# GCSE
# MATHEMATICS
# 8300/2F

Foundation Tier Paper 2 Calculator

**Mark scheme**

June 2019

Version: 1.0 Final

*196G83002F/MS*

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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**Glossary for Mark Schemes**

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

| | |
|---|---|
| **M** | Method marks are awarded for a correct method which could lead to a correct answer. |
| **A** | Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied. |
| **B** | Marks awarded independent of method. |
| **ft** | Follow through marks. Marks awarded for correct working following a mistake in an earlier step. |
| **SC** | Special case. Marks awarded for a common misinterpretation which has some mathematical worth. |
| **M dep** | A method mark dependent on a previous method mark being awarded. |
| **B dep** | A mark that can only be awarded if a previous independent mark has been awarded. |
| **oe** | Or equivalent. Accept answers that are equivalent.<br>eg accept 0.5 as well as $\frac{1}{2}$ |
| **[a, b]** | Accept values between a and b inclusive. |
| **[a, b)** | Accept values $a \leq$ value $< b$ |
| **3.14…** | Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416 |
| **Use of brackets** | It is not necessary to see the bracketed work to award the marks. |

Examiners should consistently apply the following principles

**Diagrams**

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

**Responses which appear to come from incorrect methods**

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

**Questions which ask students to show working**

Instructions on marking will be given but usually marks are not awarded to students who show no working.

**Questions which do not ask students to show working**

As a general principle, a correct response is awarded full marks.

**Misread or miscopy**

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

**Further work**

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

**Choice**

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

**Work not replaced**

Erased or crossed out work that is still legible should be marked.

**Work replaced**

Erased or crossed out work that has been replaced is not awarded marks.

**Premature approximation**

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

**Continental notation**

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 1 | 26 | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 2 | $\frac{3}{12}$ | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 3 | 3.6 | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 4 | 3270 | B1 | |
| | **Additional Guidance** | | |
| | | | |

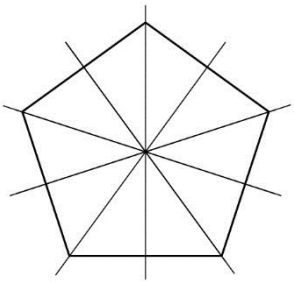
| Question | Answer | Mark | Comments |
|---|---|---|---|
| 5 | **Alternative method 1** | | |
| | 24 ÷ 4 × 3 or 18 | M1 | oe |
| | their 18 × 60 or 1080 | M1dep | oe<br>1080 implies M2 |
| | 1080 and $\frac{3}{4}$ (of a day) | A1 | |
| | **Alternative method 2** | | |
| | 24 × 60 or 1440 | M1 | oe |
| | their 1440 ÷ 4 × 3 or 1080 | M1dep | oe<br>1080 implies M2 |
| | 1080 and $\frac{3}{4}$ (of a day) | A1 | |
| | **Alternative method 3** | | |
| | 24 ÷ 4 × 3 or 18 | M1 | oe |
| | 1000 ÷ 60<br>or 16(.6…) or 16.7 or 17 | M1 | may be seen in either order (M marks not dependent)<br>[16 h 36 m, 16 h 42 m] implies division<br>16 or 17 may be embedded |
| | 16(.6…) or 16.7 or 17<br>or [16 h 36 m, 16 h 42 m]<br>and<br>18 and $\frac{3}{4}$ (of a day) | A1 | 16 or 17 may be embedded |

**Alternative method and Additional Guidance continued on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **5 cont** | **Alternative method 4** | | |
| | 24 × 60 or 1440 | M1 | oe |
| | 1000 ÷ their 1440 (× 100)<br>or $\frac{25}{36}$ or 0.69… or 69(…)% | M1dep | oe<br>$\frac{25}{36}$ or 0.69… or 69(…)% implies M2 |
| | $\frac{25}{36}$ and $\frac{27}{36}$ and $\frac{3}{4}$ (of a day)<br>or<br>0.69… and 0.75 and $\frac{3}{4}$ (of a day)<br>or<br>69(…)% and 75% and $\frac{3}{4}$ (of a day) | A1 | |
| | **Additional Guidance** | | |
| | Ignore units for the M marks but they must be correct, if given, for the A mark | | |
| | $\frac{3}{4}$ of 24 is insufficient method unless a correct method or 18 is seen | | |
| | Once 1000 ÷ 60 or 16 or 16.6… or 16.7 or 17 is seen in Alt method 3, ignore any incorrect conversion to hours and minutes. If the student only shows hours and minutes, they must be in the given range. | | |
| | Do not accept $\frac{3}{4}$ (of a day) in equivalent form eg 1080 or 18 | | A0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 6(a) | 494.325 or $\frac{19\,773}{40}$ or $494\frac{13}{40}$<br>or<br>40.96 or $\frac{1024}{25}$ or $40\frac{24}{25}$<br>or<br>535.29 or 535.3 or $\frac{107\,057}{200}$<br>or $535\frac{57}{200}$ | M1 | |
| | 535.285 | A1 | |
| | **Additional Guidance** | | |
| | Ignore any subsequent truncation or rounding if 535.285 seen in working | | M1A1 |
| 6(b) | $10^3$ and 2 and $6^2$<br>and 536<br>and indicates Sensible | B3ft | ft correct decision for comparing 536 with their 535.285<br>B2 $10^3$ and 2 and $6^2$ seen<br>B1 any two of 10, 2 and 6 seen<br>allow 1000 to imply 10 or $10^3$ and 36 to imply 6 or $6^2$ for B1 or B2 only |
| | **Additional Guidance** | | |
| | Students must give the correct ft decision for part (a) for B3 | | |
| | Correct decision for their (a) should be Sensible if their 535.285 is 530 or 540 to 2 sf. Otherwise they should indicate Not sensible | | |
| | Condone eg 10.00 for 10 etc | | |

