

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education **B277**

Module M7 (Sections A&B)

Mark Scheme for June 2010

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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.

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Marking instructions

1. Mark strictly to the mark scheme. If in doubt, consult your team leader using the messaging system within *scoris*, e-mail, or by telephone.
2. Make no deduction for omission of units except as indicated on the mark scheme (although if this leads to a later error this will of course be penalised).
3. Work crossed out but not replaced should be marked.
4. **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.
W (workless) marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.
5. Subject to 4, two situations may be indicated on the mark scheme conditioning the award of **A** marks or independent marks:
 - i. Correct answer correctly obtained (no symbol)
 - ii. Follows correctly from a previous answer whether correct or not (“ft” on mark scheme and on the annotations tool).
6. 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).
7. Always mark the greatest number of significant figures seen, even if this is then rounded or truncated on the answer line, unless the question asks for a specific degree of accuracy.
8.
 - i. Allow full marks if the correct answer is seen in the body and the answer given in the answer space is a clear transcription error, unless the mark scheme says ‘mark final answer’ or ‘cao’.
 - ii. Allow full marks if the answer is missing but the correct answer is seen in the body.
 - iii. Accuracy marks for an answer are lost if the correct answer is seen in the working but a completely different answer is seen in the answer space. Method marks would normally be given.
9. 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 **W** marks. Deduct 1 mark from any **A** or **W** marks earned and record this by using the **MR** annotation. **M** marks are not deducted for misreads.
10. 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.
11. For answers scoring no marks, you must either award NR (no response) or 0, as follows:
Award NR if:
 - Nothing is written at all in the answer space
 - There is a comment which does not in any way relate to the question being asked (“can’t do”, “don’t know”, etc.)


- There is any sort of mark that is not an attempt at the question (a dash, a question mark, etc.)

The hash key [#] on your keyboard will enter NR.

Award 0 if:

- There is any attempt that earns no credit. This could, for example, include the candidate copying all or some of the question, or any working that does not earn any marks, whether crossed out or not.
12. Where a follow through (ft) 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.
 13. In cases where there is clear evidence that a calculator has been used in section A, mark the script as normal then raise an exception (malpractice) in *scoris*. All suspected malpractice should be flagged using exceptions.
 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.
 15. Holding the F2 key on your keyboard displays the annotations toolbar next to your cursor. The following annotations are available:

✓ and ✗

	Highlighter
BOD	Benefit of doubt
FT	Follows through
ISW	Ignore subsequent working (after correct answer obtained)
M0, M1, M2	Method mark awarded 0, 1, 2
A1	Accuracy mark awarded 1
W1, W2	Workless mark awarded 1, 2
SC	Special case
^	Omission
MR	Misread

These should be used whenever appropriate during your marking. **The A, M and W 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.

16. The comments box will be used by the Principal Examiner to explain his or her marking of the practice scripts for your information. Please refer to these comments when checking your practice scripts. **Please do not type in the comments box yourself.** Any questions or comments you have for your team leader should be communicated using the *scoris* messaging system, e-mail, or by telephone.
17. As far as possible you should mark roughly equal numbers of RIGs from sections A and B. It is helpful to mark some in each section as you go, rather than marking all RIGs in one section, then all RIGs from the other.

Abbreviations

The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- Where you see **oe** in the mark scheme it means **or equivalent**.
- Where you see **cao** in the mark scheme it means **correct answer only**.
- Where you see **soi** in the mark scheme it means **seen or implied**.
- Where you see **www** in the mark scheme it means **without wrong working**.
- Where you see **rot** in the mark scheme it means **rounded or truncated**.
- 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 on the answer line, even if it is not in the method leading to the final answer.
- 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.

