# GCSE

# Applications of Mathematics (Pilot)

Unit **A381/01:** Foundation Tier

General Certificate of Secondary Education

# Mark Scheme for November 2014

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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.

1.   Annotations used in the detailed Mark Scheme.

| Annotation | Meaning |
|---|---|
| ✓ | Correct |
| ✗ | Incorrect |
| BOD | Benefit of doubt |
| FT | Follow through |
| ISW | Ignore subsequent working (after correct answer obtained), provided method has been completed |
| M0 | Method mark awarded 0 |
| M1 | Method mark awarded 1 |
| M2 | Method mark awarded 2 |
| A1 | Accuracy mark awarded 1 |
| B1 | Independent mark awarded 1 |
| B2 | Independent mark awarded 2 |
| MR | Misread |
| SC | Special case |
| ∧ | Omission sign |

These should be used whenever appropriate during your marking.

The **M**, **A, B** etc 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.

**Subject-Specific Marking Instructions**

2.   **M** marks are for <u>using a correct method</u> and are not lost for purely numerical errors.
**A** marks are for an <u>accurate</u> answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
**B** marks are <u>independent</u> of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
**SC** marks are for <u>special cases</u> that are worthy of some credit.

3.   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 <u>not from wrong working</u> **full marks** should be awarded.

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

4.   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 × (*their* '37' + 16), or FT 300 – √(*their* '5$^2$ + 7$^{2}$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *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.

5.   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.

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

   i.      **cao** means **correct answer only**.
   ii.     **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.
   iii.    **isw** means **ignore subsequent working** (after correct answer obtained).
   iv.    **nfww** means **not from wrong working**.
   v.     **oe** means **or equivalent**.
   vi.    **rot** means **rounded or truncated**.
   vii.   **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.
   viii.  **soi** means **seen or implied**.

7.   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'.

8.   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).

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 **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

10. 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.

11. 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.

12. Ranges of answers given in the mark scheme are always inclusive.

13. 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.

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.

**MARK SCHEME**

| 1 | (a) | (i) | Any three of<br>H I N O S X Z | 3 | **1:** for each correct<br>-1 each wrong – no net negatives) | Extras also count as wrong |
|---|---|---|---|---|---|---|
| | | (ii) | Can fit in more than one way (or equivalent) | 1 | | |
| | | (iii) | O | 1 | | |
| | (b) | (i) | G<br>H<br>B<br>E | 3 | **1:** for each correct, then total -1 (so max. 3) | Condone A or C for E |
| | | (ii) | 63<br>63<br>90 (condone right-angle) | 1<br>1<br>1 | Allow follow through from value of *a* | Iff *their* a is less than 90° |
| | (c) | | 10[°] | 2 | **M1:** Sight of 90 or 80 in working | |
| | (d) | | 122 ÷ 8 and 60 ÷ 12<br>75 boards<br>Cost of board 13p to 14p<br>So total cost 37p to 38p | 5 | **M1:** 60÷12 (=5) and 122÷8(=15.25)<br>**B1:** = 75 (boards)<br>**B1:** Cost 1000/10 ÷ *their '75'* =13.3(p) **or** (£)0.133<br>**B1:** Cost of pegs = 24(p)<br>**A1:** Total cost =37p to 38p o.e.<br>FT on *their* board cost<br><br>_____ **OR** _____<br><br>60÷8 (=7.5) and 122÷12(=10.16)<br>**B1:** = 70 (boards)<br>**B1:** Cost 1000/10 ÷ *their '70'*<br>= 14.28 ..(p) **or** (£)0.14 28 ...<br>**B1:** Cost of pegs = 24(p)<br>**A1:** Total cost =38p to 39p o.e.<br>FT on *their* board cost | Can imply the M1<br><br><br><br>Must have correct money units<br><br><br>(no credit here for only 60÷8/122÷12)<br>Credit lost here by not finding the cheapest cutting configuration<br><br><br><br>Must have correct money units<br><br><br>If a candidate works out cost of all puzzles giving final correct total cost then lose 1 mark (from the last 3) |

