OCR
Oxford Cambridge and RSA

GCSE

Mathematics B (Linear)

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

General Certificate of Secondary Education

Mark Scheme for June 2015

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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.

   - **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.

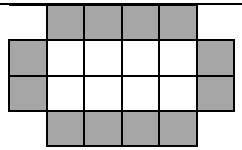
10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

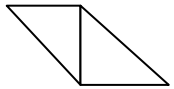
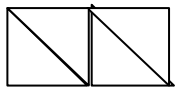
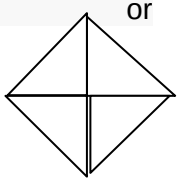
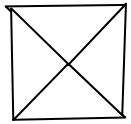
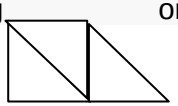
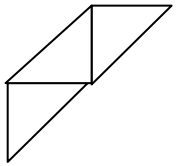
11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or 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)		4 or 40mm	1	Accept 3.8 to 4.2 or 38mm to 42 mm	
	(b)	(i)	50	1	Accept 48 to 52	
		(ii)	100	1	Accept 98 to102	
	(c)	(i)	obtuse	1		ignore spelling
		(ii)	isosceles	1		ignore spelling
2	(a)		E[ast] Left C3	3	**B2** for two correct or **B1** for one correct	 Accept 3C
	(b)		680[m]	1		
3	(a)			1		Accept shape if outline is correct. Ignore shading etc
	(b)		8 | 10 **12** | **14**	1		
	(c)		20	1		
	(d)		+4	1		Accept add 4
	(e)		92	1	**FT** from *their* (d)	

Question			Answer	Marks	Part marks and guidance	
4	(a)		Parallelogram drawn with 2 tiles	1	eg 	Parallelogram needs to be composed of 2 tiles with no gaps Need not fit on the square grid providing two right angled isosceles triangles of correct size approx are used and intention is clear
	(b)		Rectangle drawn with 4 tiles	1	eg 	Rectangle needs to be composed of 4 tiles with no gaps Need not fit on the square grid providing four right angled isosceles triangles of correct size approx are used and intention is clear
	(c)		Square drawn with 4 tiles	1	eg  or 	Square needs to be composed of 4 tiles with no gaps Need not fit on the square grid providing four right angled isosceles triangles of correct size approx are used and intention is clear
	(d)		Trapezium drawn with 3 tiles	1	eg  or 	Trapezium needs to be composed of 3 tiles with no gaps Need not fit on the square grid providing three right angled isosceles triangles of correct size approx are used and intention is clear
5	(a)	(i)	36	1		

Question			Answer	Marks	Part marks and guidance	
		(ii)	-23	1		
	(b)		(from March (-23) to June (-4)) **rises** (warms) (19°) , (from June(-4) to September (-6)) **falls** (cools) (2 °) or **stays about the same**, (from September (-6) to December (-25)) **falls** (cools) (19°)	2	**B1** for a less good explanation For 2 marks must refer explicitly or implicitly to all three stages For 1 mark must compare at least the summer with the winter explicitly or implicitly No marks if only March and December are compared	See exemplars Ignore irrelevant comments as part of an answer (anything regarding correlation is irrelevant) Condone temperature errors of one degree
	(c)		17	1		
	(d)		41	1		Accept - 41
6	(a)		6	1		
	(b)		875	2	**M1** for 30 ÷ 12 **soi** or 874.8 **seen**	874.8 followed by answer of 875 gains 2 marks
	(c)		48	2	**M1** for 80 ÷ 20 **soi**	
7	(a)		½ = 0.5 **= 50**[%] ¾ **= 0.75 = 75**[%] **97/100 = 0.97** = 97% **3/100** = 0.03 **= 3**[%]	4	**B1** for each correct line Following **B0 B0** for last two lines **SC1** for two correct values seen on last two lines.	

