

**AQA • GCSE MATHEMATICS 8300**

# Foundation Tier — Paper 2

Calculator

November 2023 exam series

**MARK SCHEME**

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# GCSE MATHEMATICS 8300/2F

Foundation Tier Paper 2 Calculator

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**Mark scheme**

November 2023

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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 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 | 8      | B1   |          |

| Q | Answer | Mark | Comments |
|---|--------|------|----------|
| 2 | −6     | B1   |          |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 3(a) | 60(%)  | B1   |          |

| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 3(b) | 20(%)  | B1   |          |

| Q    | Answer                                                            | Mark | Comments |
|------|-------------------------------------------------------------------|------|----------|
| 4(a) | 18                                                                | B1   |          |
|      | <b>Additional Guidance</b>                                        |      |          |
|      | Embedded answer with no or incorrect answer eg $\frac{18}{3} = 6$ |      | B0       |

| Q    | Answer                                                                                                                | Mark | Comments                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------|
| 4(b) | $2x = 27 - 3$ or $2x = 24$<br>or<br>$\frac{27-3}{2}$ or $\frac{24}{2}$<br>or<br>$x + 1.5 = 13.5$                      | M1   | oe eg $2x + 3 = 27$<br>$-3 \quad -3$<br>or $-2x = 3 - 27$ or $-2x = -24$ |
|      | 12                                                                                                                    | A1   |                                                                          |
|      | <b>Additional Guidance</b>                                                                                            |      |                                                                          |
|      | Embedded answer with no or incorrect answer<br>eg $2 \times 12 + 3 = 27$ without 12 selected or with incorrect answer |      | M1A0                                                                     |
|      | Trial and improvement with answer 12                                                                                  |      | M1A1                                                                     |
|      | Trial and improvement with no answer or answer other than 12                                                          |      | M0A0                                                                     |

| Q | Answer                     | Mark | Comments |
|---|----------------------------|------|----------|
| 5 | 2.25                       | B1   |          |
|   | <b>Additional Guidance</b> |      |          |
|   | 2.25%                      |      | B0       |

| Q | Answer                                                         | Mark               | Comments                             |
|---|----------------------------------------------------------------|--------------------|--------------------------------------|
| 6 | 286.28                                                         | B1                 |                                      |
|   | 311.28                                                         | B1ft               | correct or ft their 286.28 + 25.00   |
|   | 2141.57                                                        | B1ft               | correct or ft their 311.28 + 1830.29 |
|   | <b>Additional Guidance</b>                                     |                    |                                      |
|   | Mark the answer lines and ignore any numbers in the grey cells |                    |                                      |
|   | Ignore units                                                   |                    |                                      |
|   | 286.28<br>261.28<br>2091.57                                    | B1<br>B0<br>B1ft   |                                      |
|   | 1186.28<br>1211.28<br>3041.57                                  | B0<br>B1ft<br>B1ft |                                      |
|   |                                                                |                    |                                      |

| Q                           | Answer                                                                                                                                  | Mark | Comments |    |   |   |    |   |    |   |    |                                        |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------|----------|----|---|---|----|---|----|---|----|----------------------------------------|
| 7                           | <table><tr><td>4</td><td>3</td><td>10</td></tr><tr><td>5</td><td>2</td><td>12</td></tr><tr><td>6</td><td>20</td><td>1</td></tr></table> | 4    | 3        | 10 | 5 | 2 | 12 | 6 | 20 | 1 | B3 | B2 3 or 4 correct<br>B1 1 or 2 correct |
|                             | 4                                                                                                                                       | 3    | 10       |    |   |   |    |   |    |   |    |                                        |
|                             | 5                                                                                                                                       | 2    | 12       |    |   |   |    |   |    |   |    |                                        |
|                             | 6                                                                                                                                       | 20   | 1        |    |   |   |    |   |    |   |    |                                        |
| Additional Guidance         |                                                                                                                                         |      |          |    |   |   |    |   |    |   |    |                                        |
| Mark the grid               |                                                                                                                                         |      |          |    |   |   |    |   |    |   |    |                                        |
| Ignore repeats for B1 or B2 |                                                                                                                                         |      |          |    |   |   |    |   |    |   |    |                                        |



| Q    | Answer | Mark | Comments |
|------|--------|------|----------|
| 8(a) | 60     | B1   |          |

| Q    | Answer                                                                                                                                                                                                                                                            | Mark | Comments                                                |                 |     |                 |     |                 |     |                 |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|
| 8(b) | Alternative method 1                                                                                                                                                                                                                                              |      |                                                         |                 |     |                 |     |                 |     |                 |
|      | Correct reading(s) taken from one or more number(s) of pounds and correct calculation to scale up                                                                                                                                                                 | M1   | eg $1200 \times 5$<br>or $1200 \times 4 + 600 \times 2$ |                 |     |                 |     |                 |     |                 |
|      | 6000                                                                                                                                                                                                                                                              | A1   |                                                         |                 |     |                 |     |                 |     |                 |
|      | Alternative method 2                                                                                                                                                                                                                                              |      |                                                         |                 |     |                 |     |                 |     |                 |
|      | $500 \times \frac{720}{\text{their } 60}$<br>or $500 \times 12$                                                                                                                                                                                                   | M1   | oe                                                      |                 |     |                 |     |                 |     |                 |
|      | 6000                                                                                                                                                                                                                                                              | A1ft | correct or ft their 60                                  |                 |     |                 |     |                 |     |                 |
|      | Additional Guidance                                                                                                                                                                                                                                               |      |                                                         |                 |     |                 |     |                 |     |                 |
|      | A correct ft answer implies both marks<br>eg1 answer 62 in (a) and answer 5806(.45) or 5806.5 in (b)<br>eg2 answer 72 in (a) and answer 5000 in (b)                                                                                                               |      | M1A1ft<br>M1A1ft                                        |                 |     |                 |     |                 |     |                 |
|      | Further work eg $1200 \times 5 + 100 \times 5$                                                                                                                                                                                                                    |      | M0A0                                                    |                 |     |                 |     |                 |     |                 |
|      | For information: <table><tr><td>£100</td><td><math>1200 \times 5</math></td></tr><tr><td>£50</td><td><math>600 \times 10</math></td></tr><tr><td>£20</td><td><math>240 \times 25</math></td></tr><tr><td>£10</td><td><math>120 \times 50</math></td></tr></table> |      | £100                                                    | $1200 \times 5$ | £50 | $600 \times 10$ | £20 | $240 \times 25$ | £10 | $120 \times 50$ |
| £100 | $1200 \times 5$                                                                                                                                                                                                                                                   |      |                                                         |                 |     |                 |     |                 |     |                 |
| £50  | $600 \times 10$                                                                                                                                                                                                                                                   |      |                                                         |                 |     |                 |     |                 |     |                 |
| £20  | $240 \times 25$                                                                                                                                                                                                                                                   |      |                                                         |                 |     |                 |     |                 |     |                 |
| £10  | $120 \times 50$                                                                                                                                                                                                                                                   |      |                                                         |                 |     |                 |     |                 |     |                 |

