oe	2	**M1 for** 8*x* = 14 + 6 or better	Must be in an equation
	(b)		4*x* – 12*y* as answer	1		
	(c)		5(*x* – 3)	1		Condone missing final bracket
17			8	3	**M2 for** $\sqrt[3]{512}$ **M1 for** 32 × 4 × 4 soi by 512 or attempting the cube root of *their* (32 × 4 × 4) **OR** **B1** for 512	

Question			Answer	Marks	Part marks and guidance	
18			7.3	**4**	**B1** for at least 3 mid-points seen (from 2.5, 7.5, 15, 30) or implied by products 65, 90, 150, 60 **M1** for Σ*mf* where *m* is a value within each group allow one error in calculation **M1dep** for *their* '365' ÷ 50	
19	**(a)**		-1 7	**2**	**B1** for each	
	(b)		[*y* value oe] lies between a negative and a positive	**1**	Accept any correct explanation	
	(c)		1.2 first correct result of a trial of a value of *x* between 1 and 2 second correct result of a trial of a value of *x* between 1 and 2	**1** **1** **1**	The result of each trial can be rot to at least 2 sf e.g. for x = 1.5, the result could be 1.8, 1.9, 1.87, 1.88, Allow trials to more than 1 decimal place e.g. *x* = 1.35 gives 0.8103..... so we allow 0.81, 0.810, 0.8103, and so on	1.1 -0.569 1.2 -0.072 1.25 0.203 1.3 0.497 1.4 1.144 1.5 1.875 1.6 2.696 1.7 3.613 1.8 4.632 1.9 5.759
20	**(a)**		44	**2**	**M1** for 22 ÷ 50 oe	Allow fully correct non calculator method.
	(b)		0.44	**1**		Condone 44% or $\frac{44}{100}$
	(c)	**(i)**	192	**2**	**M1** for 0.12 × 1600 oe	

Question			Answer	Marks	Part marks and guidance	
21			25.1[...]... nfww cm^2	2 1	**M1** for $\pi \times 4^2$ [÷ 2] soi by 50.265... 50.27 or 50.3	
22			19 cao	5	**M4** for $\sqrt{12.35^2 - 4.75^2 + 15.2^2}$ or better **OR** **M3** for $15.2^2 + 11.4^2$ or $15.2^2 + 129.96$ or $12.35^2 - 4.75^2 + 15.2^2$ **OR** **M2** for $12.35^2 - 4.75^2$ or 11.4 or 129.96 or $[\ldots]^2 + 4.75^2 = 12.35^2$ and 15.2^2 + *their* BD^2 or $\sqrt{15.2^2 + theirBD^2}$ **OR** **M1** for $[\ldots]^2 + 4.75^2 = 12.35^2$ or 15.2^2 + *their* BD^2	Accept any correct method

Question	Answer	Marks	Part marks and guidance
23*	A full and correct solution, clearly communicated with each step clearly shown, eg 40 females in total, proportion of females is 6 ÷ 40 = 15% oe and proportion of males is 4 ÷ 25 = 16% so males as 16% > 15% oe.	**6**	
	A fully correct solution which is difficult to follow but has a correct conclusion or a fully correct solution without a clear or correct conclusion. The total of females (40) is correct and two comparable quantities (e.g. 16% and 15%) seen.	**5 – 4**	The total of females (40) is correct and one of the two proportions is also correct and the method for the other is correct but the figure is incorrect (e.g males as 16% and 6 ÷ 40 for the females but the figure is incorrect.)
	The percentage of left-handers amongst females correctly calculated, eg 6 ÷ 40 = 15% or the correct number of females (40) and the correct percentage of left-handers amongst males correctly calculated, eg 4 ÷ 25 = 16% or the correct number of females (40) shown and the method for both males and females is also correct but both figures are incorrect.	**3 – 2**	The correct percentage of males calculated or the correct number of females seen (40) and the correct method for calculating the percentage of females or males seen but the figure given is incorrect.
	The correct number of females (40) correctly calculated or the correct method to calculate the percentage of males seen. .	**1 - 0**	No worthwhile work seen. Allow any method to compare these figures eg percentages, decimals or fractions with the same denominators. Allow correct calculation of proportion of right-handers.

APPENDIX

Exemplar responses for Q 19b

Response	Mark
[solution oe] lies between a negative and a positive	**1**
0 comes between -1 and 7	**1**
It lies between x=1 and x=2 because y=-1 and y=7	**1 BOD**
if x=1 it equals -1, it is too small, which means it can't be any smaller. And if x=2 it's too big, meaning it can't be larger	**1 BOD**
The solution for one is -1 so it is close to 0 and the 7 does lie between but it too high	**1 BOD**
because there small numbers	**0**
Because the answer to this equation lies between these numbers	**0**
Because they are whole numbers	**0**
They are the closest to zero	**0**
They are the lowest integers possible to attain zero	**0**
Because it is where the points meet	**0**
because it can't be higher than 2 and less than 1, it has to be in the middle	**0**
0 comes between these numbers	**0**

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