# GCSE

# MATHEMATICS

# 8300/2F

Foundation Tier Paper 2 Calculator

**Mark scheme**

November 2019

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.


Further copies of this mark scheme are available from aqa.org.uk

**Glossary for Mark Schemes**

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

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

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

Examiners should consistently apply the following principles

**Diagrams**

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

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

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

**Questions which ask students to show working**

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

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

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

**Misread or miscopy**

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

**Further work**

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

**Choice**

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

**Work not replaced**

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

**Work replaced**

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

**Premature approximation**

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

**Continental notation**

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

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **1** | $6a$ | B1 | |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **2** | 22 | B1 | |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **3** | 1 h 45 min | B1 | |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **4** | **Q** | B1 | |
| | **Additional Guidance** | | |
| | | | |

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

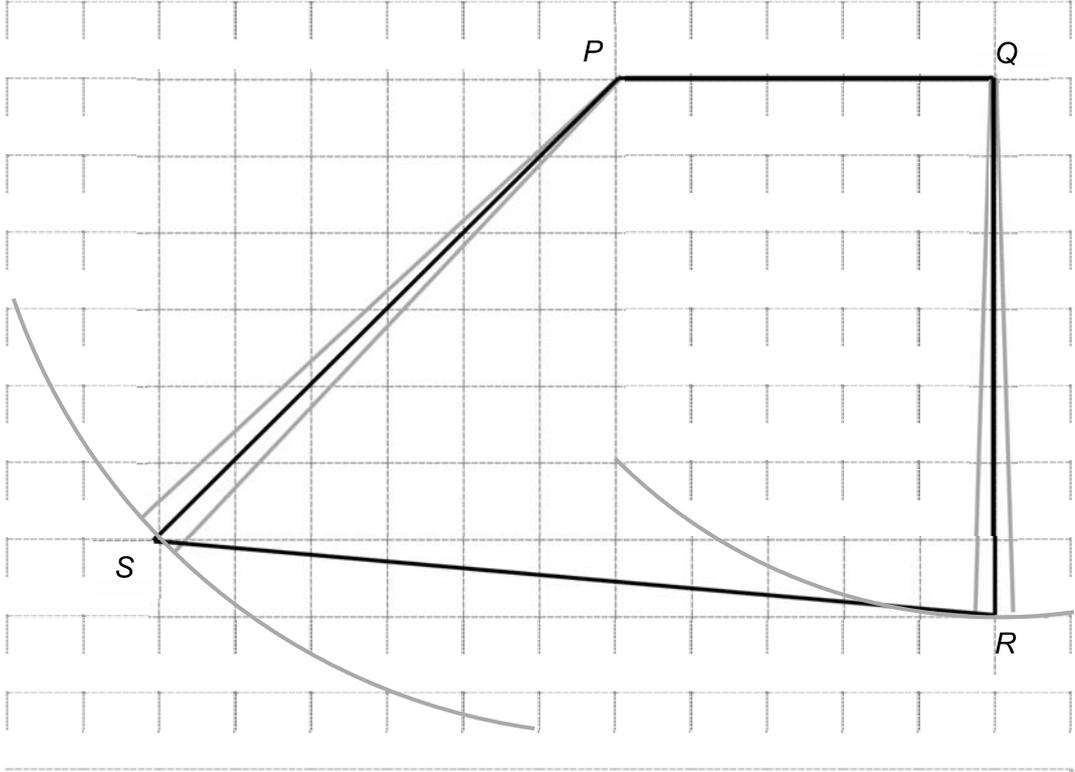| 5(a) | 11 | B1 | |
| | **Additional Guidance** | | |
| | Must be seen in this part | | |