<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">7</td><td>261.43</td><td>B1</td><td>in correct place</td></tr>
<tr><td>14.66</td><td>B1</td><td>in correct place</td></tr>
<tr><td>1517.04</td><td>B1</td><td>in correct place</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Date</th><th>Description</th><th>Credit (£)</th><th>Debit (£)</th><th>Balance (£)</th></tr>
<tr><td>01/04/2019</td><td>Starting balance</td><td></td><td></td><td>261.43</td></tr>
<tr><td>05/04/2019</td><td>Council tax</td><td></td><td>189.34</td><td>72.09</td></tr>
<tr><td>10/04/2019</td><td>Refund</td><td>14.66</td><td></td><td>86.75</td></tr>
<tr><td>12/04/2019</td><td>Salary</td><td>1430.29</td><td></td><td>1517.04</td></tr>
</table>
</td><td>B3</td></tr>
<tr><td colspan="2">Mark the table</td><td></td></tr>
<tr><td colspan="2">Condone £ and p on values</td><td></td></tr>
<tr><td colspan="2">Ignore working or values in shaded cells</td><td></td></tr>
<tr><td colspan="2">–14.66</td><td>2nd B0</td></tr>
</table>

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 8(a) | **Alternative method 1** | | |
| | 360 – 108 or 252 | M1 | oe eg 360 ÷ 5 + 180<br>may be on diagram |
| | their 252 × 5 | M1dep | oe eg 5 × (180 – 108) + 5 × 180<br>or 5 × 72 + 5 × 180 or 5 × (72 + 180) |
| | 1260 | A1 | SC1 answer 540 |
| | **Alternative method 2** | | |
| | 5 × 360 or 1800<br>**and** 5 × 108 or 540 | M1 | |
| | 5 × 360 – 5 × 108 or 1800 – 540 | M1dep | oe |
| | 1260 | A1 | SC1 answer 540 |
| | **Additional Guidance** | | |
| | Allow 252 seen on the diagram or in the working even if not used | | M1 |
| 8(b) | Line through each vertex to the midpoint of the opposite side<br> | B1 | mark intention |
| | **Additional Guidance** | | |
| | Allow dotted lines | | |
| 8(c) | There could be 0 or 1 | B1 | |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 9 | **Alternative method 1** | | |
| | 56 × 24.5 or 1372<br>or<br>21 × 27.5 or 577.5<br>or<br>(14 + 8) × 18 or 22 × 18<br>or 14 × 18 + 8 × 18 or 252 + 144<br>or 396 | M1 | amount for basic<br>or<br>amount for sports<br>or<br>amount for movies<br><br>oe |
| | Any **two** of<br>56 × 24.5 or 1372<br>or<br>21 × 27.5 or 577.5<br>or<br>(14 + 8) × 18 or 22 × 18<br>or 14 × 18 + 8 × 18 or 252 + 144<br>or 396 | M1dep | any **two** of the above implies M2 |
| | 56 × 24.5<br>+<br>21 × 27.5<br>+<br>(14 + 8) × 18 or 22 × 18<br>or 14 × 18 + 8 × 18 or 252 + 144<br>or<br>1372 + 577.5 + 396<br>or 2345.5 | M1dep | full method that would lead to 2345.5 if evaluated correctly implies M3 |
| | 2345.50 | A1 | |

**Alternative methods and Additional Guidance continued on the next pages**

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **9 cont** | **Alternative method 2** | | |
| | 14 × (24.5 + 27.5 + 18) or 14 × 70 or 980<br>or<br>7 × (24.5 + 27.5) or 7 × 52 or 364<br>or<br>8 × (24.5 + 18) or 8 × 42.5 or 340<br>or<br>27 × 24.5 or 661.5 | M1 | amount for all 3 packages<br>or<br>amount for basic + sports<br>or<br>amount for basic + movies<br>or<br>amount for basic only |
| | Any **two** of<br>14 × (24.5 + 27.5 + 18) or 14 × 70 or 980<br>or<br>7 × (24.5 + 27.5) or 7 × 52 or 364<br>or<br>8 × (24.5 + 18) or 8 × 42.5 or 340<br>or<br>27 × 24.5 or 661.5 | M1dep | any **two** of the above implies M2 |
| | 14 × (24.5 + 27.5 + 18) or 14 × 70<br>+<br>7 × (24.5 + 27.5) or 7 × 52<br>+<br>8 × (24.5 + 18) or 8 × 42.5<br>+<br>27 × 24.5<br>or<br>980 + 364 + 340 + 661.5<br>or 2345.5 | M1dep | full method that would lead to 2345.5 if evaluated correctly implies M3 |
| | 2345.50 | A1 | |

