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# GCSE Mathematics

Paper 1 Foundation Tier

Mark scheme

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8300  
November 2017

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Version: 1.0 Final

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.

Further copies of this mark scheme are available from [aqa.org.uk](http://aqa.org.uk)

## 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.

|                        |                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>M</b>               | Method marks are awarded for a correct method which could lead to a correct answer.                                                    |
| <b>A</b>               | 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>B</b>               | Marks awarded independent of method.                                                                                                   |
| <b>ft</b>              | Follow through marks. Marks awarded for correct working following a mistake in an earlier step.                                        |
| <b>SC</b>              | Special case. Marks awarded for a common misinterpretation which has some mathematical worth.                                          |
| <b>M dep</b>           | A method mark dependent on a previous method mark being awarded.                                                                       |
| <b>B dep</b>           | A mark that can only be awarded if a previous independent mark has been awarded.                                                       |
| <b>oe</b>              | Or equivalent. Accept answers that are equivalent.<br>eg accept 0.5 as well as $\frac{1}{2}$                                           |
| <b>[a, b]</b>          | Accept values between a and b inclusive.                                                                                               |
| <b>[a, b)</b>          | Accept values $a \leq \text{value} < b$                                                                                                |
| <b>3.14...</b>         | Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416                                                                                 |
| <b>Use of brackets</b> | 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 |
|-----------|----------------------------|------|----------|
| <b>1</b>  | 0.6                        | B1   |          |
|           | <b>Additional Guidance</b> |      |          |
|           |                            |      |          |
| <b>2</b>  | 75                         | B1   |          |
|           | <b>Additional Guidance</b> |      |          |
|           |                            |      |          |
| <b>3</b>  | Rhombus                    | B1   |          |
|           | <b>Additional Guidance</b> |      |          |
|           |                            |      |          |
| <b>4</b>  | -19                        | B1   |          |
|           | <b>Additional Guidance</b> |      |          |
|           |                            |      |          |
| <b>5a</b> | 17                         | B1   |          |
|           | <b>Additional Guidance</b> |      |          |
|           |                            |      |          |
| <b>5b</b> | 9                          | B1   |          |
|           | <b>Additional Guidance</b> |      |          |
|           |                            |      |          |

| Question | Answer                                                                                                                 | Mark | Comments                                                                                                  |
|----------|------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------|
| 5c       | -2                                                                                                                     | B1   |                                                                                                           |
|          | Additional Guidance                                                                                                    |      |                                                                                                           |
|          |                                                                                                                        |      |                                                                                                           |
| 6a       | Division set up, with 8 and a remainder 3 seen in correct position<br>or<br>$830 \leq \text{answer} < 840$ but not 834 | M1   | $\begin{array}{r} 8 \\ 91 \overline{) 91374} \\ \underline{8} \phantom{00} \\ 3 \phantom{00} \end{array}$ |
|          | 834                                                                                                                    | A1   |                                                                                                           |
|          | Additional Guidance                                                                                                    |      |                                                                                                           |
|          | Build up method or chunking method must lead to<br>$830 \leq \text{answer} < 840$ to score M1 or better                |      |                                                                                                           |

| Question | Answer                                                                                                                                                                                                                                                                                                        | Mark | Comments                                                                               |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------|
| 6b       | $\frac{35}{42} (+) \frac{18}{42}$                                                                                                                                                                                                                                                                             | M1   | oe<br>fractions with a correct common denominator and at least one correct numerator   |
|          | $\frac{53}{42}$                                                                                                                                                                                                                                                                                               | A1   | oe improper fraction                                                                   |
|          | $1 \frac{11}{42}$                                                                                                                                                                                                                                                                                             | B1ft | oe mixed number<br>ft for correct conversion of an improper fraction to a mixed number |
|          | <b>Additional Guidance</b>                                                                                                                                                                                                                                                                                    |      |                                                                                        |
|          | For B1ft the mixed number must not be an integer                                                                                                                                                                                                                                                              |      |                                                                                        |
|          | Beware $5 + 3 = 53$                                                                                                                                                                                                                                                                                           |      | M0                                                                                     |
|          | When attempts are made to cancel the fraction, full marks cannot be scored<br>$\frac{53}{42} = \frac{9}{4} = 2 \frac{1}{4}$ (attempt to cancel occurs before conversion to mixed number)<br>$\frac{53}{42} = 1 \frac{11}{42} = 1 \frac{1}{3}$ (attempt to cancel occurs after completely correct answer seen) |      | M1A1B0<br><br>M1A1B0                                                                   |
| 7a       | 4                                                                                                                                                                                                                                                                                                             | B1   |                                                                                        |
|          | <b>Additional Guidance</b>                                                                                                                                                                                                                                                                                    |      |                                                                                        |
|          |                                                                                                                                                                                                                                                                                                               |      |                                                                                        |

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

|    |                                                     |       |                                            |
|----|-----------------------------------------------------|-------|--------------------------------------------|
| 7b | $3 + 6 + 6 + 9 + 4$ or 28                           | M1    | at least four correct and intention to add |
|    | their $28 \div 4$                                   | M1dep | oe                                         |
|    | 7                                                   | A1    |                                            |
|    | <b>Additional Guidance</b>                          |       |                                            |
|    | Totals other than 28 must be evidenced for M1 or M2 |       |                                            |
|    | $3 + 6 + 6 + 9 + 4 = 29$ , $29 \div 4$ , answer = 7 |       | M1M1A0                                     |

|   |                                                                           |      |                                                                                                      |
|---|---------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------|
| 8 | 17 (days)                                                                 | B1   | may be implied                                                                                       |
|   | their $17 \times 8$ or 136<br>or<br>their $17 \times 0.08$                | M1   | oe<br>eg build up – must be fully correct method<br>repeated addition can imply their number of days |
|   | 1.36                                                                      | A1ft | ft their 17<br>accept 136p if £ sign deleted                                                         |
|   | <b>Additional Guidance</b>                                                |      |                                                                                                      |
|   | 16 (days) and £1.28<br>18 (days) and £1.44                                |      | B0M1A1ft<br>B0M1A1ft                                                                                 |
|   | Answer only £1.28<br>Answer only £1.44                                    |      | B0M0A0<br>B0M0A0                                                                                     |
|   | Beware digits arising from incorrect work<br>eg $18 \times 0.8 = 14.4(0)$ |      | B0M0A0                                                                                               |
|   | Condone £1.36p                                                            |      | B1M1A1                                                                                               |