| 5(b) | 3   4   4   5   9   10   12   14<br>or<br>14   12   10   9   5   4   4   3<br>or<br>3   4   4   5   9<br>or<br>14   12   10   9   5<br>or<br>$\dfrac{5+9}{2}$<br>or<br>5 and 9 chosen | M1 | allow one omission, extra or transcription error in a full list |
| | 7 | A1 | |
| | **Additional Guidance** | | |
| | Allow the ordered list to be seen by the given list or in part (a) even if part (b) is blank but not if the mean is calculated in part (b) | | |
| | Correct ordering but calculates mean | | M0A0 |
| | Answer 7.6… | | M0A0 |
| | NB  3 + 4 = 7 | | M0A0 |
| | Answer 7 from any or no list but not from 3 + 4 | | M1A1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **6** | 3 × 42 or 126<br>or<br>5 × 42 or 210 | M1 | implied by 121 or 190 or 84 |
| | 3 × 42 – 5 or 121<br>or<br>5 × 42 – 20 or 190 | M1dep | oe |
| | 69 or 69.00(p) | A1 | 69p is A0 |

| | Additional Guidance | |
|---|---|---|
| | 121 or 190 seen | M1M1 |
| | 121 ÷ 3 or 190 ÷ 5 | M1M1A0 |
| | Do not allow a misread of the discounts | |
| | Follow through the correct discount for their misread of a dress price<br>eg for a misread of £42 as £24<br>24 × 3 = 72 and no discount required so M1 max<br>but<br>24 × 5 = 120 and 120 – 5 = 115 could score M1M1 | |
| | A misread of the number of dresses must be > 3 for Amira and > 5 for Bobbi | |

| | | | |
|---|---|---|---|
| **7(a)** | –5 | B1 | |
| | Additional Guidance | | |
| | –5 + 17 = 12 or 17 – 5 = 12 but –5 not selected as answer | | B0 |

| | | | |
|---|---|---|---|
| **7(b)** | 48 | B1 | |
| | Additional Guidance | | |
| | 48 seen but 12 given as answer | | B0 |
| | Answer $\dfrac{48}{4}$ | | B0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 7(c) | $\dfrac{3}{4}$ or 0.75 | B2 | B1 partial simplification<br>eg $\dfrac{3m}{4m}$ or $\dfrac{0.75m}{m}$ or $\dfrac{9}{12}$ |
| | **Additional Guidance** | | |
| | eg $\dfrac{3m}{4m}$ seen but answer given as $0.75m$ | | B1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 8 | £15 | B1 | |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 9 | 40 | B2 | B1 correct proportion seen<br>eg $\dfrac{10}{25}$ or $\dfrac{2}{5}$ or 0.4 or $\dfrac{20}{50}$<br>or<br>10 ÷ 25 × 100 oe<br>or<br>correctly evaluates their number of shaded squares × 4<br>or<br>answer 60 |
| | **Additional Guidance** | | |
| | 10 ÷ 25 or 10 out of 25 in words or ratio used (unless recovered) | | B0 |
| | eg $\dfrac{11}{25}$ seen with answer 44 | | B1 |
| | eg 7 (shaded) seen with answer 28 | | B1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **10** | 40 ÷ 5  or  8 | M1 | may be seen on diagram eg 8 in one of the circles or as a key<br><br>implied by $\bigcirc$ = 4 |
| | their 8 × 3.5<br><br>or<br><br>their 8 + their 8 + their 8 + $\dfrac{\text{their } 8}{2}$ | M1dep | oe  calculation that would evaluate to 28<br><br>eg 8 + 8 + 8 + 4  or  3 × 8 + 4<br><br>or  their 4 × 7 |
| | 28 | A1 | |