| Q    | Answer                                                                                | Mark | Comments |
|------|---------------------------------------------------------------------------------------|------|----------|
| 9(a) | 390 or 1480                                                                           | M1   |          |
|      | 1870                                                                                  | A1   |          |
|      | <b>Additional Guidance</b>                                                            |      |          |
|      | Answer only                                                                           |      | M1A1     |
|      | Ignore calculation of 1864 but 1870 only coming from incorrect rounding of 1864 is M0 |      |          |

| Q    | Answer                                                                                     | Mark | Comments                                                                                                                                                |
|------|--------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9(b) | Valid explanation referring to <b>both</b> of the original numbers being rounded <b>up</b> | B1   | eg he rounded each number up<br>or<br>each rounded number is bigger than the actual number<br>or<br>390 is bigger than 385 and 1480 is bigger than 1479 |
|      | <b>Additional Guidance</b>                                                                 |      |                                                                                                                                                         |
|      | Ignore irrelevant, non-contradictory statements                                            |      |                                                                                                                                                         |
|      | Ignore 1864 alongside a correct explanation                                                |      |                                                                                                                                                         |
|      | Incorrect rounding or values seen in this part even alongside a correct explanation        |      | B0                                                                                                                                                      |
|      | The numbers are rounded <b>up</b> (to the nearest 10)                                      |      | B1                                                                                                                                                      |
|      | 385 became 390 and 1479 became 1480                                                        |      | B1                                                                                                                                                      |
|      | One number increased 5 and the other 1 (so it will be 6 bigger)                            |      | B1                                                                                                                                                      |
|      | 385 became 390 and 1479 became 1500                                                        |      | B0                                                                                                                                                      |
|      | The numbers are rounded to the nearest 10                                                  |      | B0                                                                                                                                                      |
|      | It's rounding so the answer is bigger                                                      |      | B0                                                                                                                                                      |
|      | 1870 is bigger than 1864                                                                   |      | B0                                                                                                                                                      |

| Q     | Answer                                                                                       | Mark | Comments                        |
|-------|----------------------------------------------------------------------------------------------|------|---------------------------------|
| 10(a) | $(18\,300 + 20\,700 + 21\,500 + 21\,500 + 21\,500 + 99\,000) \div 6$<br>or $202\,500 \div 6$ | M1   | oe<br>allow missing brackets    |
|       | 33 750                                                                                       | A1   | SC1 120 000 or [30 166, 30 167] |
|       | <b>Additional Guidance</b>                                                                   |      |                                 |
|       | Correct answer followed by rounding eg 33 750 followed by 30 000                             |      | M1A1                            |
|       | Special cases are for missing brackets or omitting one 21 500                                |      |                                 |
|       | Addition signs between the numbers with an attempt at a total implies addition               |      |                                 |
|       | A vertical column of the 6 numbers with an attempt at a total implies addition               |      |                                 |
|       | Allow misreads but must be dividing by 6                                                     |      |                                 |
|       | Accept incorrect money notation for the mean<br>eg1 33 750.0<br>eg2 30 166.6                 |      | M1A1<br>SC1                     |

| Q     | Answer                                                              | Mark | Comments                                                                                           |
|-------|---------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------|
| 10(b) | Valid explanation                                                   | B1   | accept any indication that one of the values is non-typical, or that the mean would be non-typical |
|       | <b>Additional Guidance</b>                                          |      |                                                                                                    |
|       | Ignore any attempt to state the best average                        |      |                                                                                                    |
|       | Ignore irrelevant, non-contradictory statements                     |      |                                                                                                    |
|       | Accept any indication that 99 000 is <b>significantly</b> different |      |                                                                                                    |
|       | One is an outlier / anomaly / is an odd one out / doesn't fit       | B1   |                                                                                                    |
|       | The large value boosted the average                                 | B1   |                                                                                                    |
|       | The average is too large                                            | B1   |                                                                                                    |
|       | (Five are below / most are below and) only one is above the mean    | B1   |                                                                                                    |
|       | Five are below / most are below (and only one is above) the mean    | B1   |                                                                                                    |
|       | 99 000 / one number is <b>much</b> bigger                           | B1   |                                                                                                    |
|       | 99 000 / one number is bigger                                       | B0   |                                                                                                    |
|       | The range is too large                                              | B0   |                                                                                                    |
|       | The numbers are all different                                       | B0   |                                                                                                    |
|       | Some numbers are much bigger                                        | B0   |                                                                                                    |
|       | Some of the numbers are the same                                    | B0   |                                                                                                    |
|       | It is an estimate / it's not exact / it's not accurate              | B0   |                                                                                                    |

