

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B278**: Module M8 (Sections A&B)

Mark Scheme for January 2011

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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 for examiners (January 2011)**GCSE Mathematics C (Graduated Assessment) – J517
Units B271 to B282****Marking instructions**

1. Mark strictly to the mark scheme.
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.
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.)
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.
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.
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.

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)	$x = -6$ www	3	<p>M1 for $5x + 20 = 2x + 2$</p> <p>M1 for $3x = -18$ or FT <i>their</i> 1st step to $kx = a$</p> <p>A1 for $x = -6$ or M1 FT <i>their</i> 2nd step to final answer</p>	<p>Embedded ans can get M2</p> <p>M1 FT other than from $kx = a$ where $k = 1$</p> <p>Condone improper fraction when Ft from $kx = a$ unless integer solution.</p>
	(b)	$x < 3$	2	<p>M1 for $x + 5 < 8$</p> <p>Or W1 for $x = 3$ or $x > 3$ or 3 or $x \leq 3$ etc</p>	Embedded ans can get M1
2		<p>[Prob(H) =] $\frac{1}{2}$ [Prob(6) =] $\frac{1}{6}$</p> <p>AND multiplied [gives 1/12]</p>	<p>1</p> <p>Prob(H and 6) = $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$</p> <p>scores 2</p> <p>1</p>	<p>OR</p> <p>1 for 6 possibilities on dice 2 on coin so 12</p> <p>or $6 \times 2 = 12$</p> <p>or 12 outcomes listed or shown on diagram (grid or tree diagram with 12 outcomes or tree diagram with eg 4 branches and probabilities)</p> <p>AND</p> <p>1 for explaining the 1 eg '1 out of the 12 ways is a head and a dice'</p> <p>or indicated on diagram.</p>	
3	(a)	3.47×10^{-3} , 2.78×10^{-2} , 4.54×10^{-2} , 4.37×10^2	1	Only acceptable order (but condone conversion or transcription errors)	eg 0.0347 0.0278 0.0454 43.7 scores 1
	(b)	(i) 1.8×10^9	2	M1 for 18×10^8 or 1800000000 oe	
		(ii) 6.03×10^5	2	M1 for 3000 + 600000 or digits 603	

4	$[x]= \sqrt{\frac{y+3}{5}} \quad \text{www}$	<p>3</p> <p>M1 for $y + 3 = 5x^2$ and</p> <p>M1 for $(y + 3)/5 [= x^2]$ FT <i>their</i> 1st step</p> <p>M1 for finding square root as final step - correctly presented expression involving fraction</p>	<p>For W3 (and W2) square root sign to reach below $y + 3$ 'division line'. Do not condone error in transcription to answer line.</p> <p>Examples</p> <p>$\sqrt{\frac{y-3}{5}}$ scores 2 www or (M0 M1M1)</p> <p>$\sqrt{y} = 5x - 3$ then $\sqrt{y + 3} = 5x$ then $(\sqrt{y + 3})/5$ scores M0 M1 M0 as final step does not involve finding square root</p> <p>$\frac{y}{5} = x^2 - 3$ then $x^2 = \frac{y}{5} + 3$ then</p> <p>$[x]= \sqrt{(y/5+3)}$ scores M0 M1 M1 providing final expression in correct form.</p> <p>$[x] = \frac{\sqrt{y+3}}{5}$ with no working scores 1</p>
5	<p>Lines at 15 and 95</p> <p>Box with lines at 32 and 79</p> <p>Completed diagram with median at 56</p>	<p>1</p> <p>1</p> <p>1</p> <p>If 0 scored,</p> <p>SC1 for max 95 and UQ 79 found or box plot attempted with 15 and 32 correct or box plot attempted with median within box at 56</p>	<p>Tolerance +/- 1mm (mark intent -condone part of line outside tolerance).</p> <p>Allow at 78 but not <u>at</u> 80</p> <p>Condone min and max shown by endpoints/crosses and/or not joined to box.</p>

6	(a)	-15 and 15	1		
	(b)	Points plotted correct or FT <i>their</i> (a), tolerance 1mm correct curve, tolerance 2mm	1 1	condone 1 error or 2 symmetrical errors	an omission counts as an error No FT for curve from wrong (a). Curve 0 if any section ruled Condone 2 sections with doubling and/or feathering
7	(a)	3	2	M1 for $(20 - 2) / (6 - 0)$	allow M1 for (3, 0) (0, 3) 18/6 6/18 1/3 1:3 3:1 $3x$ $3x + k$
	(b)	Y N N Y	2	W1 for Y N Y Y	If answer in (a) is 2, allow correct answer or FT to N N Y N for 2 marks If answer in (a) is -3, allow correct answer or FT to N Y N N for 2 marks

Section A Total: 25

Section B

8		Bob [and rotation] 180° [centre] (-1, 1)	1 1 1	If 0 scored, allow 1 for trapezium drawn at (-3, 0) (-4, 0) (-4, -1) (-3, -2)	
9	(a)	£158 400	2	M1 for 0.88 seen or 0.12 × 180000 or 21600 Or W1 for figs 1584	1.12 does not score in (a) or (b)
	(b)	£312 500	3	M2 for 275 000/0.88 Or M1 for 0.88 seen Or W2 for figs 3125	Allow <i>their</i> 0.88 or 1 – 0.12 for M1 or M2 eg 275000/0.78 scores M2 if subtraction seen or 0.78 used in (a).
10	(a)	'[all] angles the same' <u>and</u> either 'A common' or ∠ACB = ∠AED (or ∠ADE = ∠ABC) corresponding angles	1 1	or ABC is an enlargement [of AED]	May be implied by A common, E=C, B=D Stating/ showing 2 pairs of angles are the same is sufficient Allow 'A is the same in both triangles' Allow F angles Allow reason 'lines are parallel' for corresponding angles
	(b)	7.5	2	M1 for [SF] 2.5 or 10/4 or 4/10 oe	
11		7311.61 or 7311.62	3	M2 for 6500 × 1.04 ³ [= 7311.616] or 7306 or 7311.2 to 7311.62 Or M1 for 1.04 o.e. seen A1 for 7311 or 7312	may be implied by repeated multiplication 6760 or 7280 evidence for 1.04 seen Allow SC1 for 1.4 ³ × 6500

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