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# GCSE MATHEMATICS 8300/1F

Foundation Tier Paper 1 Non-Calculator

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Mark scheme

June 2023

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Version: Final 1.0



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 Examiner.

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

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## Glossary for Mark Schemes

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

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

|                        |                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <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.

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 1(a) | 20     | B1   |          |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 1(b) | 9      | B1   |          |

| Q    | Answer    | Mark | Comments     |
|------|-----------|------|--------------|
| 1(c) | 14 and 29 | B1   | either order |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 1(d) | 15     | B1   |          |

| Q    | Answer                     | Mark | Comments                                                |
|------|----------------------------|------|---------------------------------------------------------|
| 2(a) | [54, 58]                   | B1   | may be seen on diagram but answer line takes precedence |
|      | <b>Additional Guidance</b> |      |                                                         |
|      | Answer in a different unit |      | B0                                                      |

| Q    | Answer                       | Mark | Comments                                                |
|------|------------------------------|------|---------------------------------------------------------|
| 2(b) | [48, 52]                     | B1   | may be seen on diagram but answer line takes precedence |
|      | <b>Additional Guidance</b>   |      |                                                         |
|      | Ignore other angles measured |      |                                                         |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 2(c) | 15     | B1   |          |

| Q    | Answer                                                                | Mark | Comments |
|------|-----------------------------------------------------------------------|------|----------|
| 2(d) | 7 cm by 3 cm rectangle drawn                                          | B1   |          |
|      | <b>Additional Guidance</b>                                            |      |          |
|      | Mark intention                                                        |      |          |
|      | Allow a 7 cm by 3 cm rectangle drawn that does not use the given side |      |          |

| Q    | Answer    | Mark | Comments |
|------|-----------|------|----------|
| 3(a) | 12 or +12 | B1   |          |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 3(b) | –30    | B1   |          |

| Q    | Answer    | Mark | Comments |
|------|-----------|------|----------|
| 3(c) | 64 or +64 | B1   |          |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 3(d) | 1000   | B1   |          |

| Q | Answer                                               | Mark | Comments                                                                                                                                         |
|---|------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | $\frac{3}{5}$                                        | B2   | B1 $\frac{18}{30}$ or $\frac{9}{15}$ or $\frac{6}{10}$ or 3 out of 5<br>oe fraction, decimal or percentage<br>or their fraction fully simplified |
|   | <b>Additional Guidance</b>                           |      |                                                                                                                                                  |
|   | $\frac{30}{18} = \frac{5}{3}$<br>$\frac{1.8}{3(.0)}$ |      | B1<br><br>B1                                                                                                                                     |

| Q | Answer                                                                                   | Mark  | Comments                                                                         |
|---|------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------|
| 5 | $24 \div 2$ or 12<br>or<br>$24 \times 5$ or 120 or 820<br>or<br>$7 - 1.5(0)$ or $5.5(0)$ | M1    | oe                                                                               |
|   | $5 \times 24 \div 2$ or 60<br>or<br>$2.1(0)$ or $210(p)$                                 | M1    | oe<br>implies M2                                                                 |
|   | $7 - 1.5(0) + 5 \times 24 \div 2$<br>or<br>$8.2(0) - 2.1(0)$<br>or<br>6.1 or 610         | M1dep | oe full method to find total cost<br>dep on M2                                   |
|   | 6.10 or 610p                                                                             | A1    | SC3 $65.5(0)$ or $6550(p)$<br>or $27.62$ or $2762(p)$<br>or $7.9(0)$ or $790(p)$ |
|   | <b>Additional Guidance</b>                                                               |       |                                                                                  |
|   | SC3 $65.5(0)$ from $60 + 5.50$ working in mixed units                                    |       |                                                                                  |
|   | SC3 $27.62$ from 5 calculators and 1 pen                                                 |       |                                                                                  |
|   | SC3 $7.9(0)$ from doubling the cost of a pen instead of halving                          |       |                                                                                  |
|   | Condone (£)6.10p                                                                         |       | M1M1M1A1                                                                         |
|   | Allow mixed units for up to M3<br>eg $5.50 + 60$                                         |       | M1M1M1                                                                           |

| Q    | Answer                                                | Mark | Comments             |
|------|-------------------------------------------------------|------|----------------------|
| 6(a) | $\frac{17}{5}$                                        | B1   | oe improper fraction |
|      | <b>Additional Guidance</b>                            |      |                      |
|      | Ignore attempts to simplify after correct answer seen |      |                      |

