# GCSE

## Mathematics A

General Certificate of Secondary Education

Unit **A502/01:** Mathematics B (Foundation Tier)

# Mark Scheme for November 2011

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone:     0870 770 6622
Facsimile:     01223 552610
E-mail:         publications@ocr.org.uk

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 awarded for a correct final 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).
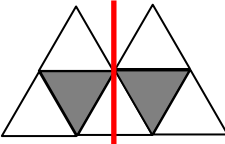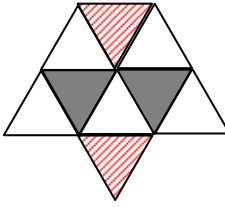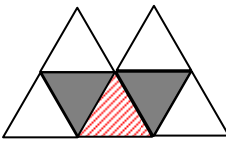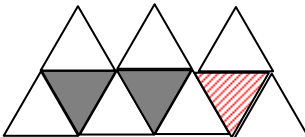
    For questions with FT available you must ensure that you refer back to the relevant previous answer.  You may find it easier to mark these questions candidate by candidate rather than question by question.
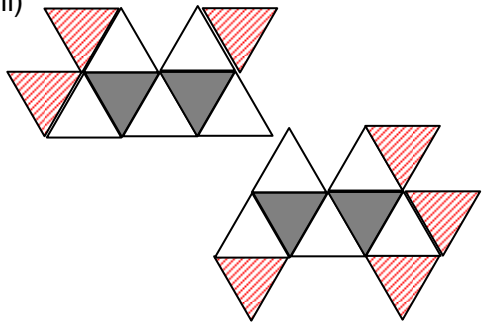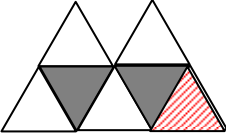
4   Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

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

    -   **cao** means **correct answer only**.
    -   **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.
    -   **isw** means **ignore subsequent working** (after correct answer obtained).
    -   **nfww** means **not from wrong working**.
    -   **oe** means **or equivalent**.
    -   **rot** means **rounded or truncated**.
    -   **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.
    -   **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
i       mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.

ii      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.

iii     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.
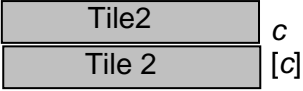
| 1 | (a) | 9 shaded sectors | 1 | Mark intention, condone slight overlaps | |
|---|-----|------------------|---|------------------------------------------|---|
| | (b) | $\dfrac{3}{8}$ | 2 | **B1** for $\dfrac{6}{16}$ oe <br><br> or $\dfrac{3}{8}$ seen but with further, wrong, working | Must be a fraction <br> Allow **B1** for 0.375 |
| | (c) | (i) [£] 24[.00] <br><br> (ii) (£) 16[.00] | 1 <br><br> 2FT | **M1** for *their* $24 \div 3 \times 2$ <br> **A1** for *their* 16 | Condone incorrect money notation eg £24.0 <br><br> If (i) $\neq$ 24 then *their* 16 must be correct to nearest p. |
| 2 | | 5.3,   5.6,   5.66,   6.5 <br><br> or <br><br> $\dfrac{1}{2}$ of 10.6, 10% of 56, $\dfrac{56.6}{10}$, $1.3 \times 5$ | 4 | **B4** for correct order of correct values/expressions <br> **If 0** <br> **M3** for all correct values seen <br> or <br> **M2** for three correct values seen <br> or <br> **M1** for two correct values seen <br> Or <br> **If 0** <br> **SC1** for correct order of four wrong values or correct placement of the original expressions using wrong valuations | 10% of 56 = 5.6 <br><br> ½ of 10.6 = 5.3 <br><br> $1.3 \times 5 = 6.5$ <br><br> $56.6 \div 10 = 5.66$ |

| 3 | (a) |  | 1 | Reasonably straight, mark intention | |
| | (b) | (i)  | 1 | **ONE** triangle aligned on axis of symmetry **and** touching whole side to whole side. Shading is irrelevant. <br><br> Condone no triangle drawn but **one** of the triangles shaded to give **one** line of symmetry <br><br>  <br> or <br> **One** large triangle added and correctly shaded to give **one** line of symmetry. <br> Eg <br>  | |

