GCSE

Mathematics B (MEI)

General Certificate of Secondary Education

Unit **B294:** Paper 4 (Higher – Terminal)

Mark Scheme for January 2012

Annotations

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.

M (method) marks are not lost for purely numerical errors.
A (accuracy) marks depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
B marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.

1   The following abbreviations are commonly found in GCSE Mathematics mark schemes.
   i.   Where you see **oe** in the mark scheme it means **or equivalent.**
   ii.   Where you see **cao** in the mark scheme it means **correct answer only.**
   iii.   Where you see **soi** in the mark scheme it means **seen or implied.**
   iv.   Where you see **www** in the mark scheme it means **without wrong working.**
   v.   Where you see **rot** in the mark scheme it means **rounded or truncated.**

vi.   Where you see **seen** in the mark scheme it 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.

vii. Where you see **figs 237**, for example, this means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.

2   Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.

3   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).

4   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.

5   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.

6   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'. If the answer is missing, but the correct answer is seen in the body allow full marks. If the correct answer is seen in 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.

7   Ranges of answers given in the mark scheme are always inclusive.

8   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.

9   Where a follow through mark is indicated on the mark scheme for a particular part question, you must ensure that you refer back to the answer of the previous part question if this is not shown within the image zone. You may find it easier to mark follow through questions candidate by candidate rather than question by question by question.

10   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)		7128	1		
	(b)		71.28	1		
	(c)		16500	1		
2			132°	3	**B1** for 120 as int or 60 as ext **B1** for 108 as int or 72 as ext If 0 **SC1** for 360 – (*their* 108 + *their* 120)	
3	(a)		4 sectors correct labels	3 1	**B2** for 3 sectors correct or 86°, 124°, 102°, 32°, 16° seen. or **M1** for 360 ÷ their total soi dep on 5 sectors of correct relative size.	
	(b)		$\dfrac{113}{180}$ oe	2	isw attempt to change form of answer **B1** for $\dfrac{51+x}{180}$ or $\dfrac{62+x}{180}$ oe soi or for correct answer with poor notation	
4	(a)	(i)	$5x - x^2$	1		
		(ii)	$x^2 + 3x - 2x - 6$ or better as final answer	2	**B1** for 3 terms correct in workings or for 4 terms 'correct' with sign errors	
	(b)	(i)	$x < 4\frac{1}{2}$ oe as final answer	2	**M1** for $6x - 4x < 9$	
		(ii)	shading/arrow etc from $4\frac{1}{2}$ to left	1ft	line without arrow must go at least 4 across.	
5	(a)		2 × 2 × 2 × 2 × 2 × 5	2	**B1** for two stages in splitting up	(eg factor tree or ladder)
	(b)	(i)	16	2	**B1** for any indication of LCM attempted	
		(ii)	150 has factor 3, 160 has only factors 2 and 5	1 1	If 0 **SC1** for any mention of 2 and 5	
6	(a)		Goes up in 7s so 7n eg 7 × 1 – 5 = 2	1 1	If 0 **SC1** three terms shown to work	
	(b)		$n = \dfrac{T+5}{7}$	2	**M1** for $T + 5 = 7n$ **SC1** for (T – 5)/7	
	(c)	(i)	Yes 478 + 5 = 483, 483 is divisible by 7 oe	1	Of 0 scored in (i) and (ii) **SC1** for 478 and 700 substituted in *their* formula	
		(ii)	No, 700 + 5 = 705, 705 not divisible by 7 oe	1		