| Q    | Answer                                                | Mark | Comments    |
|------|-------------------------------------------------------|------|-------------|
| 6(b) | $\frac{19}{100}$                                      | B1   | oe fraction |
|      | <b>Additional Guidance</b>                            |      |             |
|      | Ignore attempts to simplify after correct answer seen |      |             |

| Q | Answer                                                                                                                                                                                                                                                          | Mark  | Comments                                                                   |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------|
| 7 | (R =) 16 (days) or 4 (symbols)<br>or<br>(Sn =) 10 (days) or 2.5 (symbols)<br>or<br>(C =) 18 (days) or 4.5 (symbols)<br>or<br>(total =) 44 (days) or 11 (symbols)<br>or evidence of addition with<br>answer of 11 (symbols)<br>or $55 \div 4$ or 13.75 (symbols) | M1    |                                                                            |
|   | 55 – their 16 – their 10 – their 18<br>or $55 - 44 (= 11)$<br>or<br>2 values for Sun and Fog with a<br>total of 11<br>or<br>their $13.75 - 11$ or 2.75                                                                                                          | M1dep | oe<br>at least one of 16, 10, 18 correct<br><br>may be on diagram          |
|   | 6 and 5<br>or<br>Sun = 1 full and 1 half symbol<br>or<br>Fog = 1 full and 1 quarter symbol                                                                                                                                                                      | A1    | either order, may be on diagram                                            |
|   | Sun = 1 full and 1 half symbol<br>and<br>Fog = 1 full and 1 quarter symbol                                                                                                                                                                                      | A1ft  | ft their 11 days (must be an odd number)<br>where Sun is one more than Fog |
|   | <b>Additional Guidance</b>                                                                                                                                                                                                                                      |       |                                                                            |
|   | Mark intention for drawings, quarter and half symbol any orientation or<br>angle. Must be attempt at correct size                                                                                                                                               |       |                                                                            |
|   | 11 with no working seen or their symbols totalling 11 quarters                                                                                                                                                                                                  |       | M1M1                                                                       |

| Q    | Answer             | Mark | Comments |
|------|--------------------|------|----------|
| 8(a) | $5 \times 4$ or 20 | M1   | oe       |
|      | 18                 | A1   |          |

| Q    | Answer                                                                          | Mark  | Comments                  |
|------|---------------------------------------------------------------------------------|-------|---------------------------|
| 8(b) | $-40 + 10$ or $-30$<br>or $-40 = 5P - 10$<br>or $P = \frac{T+W}{5}$             | M1    |                           |
|      | their $-30 \div 5$                                                              | M1dep |                           |
|      | -6                                                                              | A1    | SC2 $-10$ with $-50$ seen |
|      | <b>Additional Guidance</b>                                                      |       |                           |
|      | Embedded answer of $-6$                                                         |       | M1M1A0                    |
|      | SC2 $-10$ with $-50$ seen for $-40 + 10 = -50$ and then $\div 5$                |       |                           |
|      | $-40 = 5P - 10$ may use a different letter or symbol for $P$ but not $T$ or $W$ |       |                           |

| Q | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Mark | Comments                  |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------|
| 9 | All 3 correct matches                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | B3   | B1 for each correct match |
|   | <b>Additional Guidance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                           |
|   | Matching to more than one box on the right is choice for that match                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                           |
|   | <p>The diagram shows a matching exercise. On the left, there are four boxes containing the fractions <math>\frac{1}{10}</math>, <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, and <math>\frac{1}{5}</math>. On the right, there are five boxes containing the values 0.1, 0.05, 20%, <math>\frac{2}{6}</math>, and 0.25. Lines connect the boxes as follows: <math>\frac{1}{10}</math> to 0.1, <math>\frac{1}{2}</math> to 0.25, <math>\frac{1}{4}</math> to <math>\frac{2}{6}</math>, and <math>\frac{1}{5}</math> to 0.05. The line connecting <math>\frac{1}{2}</math> to 20% is crossed out with a large X.</p> |      | B3                        |