**Alternative method and Additional Guidance continued on the next pages**

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **9 cont** | **Alternative method 3** | | |
| | 56 × (24.5 + 27.5 + 18) or 56 × 70<br>or 3920<br>or<br>35 × 27.5 or 962.5<br>or<br>(27 + 7) × 18 or 34 × 18<br>or 27 × 18 + 7 × 18 or 486 + 126<br>or 612 | M1 | amount if everyone has all 3 packages<br>or<br>amount for not having sports<br>or<br>amount for not having movies |
| | Any **two** of<br>56 × (24.5 + 27.5 + 18) or 56 × 70<br>or 3920<br>or<br>35 × 27.5 or 962.5<br>or<br>(27 + 7) × 18 or 34 × 18<br>or 27 × 18 + 7 × 18 or 486 + 126<br>or 612 | M1dep | any **two** of the above implies M2 |
| | 56 × (24.5 + 27.5 + 18) or 56 × 70<br>or 3920<br>–<br>35 × 27.5 or 962.5<br>–<br>(27 + 7) × 18 or 34 × 18<br>or 27 × 18 + 7 × 18 or 486 + 126<br>or 612<br>or<br>3920 – 962.5 – 612<br>or 2345.5 | M1dep | full method that would lead to 2345.5 if evaluated correctly implies M3 |
| | 2345.50 | A1 | |

**Additional Guidance continued on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|

| | | |
|---|---|---|
| **9 cont** | **Additional Guidance** | |
| | 2345.50(p) | M1M1M1A1 |
| | 2345.5 | M1M1M1A0 |
| | Working may be seen on the diagram | |
| | Allow all decimal values to be seen as equivalent fractions<br>eg $\frac{1155}{2}$ for 577.5 for the M marks | |
| | A 'correct' calculation does not have to be evaluated correctly | |
| | Division or multiplication by 12 or division by 56 at the end will only lose the A mark<br>eg 2345.50 ÷ 56 = 41.88 per person | M1M1M1A0 |
| | For the first two marks use the scheme that awards the most credit and do not apply the rules of choice | |
| | Addition may be implied by a column of figures | |

| | | | |
|---|---|---|---|
| **10** | $90 \times \frac{3}{10}$ or 27 | M1 | oe |
| | their 27 × 2 | M1dep | oe<br>27 × 2 implies M2 |
| | 54 | A1 | SC1 answer 126 or answer 600 |
| | **Additional Guidance** | | |
| | Answer 54 | | M1M1A1 |
| | $\frac{3}{10}$ of 90 is insufficient method unless a correct method or 27 is seen or implied | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 11 | Any two of these criticisms<br>Letters are used instead of words<br>Gaps are different<br>Bar heights do not add up to 30 | B2 | B1 for any one correct criticism<br>ignore non-contradictory statements |
| | **Additional Guidance** | | |
| | There's no key | | B1 |
| | It's not clear what C stands for / what type of vehicle it is | | B1 |
| | She's only used first letters | | B1 |
| | Labels are wrong (insufficient – needs to specify which labels) | | B0 |
| | The bars aren't evenly / equally spaced or are spread unevenly | | B1 |
| | The Van bar is too far away from the Car bar | | B1 |
| | The second gap is smaller | | B1 |
| | The Van bar is out of place | | B1 bod |
| | The $x$-axis is not evenly spread / spaced | | B1 |
| | The positioning of the bars is wrong | | B1 |
| | The bars should be 1 cm apart | | B0 |
| | Not distributed evenly | | B0 |
| | There are only 28 vehicles | | B1 |
| | 14 + 4 + 10 = 28 (not 30) | | B1 |
| | It doesn't / they don't add up to 30 | | B1 |
| | She is 2 vehicles short | | B1 |
| | She hasn't drawn all 30 **cars** on the chart | | B0 |
| | 14 should be 16 | | B0 |
| | Number of vehicles should go up to 30 not 14 | | B0 |
| | Number of vehicles is wrong (doesn't mention 30 or 28 or 2) | | B0 |
| | 14 + 4 + 10 = 26 not 30 (error seen) | | B0 |

