

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B276**: Module M6 (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.

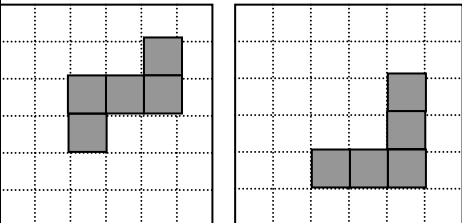

- Where you see **oe** in the mark scheme it means **or equivalent**.
- Where you see **cao** in the mark scheme it means **correct answer only**.
- Where you see **soi** in the mark scheme it means **seen or implied**.
- Where you see **www** in the mark scheme it means **without wrong working**.
- 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)	Plots 4 points at (8, 4·5), (3, 3·2), (6, 3·9) and (12, 5·6)	2	1 for plotting any two points correctly	Centre of point must be within circle – if touching circle please check $\frac{1}{2}$ small square accuracy Ignore additional plots after correct plotted points
	(b)	Positive	1	Ignore additional none contradictory comments	Comments such as ' the older the baby the heavier they are' <u>alone</u> get zero
	(c)	(i) Line of best fit	1	Must be ruled	Must be as long as the rectangle and have at least 2 points above and at least 2 points below the line If more than one line is drawn then mark the worst
		(ii) Strict FT <i>their</i> reading from LOBF at 5 weeks	1 FT	FT <i>their</i> ruled LOBF for 5 weeks (including negative gradient)	Allow ± 0.025 to their reading on graph (1mm or $\frac{1}{2}$ square)

2	(a) 16.20 cao	2	<p>M1 for $4.20 + 9.75 + 2.25$ attempted with no more than one computational error seen</p>	<p>Must read the values from the table correctly throughout the question</p> <p>Condone £16.20p notation throughout question</p>
	(b) 4.85	2 FT	<p>For FT answer must have 2d.p.'s for pence</p> <p>M1 for $(5.35 + 12.50 + 3.20) - \textit{their} 16.20$ allowing one computational error throughout or for 21.05 seen or for $1.15 + 2.75 + 0.95$</p>	<p>Working may appear with the table in (a) for this part</p> <p>e.g. $5.35 + 12.50 + 3.20 = 21.5$ and $21.5 - 16.20 = 5.3(0)$ gets M1</p>
	(c) 529(.00)	3	<p>M2 for <u>506 and 23</u> or <u>460 and 69</u> seen or for answer with figs 529 or complete correct method shown with one computational error</p> <p>Or M1 for 4 of 400, 40, 20, 3, 60, 6 seen or 506 or 23 or 69 or 460 seen or 440 <u>and</u> 66 seen</p>	<p>Allow these figures $\times 100$ throughout if working in pence for M2 or M1</p> <p>For M2 – the complete correct method with figs shown in method and no addition seen then check their answer given to imply the addition</p> <p>Do not allow conceptual error in the products for M2</p> <p>e.g. $\begin{array}{r} 11.50 \\ \times 46 \\ \hline 69.00 \\ 46.00 \end{array}$ Answer 115.00</p> <p>So has multiplied by 4 and 6 rather than 40 and 6</p>

3	(a) 3 : 10 or 0.3 : 1 or 1 : 10/3o.e	2	<p>W1 for any correctly reduced ratio eg 105 : 350, 30 :100,</p> <p>After 0 scored, SC1 for correct simplified ratio but reversed e.g. 10 : 3</p>	For W1 condone omission of ':' provided figs are right way round e.g. 105 350
	<p>(b) Shows either 31500 or 11666 to 11667 or 3.3.... www <u>and</u> reasons No (not taking risk) o.e. isw or Uses sensible approximations and reasons No o.e. isw e.g. $11000 \times 3 = 33\ 000$ and No (Mike is fine) o.e. isw or Compares ratios 3 :10 and 1 : 3 e.g. 3 :10 is less than 3 : 9 o.e. (so no) isw</p> <p><u>Examples for 2 marks</u> No if it were more then his mortgage would be 11666 and it is only 10500</p> <p>Because $10500 \times 3 = 31500$ so this is less</p>	2	<p>M1 for 3×10500 <u>attempted</u> or $35\ 000 \div 3$ <u>attempted</u> or approximation calculation method <u>attempted</u> or ratio calculation comparison method <u>attempted</u> but in all cases there is an incorrect evaluation or for correct value calculated (see LHS) but no/incorrect conclusion</p> <p>Accept maths reason for 'No' e.g. $31500 < 35000$ is fine for 2 marks.</p> <p><u>Examples for 1 mark</u> $3/3$ would be all the money but at $3/3$ of the mortgage it would be £31 500 and the full amount is 35 000</p> <p>No because $1/3$ of 35000 is 11733 and 10500 is less than this (working is shown for $1/3$ of 35000)</p>	<p>For M1 The calculations must be attempted with working or allow $35000 \div 3 = 11000$ to 12000 to imply correct working for the division $35000 \div 3 =$ any other value alone scores M0</p> <p>For 2 or M1 accept reasoning involving correct ratio of 3 : 10 and $1/3$ where comparable values are used e.g. No $3/10 < 1/3$ because $3 \times 3 = 9$ 2 marks do not accept $3/10 < 1/3$ without a comparable calculation</p> <p><u>Examples for no marks</u> No he was earning more money and could pay $2/3$ and still have some left over</p> <p>No Mike's payment wasn't more than $1/3$ because 10500×3 is less than 35000</p> <p>No because £10500 goes into £35000 3 times and still has some left over</p> <p>No because the ratio 3 :10 is the same as $3/10$ which is not equivalent to $1/3$</p>