| Q  | Answer                                               | Mark | Comments                                                               |
|----|------------------------------------------------------|------|------------------------------------------------------------------------|
| 10 | (A =) 26                                             | B1   | may be implied by correct answer                                       |
|    | (B =) 10                                             | B1   | may be implied by correct answer                                       |
|    | 260                                                  | B1ft | ft their A × their B if at least B1 awarded<br>SC2 400 or 52<br>SC1 55 |
|    | <b>Additional Guidance</b>                           |      |                                                                        |
|    | SC2 400 from A = 40 and B = 10                       |      |                                                                        |
|    | SC2 52 from A = 26 and B = 2                         |      |                                                                        |
|    | SC1 55 from $8 \times 3 + 2 \times 21 - (15 - 4)$    |      |                                                                        |
|    | Answer 260 with no incorrect values seen for A and B |      | B1B1B1                                                                 |

| Q  | Answer                                        | Mark | Comments |
|----|-----------------------------------------------|------|----------|
| 11 | $4.5 \times 7$ or $45 \times 7$ or digits 315 | M1   | oe       |
|    | 31.5(0) or $31\frac{1}{2}$                    | A1   |          |

| Q  | Answer | Mark | Comments |
|----|--------|------|----------|
| 12 | 100    | B1   |          |

| Q  | Answer                                                                                                             | Mark  | Comments                                   |
|----|--------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------|
|    | <b>Alternative method 1 – using the given scale</b>                                                                |       |                                            |
| 13 | (O) $20 \div 5$ or (A) $8 \div 2$ or 4<br>or (O) $5 \div 20$ or (A) $2 \div 8$ or $\frac{1}{4}$                    | M1    | oe                                         |
|    | their $4 \times 3$ or $3 \div$ their $\frac{1}{4}$<br>or<br>their $4 \times$ their $(5 + 3 + 2) - 20 - 8$<br>or 12 | M1dep | 20 – 8 implies M2<br><br>may be on diagram |
|    | Correct width bar, in the correct position, drawn to height of 12                                                  | A1    | mark intention, ignore any shading         |
|    | <b>Alternative method 2 – using squares</b>                                                                        |       |                                            |
|    | (O) $10 \div 5$<br>or (A) $4 \div 2$<br>or 2 (squares)                                                             | M1    |                                            |
|    | their $2 \times 3$<br>or 6 (squares)                                                                               | M1dep | 10 – 4 implies M2<br>may be on diagram     |
|    | Correct width bar, in the correct position, drawn to height of 12                                                  | A1    | mark intention, ignore any shading         |
|    | <b>Additional Guidance</b>                                                                                         |       |                                            |
|    | $(20 + 8) \div (5 + 2)$<br>$(10 + 4) \div (5 + 2)$                                                                 |       | M1<br>M1                                   |

| Q  | Answer                                                                                                                    | Mark | Comments                                                   |
|----|---------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------|
| 14 | Valid statement about proportion                                                                                          | B1   | eg there were more members than guests                     |
|    | Valid statement about average                                                                                             | B1   | eg the average number of hours was greater for the members |
|    | Valid statement about spread                                                                                              | B1   | eg the visiting times of the guests were more spread out   |
|    | <b>Additional Guidance</b>                                                                                                |      |                                                            |
|    | Condone irrelevant statements with correct statements but do not award a correct statement with a contradictory statement |      |                                                            |
|    | Accept non-members for guests                                                                                             |      |                                                            |
|    | <b>Proportion statements</b>                                                                                              |      |                                                            |
|    | There were more members                                                                                                   |      | B1                                                         |
|    | They were mostly members / More than half were members                                                                    |      | B1                                                         |
|    | There were 28% more members than guests                                                                                   |      | B1                                                         |
|    | Fewer guests (than members)                                                                                               |      | B1                                                         |
|    | The members were 64%, the guests were (only) 36%                                                                          |      | B1                                                         |
|    | The members were 64, the guests were (only) 36                                                                            |      | B0                                                         |
|    | The difference is 28%                                                                                                     |      | B0                                                         |
|    | There were 32% more members (calculation error)                                                                           |      | B0                                                         |
|    | Members visit the gym more often                                                                                          |      | B0                                                         |
|    | There were 64% members                                                                                                    |      | B0                                                         |