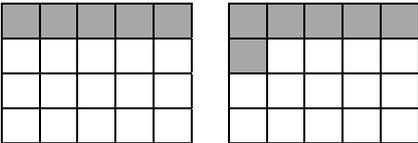| Additional Guidance | |
|---|---|
| Answer 28 | M1M1A1 |
| Condone recovery eg 8 × 3 + $\dfrac{1}{2}$ = 28 | M1M1A1 |
| Only eg 8 × 3 + $\dfrac{1}{2}$ with no recovery to 28 | M1M0A0 |
| Further work<br>eg 8 × 3.5 = 28,  28 × 4 (and answer 112) | M1M0A0 |
| eg Chicken = 8 + 16 + 24 + 28 | M1M0A0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 11 | 54 | B2 | B1 $(c =)$ –6 or $(d =)$ –9 <br><br> or $(cd =)$ $-\dfrac{1512}{-28}$ oe fraction <br><br> or $(cd =)$ $\dfrac{1512}{28}$ oe fraction |

| Additional Guidance | |
|---|---|
| Answer 54 with any or no working | B2 |
| $(c =)$ –6 or $(d =)$ –9 seen even if not subsequently used | B1 |
| $(c =)$ –6 or $(d =)$ –9 may be seen by the given calculations | B1 |
| $250 – 16^2 \times –9 = 2554$ | B1 |
| $250 – 16^2 \times \dfrac{18 \times 14}{-28} = 2554$ | B0 |
| Answer 2554 with no working | B0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 12 | B H      B T <br> G H      G T <br> R H      R T <br> W H      W T <br> with no errors or repeats | B2 | any configuration <br> accept words <br> B1 five of BT  GH  GT  R H  R T <br> W H  W T |

| Additional Guidance | |
|---|---|
| eg T B means B T so if both seen it is a repeat | |
| Condone repeats or errors for B1 but not B2 | |
| Allow B H to be written again if list restarted | |
| Do not count clear working as a repeat eg table used to work out combinations and then separate list given as answer | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 13 | Angle *PQR* = [88°, 92°]<br>and<br>line from *Q* = [6.8, 7.2] cm<br>and<br>angle *QPS* = [133°, 137°]<br>and<br>line from *P* = [8.3, 8.7] cm<br>and<br>complete quadrilateral | B4 | B3 at least three of the four measuring criteria met<br><br>B2 any two of the measuring criteria met<br><br>B1 any one of the measuring criteria met<br><br>Length of *QR* must be within 2 mm of the right-hand arc shown below<br>Length of *PS* must be within 2 mm of the left-hand arc shown below |

**Additional Guidance**



Ignore labels if present

| | | |
|---|---|---|
| **14** | triangular prism | B1 | |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | **Alternative method 1** | | |
| | 0.75  or  1.3 | M1 | decimal or percentage<br>eg 75(%)  or  130(%) |
| | 0.75  and  1.3<br>and  $\frac{3}{4}$  oe | A1 | oe  decimal or percentage<br>eg 75(%)  and  130(%)  and  $\frac{3}{4}$  oe |
| | **Alternative method 2** | | |
| | 0.25  or  0.3 | M1 | decimal or percentage<br>eg 25(%)  or  30(%) |
| | 0.25  and  0.3<br>and  $\frac{3}{4}$  oe | A1 | decimal or percentage<br>eg 25(%)  and  30(%)  and  $\frac{3}{4}$  oe |
| | **Alternative method 3** | | |
| **15** | Converts both fractions to valid common denominator with at least one numerator correct | M1 | eg  $\frac{15}{20}, \frac{26}{20}$  (both numerators correct)<br>or  $\frac{30}{40}, \frac{54}{40}$  (one numerator incorrect) |
| | Two correct fractions with valid common denominator<br>and  $\frac{3}{4}$  oe | A1 | eg  $\frac{15}{20}$  and  $\frac{26}{20}$  and  $\frac{3}{4}$  oe<br>or  $\frac{7.5}{10}$  and  $\frac{13}{10}$  and  $\frac{3}{4}$  oe |
| | **Alternative method 4** | | |
| | Converts  $\frac{1}{4}$  and  $\frac{3}{10}$  to valid common denominator with at least one numerator correct | M1 | eg  $\frac{5}{20}, \frac{6}{20}$  (both numerators correct)<br>or  $\frac{10}{40}, \frac{16}{40}$  (one numerator incorrect) |
| | Two correct fractions with valid common denominator<br>and  $\frac{3}{4}$  oe | A1 | eg  $\frac{5}{20}$  and  $\frac{6}{20}$  and  $\frac{3}{4}$  oe<br>or  $\frac{2.5}{10}$  and  $\frac{3}{10}$  and  $\frac{3}{4}$  oe |