| Question | Answer                                                                                                                                                                                             | Mark | Comments                           |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------|
| 9a       | $\frac{3}{25}$ or 0.12 or 12%                                                                                                                                                                      | B1   | oe fraction, decimal or percentage |
|          | <b>Additional Guidance</b>                                                                                                                                                                         |      |                                    |
|          | Do not accept ratios                                                                                                                                                                               |      |                                    |
|          | Ignore use of words<br>eg 3 out of 25 = $\frac{3}{25}$<br>eg 3 in 25 (only)                                                                                                                        |      | B1<br>B0                           |
|          | 12                                                                                                                                                                                                 |      | B0                                 |
|          | Ignore attempts to simplify $\frac{3}{25}$<br>eg $\frac{3}{25} = \frac{1}{8}$ (attempt to simplify)<br>$\frac{3}{25} = 0.03$ (attempt to convert to a decimal)<br>$\frac{3}{25} = 3 : 25$ (choice) |      | B1<br>B1<br>B0                     |

| Question  | Answer                                   | Mark | Comments                                                                                                                                                                                                                                                                                      |
|-----------|------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>9b</b> | E1, E3<br>and<br>E3, E4<br>and<br>C2, D2 | B2   | B1 for<br>1 pair correct and 0 incorrect<br>or<br>2 pairs correct and 0 incorrect<br>or<br>2 pairs correct and 1 incorrect<br>or<br>3 pairs correct and 1 incorrect<br>or<br>E1, E3, (E3), E4, C2 and D2 listed, but not clearly in pairs and with no additional squares other than E2 listed |
|           |                                          |      | <b>Additional Guidance</b>                                                                                                                                                                                                                                                                    |
|           |                                          |      | Accept 1E for E1 etc                                                                                                                                                                                                                                                                          |
|           |                                          |      | Ignore listing of E2 if included                                                                                                                                                                                                                                                              |
|           |                                          |      | Ignore any annotations on diagram                                                                                                                                                                                                                                                             |
|           |                                          |      | If pairings seen in working, allow list without pairings on answer line                                                                                                                                                                                                                       |

| Question                                                                                                                                               | Answer                                                                                                                                                                                                         | Mark       | Comments                                                                          |  |  |  |       |                  |  |  |        |    |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------|--|--|--|-------|------------------|--|--|--------|----|----------------------------|
| 10                                                                                                                                                     | <table><tr><th>Fraction</th><th>Percentage</th></tr><tr><td></td><td></td></tr><tr><td></td><td>30(%)</td></tr><tr><td><math>\frac{43}{100}</math></td><td></td></tr><tr><td></td><td>250(%)</td></tr></table> | Fraction   | Percentage                                                                        |  |  |  | 30(%) | $\frac{43}{100}$ |  |  | 250(%) | B3 | B1 for each correct answer |
|                                                                                                                                                        | Fraction                                                                                                                                                                                                       | Percentage |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        |                                                                                                                                                                                                                |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        |                                                                                                                                                                                                                | 30(%)      |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
| $\frac{43}{100}$                                                                                                                                       |                                                                                                                                                                                                                |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        | 250(%)                                                                                                                                                                                                         |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
| Additional Guidance                                                                                                                                    |                                                                                                                                                                                                                |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
| Do not accept fractions with non-integer numerator or denominator<br>eg $\frac{4.3}{10}$ (unless it is an attempt to cancel after correct answer seen) |                                                                                                                                                                                                                | B0         |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
| Ignore attempts to cancel $\frac{43}{100}$ once correct fraction seen                                                                                  |                                                                                                                                                                                                                |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
| 11a                                                                                                                                                    | $\frac{2}{5}$                                                                                                                                                                                                  | B1         |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        | Additional Guidance                                                                                                                                                                                            |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        |                                                                                                                                                                                                                |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
| 11b                                                                                                                                                    | $\frac{5}{9} \times 72$ or $8 \times 5$ or $360 \div 9$                                                                                                                                                        | M1         | oe eg multiples of 8 listed and 5 <sup>th</sup> one chosen with maximum one error |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        | 40                                                                                                                                                                                                             | A1         | SC1 32                                                                            |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        | Additional Guidance                                                                                                                                                                                            |            |                                                                                   |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        | $\frac{40}{72}$                                                                                                                                                                                                |            | M1A0                                                                              |  |  |  |       |                  |  |  |        |    |                            |
|                                                                                                                                                        | 40 out of 72                                                                                                                                                                                                   |            | M1A1                                                                              |  |  |  |       |                  |  |  |        |    |                            |

| Question | Answer                                                                                                              | Mark | Comments                    |
|----------|---------------------------------------------------------------------------------------------------------------------|------|-----------------------------|
| 12a      | 8                                                                                                                   | B1   |                             |
|          | Additional Guidance                                                                                                 |      |                             |
|          |                                                                                                                     |      |                             |
| 12b      | 2                                                                                                                   | B1   |                             |
|          | Additional Guidance                                                                                                 |      |                             |
|          |                                                                                                                     |      |                             |
| 13       | $1 - 0.1 - 0.6$ or $1 - (0.1 + 0.6)$<br>or $1 - 0.7$                                                                | M1   | oe                          |
|          | 0.3                                                                                                                 | A1   | oe eg 30% or $\frac{3}{10}$ |
|          | Additional Guidance                                                                                                 |      |                             |
|          | $1 - 0.1 + 0.6 = 0.3$ (recovered)<br>$1 - 0.1 + 0.6 = 1.5$ (not recovered)<br>$0.6 \div 2 = 0.3$ (incorrect method) |      | M1A1<br>M0A0<br>M0A0        |
|          | Embedded, correct answer, eg $0.3 + 0.1 + 0.6 = 1$                                                                  |      | M1A0                        |
|          | $\frac{0.3}{1}$ unless 0.3 already seen                                                                             |      | M1A0                        |

