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 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.

MARK SCHEME

Question			Answer	Marks	Part marks and guidance	
1	(a)		27	1		
	(b)		45	1		
	(c)		7	1		
	(d)		36	1		
2	(a)		Pentagon	1		May be circled in choices
	(b)		7	1		
	(c)		Correct line (only) of symmetry drawn	1	Must be at least 2 diagonals (inside the shape) long	Use overlay
	(d)		Correct enlargement drawn	2	**M1** for two lines correct or correct shape with wrong orientation (reflection or rotation)	Use overlay
	(e)		Correct reflection drawn	2	**M1** for two lines correct or for a correct reflection in the wrong position	Use overlay
3			Isosceles trapezium or an arrowhead or a kite with an area of 6 cm^2	3	**M1** for any quadrilateral (lines do not need to be ruled, intention must be clear) And **M1** for any shape with an area of 6 cm^2 And **M1** for any shape with just one line of symmetry	Ignore other lines if one quadrilateral or polygon is drawn - then just mark this shape. For more than one shape mark the worst. If a correct line of symmetry is drawn, treat it as such.

Question			Answer	Marks	Part marks and guidance	
4			9	5	**B4** for 9 8/13 or 9.6[…] or 9 rem 40 **seen** Or **M3** for 625 **nfww** Or **M1** for Scale Factor 2.5 **soi** And **M1** for 1000 – *their* 2.5 × 150 **And** **M1** for *their* 625 ÷ 65 **soi** or 65 × 9 =585 **oe**	Implied by 375 or 12 + 12 + 6 = 30 *Their* 2.5 × 150 can be **any** number *n* such that 150 < *n* < 1000
5	(a)		kilograms or kg millilitres or ml m[etres]	3	**B1** for each correct answer	
	(b)	(i)	0.65[p] or 65p[ence]	2	**Mark final answer** **M1** for 1.95 ÷ 3 or 195 ÷ 3 **soi** or answer of 1.30 or 130p[ence] Or **SC1** for answer of 0.64[p] or 64p[ence]	
		(ii)	1.13[p] or 113 p[ence]	3	**Mark final answer** **M2** for 1.12[8] or 8.27[2] or 8.28 or 113 or 1.13 **seen** Or **M1** for 9.4 × 0.12 **oe soi** or 9.4 × 0.88 **oe** soi Or **SC3** following answer of £1.30 in (i) **and** £8.27 in (ii)	For non calculator methods the process and 10% and 1% must be correct, but accept 94 +9 +9 =112 for **M2**

Question			Answer	Marks	Part marks and guidance	
	(c)		Meadowsweet (2 litre) with two **correct** appropriate comparisons with no incorrect units of rates **seen** (ignore any other rates)	**4**	**M1** for 2[litres] = 3.52 [pints] **soi** or 4 [pints] = 2.2[…] or 2.3 [litres] **soi** And **M1** for finding a cost per pint or litre or a litres/pints per pound or per pence rate Ignore units And **B1** for two correct appropriate corresponding rates Ignore units	Could be implied by1.76+1.76=3.52 or Meadowsweet = 3.52[pints] Meadowsweet Moat Farm 0.59 £/litre 0.61 to 0.62 £/litre 0.33 to 0.34 £/pint 0.35 £/pint 1.69 to 1.7 litres/£ 1.62 to 1.64 lit/£ 2.98 pints/£ 2.86 pints/£
6	**(a)**	**(i)**	S[outh]	**1**		
		(ii)	1400	**2**	Accept 1360 to 1440 **M1** for 7 [cm] (6.8 to 7.2) or figs(14) etc	
	(b)		N[orth] W[est]	**1**	Accept 315	Do not accept W[est]N[orth]
7	**(a)**		18 to 19	**1**		
	(b)		8.3 to 8.4	**1**		
	(c)		17.4 ≤ x < 17.8	**2**	**M1** for converting 40 litres and doubling or converting 50 litres and 30 litres and adding or other equivalent methods	no method needed **M1** can be gained even if calculations are incorrect, providing method is clear or a correct method can be implied by correct calculations for *their* figures but readings from graph must be sensible eg 10 litres between 2 and 3 gall 20 litres between 4 and 5 gall 30 litres between 6 and 7 gall etc

