OCR
RECOGNISING ACHIEVEMENT

GCSE

# Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B281:** Terminal Paper (Foundation Tier)

# Mark Scheme for January 2011

Oxford Cambridge and RSA Examinations

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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.

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



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OCR Publications
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Annesley
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NG15 0DL

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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. 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.)

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**

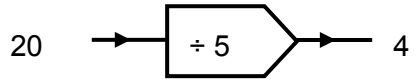
The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- 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.

* = common with B282

**Section A**

| | | | | | |
|---|---|---|---|---|---|
| **1** | **(a)** | (i) five thousand seven hundred [and] fifty two | **1** | | condone poor spelling if meaning clear<br><br>0 for fifty seven hundred and fifty two |
| | | (ii) 5792 | **1** | | |
| | | (iii) 5672 | **1** | | |
| | **(b)** | 15 | **2** | **M1** for 47 − 32 seen or for tens or units digit of 15 correct | |
| **2** | | trapezium<br>pentagon<br>cylinder<br>cone | **4** | **1** for each shape correct | |
| **3** | **(a)** | Friday | **1** | | accept abbreviations eg F or Fri |
| | **(b)** | 11 | **1** | | |
| | **(c)** | 10 | **1** | | |
| | **(d)** | 1·04 | **2** | **M1** for 3·96 or for 3·02 | |

| | | | | | |
|---|---|---|---|---|---|
| **4** | **(a)** | (2, 1) | **1** | | |
| | **(b)** | (−3, −2) plotted | **1** | ignore label | overlay to assist examiners<br>mark intent for plotting – tolerance 3 mm in this and next part |
| | **(c)** | (i) [AC = AB] (−3, 4) or (–1, 6) or (5, 6) or (7, 4) or (7, −2) or (5, –4) or (–1, –4)<br>[AB = BC] (−8, 1) or (–6, 3) or (0, 3) or (2, −5) or (–8, –5)<br>[AC = BC] (1, −3) or (−2, 2)<br><br>or FT *their* B so that ABC is isosceles | **1** | or other pts on circle centre A rad AB<br><br>or other pts on circle centre B rad AB<br><br>or any other point on line<br>$y = -1/3\ (5x + 4)$ except (−0·5, −0·5)<br>[perp bisector of AB] | overlay to assist examiners<br><br>tolerance 2 mm |
| | | (ii) FT *their* (c) if ABC is isosceles | **1** | award only if 1 mark earned for (c)(i); no FT if ABC is not isosceles | tolerance 2 mm |
| **5** | **(a)** | (i) 15 | **1** | | |
| | | (ii) 18 | **1** | | |
| | **(b)** | 10 | **2** | **M1** for 4 obtained as input for ×2 box | ignore 16 seen if 10 given as answer |
| | **(c)** | eg ÷ 2, −7 : correct function to give the required output | **2** | **M1** for a correct function and missing middle input/output shown | eg **M1** for<br>  |
| **6** | **(a)** | 300 or 320 × 6 = 1800 or 1920<br>or 300 × 590 = 1770 | **2** | **M1** for 300 or 320 or 6 used | condone 6.00, 1800.00 etc for 2 marks |