**Additional Guidance is on the next page**

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

| | **Additional Guidance** | | |
|---|---|---|---|
| **15 cont** | If answer line blank allow $\dfrac{3}{4}$ to be indicated by eg circling the correct fraction | | |
| | Allow $\dfrac{3}{4}$ to be given as a correct equivalent form<br><br>eg Alt 1  0.75  and  1.3  and  answer 0.75 | M1A1 | |
| | Ignore + or – when calculating difference from 1<br>eg Alt 2  accept 0.25 and –0.3  or  –0.25 and 0.3   or   –0.25 and –0.3 | | |
| | In Alt 1 if further work is seen eg to calculate the differences then these must be correct and comparable for the A1<br><br>eg 0.75 and 1.3  and  25 and 30 (correct change to %)  Answer $\dfrac{3}{4}$<br><br>eg 0.75 and 1.3  and  0.25 and 30 (not comparable)  Answer $\dfrac{3}{4}$<br><br>eg 0.75 and 1.3  and  0.15 and 0.3 (one incorrect)  Answer $\dfrac{3}{4}$ | M1A1<br><br>M1A0<br><br>M1A0 | |
| | Diagrams are acceptable if clear<br><br>eg  and  answer $\dfrac{3}{4}$ | M1A1 | |
| | NB the reciprocal of $\dfrac{3}{4}$ is 1.3… which may be seen truncated to 1.3 | M0 | |
| | $1 - 0.75 = 0.25$,  $1 + 0.25 = 1.25$  and 1.3 seen  and  answer $\dfrac{3}{4}$ | M1A1 | |
| | $1.3 - 1 = 0.3$,  $1 - 0.3 = 0.7$  and 0.75 seen  and  answer $\dfrac{3}{4}$ | M1A1 | |
| | Alt 3 eg  $\dfrac{15}{20}$  and  $1\dfrac{6}{20}$  and  answer $\dfrac{3}{4}$ | M1A1 | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **16** | 20 | B3 | B2 (A : B : C =) 12 : 6 : 2 <br> or (A : B =) 12 : 6 **and** (B : C =) 6 : 2 <br> or A = 12 **and** C = 2 <br><br> B1 (A : B : C =) 6 : 3 : 1 oe <br> or (A : B =) 12 : 6 or (B : C =) 6 : 2 <br> or A = 12 or C = 2 |

| Additional Guidance | |
|---|---|
| Allow clear indication that A is 12 or C is 2 | |
| 6 : 3 : 1 must be a single ratio for B1 | |
| $m$ : 6 : 2 | B1 |
| 12 : 6 : $n$ | B1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **17** | All 3 correct | B3 | B1 for each box in Column P correctly matched |
| | **Additional Guidance** | | |
| | Connections do not have to be straight lines | | |
| | Two or more lines from a box in Column P is choice so is incorrect for that box | | |
| |  | | B3 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | **Alternative method 1** | | |
| | 120 × 2  or  240<br>and<br>120 × 3  or  360 | M1 | 2 may be [2, 2.75)<br>and<br>3 may be (2.75, 3] |
| | 450 – 120  or  330 | M1 | |
| | 240  and  360  and  330  and  Yes | A1 | correct values using their  [2, 2.75) and their (2.75, 3] comparing with 330 |
| | **Alternative method 2** | | |
| | 120 × 2  or  240<br>and<br>120 × 3  or  360 | M1 | 2 may be [2, 2.75)<br>and<br>3 may be (2.75, 3] |
| | their 240 + 120  or  360<br>and<br>their 360 + 120  or  480 | M1dep | oe |
| **18** | 360  and  480  and  Yes | A1 | correct values using their  [2, 2.75) and their (2.75, 3] comparing with given 450 |
| | **Alternative method 3** | | |
| | 450 – 120  or  330 | M1 | |
| | their 330 ÷ 120  or  2.75 | M1dep | oe eg 450 ÷ 120 – 1 or 3.75 – 1 is M2 |
| | 2.75  and  Yes | A1 | comparing with given 2 and 3 |
| | **Alternative method 4** | | |
| | 450 – 120  or  330 | M1 | |
| | their 330 ÷ 2  or  165<br>and<br>their 330 ÷ 3  or  110 | M1dep | 2 may be [2, 2.75)<br>and<br>3 may be (2.75, 3] |
| | 165  and  110  and  Yes | A1 | correct values using their  [2, 2.75) and their (2.75, 3] comparing with given 120 |