| Q  | Answer                                                              | Mark  | Comments              |
|----|---------------------------------------------------------------------|-------|-----------------------|
| 11 | $55 \times 2.2$ or 121                                              | M1    | oe                    |
|    | their $121 \div 14$ or 8.6(...) or<br>121 and $(8 \times 14 =)$ 112 | M1dep | oe                    |
|    | 8 stones 9 pounds                                                   | A1    | SC2 8 stones 6 pounds |
|    | <b>Additional Guidance</b>                                          |       |                       |
|    | Answer of 8 stones 6 pounds (from incorrect conversion of 8.6...)   |       | SC2                   |
|    | Answer 8.6... stones 121 pounds                                     |       | M2A0                  |

| Q     | Answer                                                    | Mark | Comments                    |
|-------|-----------------------------------------------------------|------|-----------------------------|
| 12(a) | $80 \times 6$ or 480<br>or<br>$80 \times 7$ or $480 + 80$ | M1   | oe<br>implied by $80 : 480$ |
|       | 560                                                       | A1   |                             |

| Q     | Answer                                                                             | Mark | Comments    |
|-------|------------------------------------------------------------------------------------|------|-------------|
| 12(b) | $\frac{1}{15}$                                                                     | B1   | oe fraction |
|       | <b>Additional Guidance</b>                                                         |      |             |
|       | Decimal, percentage or ratio answer                                                |      | B0          |
|       | Do not allow 1 in 15 or 1 out of 15 unless the correct fraction seen               |      |             |
|       | $\frac{6}{100}$ or $\frac{7}{100}$ or $\frac{6.\dot{6}}{100}$ or $\frac{6.7}{100}$ |      | B0          |

| Q     | Answer                                                                                                                                                                               | Mark | Comments                                                                                                                                                                       |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13(a) | $6y = y + 15$                                                                                                                                                                        | B2   | correct single equation with $6y$ and $y + 15$ eg $15 + y = y \times 6$<br>B1 $6y$ or $y + 15$<br>or rearranged equation eg $6y - 15 = y$<br>or $5y = 15$ but not $y = 3$ only |
|       | <b>Additional Guidance</b>                                                                                                                                                           |      |                                                                                                                                                                                |
|       | B1 may be awarded for a correct term even if this is seen amongst multiple attempts or embedded in an incorrect equation or incorrect term eg $6y + 15$ or $6y + 15y$ or $6(y + 15)$ |      |                                                                                                                                                                                |
|       | Allow any variable for B1 but must be consistent for B2                                                                                                                              |      |                                                                                                                                                                                |
|       | Allow unprocessed terms for B1 or B2 eg $6 \times y$ or $y6$                                                                                                                         |      |                                                                                                                                                                                |
|       | $6y = y + 15$ seen, but then correctly simplified or solved                                                                                                                          |      | B2                                                                                                                                                                             |
|       | $6y = y + 15$ seen, but then incorrectly simplified or solved                                                                                                                        |      | B1                                                                                                                                                                             |
|       | $6y = 18$ or $y + 15 = 18$ or both (unless combined to a single equation)                                                                                                            |      | B1                                                                                                                                                                             |
|       | No work worth B2 or B1 and answer $y = 3$                                                                                                                                            |      | B0                                                                                                                                                                             |

| Q     | Answer                                                                                                                         | Mark | Comments                                                                                                                   |
|-------|--------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------|
| 13(b) | <b>Alternative method 1: substitutes <math>y = 4</math> into both sides</b>                                                    |      |                                                                                                                            |
|       | $(6y =) 24$ and $(y + 15 =) 19$                                                                                                | B1ft | oe eg $4 \times 6 = 24$ and $4 + 15 = 19$<br>correct or ft their equation if their equation has a term in $y$ on each side |
|       | <b>Alternative method 2: solves equation</b>                                                                                   |      |                                                                                                                            |
|       | $(y =) 3$                                                                                                                      | B1ft | oe eg $3 \times 6 = 18$ and $3 + 15 = 18$<br>correct or ft their equation if their equation has a term in $y$ on each side |
|       | <b>Additional Guidance</b>                                                                                                     |      |                                                                                                                            |
|       | Allow any variable                                                                                                             |      |                                                                                                                            |
|       | Only allow $(y =) 3$ seen in (a) if referenced in (b) and not contradicted                                                     |      | B1                                                                                                                         |
|       | For Alt 1, accept substituting into one side and then equating and solving the other<br>eg $4 \times 6 = 24$ and $24 - 15 = 9$ |      | B1                                                                                                                         |