Question			Answer	Marks	Part marks and guidance	
	(b)	**(i)**	3/4 **oe**	**1**	Must be a fraction, **isw**	
		(ii)	9/14 **oe**	**2**	Must be a fraction, **isw** **M1** for 10/14 **oe** (from 5/7) **soi** Or **SC1** for answer of 0.64[2…]	63/98 is correct For M1 look for 70/98
	(c)		364.8[00…] or 365	**2**	**Mark final answer** **M1** 0.76 × 480 **oe** Or **SC1** for answer of 364 or answer of 364.8% or 365%	For non calculator method eg finding 10% and 1% then finding 7 × 10% + 6 ×1% 10% (48) and 1%(4.8) must be correct and method must be clear, complete and correct for M1 Sight of 336 will imply 7 × 48 etc
8	**(a)**		16 **nfww**	**2**	**M1** for 5 × 5 or 3 × 3 or 25 or 9 or 4^2 **seen**	
	(b)	**(i)**	$5^2 – 3^2 = 2 \times$ **8** $6^2 – 4^2 =$ **2** × **10**	**2**	**B1** for one line correct Do not accept 10 × 2	
		(ii)	$100^2 – 98^2 =$ **2** × **198**	**1**	Accept 198 × 2	

Question			Answer	Marks	Part marks and guidance	
9			18	4	**Mark final answer** **M3** for 228 ÷ 43 = 5 13/43 or 5.3[...] or 5 rem 13 so 6 [buses] or so 5 [buses] **and** 15 [teachers] or 228 ÷ 46 = 4 22/23 or 4.9[…] or 4 rem 22 so 5 [buses] **and** 15 [teachers] **Or M2** for 5 13/43 or 5.30[...] **seen** or 228 ÷ 46 = 4 22/23 or 4.9[…] or 4 rem 22 so 5 [buses] or 228 ÷ 43 or ans of 15 with limited or no method **Or M1** for 4 22/23 **oe seen** or 43 pupils can go on each bus **soi** or 228 ÷ 46 **soi** or answer of 12	If it is clear from their working that 228 ÷ 43 is bigger than 5 and less than 6 so 6 [buses] this would earn M3 If it is clear from their working that 228 ÷ 46 is bigger than 4 and less than 5 so 5 [buses] this could earn M2 or M3 eg 46 × 5 = 230 5 × 3 =15 (soi) so 15 [teachers] gets M3 (bare minimum) **But** 228 ÷ 46 so 5 buses and 15 teachers or 228 ÷ 46 = 5, 5×3 = 15 get M2 only.
10	(a)		86	2	**Mark final answer** **M1** for 30 × 1.8 + 32 or 54 **seen**	
	(b)		1360	1	**Mark final answer**	

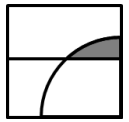
Question			Answer	Marks	Part marks and guidance	
	(c)		336	**2**	**Mark final answer** **M1** for 300 × 1.12	
11	**(a)**		Football	**1**		
	(b)		12	**2**	**M1** for 48 ÷ 4 **oe** or one quarter **oe soi**	90/360 not good enough for M1
	(c)		8	**2**	**M1** for 60[°] **soi** or 2/3 their quarter	60 may be on the diagram
12	**(a)**	**(i)**	1/12 or 0.08(3…) or 8.3(3…)%	**1**		Ratio on the answer line scores 0 Accept unlikely or 1 in (out of) 12 on the answer line with the correct answer
		(ii)	0	**1**	Only accept impossible or none **with** a correct answer on the answer line	Ratio on the answer line scores 0 Condone 0/n or 0 in (out of) n (n a positive integer)
	(b)		… flavour is **chocolate** is ½ … flavour is **strawberry** is 1/4	**2**	**B1** for one correct	
13	**(a)**		pentagon	**1**		Accept regular pentagon
	(b)		2*x* + 4*y* **oe**	**2**	**Mark final answer** **M1** for x + x + y + y + y + y or 2x or 4y **seen**	Accept *x2* etc in all parts Ignore units in all parts

Question			Answer	Marks	Part marks and guidance	
	(c)		$2x + y$ or $x + 2y$ **oe**	**1**	**Mark final answer**	Answer does not need to be simplified
	(d)		$2x + 2y$ **oe**	**1**	**Mark final answer**	Answer does not need to be simplified