**Alternative method 5 and Additional Guidance are on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **18 cont** | **Alternative method 5** | | |
| | 2 + 1 or 3<br><br>and<br><br>3 + 1 or 4 | M1 | 3 may be [3, 3.75)<br><br>and<br><br>4 may be (3.75, 4] |
| | 120 × 3  or  360<br>**and**<br>120 × 4  or  480<br><br>or<br><br>450 ÷ 3  or  150<br>**and**<br>450 ÷ 4  or  112(.5) | M1dep | oe<br>3 may be [3, 3.75)<br><br>and<br><br>4 may be (3.75, 4] |
| | 360  and  480  and  Yes<br><br>or<br><br>150  and  112(.5)  and  Yes | A1 | comparing with given 450<br><br>or<br><br>comparing with given 120 |

| **Additional Guidance** | |
|---|---|
| Use the method that gives the most marks even if there are multiple attempts | |
| Yes may be seen by the question or implied by eg It is between 2 and 3 times | |
| 450 ÷ 120 only  or  3.75 only | M0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **19** | ✓ All four triangles are right-angled<br><br>☐ All four triangles are isosceles<br><br>✓ All four triangles are congruent<br><br>✓ Area of rhombus = 4 × area of one triangle<br><br>☐ Perimeter of rhombus = 4 × perimeter of one triangle | B2 | B1  two correct with at most one incorrect<br><br>or three correct and one incorrect |
| | **Additional Guidance** | | |
| | | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **20(a)** | **Alternative method 1** shown by valid calculation | | |
| | 1500 × 100<br>or 30 000 × 5<br>or 1500 ÷ 5<br>or 30 000 ÷ 100<br>or 5 ÷ 100<br>or 1500 × 100 ÷ 5<br>or 30 000 × 5 ÷ 100<br>or 1500 × 100 ÷ 30 000 | M1 | must see one of these calculations but may evaluate incorrectly for M1<br><br>do **not** allow embedded in an invalid calculation eg 30 000 × 5 ÷ 1000 is M0 |
| | $\dfrac{1500 \times 100}{5} = 30\,000$<br>or<br>$\dfrac{30\,000 \times 5}{100} = 1500$<br>or<br>$\dfrac{1500 \times 100}{30\,000} = 5$ **and** *AB* = 5<br>or<br>1500 × 100 = 30 000 × 5<br>or<br>1500 ÷ 5 = 30 000 ÷ 100 | A1 | must show correct use of all four of 1500, 100, 5 and 30 000<br><br>may be in two stages<br><br>eg 1500 × 100 = 150 000 **and**<br>150 000 ÷ 5 = 30 000<br><br>or 1500 ÷ 5 = 300 **and**<br>30 000 ÷ 100 = 300<br><br>if units shown must be correct for A1 |