| Question                                                | Answer                                                     | Mark  | Comments                                                                                                                                                                                              |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
|---------------------------------------------------------|------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|---|---|---|---|---|---|---|---|---|
| 14                                                      | Identifies or plots any two correct points                 | M1    | points with integer values are                                                                                                                                                                        |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
|                                                         |                                                            |       | <table><tr><td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>-1</td></tr></table> | x  | -3 | -2 | -1 | 0  | 1 | 2 | 3 | y | 5 | 4 | 3 | 2 | 1 |
|                                                         | x                                                          | -3    | -2                                                                                                                                                                                                    | -1 | 0  | 1  | 2  | 3  |   |   |   |   |   |   |   |   |   |
|                                                         | y                                                          | 5     | 4                                                                                                                                                                                                     | 3  | 2  | 1  | 0  | -1 |   |   |   |   |   |   |   |   |   |
|                                                         | Correct straight ruled line from (−3, 5) to (3, −1)        | A1    | may be in a list<br>ignore incorrect plots                                                                                                                                                            |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
| Additional Guidance                                     |                                                            |       |                                                                                                                                                                                                       |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
| Correct line, but not extending from (−3, 5) to (3, −1) |                                                            | M1A0  |                                                                                                                                                                                                       |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
|                                                         | Two lines, one correct and one incorrect                   |       | M1A0                                                                                                                                                                                                  |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
| 15                                                      | Alternative method 1                                       |       |                                                                                                                                                                                                       |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
|                                                         | Method for finding a percentage beyond 5% or 1%            | M1    | eg<br>6.2 ÷ 2 or 3.1 (0.5%)<br>31 + 6.2 or 37.2 (6%)<br>31 × 2 or 62 (10%)<br>6.2 + 6.2 or 12.4 (2%)<br>31 × 3 or 93 (15%)<br>6.2 × 3 or 18.6 (3%)                                                    |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
|                                                         | Fully correct method that would lead to the correct answer | M1dep | eg<br>their 93 – their 12.4<br>(their 3.1 + their 37.2) × 2<br>their 62 + their 18.6                                                                                                                  |    |    |    |    |    |   |   |   |   |   |   |   |   |   |
|                                                         | 80.6                                                       | A1    |                                                                                                                                                                                                       |    |    |    |    |    |   |   |   |   |   |   |   |   |   |

Alternative method 2 is on the next page

| Question | Answer                                                                                                                           | Mark  | Comments                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|----------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15 cont  | <b>Alternative method 2</b>                                                                                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|          | $6.2 \times 13$ or $62 \times 13$                                                                                                | M1    | may be implied                                                                                                                                                                                                                                                                                                                                                                                                       |
|          | $10 \times 6.2 + 3 \times 6.2$ or $62 + 18.6$<br>or $6 \times 13 + 0.2 \times 13$ or $78 + 2.6$<br>or digits 806 other than 80.6 | M1dep | <u>From traditional method</u><br>their 186 + their 620<br>or<br>their 26 + their 780<br>at least one correct and placeholder of zero correct or implied<br><u>From grid method</u><br>their 600 + their 20 + their 180 + their 6<br>at least three correct<br><u>From Chinese / Napier's bones method</u><br>at least three values correct from (0)/6, (0)/2, (0)/6 and 1/8<br>and then appropriate diagonal adding |
|          | 80.6                                                                                                                             | A1    |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|          | <b>Additional Guidance</b>                                                                                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|          | In all cases, accept repeated addition for multiplication<br>eg accept $31 + 31$ for $2 \times 31$                               |       |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|          | Ignore a % sign after 80.6                                                                                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|          |                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Question                                                                                                                                                                                                                               | Answer                                                                                                                                                                                                                                | Mark                   | Comments                                                                                                                                                                                                                                                                         |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|----|----|---|----------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|---------------|----------------|----|----|----------------|---|----------------|-------------------------------------------------|----|
| 16                                                                                                                                                                                                                                     | $\frac{1}{5}$ in top centre cell<br><br>1 in centre cell<br><br>$\frac{1}{10}$ in bottom right cell                                                                                                                                   | B3                     | oe decimals<br><br>B2 any two correct<br><br>or<br><br>the product of the centre column and the diagonal from top left to bottom right are both 1<br><br>B1 any one correct<br><br>or<br><br>the product of the centre column or the diagonal from top left to bottom right is 1 |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
|                                                                                                                                                                                                                                        | Additional Guidance                                                                                                                                                                                                                   |                        |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
|                                                                                                                                                                                                                                        | A response can be awarded B2 if it meets both ways of scoring B1<br><br>Eg one correct value <b>and</b> the product of the centre column is 1 (see example below right)                                                               |                        |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
|                                                                                                                                                                                                                                        | <table><tr><td>10</td><td><math>\frac{1}{15}</math></td><td><math>\frac{1}{2}</math></td></tr><tr><td><math>\frac{1}{20}</math></td><td>3</td><td>20</td></tr><tr><td>2</td><td>5</td><td><math>\frac{1}{30}</math></td></tr></table> | 10                     | $\frac{1}{15}$                                                                                                                                                                                                                                                                   | $\frac{1}{2}$  | $\frac{1}{20}$ | 3  | 20 | 2 | 5              | $\frac{1}{30}$ | Diagonal and centre column each have product 1                                                                                                                                                                                        | or | <table><tr><td>10</td><td><math>\frac{1}{50}</math></td><td><math>\frac{1}{2}</math></td></tr><tr><td><math>\frac{1}{20}</math></td><td>10</td><td>20</td></tr><tr><td>2</td><td>5</td><td><math>\frac{1}{10}</math></td></tr></table> | 10            | $\frac{1}{50}$ | $\frac{1}{2}$ | $\frac{1}{20}$ | 10 | 20 | 2              | 5 | $\frac{1}{10}$ | Bottom right cell correct and centre column = 1 | B2 |
|                                                                                                                                                                                                                                        | 10                                                                                                                                                                                                                                    | $\frac{1}{15}$         | $\frac{1}{2}$                                                                                                                                                                                                                                                                    |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| $\frac{1}{20}$                                                                                                                                                                                                                         | 3                                                                                                                                                                                                                                     | 20                     |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| 2                                                                                                                                                                                                                                      | 5                                                                                                                                                                                                                                     | $\frac{1}{30}$         |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| 10                                                                                                                                                                                                                                     | $\frac{1}{50}$                                                                                                                                                                                                                        | $\frac{1}{2}$          |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| $\frac{1}{20}$                                                                                                                                                                                                                         | 10                                                                                                                                                                                                                                    | 20                     |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| 2                                                                                                                                                                                                                                      | 5                                                                                                                                                                                                                                     | $\frac{1}{10}$         |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| Centre column has product 1                                                                                                                                                                                                            |                                                                                                                                                                                                                                       | Diagonal has product 1 |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| <table><tr><td>10</td><td><math>\frac{1}{50}</math></td><td><math>\frac{1}{2}</math></td></tr><tr><td><math>\frac{1}{20}</math></td><td>10</td><td>20</td></tr><tr><td>2</td><td>5</td><td><math>\frac{2}{10}</math></td></tr></table> | 10                                                                                                                                                                                                                                    | $\frac{1}{50}$         | $\frac{1}{2}$                                                                                                                                                                                                                                                                    | $\frac{1}{20}$ | 10             | 20 | 2  | 5 | $\frac{2}{10}$ | or             | <table><tr><td>10</td><td><math>\frac{1}{20}</math></td><td><math>\frac{1}{2}</math></td></tr><tr><td><math>\frac{1}{20}</math></td><td>8</td><td>20</td></tr><tr><td>2</td><td>5</td><td><math>\frac{1}{80}</math></td></tr></table> | 10 | $\frac{1}{20}$                                                                                                                                                                                                                         | $\frac{1}{2}$ | $\frac{1}{20}$ | 8             | 20             | 2  | 5  | $\frac{1}{80}$ |   | B1             |                                                 |    |
| 10                                                                                                                                                                                                                                     | $\frac{1}{50}$                                                                                                                                                                                                                        | $\frac{1}{2}$          |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| $\frac{1}{20}$                                                                                                                                                                                                                         | 10                                                                                                                                                                                                                                    | 20                     |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| 2                                                                                                                                                                                                                                      | 5                                                                                                                                                                                                                                     | $\frac{2}{10}$         |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| 10                                                                                                                                                                                                                                     | $\frac{1}{20}$                                                                                                                                                                                                                        | $\frac{1}{2}$          |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| $\frac{1}{20}$                                                                                                                                                                                                                         | 8                                                                                                                                                                                                                                     | 20                     |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |
| 2                                                                                                                                                                                                                                      | 5                                                                                                                                                                                                                                     | $\frac{1}{80}$         |                                                                                                                                                                                                                                                                                  |                |                |    |    |   |                |                |                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                        |               |                |               |                |    |    |                |   |                |                                                 |    |