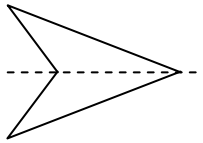
<table>
<tr>
<td>6</td>
<td>(b)</td>
<td>518 with correct working</td>
<td>3</td>
<td>M1 complete method attempted<br>A1 for at least one row of multn correct of standard long mult or grid methods<br><br>or W1 for 370 or 148 or 420 or 98 seen in use of standard method (not just listed as multiples of 14) or for complete row or column of grid method correct, ignoring final totals<br><br>W1 only, for answer of 518 with no working</td>
<td>• Working: be convinced that calculator not used<br>• M1: a complete method which, if no arithmetic errors were made, would lead to the correct solution<br>• Standard multiplication methods (other correct possibilities exist):<br>
<table>
<tr><td></td><td>3</td><td>7</td></tr>
<tr><td>×</td><td>1</td><td>4</td></tr>
<tr><td>3</td><td>7</td><td>0</td></tr>
<tr><td>1</td><td>4</td><td>8</td></tr>
<tr><td>5</td><td>1</td><td>8</td></tr>
</table>
or
<table>
<tr><td></td><td>1</td><td>4</td></tr>
<tr><td>×</td><td>3</td><td>7</td></tr>
<tr><td>4</td><td>2</td><td>0</td></tr>
<tr><td></td><td>9</td><td>8</td></tr>
<tr><td>5</td><td>1</td><td>8</td></tr>
</table>
grid methods:
<table>
<tr><td>×</td><td>30</td><td>7</td><td></td></tr>
<tr><td>10</td><td>300</td><td>70</td><td>370</td></tr>
<tr><td>4</td><td>120</td><td>28</td><td>148</td></tr>
<tr><td></td><td></td><td></td><td>518</td></tr>
</table>
<table>
<tr><td>×</td><td>3</td><td>7</td><td></td></tr>
<tr><td></td><td>0 3</td><td>0 7</td><td>1</td></tr>
<tr><td>5</td><td>1 2</td><td>2 8</td><td>4</td></tr>
<tr><td>1</td><td>8</td><td></td><td></td></tr>
</table>
or
<table>
<tr><td>37 × 2 = 74<br>37 × 4 = 148<br>37 × 8 = 296<br>37 × 16 = 592<br>592 – 74 = 518</td><td>14 × 40 = 560 [may be split further]<br>14 × 3 = 42<br>and<br>560 – 42 = 518</td></tr>
</table>
[A1 for 592 or 74 or for 560 or 42 if M1 earned]<br><br>or 37, listed 14 times with addition attempted etc<br>or chunked into the equivalent</td>
</tr>
</table>

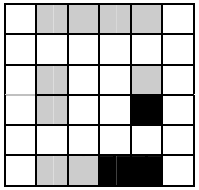
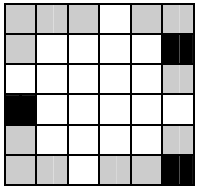
| | | | | | |
|---|---|---|---|---|---|
| **7** | **(a)** | $a$ = 110<br>angles round a point add to 360 | **1**<br>**1** | condone omission of 360 if angle correct | condone 'angles in a circle add to 360' |
| | **(b)** | $b$ = 70<br>angles of quadrilateral add to 360 | **1**<br>**1** | condone omission of 360 if angle correct | condone 'angles in a 4 sided shape add to 360' but **0** 'for angles in a parallelogram add to 360' etc |
| **8**<br>***** | | £7·14 | **3** | **M2** for 1·26 or digits 714<br>Or **M1** for [10% =] 0.84 or 84[p] or digits 126 with wrong dp<br>Or **M1** for $\frac{15}{100}\times 8.40$ or $\frac{15}{100}\times 840$ or 0·15 × 8.4 or 0·15 × 840 or 0·85 × 8.4 or 0·85 × 840 oe seen | Or **M1** for 1% = 0·084 or 8.4[p]. 1% may be implied by ÷ by 100 shown. |
| **9**<br>***** | **(a)** | Complete ordered stem and leaf table<br>5 \| 2 8<br>6 \| 1 4 9<br>7 \| 2 2 3 5 6 7 7<br>8 \| 2 3 5 6 7 8<br>9 \| 0 2<br><br>with completed Key<br>eg 6 \| 1 represents 61[bpm] | **3** | **M2** for 1 or 2 errors or omissions<br><br>Or **M1** for 3 errors or omissions or for table not ordered and/or just key completed<br><br>Allow eg 6 \| 1 = 61 | Condone commas.<br>Condone 50 etc as stem with appropriate key.<br>Condone order of stem reversed, (ie 9 \| 0 2 at top)<br>If order within rows reversed, count that as one error.<br>If key incomplete, count that as one error.<br><br>Allow **SC1** for correctly ordered table with double digit leaves [ignoring any stems or key]. |
| ***** | **(b)** | (i) 76·5<br><br>40 | **2**<br><br>**1** | **M1** for 76 and/or 77 [ as answer or identified in table or working] or for 6·5 as answer | eg accept 6 and /or 7 ringed in 70 row in table |