| | | | | | |
|---|---|---|---|---|---|
| | **(b)** | (ii)  | 1 | **ONE** triangle **not** aligned on axis of symmetry **and** touching whole side to whole side.<br><br>Condone no triangle drawn but **one** of the triangles shaded to give **no** lines of symmetry.<br>Eg<br><br>or<br>**One** large triangle added and correctly shaded to give **no** lines of symmetry. | |
| **4** | **(a)** | 32 | 1 | | |
| | **(b)** | 0.5 m or 50 cm nfww | 3 | **B2** for 0.5 or 50 as answer<br>or<br>**M2** for 10.1 – *their* 2.4 × 4 oe or<br>     10.1 – 2.3 – 2.3 – 2.3 – 2.3 – 4 × 0.1<br>or<br>**B1** for 2.4 or 4 × 0.1 or 0.4 or 4 × 10 or 40 seen | **M2** Implied by 10.1 – 4x2.13<br>Accept equivalent in cm for **M2** or **B1**. |

| 4 | (c) | 4 rolls and,<br>• Number of drops = 6 **and** 7 or 13 from clear, correct, working<br>• Number of rolls = 3.25 from clear, correct, working<br>Well set out, some annotation of steps | **4** | | Number of drops =<br>$3 \div 0.5$ oe + $5 \div 0.5$ oe.<br><br>6 + 7 = 13 drops<br><br>Number of rolls =<br>13 ÷ 4 = 3.25 |
|---|---|---|---|---|---|
| | | 4 rolls nfww but with some stages missed or unclear working or no annotation<br>or<br>4 rolls from no evidence<br>or<br>3 rolls from 13 ÷ 4 but rounded down | **3 - 2** | Two from<br>• $3 \div 0.5$ or $300 \div 50$ or 6 nfww<br>• $3.5 \div 0.5$ or $350 \div 50$ or 7 nfww<br>• $6.5 \div 0.5$ or $650 \div 5$<br>• 13 or *their* 6 drops + *their* 7 drops<br>• *Their* 13 drops ÷ 4<br>• Rounding UP *their* answer to *their* 13 drops ÷ 4 | 3.25 rounded up means that he needs 4 rolls<br><br>or<br>Total length of walls = 6.5(m)<br><br>Number of drops = $6.5 \div 0.5$ = 13 |
| | | One from<br>• $3 \div 0.5$ or $300 \div 50$ or 6 nfww<br>• $3.5 \div 0.5$ or $350 \div 50$ or 7 nfww<br>• $6.5 \div 0.5$ or $650 \div 5$<br>• 13 or *their* 6 drops + *their* 7 drops<br>• *Their* 13 drops ÷ 4<br>• Rounding UP *their* answer to *their* 13 drops ÷ 4 | **1** | | Number of rolls =<br>13 ÷ 4 = 3.25<br><br>3.25 rounded up means that he needs 4 rolls |
| | | | **0** | No relevant working **eg perimeters or areas**<br>2 x 3.0 = 6 scores 0 as part of perimeter calculation | |

| | (d) | Agreement statement | 1FT | **If answer to (c) is a number only assume "rolls"**<br><br>Yes / No [dependent on answer to **part (c)**]<br>•    Yes oe [following 4 rolls/16 strips or fewer in **(c)**]<br>•    No oe   [following more than 4 rolls/16 strips in **(c)**] | Strict FT.<br>There must be an answer to **(c)** to score first mark<br>EG<br>**0+0** for NR in **(c)** and "Yes"<br>**1+0** for 20 in **(c)** and "No, he needs 20 rolls to do the **whole** room"<br>**1+0** for 20 in **(c)** and "No, he needs 20 rolls" |
| | | Justification statement | 1 | Any correct justification for agreement statement<br>EG<br>•    Correct justification based on number of rolls or strips from **part (c)**<br>•    [No] it takes 13 rolls to cover 2 walls (after 13 from **part (c)**)<br>•    Mention of window or door not needing paper<br>•    Window "depth" unknown<br>•    Assumes other walls are the same as given<br>•    Assumes room is rectangular (cuboid)<br>•    The number of rolls was rounded up so there may be some spare<br>NB "He has doubled 4 so it is enough", scores 2. | **1+1** for 20 in **(c)** and "No, he needs 20 rolls to do the **2 walls**"<br>**1+1** for 20 in **(c)** and "No, he needs more than 20 rolls"<br><br>Marks are independent. |

| | | | | | |
|---|---|---|---|---|---|
| **5** | **(a)** | 20 | **1** | | |
| | **(b)** | 18 | **2** | **M1** for 360 ÷ *their* 20 | |
| **6** | **(a)** | 47 | **1** | | |
| | **(b)** | Any two times from 0930 to 0955 | **1** | If two times, **both** must be in the range<br>Condone a single time of **0935 to 0945**<br>Condone correct am/pm equivalents | |
| | | Sudden drop in number of cars passing | **1** | Any correct reference to "number of cars or graph dropping" | |