| Question   | Answer                                                    | Mark | Comments                                                              |
|------------|-----------------------------------------------------------|------|-----------------------------------------------------------------------|
| <b>17a</b> | 3 or 35 or 291 seen<br>or $8 \times \text{their } 3 + 11$ | M1   |                                                                       |
|            | 35 chosen                                                 | A1   |                                                                       |
|            | <b>Additional Guidance</b>                                |      |                                                                       |
|            |                                                           |      |                                                                       |
| <b>17b</b> | Subtract 11 and divide by 8                               | B1   | accept – or $\div$ for words subtract and divide but not / for divide |
|            | <b>Additional Guidance</b>                                |      |                                                                       |
|            | Do not accept use of algebra eg $(x - 11)/8$              |      | B0                                                                    |

| Question | Answer                                                                 | Mark  | Comments                                                                                                           |
|----------|------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------|
| 18       | <b>Alternative method 1</b>                                            |       |                                                                                                                    |
|          | Angle $DAB = 70$                                                       | B1    | may be on diagram                                                                                                  |
|          | Angle $ABC = 360 - \text{their } 70 - 90 - 120$<br>or Angle $ABC = 80$ | M1    | may be on diagram                                                                                                  |
|          | Valid reason                                                           | A1    | eg<br>$180 - 80 = 100$<br>$80 + 100 = 180$<br>angles on a straight line add to 180<br>$(360 - 80 - 80)/2 = 100$    |
|          | <b>Alternative method 2</b> working backwards from $x = 100$           |       |                                                                                                                    |
|          | Angle $ABC = 180 - 100$<br>or Angle $ABC = 80$                         | M1    | may be on diagram                                                                                                  |
|          | Angle $DAB = 360 - \text{their } 80 - 90 - 120$<br>or Angle $DAB = 70$ | M1dep | may be on diagram                                                                                                  |
|          | Valid reason                                                           | A1    | eg<br>opposite angles are equal<br>vertically opposite angles (are equal)<br>$180 - 70 = 110$ and $180 - 110 = 70$ |
|          | <b>Additional Guidance</b>                                             |       |                                                                                                                    |
|          | Incorrect angles seen anywhere around A or B cannot score the A1       |       |                                                                                                                    |

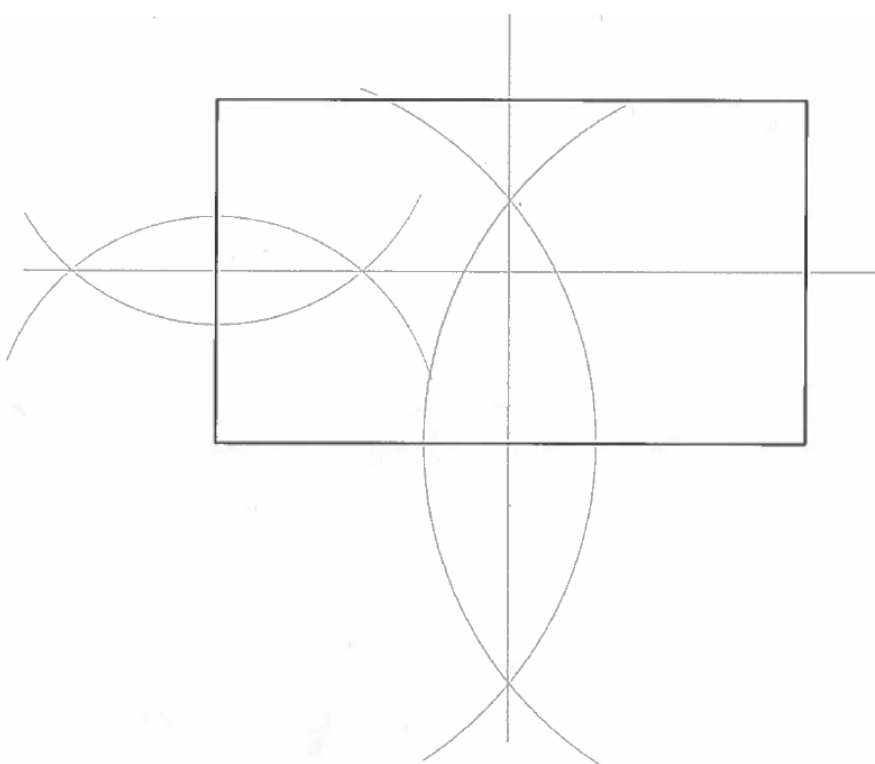
| Question | Answer                                                                                                                                                                         | Mark  | Comments                                                                                                                                                                       |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19       | Method for equating gallons to litres beyond 2 gallons = 9 litres                                                                                                              | M1    | eg<br>$9 \div 2$ or 4.5<br>$17 \times 9$ or 153<br>$9 \times 2$ or 18<br>$9 \times 8$ or 72<br>$17 \div 2$ or 8.5                                                              |
|          | Fully correct method that would lead to the correct answer                                                                                                                     | M1dep | eg<br>$9 \div 2 \times 17$<br>their $4.5 \times 17$<br>their $153 \div 2$<br>their $18 \times 4 + \text{their } 4.5$<br>their $72 + \text{their } 4.5$<br>their $8.5 \times 9$ |
|          | 76.5                                                                                                                                                                           | A1    |                                                                                                                                                                                |
|          | <b>Additional Guidance</b>                                                                                                                                                     |       |                                                                                                                                                                                |
|          | 2 gallons = 9 litres<br>4 gallons = 18 litres<br>6 gallons = 36 litres (error with working not shown)<br>8 gallons = 45 litres<br>$45 + 45 + 4.5 = 94.5$                       |       | M1M0A0                                                                                                                                                                         |
|          | 2 gallons = 9 litres<br>$9 + 9 = 18$ so 4 gallons = 18 litres<br>$18 + 9 = 36$ so 6 gallons = 36 litres (method correct)<br>so 8 gallons = 45 litres<br>$45 + 45 + 4.5 = 94.5$ |       | M1M1A0                                                                                                                                                                         |