| | | | | | |
|---|---|---|---|---|---|
| * | | (ii) One comment about median and one comment about range.<br>eg<br>at end pulse rates faster<br><br>spread of rates the same | <br><br>**1**<br><br>**1** | Comments must FT from *their* median and range [so 0 in this part if relevant value[s] missing in (b)(i)]<br>Condone 'on average' omitted from comment, as in this example.<br>Allow range the same. | See exemplar responses.<br><br>Since demand refers to context, condone lack of context in comments<br><br>Do not penalise extra wrong comments |
| **10 *** | **(a)** | 25 40 40 25 | **2** | **M1** for 2 entries correct | |
| * | **(b)** | (i) points plotted, correct or FT *their* (a), tolerance 1 mm<br><br>correct curve, tolerance 2 mm | **1**<br><br>**1** | condone 1 error or 2 symmetrical errors<br><br>within 2mm of correct positions for plots | eg 1 for plotting if both (0, 0) and (6, 0) omitted but other pts correct<br><br>use overlay and allow plots within circles<br><br>no FT for curve from wrong (a)<br>0 if any section ruled<br>use overlay and allow curve within circles<br><br>condone two sections with doubling and / or feathering [deleted work may still show up in scoris] |
| * | | (ii) 0·8, 5·2 | **2** | **1** each solution – correct or FT from *their* graph, solutions ±0·1 | tolerance ±0·1 of examiner's reading of their graph<br><br>condone a range given if in tolerance eg '0·7 – 0·8' |

**Section A Total: 50**

**Section B**

| | | | | | |
|---|---|---|---|---|---|
| **11** | **(a)** | 3·7 + cm<br>or 37 + mm | **1+1** | accept 3·6 to 3·8 oe | allow cm with ans 3.3 to 4.7 or mm with ans 33 – 47<br><br>overlay to assist examiners |
| | **(b)** | AE | **1** | or shown on diagram | |
| | **(c)** | obtuse | **1** | | |
| | **(d)** | 52 to 56 | **1** | | |
| **12** | **(a)** | 31 | **1** | | |
| | **(b)** | (i) it doesn't stop [at Oakengates] | **1** | o.e. | accept 'there isn't a train [time at Oakengates then]<br>see list of exemplars |
| | | (ii) 0954 | **1** | | accept 9.54 etc |
| | | (iii) FT *their* (b)(ii) (0939 if b(ii) correct) | **1** | o.e. | accept 9.39 etc |
| | **(c)** | 1·65 | **1** | | |
| **13** | **(a)** | Moscow | **1** | **0** for –9 | |
| | **(b)** | 10 or −10 | **1** | | |
| | **(c)** | −7 | **1** | | |
| **14** | **(a)** |  | **1** | | line need not extend outside shape; mark intent |