Question			Answer	Marks	Guidance
14*			**Shows $x = 135$** with 4A a complete method, with reasons given to support. Easy to follow	4	
			3A Shows $x = 135$ with some method that is easy to follow that is not incorrect or insufficient reasons Or 3B Shows a complete correct method,with some reason(s), with one small slip Or 3C Seeing a **full** method that the sum of the angles in an octagon is 1080 (eg a diagram dividing an octagon into 6 triangles and seeing 6 × 180 = 1080)	3–2	For the lower mark: 2A Shows $x = 135$ with no method or method that is difficult to follow, but not necessarily incorrect Or 2B Shows a complete correct method Or 2C Shows two of the following **soi** • Angle [in a] square [is] 90 (may be on the diagram) • [Angles in a] point/circle/[whole]turn [is] 360 • Exterior angles [of a polygon sum] is 360 • [Sum of angles on a straight] line [is] 180 • [Sum of angles in a] triangle is 180 Or 2D Shows an **exterior angle** is 45 (360 ÷ 8) Or 2E 1080 seen
			1A Shows one of the following **soi** • Angle [in a] square [is] 90(may be on the diagram) • [Angles in a] point/circle/[whole]turn [is] 360 • Exterior angles [of a polygon sum] is 360 • [Sum of angles on a straight] line [is] 180 • [Sum of angles in a] triangle is 180	1	
			No relevant method	0	

Question			Answer	Marks	Part Marks and Guidance	
15			Children's Hospice £400 Outings for Elderly Club £280 Sports Club £120	3	**B2** for correct answers in wrong position on the answer line **B1** for £400 for Children's Hospice AND **M1** 420/1200 × 800 or 420/600 × 400 **soi** or 180/1200 × 800 or 180/600 × 400 **soi**	
16	(a)		1.61 final answer	2	**M1** for 1.60[8…] seen Or for *their* answer seen to more than 2dp corrected to 2dp OR **SC1** for answer 3.96 or 5.35 or 5.94	Both rounded and unrounded value must be seen
	(b)		6.4	2	**M1** for $2 \times 1.8 - 4 \times {}^{-}0.7$ or for 3.6 or 2.8 or $^{-}2.8$ seen	Accept any equivalent to 6.4 for 2 marks
	(c)		$0.\dot{7}$ or 0.777[7…]	1		All decimal digits seen must be 7 to award mark Accept any clear indication for recurring notation eg $0.\dot{7}7$, $0.777'$ or 0.7^{r}, but do not accept $0.7r$

Question			Answer	Marks	Part marks and guidance	
17	(a)	(i)	49	1		
		(ii)	14.5	2	**M1** for 14 and/or 15 as answer or unambiguously identified in working space Or for 4.5 as answer Or for figs 145 as answer After **M0, SC1** for second 14 and/or first 15 unambiguously identified in table	e.g. second 4 and/or first 5 ringed in 10 row
		(iii)	$\frac{1}{10}$ final answer	2	**M1** for $\frac{3}{30}$ **o.e.** Or for converting *their* $\frac{n}{30}$ to its simplest form	Accept 0.1 for **M1** $n < 30$, both unsimplified and simplified fractions must be seen, and simplification must be possible
	(b)		3.6 **nfww**	4	**B1** for midpoints **soi** [1, 3, 5, 7, 9] **M1** for 19×1 + 12×3 + 8×5 + 7×7 + 4×9 condone one error or omission **M1 dep** for *their* 180 ÷ *their* 50	Condone one error or omission **FT** *their* 'midpoints' where each midpoint is any point/endpoint in the interval 19 + 36 + 40 + 49 + 36 or 180 seen implies **B1M1** For **FT** eg endpoints used gives 38 + 48 + 48 + 56 + 40 implies **B0M1** *Their* 50 is from attempt to sum frequencies Attempt to divide *their* sum by *their* 50 implied by correct answer to division after total