| Q  | Answer                                                                                                                         | Mark  | Comments                                                                                                                   |
|----|--------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------|
| 14 | $18.5(0) \times 2$ or 37                                                                                                       | M1    | implied by $18.5(0) \times 84$ or 1554                                                                                     |
|    | $42 \div 15$ or $\frac{14}{5}$ or 2.8 or 3                                                                                     | M1    | minibuses needed<br>implied by $3 \times 450$ or 1350<br>or $3 \times 26$ or 78                                            |
|    | $450 \times \text{their } 3 + 26 \times \text{their } 3$<br>or $1350 + 78$<br>or $476 \times 3$<br>or 1428                     | M1dep | oe<br>dep on 2nd mark<br>allow their 3 to be a decimal eg 2.8<br>1332.8 scores 2nd & 3rd marks<br>2982 or 2886.8 scores M3 |
|    | their $1428 \div 42 + \text{their } 37$<br>or $(\text{their } 1428 + 42 \times \text{their } 37) \div 42$<br>or $2982 \div 42$ | M1dep | oe eg $(450 \times \text{their } 3 + 26 \times \text{their } 3 + 42 \times \text{their } 37) \div 42$<br>dep on M3         |
|    | 71(.00)                                                                                                                        | A1    | SC4 52.50<br>SC3 52.5                                                                                                      |
|    | <b>Additional Guidance</b>                                                                                                     |       |                                                                                                                            |
|    | Up to M4 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts    |       |                                                                                                                            |
|    | Using 2.8 throughout gives an answer of 68.73(...)                                                                             |       | M4A0                                                                                                                       |
|    | Only 1 game of golf gives an answer of 52.50                                                                                   |       | SC4                                                                                                                        |
|    | 1350 + 78 may be seen embedded with an incorrect number of games of golf<br>eg $(1350 + 78 + 37) \div 42$                      |       | M1M1M1M0                                                                                                                   |

| Q  | Answer                                                                                                      | Mark | Comments    |
|----|-------------------------------------------------------------------------------------------------------------|------|-------------|
| 15 | $\frac{1}{6}$ or 0.16(6...) or 0.167 or 0.17<br>or 16(.6...) % or 16.7% or 17%                              | B1   | oe fraction |
|    | <b>Additional Guidance</b>                                                                                  |      |             |
|    | Ignore conversion attempt to fraction, decimal or percentage (but not ratio) after correct probability seen |      |             |
|    | Do not allow eg 1 in 6 or 1 out of 6 unless the correct probability seen                                    |      |             |
|    | Do not allow ratio                                                                                          |      |             |
|    | Ignore words if correct probability seen                                                                    |      |             |

| Q  | Answer                     | Mark | Comments |
|----|----------------------------|------|----------|
| 16 | 1 : 16 or $1^2 : 4^2$      | B1   | oe ratio |
|    | <b>Additional Guidance</b> |      |          |
|    | 1r : 16w                   |      | B0       |

| Q     | Answer                                                 | Mark | Comments                                              |
|-------|--------------------------------------------------------|------|-------------------------------------------------------|
| 17(a) | 2 by 4 or 4 by 2 rectangle drawn                       | B1   | accept overlap with given rectangle<br>mark intention |
|       | <b>Additional Guidance</b>                             |      |                                                       |
|       | Ignore shading and internal lines                      |      |                                                       |
|       | If more than one shape drawn apply the rules of choice |      |                                                       |

| Q     | Answer                                                                            | Mark | Comments                                              |
|-------|-----------------------------------------------------------------------------------|------|-------------------------------------------------------|
| 17(b) | Rectangle with dimensions in ratio<br>1 : 2 or 2 : 1,<br>but not 2 by 4 or 4 by 2 | B1   | accept overlap with given rectangle<br>mark intention |
|       | <b>Additional Guidance</b>                                                        |      |                                                       |
|       | Ignore shading and internal lines                                                 |      |                                                       |
|       | If more than one shape drawn apply the rules of choice                            |      |                                                       |



| Q                                                                                                                                                                                                                                                                                         | Answer                                                                                                                                                                            | Mark | Comments                                                                                                                                                 |      |      |    |      |      |   |   |      |                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|----|------|------|---|---|------|------------------------------------------------------------------------------------------------------|
| 18(a)                                                                                                                                                                                                                                                                                     | $36 \times \frac{4}{9}$ or 16 (Soft)<br><br>or $36 \times \frac{5}{9}$ or 20 (Hard)<br><br>or $36 \times \frac{1}{3}$ or 12 (Dark)<br><br>or $36 \times \frac{2}{3}$ or 24 (Milk) | M1   | oe<br><br>implied by the numbers in the relevant row or column making the correct total<br><br>accept 16 seen in Milk Soft<br><br>accept 12 in Dark Hard |      |      |    |      |      |   |   |      |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | <table><tr><td></td><td>Hard</td><td>Soft</td></tr><tr><td>Milk</td><td>13</td><td>11</td></tr><tr><td>Dark</td><td>7</td><td>5</td></tr></table>                                 |      | Hard                                                                                                                                                     | Soft | Milk | 13 | 11   | Dark | 7 | 5 | A3   | A2 two of Milk Soft = 11, Dark Hard = 7 and Milk Hard = 13<br><br>A1 Milk Soft = 11 or Dark Hard = 7 |
|                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                   | Hard | Soft                                                                                                                                                     |      |      |    |      |      |   |   |      |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | Milk                                                                                                                                                                              | 13   | 11                                                                                                                                                       |      |      |    |      |      |   |   |      |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | Dark                                                                                                                                                                              | 7    | 5                                                                                                                                                        |      |      |    |      |      |   |   |      |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | Additional Guidance                                                                                                                                                               |      |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| <table><tr><td></td><td>Hard</td><td>Soft</td></tr><tr><td>Milk</td><td>10</td><td>11</td></tr><tr><td>Dark</td><td>7</td><td>5</td></tr></table>                                                                                                                                         |                                                                                                                                                                                   | Hard | Soft                                                                                                                                                     | Milk | 10   | 11 | Dark | 7    | 5 |   | M1A2 |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | Hard                                                                                                                                                                              | Soft |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| Milk                                                                                                                                                                                                                                                                                      | 10                                                                                                                                                                                | 11   |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| Dark                                                                                                                                                                                                                                                                                      | 7                                                                                                                                                                                 | 5    |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| <table><tr><td></td><td>Hard</td><td>Soft</td></tr><tr><td>Milk</td><td>10</td><td>11</td></tr><tr><td>Dark</td><td>10</td><td>5</td></tr></table>                                                                                                                                        |                                                                                                                                                                                   | Hard | Soft                                                                                                                                                     | Milk | 10   | 11 | Dark | 10   | 5 |   | M1A1 |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | Hard                                                                                                                                                                              | Soft |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| Milk                                                                                                                                                                                                                                                                                      | 10                                                                                                                                                                                | 11   |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| Dark                                                                                                                                                                                                                                                                                      | 10                                                                                                                                                                                | 5    |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| <p>For M1 the values must be seen outside the table or implied by the table but also accept 16 seen in Milk Soft or 12 in Dark Hard</p> <table><tr><td></td><td>Hard</td><td>Soft</td></tr><tr><td>Milk</td><td>10</td><td>16</td></tr><tr><td>Dark</td><td>5</td><td>5</td></tr></table> |                                                                                                                                                                                   | Hard | Soft                                                                                                                                                     | Milk | 10   | 16 | Dark | 5    | 5 |   | M1   |                                                                                                      |
|                                                                                                                                                                                                                                                                                           | Hard                                                                                                                                                                              | Soft |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| Milk                                                                                                                                                                                                                                                                                      | 10                                                                                                                                                                                | 16   |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |
| Dark                                                                                                                                                                                                                                                                                      | 5                                                                                                                                                                                 | 5    |                                                                                                                                                          |      |      |    |      |      |   |   |      |                                                                                                      |

