

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

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

Mark Scheme for January 2011

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2011

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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.

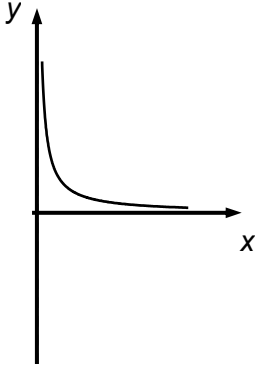
Abbreviations

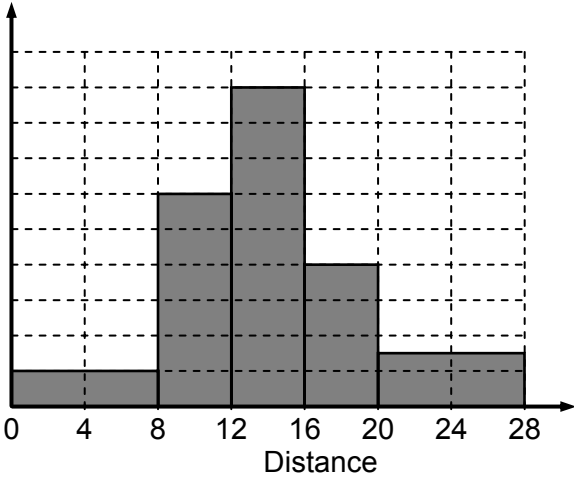
The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- 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)	1	1		
	(b)	5	1	allow ± 5	
	(c)	9/4 or 2 $\frac{1}{4}$ or 2.25 isw wrong conversion	2	M1 for one power used correctly eg M1 for 4/9 or 3/2 seen, ignoring signs or powers	eg M1 for 1/(4/9) or $\left(\frac{3}{2}\right)^2$ or 6/4 or -9/4 M0 for eg $\frac{1}{\left(\frac{2}{3}\right)^2}$: this is not sufficient
2		1.5×10^{-16} www as final answer	3	W2 for 15×10^{-17} or for 1.5×10^{-18} or for 1.5×10^{-17} Or W1 for 5×10^6 soi; W0 for just 5 000 000 if 0, allow SC1 for final answer FT from <i>their</i> 15×10^n	allow W1 for 15×10^{-138} or for 15×10^{-29} seen or for 1.5×10^{-137} or for 1.5×10^{-28}
3	(a)	$6x^2 - 7x - 5$ as final answer	2	W1 two terms correct or for three or more terms correct of $6x^2 + 3x - 10x - 5$	allow W1 for terms seen in list or grid
	(b)	$(x + 5)(x - 5)$	1	isw if go on to solve an equation	condone missing final bracket
	(c)	$(2x - 3)(x - 2)$ 2 or 3/2 o.e or FT <i>their</i> factors	M2 W1	may be seen as headings in grid M1 for $(2x \pm 3)(x \pm 2)$ or for two binomial factors giving two terms of $2x^2 - 7x + 6$ both answers required for mark	condone lack of brackets eg M1 for $(x - 1)(2x - 6)$; allow factor of 2 taken out eg M1 for $2(x - 1)(x - 3)$ if various trials and no indication as to which to mark, mark the worst

4	(a)		1	<p>graph of correct shape in first quadrant only; condone graph touching axes but not crossing them</p>	<p>curve of negative gradient, condoning minor wobbles</p> <p>condone slight moving away from axes near ends</p> <p>condone some feathering/doubling (deleted work may still show in scoris)</p>
	(b)	<p>$y = \frac{k}{x}$ or $xy = k$ o.e.</p> <p>$6 = \frac{k}{5}$ or $k = 30$ o.e.</p> <p>$y = \frac{30}{x}$ o.e.</p>	<p>M1</p> <p>M1</p> <p>A1</p>	<p>or W3 for correct answer www</p> <p>or W2 for $y \propto \frac{30}{x}$</p> <p>if 0, SC1 for $y = 30x$</p>	<p>2nd M1 does not imply 1st M1</p> <p>bod W3 for $y = 30\frac{1}{x}$ www</p>
5	(a)	4	1		

