OCR
Oxford Cambridge and RSA

# GCSE

# Applications of Mathematics (Pilot)

Unit **A382/01:** Foundation Tier

General Certificate of Secondary Education

# Mark Scheme for June 2017

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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.

**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 |

**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.
   **B** marks are independent of **M** (method) marks and are for a correct final answer, a partially correct 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 × (*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. **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**.

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.

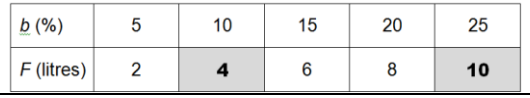
    If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

    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.

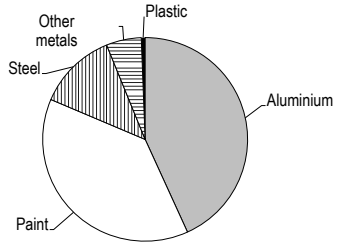
12. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

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 | Guidance | |
|---|---|---|---|---|---|---|
| 1 | (a) | | 86 - 93 | 2 | **B1** for 81-85.99 **or** 93.01-100<br>**or**<br>**M1** for clear method some indication of the majority of squares being counted e.g. using rectangles. | |
| | (b) | | 100 x part (a) | 1FT | | |
| | (c) | | 2.02(…) | 2 | **M1** for √(14800) or 121.65( ....) or 246.6(…) | |
| | (d) | (i) |  | 1 | Both needed | |
| | | (ii) | At least 3 points correctly plotted<br><br>Correct straight line | P1FT<br><br>L1FT | <br><br>Must be a straight line | |
| | | (iii) | Straight lines both passing through original.<br>The new line is less steep or has smaller gradient oe | 1<br><br>1 | Both marks are independent. | Do not accept the points are positively correlated or similar |
| | | | | | | |
| 2 | (a) | | 120 | 2 | **M1** for figs 12 as answer | |
| | (b) | (i) | 6 | 2 | **M1** for (9÷6) or 1½ oe | |
| | | (ii) | 7 or 8 | 4 | **M3** for all 4 correct calculations soi or 3 correct calculations and assumption<br>or<br>**M2** for 3 correct calculations or 2 correct calculations and assumption<br>or<br>**M1** for 2 correct calculations or one correct calculation and assumption<br>and<br>**B1** for rounding to nearest kilogram from value seen | Correct operations applied to 4 are x1000, ÷3, ÷6 and ÷ (28-31) Operations may be done in any order and maybe combined in one calculation such as ÷18 or ÷ (84 to 93)<br><br>Candidates may use 6 tonnes for 9 months and work with that.<br><br>Assumptions might include each |

| Question | | | Answer | Marks | Guidance | |
|---|---|---|---|---|---|---|
| | | | | | | crew member needs the same amount per day. |
| | **(c)** | | 200 < h < 250 AND 250 > h > 200 | **2** | **B1** for each correct inequality | -1 eeoo |
| | **(d)** | | 38400 | **2** | **M1** for 3 × 6400 or 19200 or 12800 | |
| | **(e)** | **(i)** | 412.2 – 412.8 | **1** | | |
| | | **(ii)** | 416.2 – 416.8 | **1** | | |
| | | **(iii)** | 2 | **1** | | |
| | | **(iv)** | 415 – 415.8 | **2** | **M1** for clear method<br>e.g. (414 + 417) ÷2 | |
| | | **(v)** | 396.2 - 396.8 | **3** | **M2 for** 416.2 to 416.8 – 18 or 20<br>or<br>**M1** for 2 × 9 or 10 or 18 or 20 or 416.2 to 416.8 – 2 | |
| | **(f)** | | 0.005 or $5 \times 10^{-3}$ | **2** | **M1** for figs 5 as answer or 0.005(1…) or $5.1(\ldots) \times 10^{-3}$ | |
| | **(g)** | **(i)** | 518.22 | **1** | | |
| | | **(ii)** | Slightly less than 36000 km<br>e.g. 35500 km | **3** | **M1** for 24 × 60 or 1440<br>and<br>**A1** for 36000 or 1498.26 | |
| | | **(iii)** | 2 pairs of values shown and processed to show not directly proportional and statement to this effect | **2** | **M1** for 2 pairs of values chosen and two multipliers found. e.g. 2000/1000 & 127.03/104.96<br>**A1dep** So cannot be directly proportional | Many others possible |
| **3** | **(a)** | | 1.48<br>Cubic metres or $m^3$ oe | **1**<br>**1** | | |
| | **(b)** | **(i)** | 13 | **1** | | |
| | | **(ii)** | 1 | **1** | | |
| | | **(iii)** | Semi-circle, centre A, radius 1m | **2** | **M1** for two of the three correct descriptors | Condone labelled sketch of semi-circle, with dimensions for |