**Additional Guidance continued on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|

| | | |
|---|---|---|
| **11 cont** | Three criticisms, two correct and one non-contradictory | B2 |
| | Three criticisms, two correct and one incorrect | B1 |
| | Non-contradictory statements can be ignored<br>eg The chart is too small and the vehicles don't add up to 30 | B1 |
| | The title is incorrect | B0 |
| | The $y$-axis isn't tall enough | B0 |
| | She doesn't give a time-frame / She should record colours | B0 |
| | Both criticisms may be seen in one sentence<br>eg The bars don't add up to 30 and are spread unevenly | B2 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 12 | **Alternative method 1** | | |
| | 10 × 40 or 400<br>or<br>18 × 40 or 720 | M1 | |
| | 10 × 40 × 18 × 40 | M1dep | oe implies M2 |
| | 288 000 | A1 | implies M2A1 |
| | Kitchen | A1ft | correct decision for their area with M2 awarded<br>accept 300 000 for Kitchen |
| | **Alternative method 2** | | |
| | 10 × 18 or 180<br>**and**<br>$40^2$ or 1600 | M1 | oe<br><br>10 × 18 × 40 **and** 300 000 ÷ 40<br>implies M2 |
| | $10 \times 18 \times 40^2$<br>or<br>10 × 18 **and** 300 000 ÷ $40^2$ | M1dep | |
| | 288 000<br>or<br>180 **and** 187.5<br>or<br>7200 **and** 7500 | A1 | implies M2A1 |
| | Kitchen | A1ft | correct decision for their area with M2 awarded<br>accept 300 000 for Kitchen |

**Alternative methods and Additional Guidance continued on the next pages**

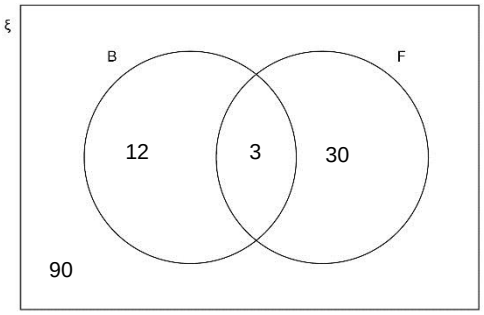
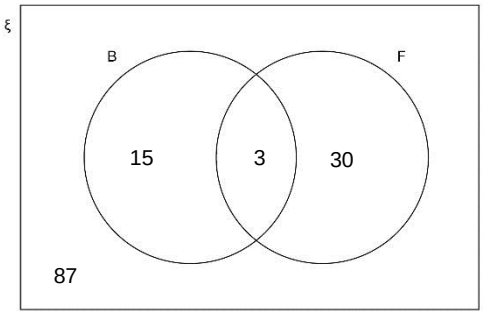
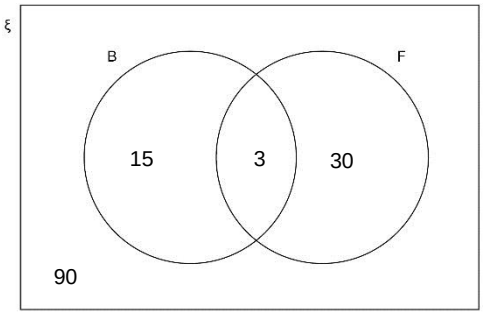
| Question | Answer | Mark | Comments |
|---|---|---|---|
| 12 cont | **Alternative method 3 (working in metres)** | | |
| | 0.1 × 40 or 4<br>or<br>0.18 × 40 or 7.2 | M1 | |
| | 0.1 × 40 × 0.18 × 40 or 28.8 | M1dep | oe implies M2 |
| | 28.8 **and** 30 | A1 | implies M2A1 |
| | Kitchen | A1ft | correct decision for their area with M2 awarded<br>accept 300 000 for Kitchen |
| | **Alternative method 4 (working in metres)** | | |
| | 0.1 × 0.18 or 0.018<br>**and**<br>$40^2$ or 1600 | M1 | oe<br>0.1 × 0.18 × 40 **and** 30 ÷ 40<br>implies M2 |
| | 0.1 × 0.18 × $40^2$ or 28.8<br>or<br>0.1 × 0.18 **and** 30 ÷ $40^2$ | M1dep | |
| | 28.8 **and** 30<br>or<br>0.018 **and** 0.01875<br>or<br>0.72 **and** 0.75 | A1 | implies M2A1 |
| | Kitchen | A1ft | correct decision for their area with M2 awarded<br>accept 300 000 for Kitchen |