Section A

1	(a)	(i) 57	2	M1 for 64 www or for 7 www or answer 71
		(ii) 25 www	2	M1 for 5 ²
	(b)	1/8 or 0.125	1	isw conversion to decimal
2		<u>Multiplying by less than 1 should reduce the value/answer oe</u> <u>Dividing by less than 1 should increase the value/answer oe</u>	1	all <u>3 underlined</u> elements need to be mentioned in answers unless using an approximation approach accept symbols \times and \div instead of multiply and divide accept the word 'decimal' <u>or</u> 0.93 and 0.47 for ' <u>less than 1</u> '
			1	do not accept either if accompanied by an incorrect written statement (ignoring any evaluations) see exemplars
3		112 www	3	W2 for 28 seen or M2 for 0.8×140 oe or M1 for 0.2×140 oe
4		(1, 3)	2	W1 for the abscissa; W1 for the ordinate If 0 scored, allow M1 for $\frac{-2+4}{2}$ oe or $\frac{5+1}{2}$ oe shown
5	(a)	Positive	1	ignore embellishments
	(b)	No <u>and</u> refers to diameter compared to height for this tree or refers to this tree not fitting the correlation or pattern or trend [of the others]	1	eg too thin for the height too tall for the diameter oe accept 'outlier', anomalous result, does not fit the pattern, too tall and thin for an oak tree etc if figures given for other trees – check scattergraph for reasonableness accept eg an oak tree with diameter 1.6 m should have a height of (about) 13 m

6	(a)	20 80	1 +1	
	(b)	5 points plotted Correct curve through 6 correct points	1ft 1	correct or ft <i>their</i> points. condone feathering and double lines if in range and linear section from (4, 80) to (5, 125)
	(c)	29 – 32.5	1ft	correct or ft <i>their</i> wrong or ruled curve read at 2.5 (± 1m height reading by eye)
7		$\angle ODC = 25$ or $\angle ODA / ODB = 90$ soi 90 – 25 oe (from angle between tangent and radius) 65 www	1 1 1	could be written on diagram – accept box marked for 90° may be implied by next step eg 180 – 90 – 25 (from angles on a straight line) implies previous mark, provided no contradiction this mark must not be awarded if finding/leading to wrong angle
8	(a)	$(x) \leq 4$	2	M1 for 4 obtained correctly without correct inequality sign or for $3x \leq 10 + 2$ Or SC1 for answer $x \leq 8/3$ o.e.
	(b)	shows $x \leq 4$	1ft	correct or ft <i>their</i> (a) <u>inequality only</u> accept dot or circle (condone unshaded) and line to the left as far as -6 if no arrow condone extra dot/circle on -6

Section A Total: 25

Exemplar responses for question 2

Q1 responses

Accept

When <u>timesing</u> by a <u>decimal</u> the <u>answer/it/number should be lower</u>	Has all 3 elements - accept decimal for 'less than 1' – refers to outcome as well
<u>Timesing a decimal</u> by a whole number the <u>answer is no more than the whole number</u>	condone the use of 'whole number as meaning the number – has all 3 elements
<u>It should be less than 124.7</u> as she has <u>x</u> by <u>0.93</u>	All 3 elements accept x and 0.93
<u>Multiplying by 0.93</u> makes the <u>answer/it/number smaller</u>	All 3 elements - accept answer/number/it as meaning 124.7
Because 1×124.7 is 124.7 so the <u>answer/it/number must be smaller</u>	Uses approximation - allow because of correct comment
If you round 0.93 up to 1 then the answer would be 124.7 and therefore the answer/it must be lower if you use 0.93	Uses approximation – condone lack of multiplication or times when using this approach as long as clearly explained

Do not accept

The answer is too high	no justification or mention of times or decimal
The answer should be less than 124.7	no mention of 0.93 or times
Because 1×124.7 is 124.7	no comment on outcome + no link to 0.93
Any number x a number less than itself is smaller	no mention of decimal
If you round them to the nearest whole number, it would come to 125 so the answer should be less than 125	uses approximation (nearest whole number) but does not show the rounded values used
It has to be smaller than 128.1	no justification, no mention of decimal or times
Her answer has increased when it should have decreased	no justification, no mention of decimal
You are timesing it by less then 1	no reference to outcome
Because 0.93 will make the answer smaller	omits the word multiplication
0.93 is too small because $1 \times 124.7 = 124.7$	needs to reference the answer/outcome as it has been asked for in the question
0.93 is too small a number to make 128.1	No mention of times

