

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education **B281**

Terminal Paper (Foundation tier)

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 for examiners (June 2010)**GCSE Mathematics C (Graduated Assessment) – J517
Units B271 to B282**

Please ensure you familiarise yourself with the mark scheme before you complete your practice scripts.

You will be required to complete **ten** practice scripts and **ten** standardisation scripts for each section (A and B) of the unit.

Make sure you turn on the comments box when working on the practice scripts. You should do the practice scripts before attempting the standardisation scripts. If you are unsure why the marks for the practice scripts have been awarded in the way they have, please consult your team leader.

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.

Viewing tips for this paper

In general, set your screen to 'fit width.'

You may find it helpful to set to 'fit height' for the following questions: 4a(ii), 5d, 6b, 10a, 10b, 11a, 11b, 17 (then zoom in twice), 18

Section A


1	(a)	(i) twenty five thousand [and] sixty two	1	
		(ii) 25 100	1	
	(b)	58	1	
2	(a)	(i) 21	1	
		(ii) 15 30	1	
		(iii) 12 or 30	1	
		(iv) 11	1	
	(b)	9 = 3 × 3 or * * * * * * * * *	1	see exemplars
3	(a)	4.50	1	
	(b)	12 or 12.00	1	
	(c)	(0)·3(0)	1	
	(d)	3/25 as final answer	2	M1 for 12/100 or better seen
4	(a)	(i) cricket	1	
		(ii) appropriate numbers on frequency axis	1	numbers by grid lines not in gaps
		correct height bars [9, 12, 7, 3, 10]	1	ft their scale if linear; tolerance less than half a unit – mark the intent; condone unruled if in tolerance
		bars consistent width [and consistent gaps]	1	
	(b)	(i) magazine	1	
		(ii) 15	2	M1 for $60 \div 4$ o.e. or for 6° [per person]

5	(a)	140	2	M1 for 35×4 o.e.
	(b)	5.1	2	M1 for $2 \times 1.4 + 2.3$ o.e.
	(c)	7	2	M1 for $35 \div 5$
	(d)	4.5 to 4.7 identified as length, isw	2	eg allow 2 for 4.5 to 4.7 seen in correct position on diagram M1 for 9 to 9.4 seen OR SC1 for 5 m
6	(a)	-1 3	1	
	(b)	three points plotted	1	ft <i>their</i> points, tolerance 2 mm
		ruled straight line joining (0, -5) to (4, 3) or further, tolerance 2mm	1	no ft; mark correct line only; ignore line outside x from 0 to 4
	(c)	No because $2 \times 12 - 5$ is not 9 or $24 - 5$ is not 9	1	oe eg 'no, when $y = 9$, $x = 7$ ' e.g. accept 'no because when x is 12, y is 19' oe see exemplars
7	(a)	$a = 34$ [angles on straight] line add to 180 <u>or</u> '[angles round a] point add to 360 and/or opposite angles are equal'	1 1	allow omission of 'add to 180' if 34 obtained <u>or</u> condone '[angles in a] circle add to 360'; allow omission of 'add to 360' if 34 obtained
	(b)	$b = 65$ '[base angles of] isosceles [triangle] [are equal]' and/or '[angles in a] triangle add to 180'	2 1	M1 for $(180 - 50) \div 2$ soi

8	(a)	200	2	M1 for 8 or 25 seen
	(b)	$\frac{13}{35}$ oe (eg $\frac{26}{70}$)	2	M1 for evidence of equivalent fractions attempted: two fractions with a correct common denominator with at least one of the numerators correct eg $\frac{28}{35}$ or $\frac{15}{35}$ oe allow SC1 for an answer which is completely correct except for a consistent error in the denominator eg $\frac{28}{30} - \frac{15}{30} = \frac{13}{30}$
9		$[2x + 1 =] 6x - 8$ or $x + \frac{1}{2} = 3x - 4$ $9 = 4x$ or $4 \frac{1}{2} = 2x$ o.e or ft 2.25 o.e. cao	M1 M1 A1	for dealing correctly with brackets for collecting terms correctly, ft allow A1 for 9/4 isw incorrect conversion allow B3 for 2.25 o.e.
10	(a)	reflection B correct (1, -2) (1, -4) (2, -2)	1	condone unlabelled (but not labelled C)
	(b)	rotation C correct (-2, 1) (-2, 2) (-4, 1)	2	condone unlabelled (but not labelled B) M1 for clockwise 90° about (0,0) or anticlockwise 90° wrong centre
11	(a)	18/48 then simplified or $8 \times 6 = 48$ and $3 \times 6 = 18$ o.e. or $3/8$ of $48 = 18$	1	condone 18/48 only condone 18/48 seen with subsequent errors
	(b)	150 www or accept answers in range 140 – 162 if supported by sensible working	2	M1 for 50 seen or for $18/48 \times 400$ o.e. or for 8 to 9 [boxes] seen or used, but not just for 8 from denominator of $3/8$