**Additional Guidance continued on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|

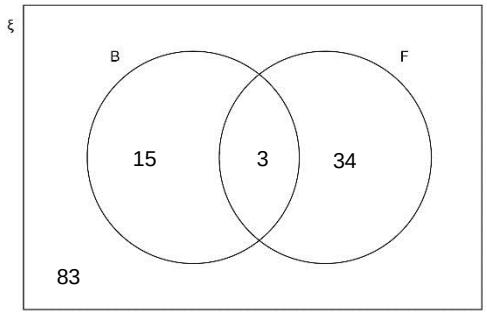
| | | |
|---|---|---|
| **12 cont** | **Additional Guidance** | |
| | 288 000 and Kitchen | M1M1A1A1 |
| | 288 000 | M1M1A1 |
| | 10 × 40 = 4000, 18 × 40 = 720 and 2 880 000 and Bedroom | M1M1A0A1ft |
| | 4000 and 720 and 2 880 000 and Bedroom (only 720 scores) | M1M0A0A0ft |
| | Ignore any incorrect attempt to subtract 288 000 from 300 000 | |
| | Any attempt to change units must be correct | |
| | NB 10 × 40 = 400, 10 × 18 = 180<br>400 × 180 = 72 000 and 300 000 – 72 000 = 228 000 and Kitchen | M1<br>M0A0A0 |

| | | | |
|---|---|---|---|
| **13** | 210 ÷ 2 × 5<br>or 105 × 5 or 1050 ÷ 2<br>or<br>210 : 525 | M1 | oe<br>eg 210 × 2.5 or 420 + 105 |
| | 525 | A1 | |
| | **Additional Guidance** | | |
| | Further work after reaching 525 | | M0A0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 14(a) | 3 in the intersection | B1 | |
| | 12 in the left hand part of B | B1 | |
| | 30 in the right hand part of F | B1 | |
| | All four sections total 135 | B1 | must be using integers > 0 and have one integer in each of the four sections |
| | **Additional Guidance** | | |
| | Mark the diagram | | |
| | Ignore any correct or incorrect numbers on the diagram outside the rectangle eg 135 | | |
| |  | | B1B1B1B1 |
| |  | | B1B0B1B1 |
| |  | | B1B0B1B0 |

**Additional Guidance continued on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|

| | | |
|---|---|---|
| **14(a) cont** |  | B1B0B0B1 |
| | Two integers in one section is choice and doesn't score the mark for that section or the final mark | |
| | Condone multiple letters or tallies or crosses etc instead of numbers for all the marks | |

| | | | |
|---|---|---|---|
| **14(b)** | $\frac{15}{135}$ or $\frac{5}{45}$ or $\frac{3}{27}$ or $\frac{1}{9}$<br>or $0.\dot{1}$ or 0.11(1…) or 11(.1…)% | B1 | oe fraction decimal or percentage |
| | **Additional Guidance** | | |
| | Ignore attempts to simplify or convert a correct fraction to a decimal or percentage | | |
| | 15 out of 135 | | B0 |
| | 0.1 without correct fraction seen | | B0 |
| | Ratio | | B0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 15(a) | (0, 3) | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 15(b) | (–3, 0) | B1 | SC1 (–3, 0) in (a) and (0, 3) in (b)<br>or (3, 0) in (a) and (0, –3) in (b) |
| | **Additional Guidance** | | |
| | (–3, 0) in (a) and (0, 3) in (b) | | (a) 0 (b) SC1 |
| | (3, 0) in (a) and (0, –3) in (b) | | (a) 0 (b) SC1 |
| 16(a) | [4, 5] | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 16(b) | Correct ruled straight line from (–25, –50) to (25, 50) | B2 | $\pm \frac{1}{2}$ small square<br>ignore ends of line outside [–25, 25]<br><br>B1 two correct points added to the table<br>or at least two correct points plotted<br>or correct line too short but crosses 2 horizontal centimetre squares |
| | **Additional Guidance** | | |
| | The correct points in the table or on the graph may be outside [–25, 25] eg (100, 200) and (–100, –200) in the table | | B1 |
| | For B1, do not count a point as correct if another point has the same *x*-coordinate, otherwise ignore extra points that are incorrect | | |
| | The B1 for points plotted cannot be implied by a line – you must see eg crosses or dots | | |
| | Ignore incorrect points in the table if B1 or B2 gained elsewhere | | |