| Question | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Mark | Comments                                         |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------|-----|---|---|---|----|---|----|---|---------|---|---|----|---|----|---------|----|----|----|----|----|---|----|----|----|---|
| 20a      | $n$ = an odd number<br>and $p$ = a prime number<br>such that $n + p$ is a square number                                                                                                                                                                                                                                                                                                                                                                                                           | B1   | eg<br>$n = 1$ and $p = 3$<br>$n = 9$ and $p = 7$ |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
|          | Additional Guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
|          | Some of the early correct pairs are :- <table><tr><th><math>n</math></th><th><math>p</math></th></tr><tr><td>1</td><td>3</td></tr><tr><td>3</td><td>13</td></tr><tr><td>5</td><td>11</td></tr><tr><td>7</td><td>2 or 29</td></tr><tr><td>9</td><td>7</td></tr><tr><td>11</td><td>5</td></tr><tr><td>13</td><td>3 or 23</td></tr><tr><td>17</td><td>19</td></tr><tr><td>19</td><td>17</td></tr><tr><td>23</td><td>2</td></tr><tr><td>25</td><td>11</td></tr><tr><td>31</td><td>5</td></tr></table> |      | $n$                                              | $p$ | 1 | 3 | 3 | 13 | 5 | 11 | 7 | 2 or 29 | 9 | 7 | 11 | 5 | 13 | 3 or 23 | 17 | 19 | 19 | 17 | 23 | 2 | 25 | 11 | 31 | 5 |
| $n$      | $p$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 1        | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 3        | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 5        | 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 7        | 2 or 29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 9        | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 11       | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 13       | 3 or 23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 17       | 19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 19       | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 23       | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 25       | 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |
| 31       | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                  |     |   |   |   |    |   |    |   |         |   |   |    |   |    |         |    |    |    |    |    |   |    |    |    |   |

| 20b | $n$ = an odd number<br>and $p$ = a prime number<br>such that $np$ is a square number                                                                                                                                                                                                                                                                           | B1 | eg<br>$n = 3$ and $p = 3$<br>$n = 27$ and $p = 3$ |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------|-----|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|---|
|     | Additional Guidance                                                                                                                                                                                                                                                                                                                                            |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
|     | Some of the early correct pairs are :- <table><tr><th><math>n</math></th><th><math>p</math></th></tr><tr><td>3</td><td>3</td></tr><tr><td>5</td><td>5</td></tr><tr><td>7</td><td>7</td></tr><tr><td>11</td><td>11</td></tr><tr><td>13</td><td>13</td></tr><tr><td>17</td><td>17</td></tr><tr><td>23</td><td>23</td></tr><tr><td>27</td><td>3</td></tr></table> |    | $n$                                               | $p$ | 3 | 3 | 5 | 5 | 7 | 7 | 11 | 11 | 13 | 13 | 17 | 17 | 23 | 23 | 27 | 3 |
| $n$ | $p$                                                                                                                                                                                                                                                                                                                                                            |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 3   | 3                                                                                                                                                                                                                                                                                                                                                              |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 5   | 5                                                                                                                                                                                                                                                                                                                                                              |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 7   | 7                                                                                                                                                                                                                                                                                                                                                              |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 11  | 11                                                                                                                                                                                                                                                                                                                                                             |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 13  | 13                                                                                                                                                                                                                                                                                                                                                             |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 17  | 17                                                                                                                                                                                                                                                                                                                                                             |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 23  | 23                                                                                                                                                                                                                                                                                                                                                             |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |
| 27  | 3                                                                                                                                                                                                                                                                                                                                                              |    |                                                   |     |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |   |

| Question | Answer                                                                                                                                       | Mark | Comments |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| 21a      | The arcs should be drawn from C or from points the same distance from C or<br>The lines are different lengths, so you can't go from the ends | B1   | oe       |
|          | <b>Additional Guidance</b>                                                                                                                   |      |          |
|          | CB $\neq$ CD                                                                                                                                 |      | B1       |
|          | Not drawn an arc from C                                                                                                                      |      | B1       |
|          | He put compass in wrong place. He should have started at C but he started at B and D                                                         |      | B1       |
|          | Should be an arc on each line CB and CD                                                                                                      |      | B0       |
|          | Arcs in wrong place                                                                                                                          |      | B0       |
|          | Arcs aren't equal                                                                                                                            |      | B0       |
|          | His line isn't in the centre of B and D                                                                                                      |      | B0       |
|          | D has a longer line than B                                                                                                                   |      | B0       |
|          | Arcs aren't the same radius                                                                                                                  |      | B0       |
|          | Should be an arc from B to D                                                                                                                 |      | B0       |
|          | Should be an arc from B to the line CD                                                                                                       |      | B0       |
|          | Should be an intersection on CB and CD                                                                                                       |      | B0       |

| Question | Answer                                                                       | Mark | Comments                                                                                     |
|----------|------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------|
| 21b      | It should be a circle, (not a square)<br>or<br>The corners are too far away  | B1   | oe eg accept circle constructed inside square, touching at midpoints of square to within 2mm |
|          | <b>Additional Guidance</b>                                                   |      |                                                                                              |
|          | A correct diagram takes precedence over statements, otherwise ignore diagram |      |                                                                                              |
|          | Any distances if quoted, eg to corners, should be accurate to within 2mm     |      |                                                                                              |
|          | Ignore any reference to the top point P                                      |      |                                                                                              |
|          | The corners are more than 3 (km or cm) away from the point                   | B1   |                                                                                              |
|          | Some points are more than 3 (km or cm) away                                  | B1   |                                                                                              |
|          | It isn't 3 (km or cm) to the corners                                         | B1   |                                                                                              |
|          | Each corner is [4.1, 4.5] (km or cm) from P (values represent tolerance)     | B1   |                                                                                              |
|          | Each corner is more than 4 away                                              | B1   |                                                                                              |
|          | It should be a circle                                                        | B1   |                                                                                              |
|          | Each point is 4.2 km from P (not true)                                       | B0   |                                                                                              |
|          | The corners of the square are 4 km (out of tolerance)                        | B0   |                                                                                              |
|          | The corners of the square are 4 km while the rest are 3 km                   | B0   |                                                                                              |
|          | Each corner will be more than 1 km away                                      | B0   |                                                                                              |
|          | She's measured 3 cm from P without checking the corners                      | B0   |                                                                                              |
|          | It is not supposed to be this shape (but what should it be?)                 | B0   |                                                                                              |
|          | She has measured 4.3 km not 3 (not stated corners)                           | B0   |                                                                                              |
|          | She hasn't shown all the points that represent 3 km                          | B0   |                                                                                              |
|          | She hasn't plotted where all the 3 km points are                             | B0   |                                                                                              |
|          | It shouldn't be a square                                                     | B0   |                                                                                              |