**Alternative method 2 and Additional Guidance are on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | **Alternative method 2** shown by unit conversion and valid calculation | | |
| | 150 000 cm  or  300 m<br><br>or  0.05 m | M1 | correct units must be shown to imply use of 100 |
| **20(a) cont** | 150 000 cm  **and**<br>30 000 × 5 = 150 000<br><br>or<br><br>150 000 cm  **and**<br>150 000 ÷ 5 = 30 000<br><br>or<br><br>150 000 cm  **and**<br>150 000 ÷ 30 000 = 5  **and**  *AB* = 5<br><br>or<br><br>30 000 cm  **and**  300 m<br>**and**  1500 ÷ 5 = 300<br><br>or<br><br>30 000 cm  **and**  300 m<br>**and**  300 × 5 = 1500<br><br>or<br><br>30 000 cm  **and**  300 m<br>**and**  1500 ÷ 300 = 5  **and**  *AB* = 5<br><br>or<br><br>0.05 m  **and**  1500 ÷ 0.05 = 30 000<br><br>or<br><br>0.05 m  **and**  30 000 × 0.05 = 1500 | A1 | correct units must be shown |

| | Additional Guidance | |
|---|---|---|
| | 30 000 × 5 may be seen as a correct build-up ie 30 000, 60 000, 90 000, 120 000, 150 000 | |
| | Measuring *AB* as a value other than 5 will score M1 max | |
| | Using *AC* or *BC* can only score a max of M1 for one of the calculations or conversions that does not use *AB* | |
| | Allow M1 even if seen among other incorrect work but for A1 their method must be all correct and unambiguous | |
| | Must show a calculation from Alt 1 or a value with units from Alt 2 for the M1 ie 150 000 only or 300 only or 0.05 only is M0 | |
| | Ignore any additional reference to the grid having 100 squares | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | **Alternative method 1**  working in cm | | |
| | [4.4, 4.6] | B1 | may be on diagram |
| | their [4.4, 4.6] × 30 000<br><br>or  [132 000, 138 000] | M1 | their *AC* must be in the range [4, 7] and must **not** be 5<br><br>[132 000, 138 000] implies B1M1 if no measurement for *AC* given |
| | their [132 000, 138 000]<br><br>÷ 100 ÷ 1000 | M1dep | oe  must be converting into km |
| | [1.32, 1.38] | A1ft | ft B0M2 |
| | **Alternative method 2**  working in cm | | |
| | [4.4, 4.6] | B1 | may be on diagram |
| | $\dfrac{\text{their } [4.4, 4.6]}{5} \times 1500$<br><br>or  their [4.4, 4.6] × 300<br><br>or  [1320, 1380] | M1 | their *AC* must be in the range [4, 7] and must **not** be 5<br><br>[1320, 1380] implies B1M1 if no measurement for *AC* given |
| **20(b)** | their [1320, 1380] ÷ 1000 | M1dep | oe  must be converting into km |
| | [1.32, 1.38] | A1ft | ft B0M2 |
| | **Alternative method 3**  working in mm | | |
| | [44, 46] | B1 | may be on diagram |
| | their [44, 46] × 30 000<br><br>or  [1 320 000, 1 380 000]<br><br>or  $\dfrac{\text{their } [44, 46]}{50} \times 1500$<br><br>or  their [44, 46] × 30<br><br>or  [1320, 1380] | M1 | their *AC* must be in the range [40, 70] and must **not** be 50<br><br>[1 320 000, 1 380 000] implies B1M1 if no measurement for *AC* given<br><br>[1320, 1380] implies B1M1 if no measurement for *AC* given |
| | their [1 320 000, 1 380 000]<br><br>÷ 10 ÷ 100 ÷ 1000<br><br>or<br><br>their [1320, 1380] ÷ 1000 | M1dep | oe  must be converting into km |
| | [1.32, 1.38] | A1ft | ft B0M2 |