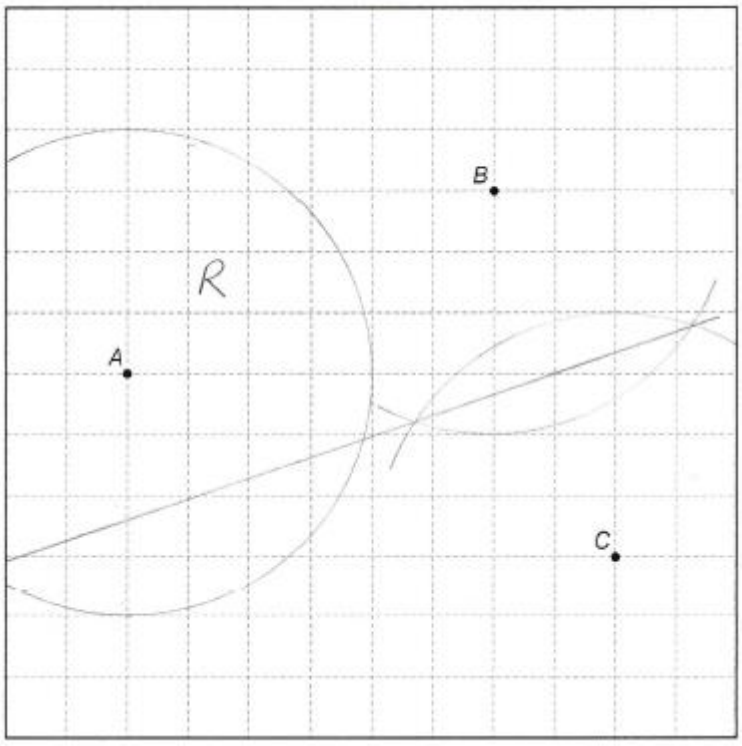
| Question | Answer | Mark | Comments |
|---|---|---|---|
| 16(c) | Correct reading of $C$ coordinate of intersection of their graph with the given graph | B2ft | ft their intersection from any line or curve<br>$\pm \frac{1}{2}$ small square<br>B1 line drawn horizontally from point of intersection to vertical axis<br>or<br>$F$ coordinate of intersection given |
| | **Additional Guidance** | | |
| | Their line does not intersect given line or they have no line | | B0 |
| | If their graph intersects given line at more than one point and they give **all** the $C$ coordinates of the intersections | | B1 |
| | If their line is correct the answer should be approximately –25 | | |
| | If their line is correct the $F$ coordinate should be approximately –12 | | |
| | Both their –25 and their –12 given<br>eg correct line seen and (–25, –12) or (–12, –25) | | B1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **17(a)** | $n + 5$ or $5 + n$ | B1 | oe eg $N – 2 + 7$ |
| | **Additional Guidance** | | |
| | Letters other than $n$ or $N$ eg $x + 5$ | | B0 |

| | | | |
|---|---|---|---|
| **17(b)** | $n + n – 2$ + their $(n + 5)$<br>or $3n + 3$ | M1 | condone any letter<br>ft their algebraic expression in (a) |
| | $3n + 3 = 60$<br>or $(n =)$ 19<br>or $(n – 2 =)$ 17 | M1dep | ft their algebraic expression in (a)<br>correct ft equation with terms on LHS collected<br>19 10p coins or 17 20p coins<br>or 19, 17, 24 chosen implies M2 |
| | (their 19 – 2) × 0.2<br>or their 17 × 0.2 or 3.4<br>or<br>(their 19 – 2) × 20<br>or their 17 × 20 or 340 | M1dep | ft their algebraic expression in (a)<br>3.4 or 340 implies M3 |
| | 3.40 | A1 | condone 3.40p<br>SC2 answer 17 |
| | **Additional Guidance** | | |
| | Allow a restart in this part ie answer £3.40 scores full marks | | |
| | Working may be seen by the table | | |
| | Answer 340p | | M1M1M1A0 |
| | £3.40 with answer eg £17.30 (total of all coins) | | M1M1M1A0 |
| | Only follow through their algebraic expression from (a) if an expression and / or equation for the total number of coins is used in this part | | |
| | Award the M mark(s) for a correct ft expression or equation even if not subsequently used | | |
| | The solution to an equation derived from an incorrect expression in (a) can score the first three marks eg answer in (a) $n – 5$<br>then working in (b) $n + n – 2 + n – 5 = 60$ $n = [22, 23]$<br>$([22, 23] – 2) \times 0.2 = [4, 4.20]$ | | M1M1<br>M1A0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **18** | 0.5 × 10 × 12 or 60 | M1 | oe |
| | 180 ÷ their 60 | M1dep | |
| | 3 | A1 | SC1 1.5 oe |
| | **Additional Guidance** | | |
| | | | |
| **19** | Increasing straight line starting at (0, 0) | B1 | mark intention<br>any constant positive gradient<br>may be shown by at least three points starting at (0, 0) |
| | **Additional Guidance** | | |
| | Must look straight and look as though the intention was to start at the origin | | |
| | Allow a dotted line | | |
| | Ignore work outside the quadrant | | |
| | Ignore construction marks, scales, labels and points plotted | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 20 | Arc, centre *A*, radius 4 cm on grid | B1 | at least a quarter-circle ± 2 mm radius<br>ignore any other arcs |