**Question 14 Additional Guidance continues on the next page**

|                    |                                                                    |    |
|--------------------|--------------------------------------------------------------------|----|
| <b>14<br/>cont</b> | <b>Average statements</b>                                          |    |
|                    | The members had a greater mean                                     | B1 |
|                    | The members visited for 1.5 (hours) more (on average)              | B1 |
|                    | The members visited for longer (on average) (than the guests)      | B1 |
|                    | Overall the members spent longer (in the gym) (on average)         | B1 |
|                    | The members' mean was 4 (hours) and the guests' was 2.5 (hours)    | B1 |
|                    | The members' was 4 and the guests' was 2.5 (no mention of average) | B0 |
|                    | The difference in mean hours is 1.5                                | B0 |
|                    | <b>Spread statements</b>                                           |    |
|                    | The members' times were more consistent                            | B1 |
|                    | The guests' times varied more                                      | B1 |
|                    | The guests had a greater range                                     | B1 |
|                    | The range of the guests was 2 (hours) more                         | B1 |
|                    | Members' range was 6 (hours), guests' (range) was 8 (hours)        | B1 |
|                    | Members were 6, guests were 8 (ambiguous)                          | B0 |
|                    | Members visited for 6 hours, guests for 8 hours (referencing mean) | B0 |
|                    | The difference in range is 2 hours                                 | B0 |
|                    | The range of the guests is high                                    | B0 |

| Q  | Answer                                                                                                                                         | Mark  | Comments                                                  |
|----|------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------|
| 15 | $2 \times 3$ or 6<br>or $4 \times 5$ or 20<br>or 14<br>or 0.3                                                                                  | M1    | oe                                                        |
|    | (their 20 – their 6) $\div$ their 20<br>or $1 - \frac{6}{20}$ or $\frac{14}{20}$<br>or $1 - 0.3$ or 0.7<br>or 30(%)                            | M1dep |                                                           |
|    | 70                                                                                                                                             | A1    | SC2 44.4 or better<br>SC1 $\frac{4}{9}$ or $\frac{8}{18}$ |
|    | <b>Additional Guidance</b>                                                                                                                     |       |                                                           |
|    | SC1 $\frac{4}{9}$ or $\frac{8}{18}$ use of perimeter without conversion to a percentage<br>SC2 44.4 use of perimeter converted to a percentage |       |                                                           |
|    | Up to M2 may be awarded for correct work seen in multiple attempts even if not subsequently used                                               |       |                                                           |
|    | Ignore any units                                                                                                                               |       |                                                           |

| Q  | Answer                                                                                                                       | Mark  | Comments                        |
|----|------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------|
| 16 | $60 \div 20$ or 3<br>or<br>$20 \div 60$ or $\frac{1}{3}$<br>or<br>$18 \div 20$ or 0.9<br>or<br>$20 \div 18$ or 1.1(1...)     | M1    | oe                              |
|    | their $3 \times 18$<br>or<br>$18 \div$ their $\frac{1}{3}$<br>or<br>their $0.9 \times 60$<br>or<br>$60 \div$ their 1.1(1...) | M1dep | oe full method to get to answer |
|    | 54                                                                                                                           | A1    |                                 |
|    | <b>Additional Guidance</b>                                                                                                   |       |                                 |
|    | Up to M2 may be awarded for multiple attempts if no answer chosen                                                            |       |                                 |
|    | For up to M2 ignore any units                                                                                                |       |                                 |
|    |                                                                                                                              |       |                                 |

| Q  | Answer                                                                                                           | Mark   | Comments                                                                                                                                           |
|----|------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 17 | <b>Alternative method 1 – numerical</b>                                                                          |        |                                                                                                                                                    |
|    | 1 and 5 and 3 or 9 (parts)<br>or<br>numbers in the ratio 1 : 5 : 3<br>or<br>(angle sum on a straight line =) 180 | M1     | oe may be seen in a ratio<br>eg $\frac{1}{5} : 1 : \frac{3}{5}$ or $\frac{1}{3} : \frac{5}{3} : 1$<br>numbers can be in any order<br>eg 30, 10, 50 |
|    | $180 \div (1 + 5 + 3)$ or 20<br>or $180 \div \frac{9}{5}$                                                        | M1dep  | oe                                                                                                                                                 |
|    | 100                                                                                                              | A1     |                                                                                                                                                    |
|    | <b>Alternative method 2 – algebraic</b>                                                                          |        |                                                                                                                                                    |
|    | $x$ and $5x$ and $3x$ or $9x$<br>or<br>(angle sum on a straight line =) 180                                      | M1     | oe correct terms with any angle as $x$<br>any letter, any order<br>may be seen on diagram                                                          |
|    | Correct equation with correct method to solve for one angle                                                      | M1dep  | eg $x + 5x + 3x = 180$<br>and $180 \div (1 + 5 + 3)$                                                                                               |
|    | 100                                                                                                              | A1     |                                                                                                                                                    |
|    | <b>Additional Guidance</b>                                                                                       |        |                                                                                                                                                    |
|    | $x + 5x + 3x = 360$ or $360 \div 9$                                                                              | M1M0A0 |                                                                                                                                                    |
|    | $\frac{1}{5}x + x + \frac{3}{5}x = 180$ and $180 \div \left(\frac{1}{5} + 1 + \frac{3}{5}\right)$                | M1M1   |                                                                                                                                                    |
|    | $\frac{1}{3}x + \frac{5}{3}x + x = 180$ and $180 \div \left(\frac{1}{3} + \frac{5}{3} + 1\right)$                | M1M1   |                                                                                                                                                    |
|    | Angle $EBD$ marked as 100 on the diagram with answer line blank                                                  | M1M1A1 |                                                                                                                                                    |
|    | 20 and 100 in working with no or incorrect answer chosen                                                         | M1M1A0 |                                                                                                                                                    |