| Question | Answer                                                                                                                                                                                                                                                                       | Mark | Comments                                                                                                       |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------|
| 21c      | One pair of equal, intersecting arcs from the vertices of one side of the rectangle                                                                                                                                                                                          | M1   | tolerance $\pm 1$ mm                                                                                           |
|          | Fully correct construction of line of symmetry with either<br>two pairs of equal, intersecting arcs from the vertices of the same side of the rectangle<br>or<br>one pair of equal, intersecting arcs from the vertices of one side of the rectangle and the diagonals drawn | A1   | tolerance $\pm 1$ mm<br><br>line of symmetry may be solid or dashed but must touch opposite sides of rectangle |
|          | <b>Additional Guidance</b>                                                                                                                                                                                                                                                   |      |                                                                                                                |
|          | Correct line with no appropriately constructed arcs                                                                                                                                                                                                                          | M0A0 |                                                                                                                |
|          |                                                                                                                                                                                          |      |                                                                                                                |

| Question | Answer                                                                                                                                                                                                            | Mark                                | Comments                                                                       |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------|
| 22       | <b>Alternative method 1</b>                                                                                                                                                                                       |                                     |                                                                                |
|          | $88 \div (7 + 4)$ or $88 \div 11$ or 8                                                                                                                                                                            | M1                                  | oe $11 \times 8 = 88$                                                          |
|          | their $8 \times 7$ and their $8 \times 4$<br>or their $8 \times 7$ and $88 -$ their value<br>or their $8 \times 4$ and $88 -$ their value<br>or 56 and 32<br>or their $8 \times (7 - 4)$<br>or their $8 \times 3$ | M1dep                               | oe<br>eg $8 \times 7 = 63$ and $88 - 63$<br>eg $8 \times 4 = 30$ and $88 - 30$ |
|          | 24                                                                                                                                                                                                                | A1                                  |                                                                                |
|          | <b>Alternative method 2</b>                                                                                                                                                                                       |                                     |                                                                                |
|          | One correctly evaluated trial for two numbers, other than 7 and 4, in the ratio 7 : 4                                                                                                                             | M1                                  | eg $70 + 40 = 110$                                                             |
|          | 56 and 32                                                                                                                                                                                                         | M1dep                               | eg $56 + 32 = 88$                                                              |
|          | 24                                                                                                                                                                                                                | A1                                  |                                                                                |
|          | <b>Alternative method 3</b> using $x : y = 7 : 4$ (correct)                                                                                                                                                       |                                     |                                                                                |
|          | $4x = 7y$<br>and<br>$4x + 4y = 352$                                                                                                                                                                               | $4x = 7y$<br>and<br>$7x + 7y = 616$ | M1<br>oe<br>forming equation from ratio and equating coefficients              |
|          | $11y = 352$<br>or $y = 32$                                                                                                                                                                                        | $11x = 616$<br>or $x = 56$          | M1dep<br>oe<br>equation in one variable                                        |
|          | 24                                                                                                                                                                                                                | A1                                  |                                                                                |

Alternative method 4 is on the next page

| Question | Answer                                                                                                | Mark                                | Comments                                                          |
|----------|-------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------|
| 22 cont  | <b>Alternative method 4</b> using $x : y = 4 : 7$ (incorrect)                                         |                                     |                                                                   |
|          | $7x = 4y$<br>and<br>$4x + 4y = 352$                                                                   | $7x = 4y$<br>and<br>$7x + 7y = 616$ | M1<br>oe<br>forming equation from ratio and equating coefficients |
|          | $11x = 352$<br>or $x = 32$                                                                            | $11y = 616$<br>or $y = 56$          | M1dep<br>oe<br>equation in one variable                           |
|          | their answer                                                                                          | A0                                  |                                                                   |
|          | <b>Alternative method 5</b> using $x : y = 7 : 4$ (correct)                                           |                                     |                                                                   |
|          | $x = \frac{7}{4}y$ or $y = \frac{4}{7}x$<br>or $x = 88 - y$ or $y = 88 - x$                           | M1                                  | oe<br>making one variable the subject                             |
|          | $\frac{7y}{4} + y = 88$ or $\frac{11}{4}y = 88$<br>or $x + \frac{4}{7}x = 88$ or $\frac{11}{7}x = 88$ | M1dep                               | oe<br>equation in one variable                                    |
|          | 24                                                                                                    | A1                                  |                                                                   |
|          | <b>Alternative method 6</b> using $x : y = 4 : 7$ (incorrect)                                         |                                     |                                                                   |
|          | $y = \frac{7}{4}x$ or $x = \frac{4}{7}y$<br>or $x = 88 - y$ or $y = 88 - x$                           | M1                                  | oe<br>making one variable the subject                             |
|          | $\frac{7}{4}x + x = 88$ or $\frac{11}{4}x = 88$<br>or $y + \frac{4}{7}y = 88$ or $\frac{11}{7}y = 88$ | M1dep                               | oe<br>equation in one variable                                    |
|          | their answer                                                                                          | A0                                  |                                                                   |
|          | <b>Additional Guidance</b>                                                                            |                                     |                                                                   |
|          | -24, with no incorrect working, implies 56 and 32                                                     | M1M1A0                              |                                                                   |
|          | $x = 32$ and $y = 56$                                                                                 | M1M1A0                              |                                                                   |