| | Correct straight line equidistant from *B* and *C* | B1 | their line must intersect any two of the five grid vertices (0, 3), (3, 4), (6, 5), (9, 6), (12, 7)<br>± 2 mm |
| | Correct enclosed region identified | B1 | ± 2 mm for the line at (0, 3), (6, 5) and the arc at (6, 6), (2, 10)<br>region may be identified by labelling R or by shading<br>implies B3 |
| | **Additional Guidance** | | |
| |  | | B1B1B1 |
| | Arc must be drawn using compasses for the first and third marks | | |
| | If a quarter-circle is in tolerance, ignore the rest of the arc for first B1 | | |
| | Grid points are based on the origin being bottom left | | |
| | Use (6, 5) not the intersection of the arc and the line to test the region | | |
| | Lines may be dotted | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 21 | **Alternative method 1** | | |
| | 18 ÷ 36 or 0.5 or 30 | M1 | oe<br>implied by 3.5 or 3 h 30 min or 3.3(0) or 210 seen |
| | $\frac{200-18}{4-\text{their } 0.5}$ or $\frac{182}{3.5}$<br>or<br>$\frac{200-18}{4\times 60-\text{their } 30}$ or $\frac{182}{210}$<br>or 0.86(6…) or 0.87 | M1dep | oe method for miles per hour or miles per minute<br>implied by $\frac{182}{3\text{ h }30\text{ min}}$ or $\frac{182}{3.3(0)}$ |
| | 52 | A1 | |
| | **Alternative method 2** | | |
| | 18 ÷ 36 or 0.5 or 30 | M1 | implied by 7 |
| | $\frac{200}{4}+\frac{50-36}{7}$ or 50 + 2 | M1dep | oe |
| | 52 | A1 | |
| | **Additional Guidance** | | |
| | Allow the first mark even if not subsequently used | | |
| | Ignore units for the M marks | | |
| | Answer 0.86(6…) or 0.87 | | M1M1A0 |
| | Answer 0.86(6…) or 0.87 with mph crossed out and replaced by miles per min oe | | M1M1A1 |
| | Working for 52 then (52 + 36) ÷ 2 | | M1M1A0 |
| | NB 50 + 2 = 52 from 200 ÷ 4 = 50 and 36 ÷ 18 = 2 | | Zero |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 22 | **Alternative method 1** | | |
| | $8^2$ or 64<br>and<br>$17^2$ or 289 | M1 | |
| | $\sqrt{17^2 - 8^2}$ or $\sqrt{225}$ or 15 | M1dep | oe<br>implies M2<br>may be seen on diagram |
| | 8 × 3 × their 15<br>or 24 × their 15 | M1dep | dep on M2<br>oe eg (8 + 16) × their 15<br>or 0.5 × 8 × their 15 × 6 |
| | 360 | A1 | SC2 [448.8, 456] |
| | **Alternative method 2** | | |
| | $\cos C = \frac{8}{17}$ or $C$ = [61.9, 62] | M1 | may be seen on diagram |
| | 17 × sin their [61.9, 62]<br>or [14.9, 15.1] | M1dep | may be seen on diagram<br>oe eg 8 × tan their [61.9, 62] |
| | 8 × 3 × their [14.9, 15.1]<br>or 24 × their [14.9, 15.1]<br>or [357.6, 362.4] | M1dep | dep on M2<br>oe eg (8 + 16) × their [14.9, 15.1]<br>or 0.5 × 8 × their [14.9, 15.1] × 6 |
| | 360 | A1 | SC2 [448.8, 456] |
| | **Alternative method 3** | | |
| | $\sin A = \frac{8}{17}$ or $A$ = [28, 28.1] | M1 | may be seen on diagram |
| | 17 × cos their [28, 28.1]<br>or [14.9, 15.1] | M1dep | may be seen on diagram<br>oe eg 8 ÷ tan their [28, 28.1] |
| | 8 × 3 × their [14.9, 15.1]<br>or 24 × their [14.9, 15.1]<br>or [357.6, 362.4] | M1dep | dep on M2<br>oe eg (8 + 16) × their [14.9, 15.1]<br>or 0.5 × 8 × their [14.9, 15.1] × 6 |
| | 360 | A1 | SC2 [448.8, 456] |