| Q  | Answer                                                                                                                                                                                                           | Mark | Comments                                                                                                                                                                                               |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18 | All conditions met: <ul style="list-style-type: none"> <li>• first number is prime</li> <li>• second number is prime</li> <li>• correctly evaluated</li> <li>• even answer</li> <li>• answer in range</li> </ul> | B3   | if their product is incorrectly evaluated or missing, then 'even answer' and 'answer in range' refer to the correct product for their multiplication<br><br>B2 4 conditions met<br>B1 3 conditions met |
|    | <b>Additional Guidance</b>                                                                                                                                                                                       |      |                                                                                                                                                                                                        |
|    | $2 \times 29 = 58$ (or $29 \times 2 = 58$ ) is the only fully correct solution                                                                                                                                   |      | B3                                                                                                                                                                                                     |
|    | Allow 50 to 60 inclusive for 'answer in range'                                                                                                                                                                   |      |                                                                                                                                                                                                        |
|    | Award the best mark from boxes or in working for up to B2                                                                                                                                                        |      |                                                                                                                                                                                                        |
|    | The two prime numbers do not have to be different                                                                                                                                                                |      |                                                                                                                                                                                                        |

| Q  | Answer                                                                                                                                               | Mark  | Comments                                                                                |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------|
| 19 | $\frac{5}{6} \times 96$ or 80                                                                                                                        | M1    | oe eg $96 \div 6 \times 5$<br>implied by 176                                            |
|    | $\frac{1}{4} \times$ their 80 or 20                                                                                                                  | M1dep | oe eg $80 \div 4$                                                                       |
|    | $\frac{2}{3} \times 96$ or 64                                                                                                                        | M1    | oe eg $96 \div 3 \times 2$<br>accept 0.66 or better for $\frac{2}{3}$                   |
|    | 84(.00)                                                                                                                                              | A1    | SC2 100.8(0) or [77.32, 77.34]<br>condone incorrect money notation<br>eg 84.0 or 84.00p |
|    | <b>Additional Guidance</b>                                                                                                                           |       |                                                                                         |
|    | SC2 for 100.8(0) is from misreading as Andrew gets £96                                                                                               |       |                                                                                         |
|    | SC2 for [77.32, 77.34] is from $\frac{2}{3}$ of 80 plus $\frac{1}{4}$ of 96                                                                          |       |                                                                                         |
|    | Do not accept ' $\frac{5}{6}$ of 96' or ' $\frac{1}{4}$ of 80' or ' $\frac{2}{3}$ of 96' for M marks unless accompanied by a correct method or value |       |                                                                                         |

| Q     | Answer          | Mark | Comments |
|-------|-----------------|------|----------|
| 20(a) | Strong positive | B1   |          |