| 7 | (a) | $2a + 2b$ | 1 | Accept $a + a + b + b$ oe <br> Do not isw | EG $a + b + a + b$ <br> Condone 2x$a$ or $a$2 but not $a^2$ |
|---|-----|-----------|---|---|---|
|   | (b) | $2a + 2b + 2c$ <br> or <br> $2(a + b + c)$ | 2 | **B1** for $a + a + b + b + c + c$ oe or better <br> Mark final answer. If $2a + 2b + 2c$ seen but then spoiled, award 1 mark only. <br><br> **SC1** for (3 or 4)$a + 2b + 2c$ | Condone 2x$a$ or $a$2 but not $a^2$ |
|   | (c) |  | 2 | Must have at least one $a$ and one $c$ correctly marked and no **other** letters <br><br> **B1** for any drawing showing tiles marked "Tile 2" without letters. <br><br> **SC1** any shape showing 2$a$ and 4$c$ with perimeter $2a + 4c$. | "Tile 2" does not need to be written on either tiles so long as the overall length is marked as $a$ and the width of each tile is marked as $c$. |
| 8 | (a) | 121 or 144 | 1 | Condone $11 \times 11$ or $11^2$ or $12 \times 12$ or $12^2$ | NB 12x12=144 and 12 as answer scores 0 |
|   | (b) | (i)       $5^4$ | 1 | Do not accept 4 alone | |
|   |     | (ii)      $4^2 \times 7^4$ | 2 | **B1** for $4^2$ or $7^4$ seen (even for $4^2\,7^4$ or $4^2 + 7^4$) | |
|   | (c) | 64 | 2 | **B1** for $4^3$ or $4^{17-14}$ seen | |

| 9 | (a) | 128 | 1 | |  |
|---|---|---|---|---|---|
|  | (b) | 127 | 2 | **M1** for 360 – 72 – 161 (or 360 – (*their* 72 + 161)) | |
|  | (c) | (i)        [Angles on straight] line = 180° | 1 | **B0** for, it's half a right angle. | |
|  |  | (ii)      90 | 2 | **M1** for 180 – 2 × 45 | |
|  | (c) | (iii)*<br>Completely correct and clearly explained account using correct mathematical terms.<br>Must state that<br>• Square as name of shape<br>• **All** sides the same length<br>• 45 + 45 = 90<br>• **All** angles equal or 90 | 3 | | |
|  |  | Two from<br>• Square as name of shape<br>• **All** sides the same length<br>• 45 + 45 = 90<br>• **All** angles equal or 90 | 2 - 1 | One from<br>• Square as name of shape<br>• **All** sides the same length<br>• 45 + 45 = 90<br>• **All** angles equal or 90 | |
|  |  | Inconclusive and ambiguous statements such as,<br>"They are all the same."<br>"The *lines* are all the same length."<br>"It's a rectangle" | 0 | | |

| 10 | (a) | (i) 50 | 1 | | |
|----|-----|--------|---|---|---|
| | | (ii) 40 | 1 | | |
| | (b) | Single ruled line within overlay | 2 | Any length<br>**M1** for any 2 points plotted or implied by eg line through (0, 0) and (1, 55) | Line, if extended, must stay within tramlines.<br>½ square tolerance |
| | (c) | A1, 30 - 50 | 1 + 1 | If 0 scored **M1** for 330 or 290 | |
| | (d) | 3 hrs 20 mins | 1 | Allow anything (and any format) from 3h 10m to 3h 30m<br><br>(or FT their crossing point ± 10mins) | Condone 3:1[0] but not 3.1, however 3.2 to 3.5 are in range so OK<br>If no line, must be in range<br>If lines (nearly) parallel allow the mark for 'No crossing point' oe. |
| 11 | (a) | 5 points correct | 2 | **B1** for at least 2 points correct | Centre touching overlay<br>Do not zoom from "fit width"<br>Ignore any extra points |
| | (b) | Positive | 1 | Ignore references to strength | |
| | (c) | Point with greatest vertical distance above *y = x* | 1 | (45, 89) | |
| | | **Total** | 60 | | |

**OCR (Oxford Cambridge and RSA Examinations)**
**1 Hills Road**
**Cambridge**
**CB1 2EU**

**OCR Customer Contact Centre**

**Education and Learning**
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

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