| Q     | Answer                                                                                                                                  | Mark | Comments                                                                |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------|
| 18(b) | $\frac{5}{36}$ or $0.13\dot{8}$ or $13.\dot{8}\%$                                                                                       | B1   | oe fraction, decimal or percentage<br>accept rounding to 2 sf or better |
|       | <b>Additional Guidance</b>                                                                                                              |      |                                                                         |
|       | Ignore incorrect simplification or conversion attempt to fraction, decimal or percentage (but not ratio) after correct probability seen |      |                                                                         |
|       | Do not allow eg 5 in 36 or 5 out of 36 unless the correct probability seen                                                              |      |                                                                         |
|       | Do not allow ratio                                                                                                                      |      |                                                                         |
|       | Ignore words if correct probability seen                                                                                                |      |                                                                         |

| Q     | Answer                                                                                                                                  | Mark | Comments                                                                                                                 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------|
| 18(c) | $\frac{\text{their } 20}{36}$ or $\frac{5}{9}$ or $0.\dot{5}$ or $55.\dot{5}\%$                                                         | B1ft | oe fraction, decimal or percentage<br>correct or ft their Hard total from the table<br>accept rounding to 2 sf or better |
|       | <b>Additional Guidance</b>                                                                                                              |      |                                                                                                                          |
|       | Ignore incorrect simplification or conversion attempt to fraction, decimal or percentage (but not ratio) after correct probability seen |      |                                                                                                                          |
|       | Do not allow eg 20 in 36 or 20 out of 36 unless the correct probability seen                                                            |      |                                                                                                                          |
|       | Do not allow ratio                                                                                                                      |      |                                                                                                                          |
|       | Ignore words if correct probability seen                                                                                                |      |                                                                                                                          |

| Q  | Answer                                                                                                    | Mark | Comments                          |
|----|-----------------------------------------------------------------------------------------------------------|------|-----------------------------------|
| 19 | <b>Alternative method 1</b>                                                                               |      |                                   |
|    | Rotation                                                                                                  | B1   |                                   |
|    | 180° or half turn                                                                                         | B1   | ignore clockwise or anticlockwise |
|    | Origin or (0, 0) or <i>O</i>                                                                              | B1   |                                   |
|    | <b>Alternative method 2</b>                                                                               |      |                                   |
|    | Enlargement                                                                                               | B1   |                                   |
|    | (Scale factor) –1                                                                                         | B1   |                                   |
|    | Origin or (0, 0) or <i>O</i>                                                                              | B1   |                                   |
|    | <b>Additional Guidance</b>                                                                                |      |                                   |
|    | Accept eg rotate for rotation and condone rotational symmetry                                             |      |                                   |
|    | Do not accept turn for first B1                                                                           |      |                                   |
|    | Accept 180 for 180°                                                                                       |      |                                   |
|    | Accept 0, 0 for origin                                                                                    |      |                                   |
|    | Do not accept centre of grid for origin                                                                   |      |                                   |
|    | Reflection on (0, 0)                                                                                      |      | B0B0B1                            |
|    | Choice of transformations eg rotation (and) $\begin{pmatrix} 4 \\ 4 \end{pmatrix}$ or rotation (and) flip |      | 1st B0                            |
|    | Combined transformation                                                                                   |      | max B0B1B1                        |

| Q  | Answer                                                                                | Mark  | Comment                                                                           |
|----|---------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|
| 20 | 12.9 <sup>2</sup> or 166.41<br>and<br>17.2 <sup>2</sup> or 295.84                     | M1    | implied by 462.25<br>or 129.43 or $\sqrt{129.43}$<br>or 11.37... or 11.38 or 11.4 |
|    | $\sqrt{12.9^2 + 17.2^2}$<br>or $\sqrt{166.41 + 295.84}$ or $\sqrt{462.25}$            | M1dep |                                                                                   |
|    | 21.5                                                                                  | A1    | oe                                                                                |
|    | <b>Additional Guidance</b>                                                            |       |                                                                                   |
|    | Correct answer with no working                                                        |       | M1M1A1                                                                            |
|    | 21.5 with error seen is A0<br>eg $\sqrt{12.9^2 + 17.2^2} = \sqrt{461.95}$ Answer 21.5 |       | M1M1A0                                                                            |
|    | Answer from trigonometry or drawing                                                   |       | M0M0A0                                                                            |