| Q     | Answer                                                                                                                                                                                                | Mark | Comments                                                                                                                                                                        |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20(b) | Straight line of best fit passing through (5, [18k, 24k]) and (23, [42k, 48k])                                                                                                                        | B1   | mark intention of straight line<br>ignore anything beyond gates                                                                                                                 |
|       | Correct reading $\pm \frac{1}{2}$ square for their straight line of best fit                                                                                                                          | B1ft | ft their straight line with positive gradient<br>ignore any working lines on the graph<br>condone thousands missing<br>may be implied by correct number of lives for their line |
|       | Correct evaluation of their answer in thousands divided by 2000                                                                                                                                       | B1ft | ft their reading from straight line but must be in thousands<br>condone half a life (or rounded or truncated) if reading is an odd number of thousands                          |
|       | <b>Additional Guidance</b>                                                                                                                                                                            |      |                                                                                                                                                                                 |
|       | (their correct line of best fit would give a reading of 34 000)<br>Answer 17<br>Answer 0.017<br>(Points =) 33 000, answer 16 (within half a square, answer truncated)<br>(Points =) 32 000, answer 16 |      | B1B1B1<br>B1B1B0<br>B1B1B1<br>B1B0B1ft                                                                                                                                          |
|       | For two lines of best fit with no answer, take as choice                                                                                                                                              |      |                                                                                                                                                                                 |

| Q  | Answer                                                                                                                                      | Mark   | Comments                                                                                                                                                                                                                                                                                         |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21 | <b>Alternative method 1 – evaluation and division</b>                                                                                       |        |                                                                                                                                                                                                                                                                                                  |
|    | $(5^2 =) 25$ or $(3 \times 5^2 =) 75$<br>or<br>$600 \div 3$ or 200<br>or<br>$600 \div 5^2$ or 24                                            | M1     | oe<br>oe eg $3 \times 200 = 600$<br>oe eg $25 \times 24 = 600$                                                                                                                                                                                                                                   |
|    | $600 \div 3 \div 5^2$ or 8                                                                                                                  | M1dep  | oe eg $8 \times 75 = 600$                                                                                                                                                                                                                                                                        |
|    | 3 with M1 awarded and not from incorrect working                                                                                            | A1     |                                                                                                                                                                                                                                                                                                  |
|    | <b>Alternative method 2 – product of prime factors</b>                                                                                      |        |                                                                                                                                                                                                                                                                                                  |
|    | 600 written as a product of factors where at least one factor is prime                                                                      | M1     | eg 2 and 300 or 5 and 120<br>or 2 and 2 and 150<br>may be seen on a factor tree or in repeated division<br>allow one strand to be incorrect if a previous value completes the product<br>eg $20 \times 30$ followed by<br>$2 \times 10 \times 5 \times 8$ implies $2 \times 10 \times 30$ for M1 |
|    | 2 and 2 and 2 and 3 and 5 and 5                                                                                                             | M1dep  | may be seen on a factor tree or in repeated division                                                                                                                                                                                                                                             |
|    | 3 with M1 awarded and not from incorrect working                                                                                            | A1     |                                                                                                                                                                                                                                                                                                  |
|    | <b>Additional Guidance</b>                                                                                                                  |        |                                                                                                                                                                                                                                                                                                  |
|    | $8 \times 3 \times 25 = 600$ and answer 3                                                                                                   | M1M1A1 |                                                                                                                                                                                                                                                                                                  |
|    | $2^3$ on answer line with M2 awarded                                                                                                        | M1M1A0 |                                                                                                                                                                                                                                                                                                  |
|    | Answer 3 on answer line with no working                                                                                                     | M0M0A0 |                                                                                                                                                                                                                                                                                                  |
|    | Do not allow $600 \div 3 \times 5^2$ for M2 in alt 1 unless recovered, but do allow $\frac{600}{3 \times 5^2}$ or $600 \div (3 \times 5^2)$ |        |                                                                                                                                                                                                                                                                                                  |

| Q  | Answer                                                                                          | Mark | Comments                                                                                       |
|----|-------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------|
| 22 | $13x + 22$                                                                                      | B2   | B1 $15x + 20$ or $-2x + 2$<br>or $13x + a$ or $bx + 22$ , where $a$ and $b$ can be any numbers |
|    | <b>Additional Guidance</b>                                                                      |      |                                                                                                |
|    | Do not ignore further working for B2<br>eg $13x + 22 = 35x$<br>eg $13x + 22, x = \frac{22}{13}$ |      | B1<br><br>B1                                                                                   |