Section A Total: 50

Section B

12	(a)		1	mark the intent
	(b)	13 17	1	
	(c)	29 'add three more lots of 4' or 'add 4 each time' oe	1 1	or '5 to start with then 6 more lots of 4' or n th term is $4n + 1$ oe see exemplars
13	(a)	1080	2	M1 for $1000g = 1 \text{ kg}$ soi, eg by 1500, or for digits 108
	(b)	12:25	2	M1 for 12: or :25
	(c)	22	2	M1 for $8800 \div 400$ o.e. or for $88 \div 400$ or for digits 22 with wrong dp
14	(a)	80(.00)	1	
	(b)	42.50	1	
	(c)	6	2	M1 for $180 - 30 [= 150]$ soi
15	(a)	sum of numbers (= 114) <i>their</i> sum $\div 10$ soi 11.4	M1 M1 A1	allow implied by 88 to 124 seen or figs 114 dep on first M1; a total must be seen if not correct or W3 for 11.4 www; allow M2 for answer of 106.8 with no working accept 11 for 3 marks only if 114 or 11.4 seen NB 0 for answer of 11 with no working
	(b)	(i) 26	1	
		(ii) 48	1	
		(iii) 24.5	2	M1 for 24 and/or 25 identified or for 4.5
	(c)	(i) ACB, BAC, BCA, CAB, CBA	2	M1 for one omission or one repeat, but do not count writing ABC for themselves as a repeat 0 if extras such as AAA, BBB, CCC also included SC1 for misread of A, B, C as headings and the fully correct rearrangements of 11, 12, 13 shown
		(ii) 0.6	1	accept fraction or % equivalents

16	(a)	lines 0 order 3	1 1	accept 'none' or 'zero'
	(b)	drawing with just one line of symmetry drawing with rotational symmetry order 1	1 1	ignore <i>their</i> line(s) of symmetry drawn they must have added to drawing (not just a 'line of symmetry') to gain any marks
17 *		mark or line indicating correct bearing measured from P or Q correct lines drawn from P and Q B marked in correct position or ft <i>their</i> lines	M1 M1 A1	$\pm 2^\circ$ $\pm 2^\circ$ dep on at least M1 gained condone absence of label B if position clearly indicated eg with cross if M0, allow SC1 for B marked at intersection of lines coming from P and Q but wrong bearings (eg using protractor E/W)
18	(a)	two rectangles 2.5 by 6 two isosceles triangles with base 4 and ht 1.5 net in correct orientation	1 1 1	tolerance 2 mm ignore construction line for height and/or right angle symbol must consist of 2 more rectangles and 2 triangles but independent of their dimensions, must be possible net if dimensions were correct
	(b)	$\frac{1}{2} \times 4 \times 1.5 \times 6$ o.e. (may be done in two steps) 18	M2 A1	M1 for $\frac{1}{2} \times 4 \times 1.5 [= 3 \text{ cm}^2]$ oe or for <i>their</i> $\frac{1}{2} \times b \times h \times 6$ using one wrong measurement from triangle A1 NB correct method required allow B1 for 18 if no working but B0 if wrong working If 0 scored allow SC1 for $6 \times 4 \times 1.5 [=36]$ without further working
		(b) cm^3	W1	