	<p>(b) bars with correct widths and heights 1, 6, 9, 4, 1.5</p>	<p>2 condone unruléd; mark intent</p> <p>W1 for 4 heights of bars correct or W1 for freq densities seen: 0.25, 1.5, 2.25, 1, 0.375 or equivalent fractions or mixed numbers isw [condone two errors or omissions in evaluating decimals after calculations such as $3 \div 8$ seen; condone rounding eg of 0.375 to 0.37 or 0.38 or 0.4]</p> <p>if no freq densities seen, allow W1 for heights in correct proportion</p>	<p>W2 for</p> 
<p>6</p>	<p>(a) $y = 5x - 4$</p>	<p>2 allow 2 for $y = 5x + -4$</p> <p>W1 for $y = 5x + c$ [$c \neq 3$ or -4] or for $y = kx - 4$ [$k \neq 5$ or 0]</p>	<p>eg W1 for $y = 5x$</p>
	<p>(b) use of $m_1 m_2 = -1$</p> <p>subst (10, 4) in $y = \text{their } mx + c$</p> <p>$y = -0.2x + 6$ oe isw</p>	<p>M1 eg [grad =] $-1/5$ seen or $y = -\frac{1}{5}x [+k]$, where k is a constant or any number</p> <p>M1 for 2nd M1, allow any non-zero m used including $y = 5x + c$ 2nd M1 may also be earned for valid step method counting back from (10, 4) to $x = 0$ ft their gradient</p> <p>A1 or W3</p> <p>SC2 for $y = -0.2 + 6$ o.e.</p>	<p>condone $-1/5x$ or $-\frac{1}{5x}$ used for gradient</p> <p>2nd M1 may be implied by their final answer passing through (10, 4) – check by substitution eg M1 for $y = \frac{1}{5}x + 2$</p> <p>A0 for $y = -\frac{1}{5x} + 6$ [but may imply Ms]</p>

Section A Total: 25

Section B

7	(a) triangle with vertices at (-4, -2) (-8, -2) and (-4, -10)	2	M1 for one vertex correct or for triangle correct size and orientation, wrong position	mark intent; condone lines unruled; condone lack of label
	(b) $-\frac{1}{2}$ oe	1		
8	(a) 66 angle at centre = twice angle at circumference	1 1	or angle at circumference is half the angle at the centre	in both parts, if no angle is given on answer line, look on diagram centre and circumference required, not eg 'edge' and 'middle'
	(b) 48 angle between tangent and radius = 90 (or right angle) angles in [cyclic] quadrilateral add to 360	1 1 1	condone 4 sided shape or kite for quadrilateral or OB joined and angle sum of triangle with $\frac{1}{2}$ AOC = 66° used – must mention isosceles or kite oe, <u>and</u> angle sum of triangle for this mark	Alternative methods: 1 for AC joined and alternate segment theorem stated to give ACB or BAC = 66° or ft their (a) and 1 dep for angle sum of triangle stated or 1 for angle between tangent and radius = 90 oe and 1 dep for 'opposite angles of cyclic quad add to 180'
9	22352.75	2	accept 22352 to 22353 M1 for 185.5 or 120.5 seen [accept 185.499 or 120.499 or better]	allow 2 for 22352.75 seen in working and rounded wrongly for final answer NB don't accept 4 sf answer – can come from 185.49 etc

10	$6a - ac = 9 - 5c$ o.e. $a(6 - c) = 9 - 5c$ $[a =] \frac{9 - 5c}{6 - c}$ oe cao as final answer	<p>M1 for collecting a terms on one side and non a terms on the other; condone one sign error</p> <p>M1 for correctly taking a outside a bracket, FT earlier error(s); may be implied by correct division FT</p> <p>A1 or W3 www</p>	no FT if their error simplifies the situation such that no bracket is required
11	(a) (i) 0.7 and 0.2 in correct positions	1	allow fractional or % equivalents in both parts
	(a) (ii) $1 - 0.4 \times 0.2$ 0.92 oe	<p>M2 or M2 for $0.6 + 0.4 \times 0.8$ or for $0.6 \times 0.7 + 0.6 \times 0.3 + 0.4 \times 0.8$</p> <p>Or M1 for two of these three products or results [and no extras] used or for identifying all the correct branches</p> <p>A1 allow W3 for 0.92 www</p>	<p>or M2 for $0.6 + 0.32$ or $0.42 + 0.18 + 0.32$ ft their tree if both probs given are not the same</p> <p>eg M1 for all 3 correct branches ticked or starred (and other one left blank) or eg M1 for $0.4 \times 0.8 + 0.6 \times 0.7 [= 0.74]$</p>
	(b) $66/400 \times 50$ or $66 / 8$ oe 8	<p>M1 eg finding that $66 = 16.5\%$ of 400 and then calculating 0.165×50</p> <p>A1 NB evidence of correct method required</p>	<p>allow M1 for answer of 8.25 with no working</p> <p>NB 0 for just $400/50 = 8$</p>

12	(a) 96 www	2 condone other answer in range 95.9 to 96.1 for 2 marks M1 for [vol sf =] 2^3 or 8 or M1 for eg cuboid 2 by 2 by 3 and then $4 \times 4 \times 6$ seen	or M1 for $(\sqrt[3]{12} \times 2)^3$ oe; M0 for other $(a \times 2)^3$
	(b) vol = $\frac{4}{3} \times \pi \times 5 \cdot 2^3$ mass = $0.045 \times \textit{their vol}$ 26.5 or 27	M1 or M1 implied by 588.9 to 589.1 or 590 M1 bod M1 for $0.045 \times \textit{their}$ first calculation with π used A2 A1 for other answer in range 26.5 to 26.6; allow W4 for 26.5 or 27 www; allow W3 for other answer in range 26.5 to 26.6 www allow A2 for 30 following correct method seen	M0 for eg 0.045×5.2

Section B Total:25

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity



OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553