| Q  | Answer                                                                                       | Mark | Comments                 |
|----|----------------------------------------------------------------------------------------------|------|--------------------------|
| 21 | 21 + 58 or 79                                                                                | M1   | may be marked on diagram |
|    | 079                                                                                          | A1   |                          |
|    | <b>Additional Guidance</b>                                                                   |      |                          |
|    | 21 + 58 followed by further work leading to the answer<br>eg $21 + 58 = 79$ , $90 - 79 = 11$ |      | M0A0                     |

| Q  | Answer | Mark | Comments |
|----|--------|------|----------|
| 22 | 9      | B1   |          |

| 23 | Answer                                                                                                     | Mark  | Comment                                                                                    |
|----|------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------|
|    | <b>Alternative method 1: price of buying 8 from each shop</b>                                              |       |                                                                                            |
|    | $2.39 \times 8$ or 19.12                                                                                   | M1    | oe<br>shop A                                                                               |
|    | $3.08 \times 4 + 3.08 \div 2 \times 4$<br>or 18.48                                                         | M1    | oe<br>shop B                                                                               |
|    | $11.4 \div 6$ or 1.9(0)<br>or $11.4 \times 2 \div 6$ or 3.8(0)                                             | M1    | oe<br>shop C                                                                               |
|    | $11.4 \times 2 - \text{their } 1.9(0) \times 2$<br>or $11.4 \times 2 - \text{their } 3.8(0)$<br>or 19(.00) | M1dep | oe<br>dep on previous mark<br>$11.4 \times \frac{5}{6} \times 2$ oe scores 3rd & 4th marks |
|    | B and 18.48<br>with 19.12 and 19(.00) seen                                                                 | A1    |                                                                                            |
|    | <b>Alternative method 2: compares price of individual sticks first</b>                                     |       |                                                                                            |
|    | $3.08 \times 1.5 \div 2$ or 2.31                                                                           | M1    | oe<br>shop B                                                                               |
|    | $(11.4 \div 4) \div 6$ or 0.47(5) or 0.48                                                                  | M1    | oe<br>shop C                                                                               |
|    | $11.4 \div 4 - \text{their } 0.475$<br>or 2.37(5) or 2.38                                                  | M1dep | oe<br>dep on previous mark<br>$11.4 \times \frac{5}{6} \div 4$ oe scores 2nd & 3rd marks   |
|    | their $2.31 \times 8$ or 18.48<br>with M3 awarded                                                          | M1dep | oe                                                                                         |
|    | B and 18.48<br>with 2.31 and 2.37(5) or 2.38 seen                                                          | A1    |                                                                                            |

**Mark scheme and Additional Guidance continue on the next page**

|         |                                                                   |       |                                                                                    |
|---------|-------------------------------------------------------------------|-------|------------------------------------------------------------------------------------|
| 23 cont | <b>Alternative method 3: compares the price of 4 sticks first</b> |       |                                                                                    |
|         | 2.39 × 4 or 9.56<br>and<br>3.08 × 1.5 × 2 or 9.24                 | M1    | oe<br>shops A and B                                                                |
|         | 11.4 ÷ 6 or 1.9(0)                                                | M1    | oe<br>shop C                                                                       |
|         | 11.4 – their 1.9(0) or 9.5(0)                                     | M1dep | dep on previous mark<br>$11.4 \times \frac{5}{6}$ oe scores 2nd & 3rd marks        |
|         | their 9.24 × 2 or 18.48<br>with M3 awarded                        | M1dep | oe                                                                                 |
|         | B and 18.48<br>with 9.56 and 9.24 and 9.5(0)<br>seen              | A1    |                                                                                    |
|         | <b>Alternative method 4: compares the price of 2 sticks first</b> |       |                                                                                    |
|         | 2.39 × 2 or 4.78<br>and<br>3.08 × 1.5 or 4.62                     | M1    | oe<br>shops A and B                                                                |
|         | (11.4 ÷ 2) ÷ 6 or 0.95                                            | M1    | oe<br>shop C                                                                       |
|         | 11.4 ÷ 2 – their 0.95 or 4.75                                     | M1dep | dep on previous mark<br>$11.4 \times \frac{5}{6} \div 2$ oe scores 2nd & 3rd marks |
|         | their 4.62 × 4 or 18.48<br>with M3 awarded                        | M1dep | oe                                                                                 |
|         | B and 18.48<br>with 4.78 and 4.62 and 4.75<br>seen                | A1    |                                                                                    |

