GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B279:** Module M9 (Sections A&B)

Mark Scheme for January 2012

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

i.   **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.

ii.   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.

iii. 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.

iv. 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.

v. 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)
- **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**.

vi. 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'.

vii. 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).

viii. 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.

ix.   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.

x.   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'. 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.

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

xii.   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.

xiii.   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)		0.75 oe	1		
	(b)		0.28 oe	2	**M1** for 0.7 × 0.4	Penalise wrong notation once only
2			40	2	**M1** for 400 × 2000/500 or 1600 or 800000 /500 oe	Condone for **M1** 400 × 2100/500 or 1680 or 84000/500 oe
3	(a)		$6x^2 + 5x - 6$	3	**M2** for 3 terms correct from $6x^2 + 9x - 4x - 6$ Or **M1** for 2 terms from 4 terms correct	
	(b)		$(2x - 5)(2x + 5)$	2	**M1** for $(2x \pm 5)(2x \pm 5)$ or factors which give both terms correct and an extra term eg $(4x-5)(x + 5)$ or **M1** for$(4x -5)(4x +5)$	
4	(a)		5^6	2	**M1** for $2 + 0 - {}^-4$ or $5^2/5^{-4}$ or $5^6 x 5^0$	**M0** $5^3/5^{-4} = 5^7$
	(b)		$5^{0.5}$ or $\sqrt5$	2	**M1** for $5^{1.5}$ or numerator $5\sqrt5$	
5			$y = {}^-\frac{1}{2} x + 3$	3	**B1** for gradient $^-\frac{1}{2}$ **M1** for substitution eg $0 = {}^- 0.5 \times 6 + c$ Or **B1** for + 3 in final equation	
6			22° alternate segment	B1		22 may be marked on diagram or implied by their working
			PQS = 90° angle in a semicircle	B1		bod Q = 90
			46	B2	**M1** for 180 – (22 +90 + *their* SQR) _____ ALT Method: **B1** for ROQ = 44° angle at centre = 2 x angle at circumference **B1** for OQR = 90° angle between radius and tangent **B2** for 46 or **B1** for 180 – 90 – 44 If **B0** scored allow **SC1** for RQS =22 or PQS = 90 or ROQ = 44° or OQR = 90°	bod Q =90 only if marked on diagram 22 or 90 may be seen on diagram

Question			Answer	Marks	Part marks and guidance	
7	(a)		$y = 6\sqrt{x}$ oe	2	oe eg $y^2/36 = x$ **M1** for $24 = k\sqrt{16}$ or $30 = k\sqrt{25}$ or $k = 6$	$y = 6x$ **M1** implied
	(b)		400	2	**M1** for $120 = 6\sqrt{x}$ or $\sqrt{x} = 20$	FT from $120 = k\sqrt{x}$ $k \neq 1$ for **M1** Condone 20 α $\sqrt{x}$

Section B

Question			Answer	Marks	Part marks and guidance	
8			659.07[1875] or 659.1 or 659	2	**M1** for 6.05, 8.75, 12.45 Or 6.05 x 8.75 x 12.45 with one error	
9			$[x=] \sqrt[3]{2y+3}$	3	**M1** for $2y = x^3 - 3$ **M1** for $2y + 3 = x^3$ FT their 1st step **M1** for $\sqrt[3]{2y+3}$ FT their 2nd step	Only FT equivalent steps ALT **M0** $y = \dfrac{x^3}{2} - \dfrac{3}{2}$ **M1** for $y + \dfrac{3}{2} = \dfrac{x^3}{2}$ **M1** for $2y + 3 = x^3$ **M1** for $\sqrt[3]{2y+3}$
10	(a)		Sample is not representative of all students	1		See exemplars
	(b)		13	2	**M1** for $\dfrac{240}{900} \times 50$ **A1** accept 14	
11			$4x^2 - 7$	2	**M1** for $3x(4x^2 - 7)$ or $4x^2$ or $^-7$ nfww	
12			5.138... or 5.14 or 5.1	4	**M1** for $\pi \times 4^2 \times 11[= 552.9...]$ **And** **M2** $20\pi r^2 = 3 \times$ their cylinder or better **Or M1** for $\dfrac{\pi \times r^2 \times 20}{3}$ **A1** for 5.13 to 5.14 or 5.1	$20\, r^2 = 3 \times 16 \times 11$ $[r^2 = 26.4.]$

Question			Answer	Marks	Part marks and guidance	
13	(a)		A ($^-$4, 0, 0)	1		
			E (0, 7, 3)	1		
	(b)		8.6[…]	2	**M1** for √(4² + 3² + 7²) or √74 or BC or EF = 5 or √25 or OF = 8.06.or √65	OE scores **0**
	(c)		23.1 to 23.3	3	**M2** for tan^{-1} (3/7) Or **M1** for tan (angle) = 3/7 Or **M1** *their* inverse trig function used correctly FT *their* trig function (must use lengths from diagram or calculations) **A1** allow 23 **SC2** 66.7 to 66.9 (allow 67 if working shown)	eg sin^{-1}(3/4). eg sin *x* = 3/4 then *x* = 48.6 is sufficient evidence for use of inverse trig function
14			56.2 to 56.3	4	**M2** for 160 + 290 + 260 + 60 + 30 or 800 Or **M1** for 3 correct frequencies **And M1** for 450÷800 or, if **M1** not **M2** scored above, for *their* 450 ÷ *their* 800 **A1** for 56 dependent on first **M2** scored (will imply the **M1** 450/800) **SC3** for 43.7 to 43.8 Allow 44 **SC3** if first **M2** scored] ALT method: squares **M2** for 3.2 + 5.8 +5.2 +1.2 +0.6 (or 80,145,130,30,15) Or **M1** for 3 correct **M1** *their* 9 ÷ *their* 16 (or *their* 225 ÷ *their* 400)	Accept 10 x 16, 10 x 29 etc Accept 10 x 16, 10 x 29 etc NB 45/62 scores **M1** only

APPENDIX

Exemplar responses for question 10

Response	Mark awarded
It might be a different year queuing up first.	1bod
They might run out and change the opinions of school lunches at the back.	1
They are going to be the most eager to eat the lunches.	1
They all eat the school lunches so they must like them.	1
They may all have a better opinion as they go in first.	1
There is no random selection and the first 50 students could be first for a reason.	1
They may all be the same class - it wouldn't be a fair spread of students in the school.	1
She hasn't collected results from other year groups.	1bod
Won't get a full spread of year groups.	1bod
What if they bring packed lunches, their opinion won't be heard.	1
She isn't taking a random sample.	0 needs qualifying
They are not spread out, should survey people from different points of queue as it may affect their opinion.	1
There could be male and female students.	0
There won't be a proportionate sample of students from each year.	1bod
It is not taking a fair sample from each year group and genders.	1
50 is a large enough number for an accurate prediction and she will get a variety of different ages.	0
It may be all from the same year group.	1bod
Not randomly selected, could be reasons why they are at front.	1
Won't be equal number of gender and ages	1
Some sets of students may get let out before others	1bod

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