

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B276**: Module M6 (Sections A&B)

Mark Scheme for June 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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Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
W marks are workless marks, which are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.
SC marks are for special cases that are worthy of some credit.
2. 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 not from wrong working **full marks** should be awarded.

Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. 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 $180 \times (\textit{their} '37' + 16)$, or FT $300 - \sqrt{(\textit{their} '5^2 + 7^2)}$. Answers to part questions which are being followed through are indicated by eg FT $3 \times \textit{their} (a)$.

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.

4. 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.
5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.
 - **cao** means **correct answer only**.
 - **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**.
6. 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'.
 7. 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).
 8. 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.
 9. 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.
 10. 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' or 'cao'. 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.
 11. Ranges of answers given in the mark scheme are always inclusive.
 12. 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.
 13. 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.

Section A

Question		Answer	Marks	Part marks and guidance	
1	(a)	$\frac{2}{3}$	3	<p>M1 for $\frac{5}{12} + \frac{3}{12}$ or for attempt to convert both fractions to another common denominator with at least one numerator correct And A1 for $\frac{8}{12}$ o.e. Or W1 for fully cancelling their incorrect answer (maybe top heavy)</p>	eg $\frac{6}{16} = \frac{3}{8}$
	(b)	7	1		
2	(a)	12	1	Not 12 <i>m</i>	
	(b)	20	2	M1 for 25	Check answer nfw
3	(a) (i)	42	1		
	(ii)	37	2	M1 for evidence of adjacent pair of values indicated in an unambiguous way – the pair may come from 3 6 8 8	Accept answer 36 or 38 as clear intent to find the middle number. Condone 3 6 or 3 7 or 3 8 for 1 or 2 marks
	(b)	[On average,] members were older in the morning	1	ft <i>their</i> 37	
	(c)	0.15 oe	2	M1 for 1 – <i>their</i> '0.35 + 0.2 + 0.3' Or SC1 for answer of 0.6[0]	If 15 must see % for 2 marks. 0.85 -1 scores M1

Question		Answer	Marks	Part marks and guidance	
4	(a)	$7p^2$	1	Mark final answer	
	(b)	$12x - 20$	1	Mark final answer	
	(c)	$x(x - 7)$	1	Mark final answer. Condone missing end bracket	
5	(a)	Angles in a triangle or a triangle (adds up to) 180	1		
	(b)	62° alternate angles (with BDE)	1 1	Other valid methods must be complete with reasons for each step	Condone Z angles, alternative angles
6	(a)	Triangle with vertices at $(-4, -2)$ $(-4, -3)$ $(-2, -3)$	1		
	(b)	Scale factor 2 centre (0, 0)	1 1	Two correct and one incorrect statement scores a max of 1 mark Accept around (0,0)	Condone twice as big, double size, enlarged by 2. Accept origin.
7		1.5 o.e.	3	M2 for $10x = 15$ Or M1 for $10x + 2 = 17$ or better or for $8x = 15 - 2x$ or better or for $ax = b$, with a or b correct And M1 for final solution correct or FT from <i>their</i> M1 soi	May be implied, eg $6x + 2 = 17$, $x = 2.5$ implies M1 M1 eg $6x + 19 = 0$, $x = -19/6$ implies M0 M1 eg $6x + 2 = 17$, $15 \div 6 = 2.3$ implies $6x = 15$ gets M1 M0 Allow $15/10$ or better for 3 marks; M2 only for $15/10$ seen then spoilt, eg 1 r 5 as ans. Allow 2 for 1.5 seen embedded in original equation. eg $10x + 2 = 17$, $10x = 19$, $x = 1.9$ gets M1M1

Section A Total: 25

Section B

Question		Answer	Marks	Part marks and guidance	
8	(a)	PS = 6cm and $\angle P = 90^\circ$	1	Allow $\pm 2\text{mm}$ and $\pm 2^\circ$	
		$\angle Q = 48^\circ$	1	Condone no labels	
		QR = 10cm and shape completed	1		
	(b)	103 – 107°	1	FT <i>their</i> diagram $\pm 2^\circ$ if 3 not scored May be written on the diagram	Condone in an unambiguous list of P, S and R or in a sum of these angles Answer space takes precedence if different from diagram other than the two cases above
9	(a)	Both points plotted	1	Tolerance $\frac{1}{2}$ square	
	(b)	The bigger the engine size, the more the CO ₂ emissions	1	Accept positive correlation	NB 0 for negative correlation
	(c)	190 – 210	1		
10		Ruled straight line from (0, 5) to (10, 0)	3	W2 for 2 or more correct points plotted correctly with none wrong or for a short correct line. W1 for any 2 points from their table plotted correctly (ignore extras) or for a completely correct table even if plotted incorrectly. If the table is extended condone 1 error.	Tolerance for line for 3 marks: inside or touching circles at (0, 5) to (10, 0) – ignore other plots if line is correct and accurate For other plots tolerance 2mm (by eye) If plots not seen and line is short, allow line to imply the points, eg a short 'correct' line gets 2 marks Ignore anything outside the range $x = 0$ to 10 Allow 2 out of 3 for correct ruled line intent

Question		Answer	Marks	Part marks and guidance	
11	(a)	5 : 3 or $\frac{5}{3} : 1$ or 1 : 0.6 or $1 : \frac{3}{5}$	2	M1 for correct partial simplification eg 75 : 45 or SC1 for 3 : 5 from 450 : 750	M1 for 7.5 : 4.5 etc. Allow 2 for 1.67 : 1 or 1.66 : 1 or better as final answer 0 for 1.6 : 1 or 1.7 : 1 with no other simplification seen
	(b)	210	2	M1 for $840 \div 4$ o.e. or for answer of 630	M1 only for 210 in working but not final answer
12	(a)	6.5	2	W1 for 6.46(...) or 6.47 or answer of 25.8 or <i>their</i> pre-rounded answer seen and rounded correctly to 1 dp	Condone 6.4 but not from the wrong answer
	(b)	2 hours 15 minutes	1		
13	(a)	28.5 – 28.6 or 28	1	Ignore rounding after 28.57(...)	
	(b)	11.18 – 11.22	3	M2 FT for $17.5 - 180 \div \textit{their (a)}$ or $320 \div \textit{their (a)}$ or $\frac{320}{500} \times 17.5$ or $17.5 - \frac{180}{500} \times 17.5$ Or M1 FT $180 \div \textit{their (a)}$ or 6.3 or 6.29... or for $500 - 180$ or 320 or for $\frac{180}{500} \times 17.5$	Answer of 28 in (a): allow M2 for $320 \div 28$ or for an answer of 11.0(7...) or 11.1 or 11.4(...) Allow M1 for $180 \div 28$ or 6.4(2....) Answer of 29 in (a): allow M2 for $320 \div 29$ or for an answer of 11.0(3...) or 11.2(9...) or 11.3 Allow M1 for $180 \div 29$ or 6.2(0....) For FT method must be seen

Question		Answer	Marks	Part marks and guidance
14		21	4	<p>M3 for $(35 \times 30 \times 12) \div (30 \times 20)$ or better Or M2 for $35 \times 30 \times 12 = 30 \times 20 \times d$ Or M1 for $35 \times 30 \times 12$ or $30 \times 20 \times d$</p> <p>12600 \div 600 12600 = 600<i>d</i> 12600 or 600<i>d</i></p> <p>ALT METHOD M3 for $\frac{12}{20} \times 35$ Or M2 for operation linking $\frac{12}{20}$ and 35 Or M1 for $\frac{12}{20}$ or better</p>

Section B Total: 25

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