**Additional Guidance continues on the next page**

| 23 cont | Additional Guidance                                                                                                                                                                                                                                                                                                                                      |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------|------------|------------|------------|------------|---|------|------|------|-------|---|------|------|------|-------|---|-----------------|------|--------|---------|
|         | Up to M4 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts                                                                                                                                                                                                                              |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | Use the scheme which gives the highest mark                                                                                                                                                                                                                                                                                                              |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | NB The 4th mark in Alts 2, 3 and 4 does not imply any earlier marks<br>Either the method or values must have been seen and awarded for the first 3 marks in order to give this mark<br><br>However 18.48 always implies M1 by Alt 1                                                                                                                      |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | If students use different numbers of sticks for different shops do not combine marks from different schemes<br><br>but note that there are possible valid methods that compare eg 2 sticks from A and B and then 4 sticks from B and C (escalate if seen)                                                                                                |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | All schemes can be oe in pence and allow work in a mix of pounds or pence for up to M4                                                                                                                                                                                                                                                                   |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | Allow $\times 0.16(6\dots)$ or $\times 16(.6\dots)\%$ or $\times 0.167$ or $\times 16.7\%$ or $\times 0.17$ or $\times 17\%$ if seen for method for one sixth for shop C but must recover to given values for A mark                                                                                                                                     |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | Allow $\times 0.83(3\dots)$ or $\times 83(.3\dots)\%$ if seen for method for five sixths for shop C but must recover to given values for A mark                                                                                                                                                                                                          |            |            |            |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
|         | <table><tr><th>Shop</th><th>Cost for 1</th><th>Cost for 2</th><th>Cost for 4</th><th>Cost for 8</th></tr><tr><td>A</td><td>2.39</td><td>4.78</td><td>9.56</td><td>19.12</td></tr><tr><td>B</td><td>2.31</td><td>4.62</td><td>9.24</td><td>18.48</td></tr><tr><td>C</td><td>2.37(5) or 2.38</td><td>4.75</td><td>9.5(0)</td><td>19(.00)</td></tr></table> |            |            |            | Shop | Cost for 1 | Cost for 2 | Cost for 4 | Cost for 8 | A | 2.39 | 4.78 | 9.56 | 19.12 | B | 2.31 | 4.62 | 9.24 | 18.48 | C | 2.37(5) or 2.38 | 4.75 | 9.5(0) | 19(.00) |
| Shop    | Cost for 1                                                                                                                                                                                                                                                                                                                                               | Cost for 2 | Cost for 4 | Cost for 8 |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
| A       | 2.39                                                                                                                                                                                                                                                                                                                                                     | 4.78       | 9.56       | 19.12      |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
| B       | 2.31                                                                                                                                                                                                                                                                                                                                                     | 4.62       | 9.24       | 18.48      |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |
| C       | 2.37(5) or 2.38                                                                                                                                                                                                                                                                                                                                          | 4.75       | 9.5(0)     | 19(.00)    |      |            |            |            |            |   |      |      |      |       |   |      |      |      |       |   |                 |      |        |         |

| Q  | Answer                                                                                                                                                                                                                                                                          | Mark  | Comments                                                                                    |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------|
| 24 | $8 \times 10$ or 80<br>or<br>$0.5 \times 8 \times (14 - 10)$<br>or $0.5 \times 8 \times 4$ or 16<br>or<br>$8 \times 14$ or 112                                                                                                                                                  | M1    | oe<br>may be seen in an incorrect attempt to calculate the population eg $\frac{9450}{112}$ |
|    | $8 \times 10 + 0.5 \times 8 \times (14 - 10)$<br>or $8 \times 10 + 0.5 \times 8 \times 4$<br>or $80 + 16$<br>or<br>$8 \times 14 - 0.5 \times 8 \times (14 - 10)$<br>or $8 \times 14 - 0.5 \times 8 \times 4$<br>or $112 - 16$<br>or<br>$0.5 \times (10 + 14) \times 8$<br>or 96 | M1dep | oe<br>may be seen in an incorrect attempt to calculate the population eg $\frac{9450}{96}$  |
|    | their $96 \times 9450$                                                                                                                                                                                                                                                          | M1    | oe<br>their 96 must be from a calculation using at least two of 8, 10 and 14                |
|    | 907 200                                                                                                                                                                                                                                                                         | A1    |                                                                                             |
|    | <b>Additional Guidance</b>                                                                                                                                                                                                                                                      |       |                                                                                             |
|    | The first M1 may be awarded for a correct partial area even if this is seen amongst multiple attempts                                                                                                                                                                           |       |                                                                                             |
|    | eg1 $(8 + 10 + 14) \times 9450 = 302\,400$<br>eg2 $32 \times 9450 = 302\,400$ (working not seen)                                                                                                                                                                                |       | M0M0M1A0<br>M0M0M0A0                                                                        |



| Q     | Answer | Mark | Comment |
|-------|--------|------|---------|
| 25(a) | 3      | B1   |         |

| Q     | Answer                                                                                                         | Mark | Comment                                                                                                                    |
|-------|----------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------|
| 25(b) | No and correct reason                                                                                          | B1   | eg<br>no and this gives percentage (not angle)<br>no and it should be ( $\times$ ) 360 (not 100)<br>no and it should be 72 |
|       | <b>Additional Guidance</b>                                                                                     |      |                                                                                                                            |
|       | Yes indicated                                                                                                  |      | B0                                                                                                                         |
|       | If neither box is ticked then No may be implied by the reason<br>eg She hasn't used $360^\circ$ for the circle |      | B1                                                                                                                         |
|       | Ignore irrelevant, non-contradictory statements                                                                |      |                                                                                                                            |
|       | Do not ignore incorrect calculations or evaluations of the angle, or incorrect statements                      |      |                                                                                                                            |
|       | No and this is 20%                                                                                             |      | B1                                                                                                                         |
|       | No and she still needs to work out 20% of 360                                                                  |      | B1                                                                                                                         |
|       | No and a circle is $360^\circ$                                                                                 |      | B1                                                                                                                         |
|       | No and angles in a pie chart are 360                                                                           |      | B1                                                                                                                         |
|       | No and she needs to divide 360 by 5                                                                            |      | B1                                                                                                                         |
|       | No, shouldn't have $\times$ by 100                                                                             |      | B0                                                                                                                         |
|       | No, she should have divided 360 / divided by 360                                                               |      | B0                                                                                                                         |
|       | No and a circle has 360 <b>not 180</b>                                                                         |      | B0                                                                                                                         |
|       | No and it's not big enough                                                                                     |      | B0                                                                                                                         |