| | | | | | |
|---|---|---|---|---|---|
| **14** | **(b)** |  | **2** | **M1** for two correct<br>or for all 3 correct + one extra | overlay to assist examiners |
| | **(c)** |  | **2** | **M1** for two correct<br>or for all 3 correct + one extra | overlay to assist examiners |
| **15** | **(a)** | 16 | **1** | | |
| | **(b)** | rectangle drawn size 4 × 3<br>or 3 × 4 or 6 × 2 or 2 × 6 | **1** | | condone 1 × 12 if drawn fairly accurately beyond grid |
| | **(c)** | 8·4 | **2** | **M1** for 16·8 or for ½ × 3 × 5·6 | |
| **16** | **(a)** | 3 with correct working | **3** | **M1** for attempt to add 7·8 + 10 + 13·2 + 23·7 [=54·7]<br>**M1** (dep on first **M1**) for 58·9 − *their* 54·7 [=4·2] <u>and</u> attempt to divide (o.e.) by 1·4<br><br>**W1** only, for answer of 3 with no working | allow second M1 for attempt at repeated adding of 1·4 from their 54·7 |
| | **(b)** | 48·28 www | **3** | **W2** for 48·27(…) or 48·30<br>Or **M1** for 58·9 ÷ 1·22 | allow **M1** for 48·3 |

| | | | | | |
|---|---|---|---|---|---|
| **17** | **(a)** | (i) 4 | **1** | | condone 3 × 4 = 12 but not just 3 × 4 |
| | | (ii) 4·5 or 4 ½ or 9/2 | **2** | **M1** for $2x = 9$ or for 9 ÷ 2 or 4·5 soi | eg **M1** for answer of 4r1 or 4·1;<br>condone fully embedded answer for both marks |
| | **(b)** | (i) $7t + 3w$ as final answer | **2** | **M1** for either term correct or for both correct but spoilt | |
| | | (ii) $3c^2$ as final answer | **1** | **0** for $3 \times c^2$ etc | bod attempt at position of squared symbol |
| **18** | **(a)** | 4 5 6 7 8 9<br>5 6 7 8 9 10 | **1** | condone one error or omission | |
| | **(b)** | (i) 4/24 or 2/12 or 1/6 o.e. isw | **1** | isw wrong cancelling<br><br>accept dec or fractional equivs in parts (b) to (d) | deduct 1 from mark gained once only in parts (b)(i) to (iii) for 'in' or 'out of' or 4 : 24 or 'to' etc<br>allow odds to score in (ii) only;<br>no FT for numerators from wrong table |
| | | (ii) 0 | **1** | accept 0/24 or FT *their* denom. in (a) | |
| | | (iii) 6/24 or 3/12 or ¼ o.e. isw | **1** | or FT *their* denom in (a)<br>isw wrong cancelling | |
| **19*** | **(a)** | 440 www | **3** | **M2** for 439·6 to 439·9<br>Or **M1** for $\pi \times$ 140 | |
| * | **(b)** | 170 | **2** | **M1** for (51/6) x 20 oe<br><br>**SC1** for answer of 153 or 204 or 160 or 180 | eg **M1** for 8·5 × 20 |

| | | | | | |
|---|---|---|---|---|---|
| **20 *** | | 34 or 34.4.. to 34.5 | **3** | **M2** for 0·655 to 0·656 or 0·66<br>or for 65.5 to 65·6 or 66 [%]<br><br>or for (55700 – 36500)/55700 [= 19200/55700]<br><br>or for 0·34 or 0·344 to 0·345<br><br>Or **M1** for 19200 seen or for 36500/55700<br><br>if M0 allow **SC1** for 35 (from truncated 0·65) | **0** for just 55700 – 36500 shown or calculated incorrectly [they can get **M2** as shown above for full method ] |
| **21 *** | | 29·2(...) or $\sqrt{(69^2 + 54^2)}$<br><br>87·6(...) or 87 or 88 | **M3**<br><br>**A1** | accept 29 if correct method seen<br><br>Or **M2** for $\sqrt{(23^2 + 18^2)}$ or $\sqrt{853}$ or $69^2 + 54^2$ or 7677<br>Or **M1** for $23^2 + 18^2$ or 853<br><br>**W4** for 87·6(...) www | allow **W4** for 87·6(...) from scale drawing, allow **SC2** for 87 to 88 from scale drawing |

**Section B Total: 50**

**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
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**Head office**
**Telephone: 01223 552552**
**Facsimile: 01223 552553**