| 2 | (a) | (i) | 6<br>$m^2$ | 1<br>1 | Condone 12 (assumed 2-sided) | Independent marks |
|---|---|---|---|---|---|---|
| | | (ii) | 5 to 7 [metres] | 1 | **1:**     15 feet  to 21 feet if units replaced | |
| | | (iii) | 330 | 1 | Ignore + or - | |
| | | (iv) | 280 (watts per square metre) | 2 | **1:**     Evidence in working of × 0.2 or ÷ 5<br>      **or** 140 **or** 280 **or** 1120 seen | Last two for calculating 20% soi |
| | (b) | (i) | (-114, 61.7) | 1 | Condone -113.8  61.7 | |
| | | (ii) | (-96, 64.3) NAMBI | 1 | | See overlay |
| | (c) | (i) | 160 [$m^2$] | 3 | **B3: 160**<br>**or**<br>**B1:**   $13^2$ or 169 seen in working<br>**and**<br>**B1:**   $3^2$ or 9  seen in working | |
| | | (ii) | 10 000 000 | 1 | | Be sensitive to other ways of handling separators in large numbers – comas, blanks etc.<br>Mark for 1 and seven zeroes ignore commas<br>Condone 10/ten million |
| | (d) | (i) | 13.6……. | 2 | **1:**     118.3 … **seen** in working<br>      (from $\sqrt{0.035 \times 400000}$ )<br>**or**   1618.(497 ...)<br>**or**   40.(230 ...) | 13.67879719<br><br>From missing the root<br>From rooting the whole expression |
| | | (ii) | which is 14 days … | 1FT | | |
| | (e) | (i) | 500 | 1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (ii) | 3 or 2.7 ... years | 3 | **M1:** 50 000 ÷ 50 soi<br>**A1:** 1000 days<br>**M1:** days in a year 364/5/6 or 360 | See LIST after coordination<br>**FT** from **e(i) e(i)** × 100<br>hence 500 × 100 = 50000<br>∴ 100 × 10 = 1000 days<br><br>**isw** if attempt to convert correct the decimal years<br><br>Mark division by repetitive addition in the same way. |
| 3 | (a) | (i) | 0.04 | 2 | **B1:** 3.3(00) **seen** in working<br>**or** figs 4 as answer | |
| | | (ii) | Lost | 1FT | Lost weight **oe** | Dependent on gaining at least 1 mark in part (i). |
| | (b) | (i) | Evie …. 0.025 or 25g | 3 | **M1:** 20.5 × 0.45 soi (=9.225)<br>**M1:** Statement based on *their* figures<br>_____ **or** _____<br>**B2:** Evie + figs 25 **or** wrong/no name but (-) 0.025<br>**or**<br>**B1:** just figs 25 and nothing or wrong "Evie" | |
| | | (ii) | 13 $\frac{3}{4}$ or 13.75 | 2 | **1:** 6.75 and 20.5 **seen**<br>**or** 20 $\frac{1}{2}$ - 6 $\frac{3}{4}$ **or** better **seen** | Allow 20 – 6 **and** ¾ - ¼ = ½ **both** seen |
| | | (iii) | 5 and 6<br>1.135 or 1.14 kg | 1<br>2 | <br>If zero (for the "2" scored) **1** for any one of these **seen** in working: 0.575, 0.815, 0.595, 0.635 | So 5 and 6 **plus** one correct change gains 2 but just 5 and 6 gains 1 |
| | (c) | (i) | 137 | 2 | **1:** 60 **seen** in working | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (ii)* | Adults aren't growing all their life e.g. a height of over 3 m at over 40 years old is impossible | 3 | **3:** a specific age over 20 chosen, giving a height over 2 m (or 200 cm) which is unlikely or impossible<br><br>**2:** Impossible because adults don't continue to grow **or** correct height predicted for stated 16+ age but no or incorrect comment<br><br>**1:** A clear attempt to substitute a 16+ age into the formula | Must 'state' or similar<br><br>An attempt such as "6 x age + 77" or better. |
| | **(d)** | **(i)** | 180 | 1 | | |
| | | **(ii)** | (70, 150) NAMBI | 1 | | |
| | | **(iii)** | 140 | 1 | | |
| | | **(iv)** | Adult = twice/2 times/× 2 child's height (or better) | 1 | | Condone just "x 2" or "2*h*" i.e. interpreted as a verbal response to the question |
| | **(e)** | | 164 | 3 | **M1:** 162 + 179 soi (=341) **or** 1.62 + 1.79 – 13 soi (=(-)9.59)<br>**M1:** Division by 2 evident in working | **SC2** for 1.64 given as the answer |
| | | | | 60 | | |

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