| Q  | Answer                                                                                                                                                                                                   | Mark | Comments                                                                                                                                                                                                |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23 | Any two from:<br>Reference to graph passing through point where $x = 0$<br>Reference to graph being incorrect for negative $x$ values<br>Reference to the graph stopping before the end of the axes/axis | B2   | B1 any one correct reference<br>eg the graph touches the $y$ -axis<br><br>eg the graph to the left of the $y$ -axis should be below the $x$ -axis<br><br>eg the graph should go to the ends of the axes |
|    | <b>Additional Guidance</b>                                                                                                                                                                               |      |                                                                                                                                                                                                         |
|    | Ignore non-contradictory, irrelevant responses alongside a correct response                                                                                                                              |      |                                                                                                                                                                                                         |
|    | Draws correct graph                                                                                                                                                                                      |      | B2                                                                                                                                                                                                      |
|    | Draws graph with one section correct for positive values of $x$ or negative values of $x$                                                                                                                |      | B1 for that section                                                                                                                                                                                     |
|    | 'It isn't the graph of $y = \frac{1}{x}$ ' scores B0, but B1 may still be scored for the other criticism                                                                                                 |      |                                                                                                                                                                                                         |
|    | 'There are no numbers on the axes' scores B0, but B1 may still be scored for the other criticism                                                                                                         |      |                                                                                                                                                                                                         |
|    | <b>Mark for graph touching <math>y</math>-axis</b>                                                                                                                                                       |      |                                                                                                                                                                                                         |
|    | You cannot have $x = 0$                                                                                                                                                                                  |      | B1                                                                                                                                                                                                      |
|    | The line in the top right should be moved to the right                                                                                                                                                   |      | B1                                                                                                                                                                                                      |
|    | It says $x$ doesn't $= 0$ but it (the sketch) does                                                                                                                                                       |      | B1                                                                                                                                                                                                      |
|    | One line is touching the $y$ -axis                                                                                                                                                                       |      | B1                                                                                                                                                                                                      |
|    | The lines should be symmetrical                                                                                                                                                                          |      | B0                                                                                                                                                                                                      |
|    | You cannot have $y = 0$                                                                                                                                                                                  |      | B0                                                                                                                                                                                                      |
|    | One line is touching the $y$ -axis but the other isn't                                                                                                                                                   |      | B0                                                                                                                                                                                                      |

**Question 23 Additional Guidance continues on the next page**

|                    |                                                                   |    |
|--------------------|-------------------------------------------------------------------|----|
| <b>23<br/>cont</b> | <b>Mark for negative values being in the wrong quadrant</b>       |    |
|                    | There shouldn't be anything in the top-left section               | B1 |
|                    | There should be something in the bottom-left section              | B1 |
|                    | It is the graph of $y = \frac{1}{x^2}$                            | B1 |
|                    | It should have rotational symmetry                                | B1 |
|                    | It should be symmetrical about $y = x$                            | B1 |
|                    | It should be symmetrical about $y = -x$                           | B1 |
|                    | It should be symmetrical                                          | B0 |
|                    | One should be negative                                            | B0 |
|                    | The bit on the left is wrong                                      | B0 |
|                    | The negative values are plotted incorrectly                       | B0 |
|                    | <b>Reference to the graph stopping before the end of the axes</b> |    |
|                    | It stops before the end of the axes                               | B1 |
|                    | The lines don't go far enough                                     | B1 |
|                    | The lines need to be higher up                                    | B0 |

| Q  | Answer                                                                                                             | Mark  | Comments                                                                                                                          |
|----|--------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------|
| 24 | <b>Alternative method 1 – algebra based on Sunita's age</b>                                                        |       |                                                                                                                                   |
|    | $5 \times 3$ or 15                                                                                                 | M1    | may be implied by their algebraic total of the three ages being divided by 3                                                      |
|    | $x - 1$ or $2x$<br>or $4x - 1$                                                                                     | M1    | oe expressions<br>any letter throughout                                                                                           |
|    | $x + \text{their } (x - 1) + \text{their } 2x = \text{their } 15$<br>or $4x - 1 = \text{their } 15$                | M1dep | oe equation eg $\frac{x + x - 1 + 2x}{3} = 5$<br>dep on M1M1                                                                      |
|    | $(x =) 4$                                                                                                          | M1dep | correct solution to their equation<br>if the solution has a decimal part allow truncation or rounding to the nearest whole number |
|    | 8                                                                                                                  | A1    |                                                                                                                                   |
|    | <b>Alternative method 2 – algebra based on Joel's age</b>                                                          |       |                                                                                                                                   |
|    | $5 \times 3$ or 15                                                                                                 | M1    | may be implied by their algebraic total of the three ages being divided by 3                                                      |
|    | $\frac{y}{2}$ or $\frac{y}{2} - 1$<br>or $2y - 1$                                                                  | M1    | oe expressions<br>any letter throughout<br>$2y - 1$ must not come from $y + y - 1$                                                |
|    | $y + \text{their } \frac{y}{2} + \text{their } (\frac{y}{2} - 1) = \text{their } 15$                               | M1dep | oe equation eg $\frac{y + \frac{y}{2} + \frac{y}{2} - 1}{3} = 5$<br>dep on M1M1                                                   |
|    | $2y + \text{their } y + \text{their } (y - 2) = 2 \times \text{their } 15$<br>or $4y - 2 = 30$<br>or $2y - 1 = 15$ | M1dep | their equation with no denominator                                                                                                |
|    | 8                                                                                                                  | A1    |                                                                                                                                   |