**Additional Guidance is on the next page**

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **20(b) cont** | **Additional Guidance** | | |
| | Answer only in range [1.32, 1.38] | | B1M1M1A1 |
| | Answer must match their *AC* if seen | | |
| | Must be using the scale 1 : 30 000  or  5 : 1500 | | |
| | Their [4.4, 4.6] is often 4 (perhaps counting squares crossed diagonally) or 6 (perhaps 2 down and 4 across) | | |
| | 4 seen and answer 1.2 | | B0M1M1A1ft |
| | 4 seen and 120 000 (by Alt 1)  or  4 seen and 1200 (by Alt 2) | | B0M1M0A0 |
| | Answer 1.2 (without 4 seen) | | Zero |
| | 6 seen and answer 1.8 | | B0M1M1A1ft |
| | 6 seen and 180 000 (by Alt 1)  or  6 seen and 1800 (by Alt 2) | | B0M1M0A0 |
| | Answer 1.8 (without 6 seen) | | Zero |
| | 4.7 seen and answer 1.41 | | B0M1M1A1ft |
| | 4.7 seen and 141 000 (by Alt 1)  or  4.7 seen and 1410 (by Alt 2) | | B0M1M0A0 |
| | Answer 1.41 (without 4.7 seen) | | Zero |
| | Using Pythagoras gives $AC = \sqrt{20}$ or $2\sqrt{5}$ or 4.4(72…) or 4.5 | | B1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **21** | 2 and 7<br>or  2 and 13<br>or  2 and 19 | B2 | either order<br><br>B1  any pair of **different** numbers chosen from 2, 3, 5, 7, 11, 13, 17, 19<br><br>eg  2 and 3  or  3 and 5 |
| | **Additional Guidance** | | |
| | Mark the answer line but, if answer line blank, the pair of numbers must be clearly selected for B2 or B1 | | |
| | List of prime numbers without selecting a pair | | B0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | 9 × 5 or 45<br><br>or<br><br>9 × 3 or 27<br><br>or<br><br>5 × 3 or 15 | M1 | may be multiplied by 2<br><br>implied by 90 or 54 or 30 or (total =) 174<br>or 90 + 54 + 30 = 174 |
| | 9 × 5 × 2 or 90<br>**and**<br>9 × 3 × 2 + 5 × 3 × 2 or 54 + 30<br>or 84<br><br>or<br><br>9 × 5 or 45<br>**and**<br>9 × 3 + 5 × 3 or 27 + 15 or 42 | M1dep | accept blue = 90 and (total =) 174<br><br>or green = 84 and (total =) 174 |
| | 90 and 84 and Yes<br><br>or<br><br>45 and 42 and Yes | A1 | oe<br>condone incorrect units |
| **22** | **Additional Guidance** | | |
| | Yes may be seen by the question or implied by eg blue is bigger | | |
| | Ticking or circling blue or 90 without a comment does not imply Yes | | |
| | Allow M1 even if not subsequently used | | |
| | Allow M1 even if seen among other calculations for eg perimeter or volume | | |
| | Works out the area of a face and then uses this for the 'volume'<br>eg 5 × 3 = 15, 15 × 9 = 135 or 5 × 3 = 15, 15 × 15 = 225 | M1M0A0 | |
| | Only works out a 'volume' with correct or incorrect method<br>eg 5 × 3 × 9 = 135 or 5 × 3 × 5 × 3 = 225 | M0M0A0 | |
| | Ignore incorrect subtraction eg 90, 84 and Yes blue is 8 greater | M1M1A1 | |
| | 90 + 54 + 30 = 174<br><br>(174 ÷ 2 = 87)<br><br>90 is more than half so Yes or 84 is less than half so Yes | M1<br><br>M1A1 | |
| | Only 90 and 174 without identifying 90 as the blue area | M1M0A0 | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | **Alternative method 1** | | |
| | 1 – 0.4 – 0.25  or  0.35 | M1 | oe fraction or percentage |
| | their 0.35 × 80 | M1dep | oe |
| | 28 | A1 | |
| | **Alternative method 2** | | |
| **23** | 0.4 × 80  or  32 and 0.25 × 80  or  20 | M1 | oe eg (0.4 + 0.25) × 80  or  0.65 × 80  or  52 |
| | 80 – their 32 – their 20 | M1dep | oe eg 80 – their 52 |
| | 28 | A1 | |
| | **Additional Guidance** | | |
| | Answer 28 out of 80 | | M1M1A1 |
| | Answer $\frac{28}{80}$ | | M1M1A0 |
| | Allow M1 even if not subsequently used | | |
| | 28 seen but answer given as 0.35 | | M1M0A0 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **24** | 720 | B2 | B1 at least 3 multiples of 120 (> 120) and at least 3 multiples of 144 (> 144) eg 240  360  480 and  288  432  576 or (120 =) 2 × 2 × 2 × 3 × 5 or (144 =) 2 × 2 × 2 × 2 × 3 × 3 or (Answer =) 2 × 2 × 2 × 2 × 3 × 3 × 5 or  (Answer =) $2^4 \times 3^2 \times 5$ or (Answer =) any multiple of 720 (> 720) eg 1440  or  17 280 |