| Q  | Answer                                                                                                                                         | Mark  | Comment                                                                                                                                                                                                                                                                                                                          |
|----|------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26 | Correct method or evaluation of the area of any face<br>or<br>correct method or evaluation of the volume of any relevant cuboid of length 6 cm | M1    | eg $5 \times 6$ or 30<br>or $2 \times 6$ or 12<br>or $3 \times 6$ or 18<br>or $4 \times 6$ or 24<br>or $2 \times 5 + 2 \times 2$ or $10 + 4$ or 14<br>or<br>$2 \times 5 \times 6$ or 60<br>or $2 \times 2 \times 6$ or 24<br>or $2 \times 3 \times 6$ or 36<br>or $4 \times 2 \times 6$ or 48<br>or $5 \times 4 \times 6$ or 120 |
|    | Correct method for volume of prism                                                                                                             | M1dep | eg $2 \times 5 \times 6 + 2 \times 2 \times 6$ or $60 + 24$<br>or $14 \times 6$                                                                                                                                                                                                                                                  |
|    | 84                                                                                                                                             | A1    |                                                                                                                                                                                                                                                                                                                                  |
|    | <b>Additional Guidance</b>                                                                                                                     |       |                                                                                                                                                                                                                                                                                                                                  |
|    | The first M1 may be awarded even if this is seen amongst multiple attempts                                                                     |       |                                                                                                                                                                                                                                                                                                                                  |

| Q  | Answer                                                                                                                      | Mark  | Comment                                                                                          |
|----|-----------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------|
| 27 | $3 \times 45$ or 135 or 63                                                                                                  | M1    | may be seen embedded in an expression, equation or calculation<br>eg $3 \times 45 + 31.5x = 198$ |
|    | $\frac{198 - 3 \times 45}{31.5}$<br>or $(198 - 135) \div 31.5$<br>or $63 \div 31.5$ or 2 (hours)                            | M1dep | oe eg $31.5 \times 2 = 63$<br>implied by total of 5 (hours)                                      |
|    | $198 \div (3 + \text{their } 2)$ or $198 \div 5$                                                                            | M1dep |                                                                                                  |
|    | 39.6                                                                                                                        | A1    | accept 40 with M3 awarded                                                                        |
|    | <b>Additional Guidance</b>                                                                                                  |       |                                                                                                  |
|    | Up to M2 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts |       |                                                                                                  |
|    | NB $31.5 \div (45 \div 3) = 2$ (hours)                                                                                      |       | M0M0                                                                                             |

| Q  | Answer                                                                                                                                   | Mark | Comment                                                                                                                             |
|----|------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------|
| 28 | $8a + 29$                                                                                                                                | B1   | oe eg $2(4a + 13) + 3$                                                                                                              |
|    | $15a + 48$                                                                                                                               | B1ft | correct or ft B0 only<br>their $8a + 29$ must be in the form $na + c$<br>where $n \neq 0$ and $c \neq 0$<br>implied by $3(5a + 16)$ |
|    | $3(5a + 16)$<br>or $15 = 5 \times 3$ and $48 = 16 \times 3$                                                                              | B1   | oe eg $5a + 16$ so it divides by 3                                                                                                  |
|    | <b>Additional Guidance</b>                                                                                                               |      |                                                                                                                                     |
|    | Ignore use of substitution as an attempt to show divisibility                                                                            |      |                                                                                                                                     |
|    | Ignore further non-contradictory statements                                                                                              |      |                                                                                                                                     |
|    | Further simplification eg $15a + 48 = 63$ which is $21 \times 3$                                                                         |      | B1B1B0                                                                                                                              |
|    | For the 1st B1 accept $8a + 29$ embedded in a calculation for the sum of the first four terms<br>eg $a + 1 + 2a + 5 + 4a + 13 + 8a + 29$ |      |                                                                                                                                     |
|    | For the 2nd B1 accept $15a + 48$ embedded in a calculation to show divisibility<br>eg $\frac{15a+48}{3} = 5a + 16$                       |      |                                                                                                                                     |
|    | For the 3rd B1 accept 15 is a multiple of 3 and 48 is a multiple of 3                                                                    |      |                                                                                                                                     |
|    | $8a + 29$<br>$a + 2a + 4a + 8a = 15a$ $1 + 5 + 13 + 29 = 48$ but $15a + 48$ not seen<br>$15 = 5 \times 3$ and $48 = 16 \times 3$         |      | B1<br>B0<br>B1                                                                                                                      |

| Q  | Answer                                                                                                                                                                                 | Mark  | Comment                                                                                                               |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------|
| 29 | <b>Alternative method 1</b>                                                                                                                                                            |       |                                                                                                                       |
|    | $\frac{32-14}{12-3}$ or $\frac{18}{9}$<br>or $(m =) 2$                                                                                                                                 | M1    | oe eg $\frac{14-32}{3-12}$<br>implied by $y = 2x \dots$                                                               |
|    | 14 = their $2 \times 3 + c$<br>or $32 = \text{their } 2 \times 12 + c$<br>or $(m =) 2$ and $c = 8$<br>or<br>$y - 14 = \text{their } 2(x - 3)$<br>or $y - 32 = \text{their } 2(x - 12)$ | M1dep | oe                                                                                                                    |
|    | $y = 2x + 8$                                                                                                                                                                           | A1    |                                                                                                                       |
|    | <b>Alternative method 2</b>                                                                                                                                                            |       |                                                                                                                       |
|    | 14 = $3m + c$ and $32 = 12m + c$<br>and $32 - 14 = 12m - 3m$<br>or $m = 2$<br>or<br>$56 = 12m + 4c$ and $32 = 12m + c$<br>and $56 - 32 = 4c - c$<br>or $c = 8$                         | M1    | oe correct method to work out $m$ or $c$<br>using simultaneous equations<br>implied by $y = 2x \dots$ or $y = mx + 8$ |
|    | Correct substitution of their $m$ into<br>one of the original equations<br>or<br>correct substitution of their $c$ into<br>one of the original equations<br>or<br>$m = 2$ and $c = 8$  | M1dep |                                                                                                                       |
|    | $y = 2x + 8$                                                                                                                                                                           | A1    |                                                                                                                       |