| Question | Answer                                                                                                           | Mark | Comments                                                                                                                  |
|----------|------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------|
| 23       | Valid criticism referring to the line from (0, 0) to (10, 1)                                                     | B1   | eg there shouldn't be a curve<br>need to be specific about the line shape, it is not sufficient to simply say it is wrong |
|          | Valid criticism referring to the line from (15, 1)                                                               | B1   | oe<br>eg he never goes 2 km from home                                                                                     |
|          | <b>Additional Guidance</b>                                                                                       |      |                                                                                                                           |
|          | Criticisms can be in either order                                                                                |      |                                                                                                                           |
|          | A correct diagram takes precedence over statements, otherwise ignore diagram                                     |      |                                                                                                                           |
|          | <b>For first B1:</b>                                                                                             |      |                                                                                                                           |
|          | The first part is curved                                                                                         |      | B1                                                                                                                        |
|          | The curve should be a straight line                                                                              |      | B1                                                                                                                        |
|          | He has drawn a curve for constant speed                                                                          |      | B1                                                                                                                        |
|          | The line is curved which shows his speed was not consistent/constant                                             |      | B1                                                                                                                        |
|          | He's not going at a constant speed to the shop (correct referral to graph)                                       |      | B1                                                                                                                        |
|          | All lines should be straight                                                                                     |      | B1                                                                                                                        |
|          | Constant speed should be a diagonal/straight line                                                                |      | B1                                                                                                                        |
|          | The line shouldn't curve                                                                                         |      | B1                                                                                                                        |
|          | The constant speed should be  |      | B1                                                                                                                        |
|          | The curved line shows he decreased speed                                                                         |      | B1                                                                                                                        |
|          | It should be a straight line from 0 to 10                                                                        |      | B1                                                                                                                        |
|          | It should be a straight line at the start                                                                        |      | B1                                                                                                                        |
|          | A distance-time graph shouldn't have curves                                                                      |      | B0                                                                                                                        |

Continued on next page

|         |                                                                                  |    |
|---------|----------------------------------------------------------------------------------|----|
| 23 cont | It should be a straight line ( 'It' seems to be referring to the whole graph)    | B0 |
|         | The curved line shows he increased and decreased speed                           | B0 |
|         | He was walking at a range of speeds, so not consistent (referral to whole graph) | B0 |
|         | The constant speed is drawn incorrectly (how?)                                   | B0 |
|         | The lines should be curved or straight, not both                                 | B0 |
|         | The curve should be a line of best fit                                           | B0 |
|         | It should be a straight line from 0 to 15 (it should be to 10)                   | B0 |
|         | The curve is wrong (how?)                                                        | B0 |
|         | <b>For 2nd B1:</b>                                                               |    |
|         | The line should go down at the end                                               | B1 |
|         | He isn't walking home, he's walking further away                                 | B1 |
|         | He has walked away from home when he hasn't                                      | B1 |
|         | The line should go back to the bottom of the graph                               | B1 |
|         | The graph should return to zero                                                  | B1 |
|         | The last part should be decreasing (instead of increasing)                       | B1 |
|         | The line for him walking home should have negative gradient                      | B1 |
|         | The graph shows he didn't walk home                                              | B1 |
|         | The line for him walking home should have negative correlation                   | B0 |
|         | The line for the journey home goes the wrong way                                 | B0 |
|         | The graph does not show his journey home                                         | B0 |
|         | His house is 2 km away from the shop                                             | B0 |
|         | The line should be decreasing instead of increasing (which line?)                | B0 |
|         | His home is 1 km from the shop not 2 km                                          | B0 |

| Question | Answer                                                                                                                         | Mark | Comments               |
|----------|--------------------------------------------------------------------------------------------------------------------------------|------|------------------------|
| 24       | <b>Alternative method 1</b>                                                                                                    |      |                        |
|          | Three whole numbers that each are less than 80 and have units digit 4<br>or<br>States that each number must have units digit 4 | M1   |                        |
|          | 82                                                                                                                             | A1   |                        |
|          | <b>Alternative method 2</b>                                                                                                    |      |                        |
|          | Correctly evaluated trial for three whole numbers, none of which are a multiple of 10, and that, when rounded, total 70        | M1   | eg $33 + 33 + 13 = 79$ |
|          | 82                                                                                                                             | A1   |                        |
|          | <b>Additional Guidance</b>                                                                                                     |      |                        |
|          | $39 + 33 + 13 = 85$ $(40 + 30 + 10 = 80)$                                                                                      |      | M0                     |
|          | Beware 82 from incorrect values, eg $39 + 24 + 19 = 82$                                                                        |      | M0A0                   |
|          | Ignore incorrectly evaluated trials that do not solely lead to the answer                                                      |      |                        |
| 25       | $n - 1$                                                                                                                        | B1   |                        |
|          | <b>Additional Guidance</b>                                                                                                     |      |                        |
|          |                                                                                                                                |      |                        |

| Question | Answer                                                                                   | Mark | Comments                         |
|----------|------------------------------------------------------------------------------------------|------|----------------------------------|
| 26(a)    | $\frac{1}{2}(b + 2b)h$ or $3 \times \frac{1}{2}bh$                                       | M1   | oe                               |
|          | $1.5bh$ or $\frac{3}{2}bh$ or $\frac{3bh}{2}$ or $1\frac{1}{2}bh$                        | A1   | accept $hb$ for $bh$             |
|          | <b>Additional Guidance</b>                                                               |      |                                  |
|          | Correct expression with $\times$ , $\div$ or brackets                                    |      | M1A0                             |
|          | Condone units within expressions for M1 only                                             |      |                                  |
|          | Condone the expression given within a formula<br>eg $A = 1.5hb$                          |      | M1A1                             |
|          | Condone correct expression stated and then equated to a value or with values substituted |      | M1A1                             |
| 26(b)    | $3b + 2s$<br>or $3b = 2s$<br>or $4s$                                                     | M1   | oe                               |
|          | $6b$                                                                                     | A1   | oe<br>eg $b + b + b + b + b + b$ |
|          | <b>Additional Guidance</b>                                                               |      |                                  |
|          | Condone the expression given within a formula<br>eg $P = 6b$                             |      | M1A1                             |

| Question | Answer                                                                                                  | Mark | Comments                               |
|----------|---------------------------------------------------------------------------------------------------------|------|----------------------------------------|
| 27       | $\pi \times 6 \times 6$<br>or $36\pi$ or [113, 113.112]<br>or $9 \times [3.14, 3.142]$ or [28.26, 28.3] | M1   | oe<br>accept [3.14, 3.142] for $\pi$   |
|          | $9\pi$ or $9 \times \pi$ or $\pi 9$ or $\pi \times 9$                                                   | A1   |                                        |
|          | <b>Additional Guidance</b>                                                                              |      |                                        |
|          | 36 $\pi$ followed by an incorrect method<br>eg $36\pi \div 2 = 18\pi$ with answer 18 $\pi$              |      | M1A0                                   |
|          | Answer of 9 $\pi$ from $\pi \times 3^2$                                                                 |      | M0A0                                   |
|          | 9 $\pi$ and [28.26, 28.3] given on answer line                                                          |      | M1A0                                   |
|          | $\pi 1^2$ stated but followed by 36 or 9                                                                |      | M0A0                                   |
| 28a      | $1.25 \times 10^4$                                                                                      | B1   | accept $10^4 \times 1.25$              |
|          | <b>Additional Guidance</b>                                                                              |      |                                        |
|          | $1.2 \times 10^4$ or $1.3 \times 10^4$                                                                  |      | B0                                     |
| 28b      | 0.034                                                                                                   | B1   | accept $\frac{34}{1000}$ (oe fraction) |
|          | <b>Additional Guidance</b>                                                                              |      |                                        |
|          | If fraction given, ignore attempts to cancel                                                            |      |                                        |