Question			Answer	Marks	Part marks and guidance	
						seen, dependent on previous **M1**
18			Perpendicular bisector of AD with correct arcs with two intersections Arc centre C radius 4.5 cm Correct area shaded	**2** **1** **1**	**B1** for bisector with insufficient or no arcs **FT** *their* bisector parallel to AB and *their* arc centre C	For tolerance check distances on perimeter of rectangle Bisector 34 to 38 mm from A **and** B Arc 43 to 47 mm from C Accept solid or dashed lines and arcs Shaded part should be as below 
19	**(a)**		$\frac{43}{160}$ or 0.268[…] or 0.269 or 0.27	**1**	Award mark if $\frac{43}{160}$ seen	Condone 26.8[…]% or 26.9% or 27%, must have % symbol or correct fraction seen
	(b)		285 or 286	**2**	**M1** for $\frac{38}{160}$ or $\frac{1200}{160}$ or $\frac{160}{1200}$ **oe**	**M1** implied by 7.5 seen or by answer 285.6

Question			Answer	Marks	Guidance
20*			$t = \frac{v - 20}{5}$ with a complete correct method using appropriate algebraic form	2	Must have t = for 2 marks
			1A Correct answer but method not complete or correct 1B Correct answer but not in an appropriate algebraic form 1C One full correct step shown (could follow an incorrect step FT)	1	
			1D Shows evidence of dividing by 5	0	eg this could be implied by dividing by 5t
			No appropriate method		

Question			Answer	Marks	Part Marks and Guidance	
21	(a)		Correct translation Vertices(-5,4), (-6,5), (-4,6)	2	**B1** for correct horizontal or vertical movement **SC1** for triangle with vertices (-4, 3), (-3, 2), (-2, 4)	Clear intention Use overlay
	(b)		(-4, 8) 3	2	**B1** for one correct **Max 1 mark if second transformation mentioned**	Condone missing brackets in coordinates, Do not allow a vector Condone 3 times (bigger) or ×3 etc Condone sf +3 Condone 1 : 3 but not 3 : 1

APPENDIX

Exemplar responses for Q5(b)

Response	Mark
In March the temperature was very low, then June it went a lot warmer and stayed warmer through September and then it dropped again in December	**2**
In March the temperature was -23 rising to -4 in June. There was a drop of -2 in September giving a temperature of -6 which fell drastically to -25 in December	**2**
From March the temperature got higher through June and September and December it got colder than it was in March	**1**
The variation was in June and September the temperature was higher than in March and December	**1**
The temp got warmer through June and Sep but droped back down in Dec	**1**
March was cold, June and September warmed up. In December it began to get cold again	**1**
During June and September the minimum temperature was higher as they are summer months. March is lower and December is the lowest because they are winter	**1**
In June and September the temperature increased and decreased in March and December during the winter	**1**
In March and December the temperatures were lower than the other months so it was much colder	**1**
The record shows that the minimum temperature is bad at first but gets better for 2 months but takes a turn for the worse	**1**
It started of cold in March then got **hotter** until September the the temperature dropped to December	**1**
From being colder in March it got warmer in June then still warmer in September however still dropped then through to December got colder	**1**
It got hotter as time passed on and then it started to decrease and get colder	**1**
Because the temperature increased and decreased throughout the year	**1**
The temperature was very low in March then during summer the weather gradually rised but then dropped back down again when winter came	**1**
There is no correlation to the temperature, it began cold and rised from June to September then dropped again	**1**
Because the temperature increased and decreased throughout the year	**1**
From March through to December the minimum temperature dropped by 2 degreesC	**0**
The temperature went **down** to -4 then went **up** to -25	**0**
There is only -2 difference from March to December where you would expect it to be warmer in March	**0**
The temperature in December decreased	**0**
It showed a negative correlation in March then became positive in June and then negative again in December	**0**
Because in March it start to get cold for December, so it drop down to near to the same temperature as December	**0**
March is -22 minimum but December has more minimum by -25	**0**
The temp varied by -2 degrees	**0**
Minimum temperature decreased rapidly from March to June but rising (only 3°) rapidly in September before rapidly increasing from -6° to -25	**0**

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