19	(a)	$7a - 5c$	2	<p>W1 for $7a$ (W0 for $-7a$) in <i>their</i> answer</p> <p>W1 for $-5c$ in <i>their</i> answer</p> <p>OR</p> <p>W1 for $7a - 5c$ seen then spoilt by further work</p> <p>allow W1 for $7a + -5c$</p>
	(b)	$5x - 20$	1	mark final answer (but ignore $x = 4$ after $5x - 20$)
	(c)	$x(x + 3)$	1	mark final answer
	(d)	$[x =] \frac{y+2}{5}$ oe	2	<p>M1 $y + 2 = 5x$ oe (eg $y/5 = x - 2/5$)</p> <p>OR</p> <p>SC1 for answer of</p> <p>$y + 2 \div 5$ or $\frac{y}{5} + 2$ or $\frac{y-2}{5}$ oe</p>
20	(a)	$4 : 3 : 5$	1	
	(b)	17500	2	<p>M1 for $42000 / \textit{their}(4 + 3 + 5)$ [= 3500]</p> <p>or $42000 / \textit{their}(16 + 12 + 20)$ [= 875]</p> <p>or for figs 175 seen in answer</p>
21		<p>Veggie burger with</p> <p>B $17.1 - 17.2$ or $17[\%]$</p> <p>C $16.7 - 16.8$ or 16 or $17[\%]$</p> <p>V $21.4\dots$ or $21[\%]$</p> <p><u>or</u> ALT method:</p> <p>Veggie burger with</p> <p>B: 5.8 to 5.9</p> <p>C: 5.9 to 6.0</p> <p>V: 4.6 to 4.7</p>	3	<p>accept equiv decimals for full marks or for part marks</p> <p>labels B, C, V not required as long as working clear</p> <p>M2 for any two of:</p> <p>$17.1 - 17.2$ or 17% ,</p> <p>$16.7 - 16.8$ or 16 or 17%,</p> <p>$21.4\dots$ or 21% seen</p> <p>or M1 any one of $47/274$ or $29/173$ or $54/252$ seen</p> <p><u>or</u></p> <p>SC1 for all of</p> <p>B: 5.8 to 5.9,</p> <p>C: 5.9 to 6.0,</p> <p>V: 4.6 to 4.7</p> <p>with wrong/no choice made</p>

Section B Total: 50

Exemplar/sample comments

Question 2(b)

Response	Mark
3^2 is 9	1
Because 3 squared = 9	1
Because it is in the three times table which means $3^2 = 9$. [last part of comment gets the mark]	1
Because you square 3 to get it	1
9 represents a square because when a square is drawn it is 9 (with square 3×3 drawn)	1
Because 3 goes into it 3 times	1
It can be made by multiplying the same number together $3 \times 3 / 3^2 = 9$. 9 can be square rooted.	1
Because you can times 3 by itself to equal 9	1
$3 \times 3 = 9$ and $9 \times 9 = 81$	1
Because $3 \times 3 = 9$	1
$3 \times 3 = 9$, 3 goes into 9 three times, and $9 \div 3 = 3$	1
if a number can be timesed by itself to make 9 (3)	1 BOD
It can be timesed by itself	0
Because it has 3 square number in itself	0
9 is a square number because you can multiply it by itself	0
Because $3 + 3 + 3 = 9$ [would have given 1 if 3 by 3 diagram also present]	0
Because you can divide it by itself	0
It can be squared up to 9 by 3.	0
it can be split roughly 3 times	0
9 is a square number cos it can be times by itself	0
Because it's a three times table	0
It has a number that can be timesed to make it	0
You \times 9 by 9	0
Because there is only two numbers that goes into 9	0
Because a number goes into it which is 3	0
9 is a square number because only 1, 3, 9 goes into it	0
Because 9 dots can make a square [would accept with diagram]	0
Because 9^2 or $9 \times 9 = 81$	0
Because it can be doubled by itself.	0

Question 6(c)