**Alternative method and Additional Guidance continued on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **22 cont** | **Alternative method 4** | | |
| | cos $C = \frac{8}{17}$ or $C$ = [61.9, 62] | M1 | may be seen on diagram |
| | $\frac{1}{2}$ × 8 × 17 × sin their [61.9, 62]<br>or [59.9, 60.1] | M1dep | oe |
| | 6 × their [59.9, 60.1]<br>or [357.6, 362.4] | M1dep | oe |
| | 360 | A1 | SC2 [448.8, 456] |
| | **Additional Guidance** | | |
| | 15 without a contradictory value for *AB* scores the first two marks on Alt method 1, even if not subsequently used | | M1M1 |
| | $\sqrt{17^2 + 8^2}$ | | M1M0 |
| | 3rd M1 is for the total area and may be calculated in various ways eg using a trapezium + a triangle | | |
| | 3rd M1 is for the total area so further work will lose the mark<br>eg 360 seen followed by 360 – 60, answer 300 | | M1M1M0A0 |
| | May use sine rule or cosine rule but must reach *AB* = …. to award the second M1 in Alt 2 or 3 | | |

| | | | |
|---|---|---|---|
| **23(a)** | continuous grouped | B1 | both circled |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 23(b) | **Alternative method 1** | | |
| | 380 ÷ 2<br>or<br>(380 + 1) ÷ 2<br>or<br>381 ÷ 2<br>or<br>190 or 190.5 or 191 | M1 | oe eg $\frac{59+158+106+45+12}{2}$<br>may be seen by the table |
| | $2 < t \leqslant 4$<br>with<br>190 or 190.5 or 191 seen | A1 | |
| | **Alternative method 2** | | |
| | $2 < t \leqslant 4$<br>with<br>59 + 158 – 106 – 45 – 12 = 54 seen | B2 | oe calculation eg 217 – 163 = 54<br>B1 59 + 158 – 106 – 45 – 12 = 54 oe |
| | **Additional Guidance** | | |
| | $2 < t \leqslant 4$ with 190 or 190.5 or 191 not seen | | M0A0 |
| | Condone 2 – 4 in both or one of the spaces on answer line<br>if 190 or 190.5 or 191 seen | | M1A1 |
| | Condone missing brackets if recovered | | |
| | Alt 2 54 with calculation not seen | | B0 |
| | Alt 2 $2 < t \leqslant 4$ and 54 with calculation not seen | | B0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 23(c) | $\frac{45+12}{380}$ or $\frac{57}{380}$ or $\frac{3}{20}$ or 0.15<br>or $100 \div \frac{380}{57}$ or $57 \div 3.8$ | M1 | oe proportion or calculation<br>must use 380 |
| | 15 | A1 | |
| | **Additional Guidance** | | |
| | $1 - \frac{59+158+106}{380}$ or $1 - \frac{323}{380}$ or $1 - \frac{17}{20}$ or $1 - 0.85$ | M1 | |
| | Correct proportion seen even if not subsequently used | M1A0 | |
| | Do not allow misreads of 380 | | |
| | Build-up<br>eg 10% = 380 ÷ 10 or 38<br>5% = 38 ÷ 2 or 19<br>38 + 19 = 57<br>is M0A0 unless answer 15 | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 24 | –1 0 1 2 | B3 | B2 three correct values with no incorrect values<br>or<br>–3 –2 –1 0 1 2 and –1 0 1 2 3 4 5<br>or<br>interval that contains only the integers –1 0 1 2<br><br>B1 –3 –2 –1 0 1 2<br>or –1 0 1 2 3 4 5<br><br>SC2 answer 2 3 4 5 |

| Additional Guidance | |
|---|---|
| Examples of intervals that contain only the integers –1 0 1 2<br>$-1 \leqslant x \leqslant 2$ or [–1, 2] or $-2 < x < 3$ or (–2, 3) | |
| –1 0 1 2 3 4 5 may be shown as an interval that contains only these integers eg $-1 \leqslant x < 6$ or [–1, 6) | |
| Intervals can be shown on a number line | |
| –3 –2 –1 0 1 2 can **not** be shown as an interval or on a number line | |
| Lists may be in any order eg 1 2 3 4 5 –1 0 | B1 |
| Condone repeats in lists eg –1 0 1 1 2 | B3 |
| Ignore commas/and/or between numbers in lists | |
| –3 –2 –1 0 1 2 3 4 5 with no other valid working | B0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 25 | **Alternative method 1** | | |
| | (65% =) $\frac{13}{20}$<br>or 7 : 13 | M1 | |
| | 13 | A1 | must be selected as the answer |
| | **Alternative method 2** | | |
| | (100 – 35) ÷ 35 × 7<br>or<br>7 ÷ 35 × 100 – 7 or 20 – 7 | M1 | oe eg 35 ÷ 7 = 5 and 65 ÷ 5 |
| | 13 | A1 | must be selected as the answer |
| | **Alternative method 3** | | |
| | $\frac{35}{7} \times n = 100 - 35$<br>or $5n = 65$ | M1 | oe equation<br>eg $\frac{7}{n} = \frac{35}{100-35}$<br>or $35n = 455$ |
| | 13 | A1 | must be selected as the answer |
| | **Additional Guidance** | | |
| | 35 : 65 with no other valid working | | M0 |
| | Condone answer £13 | | M1A1 |
| | Answer 13% or 13$n$ | | M1A0 |
| | 65% = 0.65 | | M0 |
| | Alt 2 65 ÷ 35 = 1.9<br>1.9 × 7 = 13.3 (evidence of premature approximation)<br>Answer 13 | | <br>M1<br>A0 |
| | Alt 2 65 ÷ 35 = 1.9<br>1.9 × 7 = 13 (assume full calculator value used) | | M1<br>A1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 26 | 0.25 | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 27 | $y = 3x$ | B1 | |
| | **Additional Guidance** | | |
| | | | |
| 28 | $10n + 1$ or $1 + 10n$ | B2 | B1 $10n$ (…) |
| | **Additional Guidance** | | |
| | Ignore LHS of formula given eg $Tn = 10n + 1$ | | B2 |
| | Condone $n = 10n + 1$ or $n$th term $= 10n + 1$ | | B2 |
| | Allow other variables eg $10x + 1$ | | B2 |
| | Allow a multiplication sign eg $10 \times n + 1$ or $n \times 10 + 1$ | | B2 |
| | $n10$ … | | B1 |
| | $n10 + 1$ | | B1 |
| | $10n + 1n$ | | B0 |
| | Choice eg $10n + 1$ and $1n + 10$ | | B0 |