Question 24 continues on the next page

|                    |                                                                                                                                                                                                               |       |                                                                                                  |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------|
| <b>24<br/>cont</b> | <b>Alternative method 3 – trial and improvement</b>                                                                                                                                                           |       |                                                                                                  |
|                    | $5 \times 3$ or 15                                                                                                                                                                                            | M1    | may be implied by their total of the three ages being divided by 3                               |
|                    | Trial of three numbers which fit the criteria, with either their sum correctly evaluated or their sum divided by 3                                                                                            | M1    | eg $2 + 1 + 4 = 7$<br>or $(2 + 1 + 4) \div 3$<br>condone missing brackets                        |
|                    | Second trial of three numbers which fit the criteria, with either their sum correctly evaluated or their sum divided by 3                                                                                     | M1dep | dep on previous M1<br>eg $3 + 2 + 6 = 11$<br>or $(3 + 2 + 6) \div 3$<br>condone missing brackets |
|                    | 4, 3 and 8 selected as their final combination                                                                                                                                                                | M1dep | any order<br>implies M4                                                                          |
|                    | 8                                                                                                                                                                                                             | A1    |                                                                                                  |
|                    | <b>Additional Guidance</b>                                                                                                                                                                                    |       |                                                                                                  |
|                    | Up to M4 may be awarded for correct work seen in multiple attempts even if not subsequently used                                                                                                              |       |                                                                                                  |
|                    | Correct expressions, but the sum of the three ages is equated to 5<br>eg $4x - 1 = 5$                                                                                                                         |       | M0M1M0M0A0                                                                                       |
|                    | In alt 1, the correct value of $x$ or the correct age for Joel for their two terms for Beth and Joel, with one correct, implies the first 4 marks<br>eg $x$ and $x + 1$ and $2x$ , with $x = 3.5$ or answer 7 |       | M1M1M1M1A0                                                                                       |
|                    | In alt 2, the correct value of $y$ for their two terms for Sunita and Beth, with one correct, implies the first 4 marks<br>eg $y$ and $\frac{y}{2}$ and $(\frac{y}{2} + 1)$ , with $y = 7$ or answer 7        |       | M1M1M1M1A0                                                                                       |
|                    | In alt 1 and alt 2, condone missing brackets in equations if not recovered for up to M1M1M1<br>eg $x + x - 1 + 2x \div 3 = 5$ not recovered                                                                   |       | M1M1M1M0A0                                                                                       |

| Q  | Answer                                                                                                                                                                                         | Mark | Comments                                                                                                   |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------|
| 25 | $\frac{7}{3}$                                                                                                                                                                                  | M1   | oe improper fraction                                                                                       |
|    | $\times \frac{5}{4}$ or $\times 1.25$<br>or<br>$7 \times 5$ and $3 \times 4$<br>or<br>$\frac{7 \times 5}{3 \times 5} \div \frac{4 \times 3}{3 \times 5}$ or $\frac{35}{15} \div \frac{12}{15}$ | M1   | oe<br><br>if seen in a grid, must be selected                                                              |
|    | $\frac{35}{12}$                                                                                                                                                                                | A1   | oe improper fraction                                                                                       |
|    | $2\frac{11}{12}$                                                                                                                                                                               | A1ft | oe mixed number<br>ft their improper fraction correctly converted to a mixed number if at least M1 awarded |
|    | <b>Additional Guidance</b>                                                                                                                                                                     |      |                                                                                                            |
|    | Ignore attempts to simplify after mixed number seen                                                                                                                                            |      |                                                                                                            |
|    | $\frac{8}{3} \times \frac{5}{4} = \frac{40}{12}$ , answer $3\frac{4}{12}$                                                                                                                      |      | M0M1A0A1ft                                                                                                 |