4	(a)	(i) 17	1		
		(ii) 23	1		
	(b)	$2 \times (5 + 3) + 4 = 20$	1	Ignore additional redundant brackets	e.g. $(2 \times (5 + 3) + 4) = 20$ gets 1 mark
5	(a)	$3x + 18$ final answer	1	Condone $3 \times x$ for $3x$	Not for $3x + 3 \times 6$
	(b)	$7(a + 3)$ final answer	1	Condone final bracket omitted	Condone $1a$ for a
6		<p>Plan view Side view</p>  <p>allow in any orientation cao</p>	<p>1+1</p> <p>Allow freehand provided intention is clear</p> <p>Condone internal lines but do not allow if smaller square drawn inside each square of the grid in outline</p> <p>e.g. </p>		
7		0.75	2	M1 for $1 - (0.07 + 0.18)$ or for 0.25 o.e. shown Or SC1 for answer 0.12	

Section A Total: 25

Section B

8	(a)	21.4	1	Penalise first occurrence only for key not interpreted	
	(b)	4.9	1		
	(c)	22.1	1		
9		1.512	4	[or 1 512 000] Check diagram for working as well M3 for $(0.7 + 0.4 + 1) \times 0.8 \times 0.9$ o.e. Or M2 for any two correct volumes www Or M1 for 0.4 seen or for 0.504 or 0.288 After M0, SC2 for answer 1.656 (use of 0.6 for height of third cuboid)	Throughout question accept equivalents in cm/cm^3 . e.g. M3 for $0.504 + 0.72 + 0.288$ M2 for any 2 of the above www (not for 0.72 from 0.9×0.8 for the third cuboid) e.g. 0.504, 0.72, 0.432 gets M2 as 0.72 is 2 nd cuboid
		m^3	1	[or cm^3 if clearly working in cm]	
10		$p = 72^\circ$ <u>Corresponding</u> [angle to C]	1 1	Allow <u>complete</u> longer reasons e.g. if angle q found first and used in reason [angles in a] triangle = 180 and [angles on a straight] line = 180 Ignore additional irrelevant comments but not wrong comments or working	Condone F angle Also accept as a longer reason: corresponding [angle] and [vertically] opposite e.g. corresponding and alternate gets 0 marks
		$q = 42$ <u>Alternate</u> [angle to D]	1 1	Allow <u>complete</u> longer reasons involving angle p e.g. [angles in a] triangle = 180 and [angles on a straight] line = 180 Ignore additional irrelevant comments but not wrong comments or working	Condone Z angle or alternative [angle] Also accept as a longer reason: alternate [angle] and [vertically] opposite [angle]

11	(a)	3 and (-3, 3)	1+1	Accept $\times 3$ for scale factor	
	(b)	Triangle with coordinates (-4, 1) (-5, 1) and (-5, 3)	2	M1 for line $x = -3$ drawn (ignore enlargement lines drawn but not others)	Accept freehand if intention clear
12	(a)	$2x - 6 = 11$ or $7x = 5x + 17$ o.e. $2x = 17$ $17/2$ isw or 8.5 or $8\frac{1}{2}$	M1 M1 M1	For getting to form $ax = b$; FT <i>their</i> wrong first step for $a \neq 1$ or 0 and $b \neq 0$ or M1 for $2x = k$ or $kx = 17$ ($k \neq 0$ or 1) If correct implies first M1 Correct answer or FT from <i>their</i> $ax = b$ with $a \neq 1$ or 0 and $a \neq b$ and $b \neq 0$ Allow W3 for $17/2$ isw or 8.5 or $8\frac{1}{2}$ www	After incorrect first step shown and then answer given without further steps shown, allow method marks to be implied by a correct FT answer from first step e.g. first step $7x = 5x + 19$ M0 then $x = 19/2$ M1FT M1FT implied Allow FT step as fraction isw If division step not shown accept answer to 2sf rounded or truncated isw Allow correct embedded solution in original equation as final answer for 3 marks
	(b)	$12x - 3 [= 27]$ or $4x - 1 = 9$ $12x = 30$ or $4x = 10$ $5/2$ isw or 2.5 or $2\frac{1}{2}$	W1 M1 M1	For getting to form $ax = b$; FT <i>their</i> wrong first step for $a \neq 1$ or 0 and $b \neq 0$ If correct implies first W1 Correct answer or FT from <i>their</i> $ax = b$ with $a \neq 1$ or 0 and $b \neq 0$ Allow W3 for $5/2$ isw or 2.5 or $2\frac{1}{2}$ www	For FT allow as fraction in lowest terms isw or if division step not shown accept answer to 2sf rounded or truncated isw Allow correct embedded solution in original equation as final answer for 3 marks

13	Ruled straight line from (0, 8) to (8, 0)	<p>If 3 not earned, allow 1 mark for <u>each</u> correct point plotted (max 2 marks) eg (0, 8) and (1, 7) and none incorrect</p> <p>3 <u>but</u> 1 mark only for 2 or more correct + one wrong and 0 marks if more than 1 point incorrect (unless line scores 3)</p> <p>If 0 earned, allow SC1 for ruled straight line with negative gradient through (0, 8) or (8, 0)</p>	<p>Tolerance for line for 3 marks : inside or touching circles at (0, 8) and (8, 0) – ignore other plots if line is correct and accurate.</p> <p>Condone partial double line if in tolerance at (0, 8) and (8, 0)</p> <p>For other plots for individual marks (1mm by eye) If plots not seen and line is short, allow line to imply the points e.g. a short 'correct' line gets 2 marks</p> <p>Ignore anything outside the range $x = 0$ to 8</p> <p>Allow 2 out of 3 for correct ruled line intent but slightly inaccurate with or without plots seen</p>
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Section B Total: 25

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