Response	Mark
Every time x goes up by 1 y is 2 more than the previous y number (copy of table included) and when you get to x 12 y is 19 and not 9. (Table above comment showing this)	1
No, $2 \times 12 - 5 = 19$, this needs to answer 9 and it doesn't	1
No, $x = 12 \times 2 = 24 - 5 = 19$ [condone string of equals without y mentioned]	1
No, $2x - 5$. $2 \times 12 = 24 - 5 = 19$ so it won't be on the graph.	1
$12 + 12 = 24 - 5 = 19$ and the y -axis needs to be a 9 not 19	1
No, 12 is x and $2 \times 12 = 24$ then $- 5 = 19$ instead of 9	1
No, $12 \times 2 = 24$ and $24 - 5$ don't = 9	1
There is no way of equating this point on the line $y = 2x - 5$ however you could reach this point if you drew the line long enough but this is irrelevant in doing so as it is not on the $y = 2x - 5$ line. (Table above showing points (6, 7) (8, 11) (10, 15))	0 contradictory
No if you do make x 12 it becomes bigger than (12, 9)	0
No, It wouldn't fit as 12 is 3 bigger than 9 when they all have one space apart.	0
No, if you carry on it goes (6, 7) (8, 11) (10, 15) [would have given if they had included (7, 9) or if they had commented that they had got past 9 for y]	0
No, the coordinates don't follow the equation ($y = 2x - 5$) would equal 7 not 9	0
No you would have (12, 7)	0
No $x = 12$, $12 \times 2 = 24 - 5 = 18$. $x = 12$ $y = 18$ not 9 [If they give a value of y it must be correct]	0
No, the y axis is always going up in 4 so the answer instead should be (9,15)	0
No, because double 5 is 10 and double 6 is 12 but for it to be (12, 9) it would have to be on 4.5	0
No, there are no numbers that when multiplied by 2 then subtract 5 will make 19. $12 \times 2 = 24 - 5 = 19$ [first part of statement wrong, so 0]	0
No, it is too short	0
No, $12 \times 2 - 5 = 19$, $9 \times 2 - 5 = 13$ [choice of which is correct value of x to use]	0
No, line is too steep	0
No, all the numbers are odd so I used the same technique I did for 0, 2, 4 and got (13, 9)	0
No the y numbers go up by 4 each time	0
No, $9 \times 2 = 18$, $18 - 5 = 13$ so it can't be 12 as it would not fit on the line	0
No, when x is multiplied by 2, $5 - 24$ does not equal to 9 [5 - 24 should be 24 - 5]	0
No, the point will be (12, 15) or (8, 9)	0
The y -axis is rising 4s so it would go 7 to 11 missing 9 completely	0
No the point is too far off for the line of best fit.	0

Question 12(c)

Response	Mark
29, $17 + 4 = 21 + 4 = 25 + 4 = 29$	1, 1
29, 5 would have 21, 6 would have 25, 7 would have 29 there are 4 more lines on each pattern that is added.	1, 1
29, every line from each pattern goes up four numbers and if 4 is 3 numbers away from 7 it would make it 4 lots of 3 going up again instead of 4 lots of 1	1, 1
29, $4 \times 3 = 12$. $12 + 17 = 29$	1, 1
29, every pattern has 4 more lines than the one before.	1, 1
29, it goes up in fours $4 - 7$ is $3 + 4 = 12$. $12 + 17 = 29$	1, 1
29, you add on 4 each time	1, 1
29, you add on 4 lines from the last pattern to get the amount of lines for the next one	1, 1
29, goes up in 4's ($4 \times 3 = 12$ $17 + 12 = 29$)	1, 1
29, it goes up in fours	1, 1
29, each pattern has 4 more straight lines [with diagram of pattern 7 and each line numbered]	1, 1
29, if you add pattern 3 and pattern 4 you get 30, but you need to take one off as they start and ending the same way $13 + 17 = 30 - 1 = 29$ [NB correct alternative method here]	1, 1
29, add on 4 each time, pattern 6 would have 25 lines so pattern 7 must have 29	1, 1
29, the amount goes up in fours so you could do $4 \times 3 = 12$, $12 + 17 = 29$ because there is a 3 unit difference between 4 and 7	1, 1
29, You add 4 for each pattern so it is adding 12 in total.	1, 1
29, The n th term is $4n + 1$	1, 1
29, the pattern is add 4 [accept as implying repeated addition]	1, 1
29, You add on 4 until you get to 7 5 21 6 25 7 29	1, 1
29, I use pattern 4 to answer pattern 7, easy	1, 0
29, $35 - 6 = 29$, you times the pattern number by 5 then $- 1$ from what order it is [trying to say $5n - (n - 1)$ but have made error]	1, 0
29, I added on an extra 12 to the sequence. [needs to explain where the 12 comes from]	1, 0
29, I just did 7 squares and counted all the lines	1, 0
29, you add four onto the number before so 25 26 27 28 <u>29</u> and that's the rule $+ 3$ [contradiction]	1, 0
29, the number of straight lines are going up in the $4 \times$ table	1, 0
29, add on 4 [implies 4 added once only]	1, 0
28, $4 + 17 = 21$, $21 + 4 = 25$, $25 + 4 = 28$ [mark for reason is independent]	0, 1

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