Q2 responses

Accept

<u>Dividing by 0.47</u> will make the <u>answer/it/number bigger</u>	All 3 elements
35 divided by $0.5 = 70$ so the <u>answer/it/number is too low</u>	All three elements + approximation approach
<u>Dividing by a decimal</u> makes the <u>answer/it/number bigger</u>	All three elements
A whole number <u>divided by a decimal</u> <u>increases the whole number/it/answer</u>	All three elements - condone the use of 'whole number as meaning the number
When <u>dividing by a decimal</u> the <u>answer/it/number is higher</u>	All three elements
If you round 0.47 to 1 then the answer would be 35.4, if you use 0.5 the answer/it would be 70.8 so using 0.47 will make the answer/it higher	Uses approximation – very clear correct explanation condone lack of 'divide' in this approach

Do not accept

The answer should be bigger than 35.4	no reference to 0.47 or division
If you double the answer it is almost 35.4 and she is dividing by 0.47 not 2	muddled - not clear – approximation approach
Because she is dividing by a decimal	no reference to answer
When you divide by less than 1 you multiply it	not clear, no ref to answer
This is wrong as 1 goes in to this more than 16.8 times	not clear – no ref to decimal or outcome
Only dividing by 2 would give an answer around 16.8 and the number is nowhere near 2	not clearly referring to division by a decimal
The answer should be bigger than 16.8	no ref to decimal or division
When the number you are dividing by is smaller, it cannot equal 16.8	no ref to decimal or outcome
You are dividing it by less than 1	no ref to outcome
Because you are dividing by a decimal – it can't be right	no ref to outcome
35 divided by 1 is 35 and her answer is way too small	no refer to decimal
Any number between 0 and 1 makes an answer bigger than the original number	no mention of dividing
Because the answer is too low	no reference to decimal or dividing

Section B

9		3.5 oe 28	1 1	after 0 scored, M1 for $31.5 \div 9$ or 3.5 seen eg answers reversed
10	(a)	4.25 oe www	3	M1 for $20x - 35$ or $4x - 7 = 50/5$ M1 for $20x = 85$ or $4x = 17$ ft <i>their</i> first step to $kx = b$ M1 for $x = 4.25$ oe ft <i>their</i> $kx = b$ with $k \neq 1$
	(b)	$x^2 + 5x + 2x + 10$ or $x^2 + 7x + 10$ isw	2	M1 for 3 correct terms seen but not $2x$ from x times x or 2 correct terms from the 3 term final answer $x^2 + 7x + 10$
	(c)	$(x =) \frac{y+5}{3}$ oe	2	M1 for $y + 5 = 3x$ or answer $(x =) \frac{\pm y \pm 5}{\pm 3}$ or $y + 5 \div 3$ or $y/3 + 5$
11	(a)	64.7 isw	4	M1 for mid-intervals: at least three of 45, 55, 65, 75, 85 soi M1 for 6470 seen or <i>their</i> $\sum fX$ where each x is in the correct interval including the end boundaries M1dep (on 2 nd M1) for <i>their</i> $\sum fX / 100$ (allow division by <i>their</i> attempt at $10 + 26 +$ $30 + 25 + 9$)
	(b)	$\frac{34}{100}$ oe	2	M1 for 34 seen as numerator in fraction answer or $\frac{25+9}{100}$ or $\frac{100 - (10 + 26 + 30)}{100}$ After 0 , SC2 for 59.7 or 69.7 final answer
12	(a)	0.235 to 0.236 or 0.24 www	3	M1 for $\pi \times 0.25^2$ (0.196...) seen M1 for <i>their</i> $(\pi \times 0.25^2) \times 1.2$ ft <i>their</i> cross sectional area; dep on use of π for area
	(b)	Does not fit <u>and</u> 1.3 shown	4	M3 for 1.3 shown www, with no/wrong conclusion Or M2 for $\sqrt{1.2^2 + 0.5^2}$ Or M1 for $1.2^2 \pm 0.5^2$ or 1.69 seen

13	11.252 or 11.25 or 11.3 (mark at most accurate)	3	M2 for 42.195/3.75 oe or answer 0.187 to 0.188 or 0.19 (if 0.18 – check working mark at most accurate) Or M1 for 42.195 / <i>their</i> time in hours or mins implied by answer 12.2... or figs 187 to 188 seen
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Section B Total: 25

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