| Question | | | Answer | Marks | Guidance | |
|---|---|---|---|---|---|---|
| | | | | | | 1 or 2 marks |
| | | (iv) | 55° + 125° = 180° so Yes as interior angles | 2 | M1 for 55° + 125° = 180° or Identifies interior angles | |
| | | (v) | Correctly drawn diagram<br><br>9.7 to 10.3 m | 2<br><br>1FT 1 | **M1** for 7cm with 60° or 6cm with 100° or both lengths or both angles<br><br>FT their AC measurement | Angles ± $2^0$<br>Lengths ± 0.2cm<br><br>AC may be seen on diagram |
| | (c) | (i) | Any one of  | 2 | **M1** for just one triangle added | Mark for intent – lines need not be drawn with ruler. |
| | | (ii) | Correctly drawn triangle with correct pair of visible arcs | 2 | **M1** for correctly drawn triangle without pair of arcs or correct arcs not joined | Condone arcs ±0.2 cm |
| | | (iii) | 34 - 42 | 2 | **M1** for 17 to 21 either by counting or area of triangle | |
| | (d) | (i) | High probability | 1 | | |
| | | (ii) | High probability | 1 | | |
| | | (iii) | Very low probability | 1 | | |
| | (e) | (i) | $\frac{2}{135}$ | 2 | **M1** for correct denominator or numerator | |
| | | (ii) | No and 0.014(...) is not equal to 0.0001 | 2 | **M1** for 0.014(…) or 0.0001 or attempt to create fractions with a common denominator | |
| | (f) | (i) | 3.0 - 3.5 mm oe | 2 | **M1** for figs 3.0 - 3.5 or correct mm or cm for their answer. E.g. 6 mm | |
| | | (ii) | 54.5 - 55.5 | 1 | | |
| | | (iii) | 3.5 - 4.5 | 1 | | |

| Question | | | Answer | Marks | Guidance | |
|---|---|---|---|---|---|---|
| | | (iv) |  | 2 | **B1** for Aluminum and paint correct<br>and<br>**B1** for Steel, others and plastic correct | |
| | | | | | | |
| 4 | (a) | (i) | IQX1 which has 16 stars | 2 | **B1** for each | |
| | | (ii) | Any suitable printer choice with clear supporting reason | 2 | **B1** for printer choice with vague or indistinct reason | |
| | (b) | | £123.50 | 4 | **M1** for 0.1 × 165 or 16.5(0)<br>and<br>**M1** for 165 – *their* 16.50 or 148.5(0)<br>and<br>**M1** for their 148.5(0) – 25<br>If **M0** then **SC2** for 140 - 0.1 × 140 or 126 or **SC1** for 0.1 × 140 or 14<br>And<br>**A1** for 123.50 | |
| | (c)* | | Yes, Tom is right with 3 correct calculations<br>3 correct calculations with no or incorrect conclusion<br>or 2 correct calculations and correct decision for their figures<br>2 correct calculations | 4<br>3<br>2 | | Correct calculations could include<br>20.47 + 3 = 23.47<br>*their* 23.47 × 130 = 3051.10<br>*their* 3051.10 ÷ 1320 = 2.31(1…)<br>1320 × 2 = 2640 |

| Question | | | Answer | Marks | Guidance | |
|---|---|---|---|---|---|---|
| | | | 1 correct calculation | **1** | | |
| | | | | | | |
| | | | | | | |
| **5** | **(a)*** | | Assumptions re time at school & time awake stated & used to calculate proportions compared with proportion of accidents calculated using values read from graph with decision Hareen correct that follows their work & Emily incorrect with correct reasoning | **5** | | Treat use of incorrect age group as MR<br><br>Look for figures on bar chart<br><br>From bar chart age 10 -14<br>School injuries 55 – 62<br>Total injuries 158 – 160 |
| | | | Correct conclusion for Hareen with at least one assumption stated & method shown. May or may not have conclusion for Emily | **4 – 3** | For lower mark no or incorrect conclusion(s) with assumption(s) stated & some calculations working towards comparison with method shown. | Assumptions<br>Time at school 6 – 9 hours<br>Time awake 14 – 18 hours<br><br>Comparison eg 56/159 < 7/15 |
| | | | One correct assumption & one relevant reading from bar chart or one correct assumption leading to stated correct conclusion or one relevant reading leading to stated correct conclusion | **2 – 1** | For lower mark one correct assumption or one relevant reading from bar chart or conclusion Emily incorrect | e.g. Emily incorrect as spend more time at school than anywhere else |
| | **(b)** | **(i)** | Fully correct two-way table | **3** | **M2** for two –way table with four correct age groups defined & six correct places defined<br><br>Or **M1** for two-way table with either four correct age groups or six correct places or both age groups & places labelled<br><br>If **M0** then **SC1** for frequency table with 24 correct unique spaces | For M2, allow at up to two errors or omissions if either label age groups or places given |

| Question | | | Answer | Marks | Guidance | |
|---|---|---|---|---|---|---|
| | | **(ii)** | 8 in correct place in a two-way table | **1** | If **0** then **SC1** for 8 in unique space for age 5-9 & sports provided **SC1** awarded in **(b)(i)** | Allow '8' as tally marks or number |
| | | | | **90** | | |

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