Question			Answer	Marks	Part marks and guidance	
8	(a)	(i)	96	1		
		(ii)	28	1		
	(b)	(i)	37	1		
		(ii)	52	2	**Mark final answer** **M1** for 154 + 2 or 156 Or **SC1** for 53 1/3 or 53.3[3…] or 154 2/3 or 154.6[6…] or 154.7 on answer line	
		(iii)	All the terms are 1 **oe** or The answer keeps repeating	1	Just finding the next term to be 1 is not sufficient	See exemplars
9	(a)		9	1		
	(b)		7	2	**M1** for 2, 3, 4, […], 8, 9 in order **seen** Ignore these numbers 'crossed out' Or **M1** for an embedded answer **seen**	2, 3, 4, 8, 9 **seen** gets **M1** Ignore these numbers 'crossed out' eg 4 +7 = 11 ÷ 2 = 5.5
	(c)		4	2	**M1** for 4.5 × 6 or 27 **seen**	

Question			Answer	Marks	Part marks and guidance	
10	(a)		7/20	2	**Mark final answer** **M1** for 35/100	No marks for 0.35
	(b)		90	1	**Mark final answer**	
	(c)		12	2	**Mark final answer** **M1** for a fraction equivalent to 3/25 or 0.12 or 3/25 ×100	12/100 gets **M1** only
11	(a)	(i)	9	1		
		(ii)	36	1		
	(b)	(i)	16	2	**M1** for [3^2 =] 9 or [$\sqrt{49}$ =] 7	
		(ii)	32	2	**M1** for 2×2×2×2×2 or better	
12	(a)		2003	1		
	(b)		5	1		
	(c)		2 hours 3 minutes 37 to 39 secs	1		
	(d)		47 to 49 seconds	1	**FT** from *their* (c) (86 – *their* 38) (Not strict FT)	2007 record is 2 h 4 min 26 sec
13	(a)		x: 1, 3, 5 y: **3**, 7, **11**	1		
	(b)		Correct **straight** line (ruled) going through (1,3) and (5,11) Intention for line **to go through** these points must be clear	2	**M1** for *their three* points plotted Whole of line must be within overlay	Use overlay

Question			Answer	Marks	Part marks and guidance	
14	(a)		$4x + 4y$ or $4(x + y)$ **oe**	2	**Mark final answer** **M1** for $x+x+x+x+y+y+y+y$ or better **seen** or $4x$ or $4y$ as only term in x or y on answer line Or **SC1** for $8x + 8y$ or $5x + 6y$	Accept $x4$ etc Ignore units
	(b)		$6x + 4y$ or $2(3x + 2y)$ **oe**	2	**Mark final answer** **M1** for $x+x+x+x+x+x+y+y+y+y$ or better **seen** or $6x$ or $4y$ as only term in x or y on answer line	
15	(a)		56.5 or 56½ or $\frac{113}{2}$	2	**M1** for $137 - 24 = 2x$ **oe soi** Or **M1** for *their* $113 \div 2$ Or **M1** for flow chart→ - 24 → ÷2→ **soi** Or **M1** for embedded answer Or **SC1** for answer of 44.5 **oe**	137 = 23 + 2 × 56.5
	(b)		**–**12	2	**M1** for $x/4 = 6 - 9$ **oe soi** Or **M1** for $[6 – 9]= -3$ **seen** Or **M1** for $x + 36 = 24$ Or **M1** for flow chart → -9 → ×4→ **soi** Or **M1** for an embedded answer Or **SC1** for answer of 12 or 15	-12/4 + 9 = 6

Question			Answer	Marks	Part marks and guidance	
16	(a)		11.6 or 11.58[…]	4	**B1** for midpoints **soi** [2.5, 7.5, 12.5, 17.5, 22.5, 27.5] **M1** for 2.5×12 + 7.5×15 + 12.5×16 + 17.5×9 + 22.5×5 + 27.5×3 **soi** Condone 1 error or omission **M1 dep** for *their* 695 ÷ *their* 60	Condone at least 4 correct midpoints FT their 'midpoints' where each midpoint is any point/endpoint in the interval 30 + 112.5 + 200 + 157.5 + 112.5 + 82.5 or 695 seen implies **B1M1** *Their* 60 is from attempt to sum frequencies Attempt to divide *their* sum by *their* 60 implied by correct answer to division after total seen, dependent on previous **M1** Allow 4 marks for 11.5 following correct division seen. ISW after 11.58 seen if 'estimation' attempted. Answer eg 10 < t ≤ 15 scores max 3 for working
	(b)		Correct frequency polygon with scale	3	**B1** for linear scale for frequency on vertical axis **B1** for at least 5 heights correct [12, 15, 16, 9, 5, 3] FT their linear scale or implied linear scale if no scale indicated **B1** for plots at midpoints and joined with straight lines **Max 2 marks if not completely correct**	Condone zero not marked, but scale must start from 0 Bar chart scores max 2 for scale and heights If frequency polygon and bar chart shown, mark best Ignore lines joining to origin, (30, 0) or first point to last, etc Clear intention of straight lines