| Question | Answer                                                                                                                                                                                                                                                                                                                                             | Mark | Comments                         |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------|
| 29       | $((\sqrt{3})^2 =) 3$ and $((\sqrt{2})^2 =) 2$<br>or $(\sqrt{6})^2$ or $\sqrt{6^2}$ or $\sqrt{36}$<br>or $\sqrt{9} \times \sqrt{4}$ or $\sqrt{9 \times 4}$                                                                                                                                                                                          | M1   |                                  |
|          | 6                                                                                                                                                                                                                                                                                                                                                  | A1   |                                  |
|          | <b>Additional Guidance</b>                                                                                                                                                                                                                                                                                                                         |      |                                  |
|          | $3 \times 2 = 6$ with answer eg $\sqrt{6}$ or $6^4$                                                                                                                                                                                                                                                                                                |      | M0A0                             |
|          | Condone $\sqrt{3} = 1.7$ , $1.7^2 = 3$ and $\sqrt{2} = 1.4$ , $1.4^2 = 2$ ,<br>otherwise<br>$\sqrt{3}$ or $\sqrt{2}$ or $3^2$ or $2^2$ incorrectly evaluated does not score even if<br>answer is 6<br>eg $\sqrt{3} = 1.5$ , $1.5^2 = 3$ , answer 6<br>$\sqrt{2} = 1$ , $1^2 = 2$<br>$3^2 = 6$ , $\sqrt{6} = 3$<br>$(\sqrt{6})^4$<br>$\sqrt{2} = 1$ |      | M0A0<br>M0A0<br>M0<br>M0A0<br>M0 |

| Question | Answer                                                                                                                                                              | Mark  | Comments                                                                                     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------|
| 30       | <b>Alternative method 1</b>                                                                                                                                         |       |                                                                                              |
|          | $x + 2x + 2x + 10$ or $5x + 10$<br>or $x + 2x + 2x + 10 + 90$<br>or $5x + 100$                                                                                      | M1    | oe                                                                                           |
|          | $x + 2x + 2x + 10 = 360 - 90$<br>or $5x + 10 = 270$<br>or $x + 2x + 2x + 10 + 90 = 360$<br>or $5x + 100 = 360$<br>or $5x = 260$                                     | M1dep | oe                                                                                           |
|          | $(x =) 52$ or $2x = 104$<br>or $2x + 10 = 114$                                                                                                                      | A1    | may be on diagram                                                                            |
|          | $\frac{114}{360}$ or $\frac{57}{180}$ or $\frac{38}{120}$ or $\frac{19}{60}$<br>or $0.31(6\ldots)$ or $0.317$ or $0.32$<br>or $31(6\ldots)\%$ or $31.7\%$ or $32\%$ | B1ft  | ft $\frac{2 \times \text{their } 52 + 10}{360}$<br>or $\frac{\text{their angle for C}}{360}$ |

Alternative method 2 is on the next page

| Question | Answer                                                                                                                                                                | Mark     | Comments                                                                                     |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------|
| 30 cont  | <b>Alternative method 2</b>                                                                                                                                           |          |                                                                                              |
|          | $\frac{90}{360} + \frac{x}{360} + \frac{2x}{360} + P(C) = 1$<br>or $\frac{90}{360} + \frac{x}{360} + \frac{2x}{360} + \frac{2x+10}{360}$<br>or $\frac{2x+10}{5x+100}$ | M1       | oe                                                                                           |
|          | $\frac{90}{360} + \frac{x}{360} + \frac{2x}{360} + \frac{2x+10}{360} = 1$                                                                                             | M1dep    | oe                                                                                           |
|          | $(x =) 52$ or $2x = 104$<br>or $2x + 10 = 114$                                                                                                                        | A1       | may be on diagram                                                                            |
|          | $\frac{114}{360}$ or $\frac{57}{180}$ or $\frac{38}{120}$ or $\frac{19}{60}$<br>or 0.31(6..) or 0.317 or 0.32<br>or 31(.6...) % or 31.7 % or 32 %                     | B1ft     | ft $\frac{2 \times \text{their } 52 + 10}{360}$<br>or $\frac{\text{their angle for C}}{360}$ |
|          | <b>Additional Guidance</b>                                                                                                                                            |          |                                                                                              |
|          | Ignore incorrect simplification or conversion after $\frac{114}{360}$ oe                                                                                              | M1M1A1B1 |                                                                                              |
|          | $\frac{360-10-90}{5}$ oe                                                                                                                                              | M1M1     |                                                                                              |
|          | $x + 2x + 2x + 10$ followed by $6x + 10 = 270$                                                                                                                        | M1M0     |                                                                                              |
|          | Do not accept decimal within fraction for final answer if correct fraction not seen                                                                                   |          |                                                                                              |
|          | The follow through is not available if A1 awarded                                                                                                                     |          |                                                                                              |

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

|       |                                                                                 |    |                           |
|-------|---------------------------------------------------------------------------------|----|---------------------------|
| 31(a) | $(x - 10)(x + 10)$                                                              | B1 | either order<br>ignore fw |
|       | <b>Additional Guidance</b>                                                      |    |                           |
|       | $(x + 10)(x + -10)$                                                             |    | B1                        |
|       | Condone missing bracket at end only<br>$(x - 10)(x + 10)$<br>$(x - 10)(x + 10)$ |    | B1<br>B0                  |
|       | $(x - 10)(x + 10)$ followed by attempt to solve, eg answer $x = 10$ , $x = -10$ |    | B1                        |
|       | answer only $x = 10$ , $x = -10$                                                |    | B0                        |

|       |                                                                                    |    |                                                                    |
|-------|------------------------------------------------------------------------------------|----|--------------------------------------------------------------------|
| 31(b) | $7x - 2x > 1 - 6$ or $5x > -5$<br>or $6 - 1 > 2x - 7x$ or $5 > -5x$<br>or $1 > -x$ | M1 | oe<br>collecting terms                                             |
|       | $x > -1$ or $-1 < x$                                                               | A1 | SC1 incorrect sign eg $x \geq -1$ or $x = -1$<br>or answer of $-1$ |
|       | <b>Additional Guidance</b>                                                         |    |                                                                    |
|       | Answer $x > \frac{-5}{5}$                                                          |    | M1A0                                                               |
|       | Answer only $\frac{-5}{5}$                                                         |    | SC0                                                                |
|       | $x > -1$ with $-1$ or $0, 1, 2, \dots$ as the answer                               |    | M1A0                                                               |