Question			Answer	Marks	Part Marks and Guidance	
7	(a)		7.89×10^{-6}	1		
	(b)	(i)	$4.80(2) \times 10^9$	2	**B1** for figs 480(2)	
		(ii)	30 or 3×10^1	2	**M1** for $9.22 \times 10^8 \div 3.04 \times 10^7$ or better with rounding	
8			OA = OB, $\angle$ONA = $\angle$ONB, ON = ON radii	1 1	If 0 for 1st 2 marks **SC1** for OA = OB (radii)	
			RHS conclusion	1 1	Dep on 1st and 3rd mark	
9	(a)		$\dfrac{5}{42}$ oe	2	**B1** for $\dfrac{5}{14}$ seen	
	(b)		$\dfrac{5}{7}$ oe	4	**M3** for $1 - 3 \times \dfrac{5}{15} \times \dfrac{4}{14}$ oe or **M2** for $\dfrac{5}{15} \times \dfrac{10}{14}$ or **M1** for $\dfrac{5}{15} \times \dfrac{4}{14}$ or **SC1** for $\dfrac{2}{3}$	
10	(a)	(i)	$\frac{1}{3}$**a** + $\frac{2}{3}$**b**	2	**B1** for **a** + k(**b** − **a**) $k \neq 1$ or **b** + $\frac{1}{3}$BA	
		(ii)	$\frac{1}{2}$**a** www	2	**B1** for $\frac{3}{2}$ their **(i)**	
	(b)		parallel or half the length	1	Dep on k**a** in **(a)** Not just $\overrightarrow{BC} = \frac{1}{2}\overrightarrow{OA}$	
11			ruled line from (0, 0) to (40, 8) ruled horizontals 10 and 60 mins line from (50, 8) **FT** to (t, 20) steeper than 1st line straight line from their leaving point to (T, 0)	1 1 1 1 1	Penalise ruler once indep	
			T = 'their leaving time' + 100	1		

Question			Answer	Marks	Part Marks and Guidance	
12	(a)	(i)	Rotation, Reflection, Translation, Enlargement	2	**B1** for 2 correct and no extras	
		(ii)	Rotation, Reflection, translation	1	no extras	
		(iii)	Enlargement	1	no extras	
		(iv)	Translation, Enlargement	1	Condone rotation (180°), as extra	
	(b)		Translation	1		
			$\begin{pmatrix} -2 \\ 3 \end{pmatrix}$	1		
13			circle centre Q radius 4 cm	1	compass drawn ± 0.2 cm	
			bisector of $\angle$ Q	1	± 2° arcs not necessary	
			Correct region	1	**FT** if intentions clear for circle and bisector	
14	(a)		110, 6x, 56	1		
			33 + x, their (178 + 6x)	1	their (178 + 6x) must be f(x)	
	(b)		their (178 + 6x)/ their (33 + x) = 5.6		**M1**	
			their (178 + 6x) = 5.6 [their (33 + x)]		**M1FT**	
			multiplying out and isolating xs		**M1FT** all marks dep on both totals being f(x)	
			x = 17	4	**A1** If no equation, **SC2** for x = 17	
15	(a)	(i)	13 636 to 13 637 or 13 640 or 13 600	2	**M1** for 15000 ÷ 1.1 oe	
		(ii)	19965	2	**M1** for 15000×1.1^3 **SC1** for 8 years soi by eg 32153.....	
	(b)		2016	2	**nfww** **B1** for two further trials of 1.1^n seen	
	(c)		P = 15000×1.1^t	2	**B1** for 1.1^t	
16	(a)		$-x^2 + 6x - 4 = 0$ oe	2	3 term quadratic **B1** for $3 + 4x - x^2 = 7 - 2x$	
	(b)		$y = x - 2$	1		
			drawing their $y = x - 2$	1	**FT**	Line must cut curve twice
			solutions	1	strict **FT** from their straight line	

Question			Answer	Marks	Part Marks and Guidance	
17	(a)		360 – 150 – 108 or 72 + 30 seen	1		
	(b)		157 to 157.5	3	**M2** for AC² = 80² + 120² – 2×80×120 cos 102 or **M1** for some clear attempt at cosine rule	
	(c)		300 to 300.5	4	**M2** 80sin102/their(b) soi by 29.8 or **M1** for sin102/their(b) = sinC/80 **A1** for 29.8	
18	(a)		Correct graph (–4, 0), (–2, 3), (0,0)	1		
	(b)		Correct graph (–1, 0), (0, 3), (1, 0)	1		
19	(a)		158.3	2	**M1** for 172, 135, 168 used	
	(b)		192	3	**M1** for 170 × 3 or correct equation for *q* **M1** for their 510 – 176 – 142	

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