Question			Answer	Marks	Part marks and guidance	
	(c)		$10 < t \leq 15$	**1**		Accept any clear indication of 10 to 15 group eg 10 – 15, third group etc
	(d)		No and 28[.3]% OR No, 25% of 60 is 15, and 17 wait more than 15 minutes	**2**	**M1** for 17 seen or 0.25 × 60 = 15 **soi**	For 2 marks need comparison of 17 with 15 or correct percentage seen **M1** implied by eg 1-43/60
17	**(a)**	**(i)**	Alternate [angles]	**1**		Condone Z [-angles] Do not accept 'alternative'
		(ii)	65°	**2**	**M1** for 120 – 55 Or 180 – 60 – 55 Or angle EFB = 60 or angle FBC = 60 **soi**	2 marks for 65 correctly positioned on diagram unless contradicted by answer line Implied by 180 – 120 = 60
	(b)		26.5° final answer	**1**		
18			41.16 or 41.2 final answer	**2**	**M1** for 4.9 × 8.4 **oe** with no further calculation	
19	**(a)**		0.32 **oe**	**2**	**M1** for 0.24 + 0.12 + 0.2 + 0.04 + 0.08 Or **SC1** for answer 0.72	**M1** implied by 0.68 seen
	(b)		0.36 **oe**	**1**		isw for attempted conversion or interpretation

Question	Answer	Marks	Part marks and guidance
20	Yes, with fully correct calculation of time taken to fill tank and comparison with 10 minutes. Calculations clearly annotated	5	Volume = $\pi \times \left(\frac{0.44}{2}\right)^2 \times 1.2 = 0.182\ m^3 = 182000\ cm^3$ (3sf) Time = $\frac{0.182 \times 1000}{20}$ = 9.12 minutes
	P Correct calculations for volume **and** time with no final answer/comparison seen OR **Q** Clearly annotated calculations with comparison with 10 minutes and FT correct decision with max one arithmetic error	4-3	For lower mark **P** Correct volume with units: 0.182 m^3 or 182000 cm^3 or 182 litres OR **Q** Correct formula for volume of cylinder used and attempt at time for their volume eg ÷ 20 or 20000 (units may be inconsistent) OR **R** Correct use of *their* volume to find time and has compared *their* time appropriately with 10 minutes
	P Correct volume calculation seen, ie $\pi \times 0.22^2 \times 1.2$ or $\pi \times 22^2 \times 120$, condone inconsistent units OR **Q** Correct evaluation of *their* volume divided by 20, 0.02 or 20000 OR **R** 200 litres in 10 minutes or 200000 cm^3 in 10 minutes or 0.2 m^3 in 10 minutes OR **S** Has at least two of 1P, 1Q, 1R, 1S, 1T, 1U, 1V	2-1	For lower mark **P** Correct volume formula ($\pi r^2 h$) **soi** OR **Q** Works out the area of cross section (circle) correctly as 0.15[2] or 1500 or 1520 OR **R** Attempt at *their* volume ÷ 20 or 20000 OR **S** Amount of water in 10 minutes: 20 × 10 or *their* 20000 × 10 OR **T** Correct conversion of *their* volume to litres OR **U** Converting 20 litres to 20000 cm^3 **and** (0.44 m to 44 cm **or** 0.22m to 22cm **or** 1.2 m to 120 cm) OR **V** Diagram of cylinder with height 1.2 and diameter 0.44 labelled

APPENDIX

Exemplar responses for Q8(b)(iii)

Response	**Mark**
The sequence will always be 1	**1**
The sequence would never get bigger as 1 × 3 - 2 = 1	**1**
The sequence has ongoing 1s	**1**
All numbers the same	**1**
The sequence starts at 1	**0**
1 → ×3 → −2 → =1	**0**
The sequence would never get bigger	**0**

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