GCSE

# Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/01:** Foundation Tier

# Mark Scheme for June 2012

Any enquiries about publications should be addressed to:

**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**

1.    **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.

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 <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.

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 × (*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.

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.

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

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.

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| **1** | (a) | | 40 | 1 | | |
| | (b) | | $\dfrac{4}{40}$ **oe** eg $\dfrac{1}{10}$ | 1 | Ignore subsequent attempts to simplify if incorrect | Percentages or decimals not allowed |
| | (c) | | 400 | 1 | | |
| | (d) | | 20 | 2 | **M1** for 40 ÷ 2 or 50 ÷ 25 or 1000÷50 or (40 × 25) ÷ 50 **soi** or "two squares a ball" or similar stated | Full **FT** from **(a)** eg "40" ÷ 2 or ("40" × 25) ÷ 50 **soi** |
| | (e)* | | Clear statement that Sanjay is correct, with supporting working to give stated lengths:-<br>     2 miles = 3.2 km and<br>     amount of wool is 3.3 km<br>  **or**<br>     amount of wool is 3.3 km<br>     (which is) 2.06….. miles | 4 | **3** for 2 miles = 3.2 km and amount of wool is 3.3 km or for amount of wool is 3.3 km (which is) 2.06….. miles<br><br>**or**<br>**2** for "3.2" or "3.3" or "3300" or "2.06 …" **seen**<br><br>**or**<br>**1** for conclusion **and** an attempt at conversion of miles to km or attempt to find the length | Full **FT** from **(d)** for whole part Conclusion not given or wrong one<br><br><br><br><br>For example:<br>2 × 1.6 or "20" × 165 or **figs** 33 (ie correct calculation) |
| **2** | (a) | (i) | 10 000 000 | 1 | | |
| | | (ii) | "ten million" | 1 | Full **FT** from **(i)** | Must be all words; ten thousand, thousand not allowed (ignore any money units given) |
| | (b) | | Height: 2.0 to 3.0 metres inclusive<br>Length: 4 to 5 metres inclusive | 1<br>1 | If 0 scored, **Allow 1** where "length" > "height" | Accept Imperial equivalent if units clearly stated |
| | (c) | | 3.5 to 4.9 | 1 | | |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| (d) | | | 30 | 1 | Condone "½ an hour" | |
| (e) | | | 35 | 1 | | |
| (f) | (i) | | Gator | 1 | Accept clearly labelled or indicated in some way | |
| | (ii) | | 13 | 1 | | |
| | (iii) | | 8 | 1 | | |
| | (iv) | | $025°$ to $033°$ | 1 | Condone 25 to 33 | |
| (g) | (i) | | 2.6457 … … | 2 | **1** for **figs** 7 seen in working or on dotted line or response in range 2.64 to 2.65 | |
| | (ii) | | 3 | 1 | **FT** on answer to part **(i)** | |
| (h) | (i) | | Rhombus | 1 | | |
| | (ii) | | $d = 140°$ | 2 | **1** for $180 - 40$ or $360 - 2 \times 40$ seen in working | |
| (i) | | | There several sets of numbers that sum to 30, for example: 2, 10, 18 & 2, 3, 4, 4, 6, 11, 2, 2, 4, 4, 18 & 3, 6, 10, 11 2, 4, 6, 18 & 2, 3, 4, 10, 11 | 3 | **2** for one box with total of 30 using given numbers **OR** **1** for correct sum of the numbers (60) seen **and** **1** for 30 seen in working | |
| (j) | (i) | | Reflection: T, H, I, E | 2 | **1** for minimum of 3 correct out of maximum of 5 or 2 correct but no errors | |
| | (ii) | | Rotation:   N, H, I, S | 2 | **1** for minimum of 3 correct out of maximum of 5 or 2 correct but no errors | |

| Question | | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| 3 | | | Clear statement that the rule gives a value equal to the value of $\pi$ given on a standard calculator (3.141592654), supported by clear evidence of the appropriate calculation. | 3 | **2** for 3.1415926…… seen with working<br><br>**or**<br>**1** for two of these numbers seen in working<br>4745　42　21　4703<br><br>**or**<br>**1** for 3.1415…… | ie allow truncated to 7 dp<br><br><br><br><br><br>Or better if 10+ sf calculator |
| 4 | (a) | (i) | 48 | 1 | | |
| | | (ii) | 52 | 1 | | |
| | | (iii) | $\dfrac{1}{12}$ | 1 | | |
| | (b) | (i) | 1p | 1 | Condone 11 215 | |
| | | (ii) | 1129 | 1 | Condone extra "million" added by candidate | |
| | | (iii) | 2p | 1 | Condone 6664 | |
| | (c) | (i) | 5 | 1 | | |
| | | (ii) | 0.078 or 0.08 | 2 | **1** for **figs** 78 seen in working but not 7.8 (as given in question) | |
| 5 | (a) | | 360, 75, 225, 225 | 2 | **M1** for any one value from<br>360, 75 and 225 in correct position | |
| | (b) | | 10 | 2 | **M1** for 2.5 or 4 × 600 ÷ 240 or 600 ÷ 60<br>or 1 portion = 60g | |

| | Question | | Answer | Marks | Part Marks and Guidance | |
|---|---|---|---|---|---|---|
| **6** | (a) | | 15   18.5 | 2 | **1** for one correct value | |
| | (b) | | Correct single straight line drawn | 2 | **1** for at least one point plotted correctly | Line touching/intersecting all the overlay circles |
| | (c) | | 13.5 - 16.5 years old | 2 | **1** for sight of (8 to 12) in working or for a point indicated on the graph between $x = 8$ and $x = 12$ but not (10, 15) | Tooth is about 8 - 12 mm long, using graph gives age close to 13.5 - 16.5 |
| | (d) | | "According to graph would not have a wisdom tooth – zero or even negative length" or equivalent | 1 | Explicit mention/reference to graph or line | A "medical" reason eg Wisdom teeth don't grow before 8 or similar is not acceptable |
| **7** | (a) | | $6x + 2$ or $2(3x + 1)$ | 2 | **M1** for $2x + 3 + 3x - 5 + x + 4$ or $6x$ or 2 | |
| | (b) | | Sides of 19, 19, 12 **and** 'two equal sides' or equivalent explicitly stated | 2 | **M1** for one side correctly evaluated or for $2x + 3 = 3x - 5$ solved to given $x = 8$ | Condone 19 = 19 (and 12) for two equal. Sides may be labelled on the given diagram. |

**APPENDIX 1**

Exemplar responses for questions *6(d)*

| Response | Mark awarded |
| --- | --- |
| Line does not go no further than 8 (as a minimum) | 1 |
| Average lines goes no further than 8 | 1 |
| The formula line ends at 8 | 1 |
| Graph doesn't go after 8 | 1 |
| Line of best fit does not start till after 8 (as a minimum) | 1 |
| Wisdom teeth don't grow before 8 | 0 |