| Additional Guidance | |
|---|---|
| Prime factor responses for B1 may be in index form eg  (120 =) $3 \times 5 \times 2^3$ | B1 |
| Prime factor responses for B1 may be seen on a factor tree or a Venn diagram or in repeated division eg1   2  2  2  3  5  on a factor tree for 120 eg2   2  2  2  2  3  3    inside one circle on a Venn diagram | B1 B1 |
| For B1 allow some incorrect multiples if 3 correct of each eg1  240  380  480  720  900  (3 correct) and  288  432  576  868  (3 correct) eg2   Answer 1440 but some incorrect multiples seen | B1 B1 |
| Any multiple of 720 (> 720) given in unsimplified form eg1   $2^7 \times 3^3 \times 5$ eg2  2 × 2 × 2 × 2 × 2 × 5 × 3 × 3 | B1 B1 |
| B1 can still be awarded even if subsequently works out HCF | |
| Answer 720 with some incorrect multiples seen | B2 |
| For products of prime factors, ignore inclusion of   × 1 | |

| Question | Answer | Mark | Comments |
|----------|--------|------|----------|
| **25(a)** | Positive | B1 | accept +ve or + |

| | | |
|---|---|---|
| **Additional Guidance** | | |
| Ignore any reference to the strength of the correlation | | |
| As one jump increases so does the other so positive | | B1 |
| As one jump increases so does the other | | B0 |

| Question | Answer | Mark | Comments |
|----------|--------|------|----------|
| **25(b)** | Straight line of best fit passing through<br>(150, [504, 512])<br>and<br>(180, [550, 558]) | B1 | accept if clear intention to draw a straight line<br><br>ignore anything either side of the gates |
| | Correct reading $\pm\dfrac{1}{2}$ square for their straight line of best fit | B1ft | ft straight line with positive gradient<br><br>accept if clear intention to draw a straight line<br><br>ignore any working lines on the graph |

| | | |
|---|---|---|
| **Additional Guidance** | | |
| No line of best fit | | B0B0ft |
| Short straight line with positive gradient and correct reading $\pm\dfrac{1}{2}$ square for their line | | B0B1ft |
| Two lines of best fit, mark the line that leads to their answer | | |
| Two lines of best fit, no answer, apply the usual rules of choice | | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | Valid reason | B1 | eg 195 cm is outside the range of values or cannot extrapolate |
| | **Additional Guidance** | | |
| | Allow '195'   or   'his jump'   or  'it'   to represent 195 cm | | |
| | B1 responses - do **not** allow points/data/plots/results to be replaced by graph or line | | |
| | 195 exceeds the data | | B1 |
| | It is beyond/outside the data | | B1 |
| | 195 is higher than 185 | | B1 |
| | Nobody else jumped that high | | B1 |
| | His jump is more than the others | | B1 |
| | The correlation stops at 560 | | B1 |
| | All the other points/data/plots/results are less than 195 | | B1 |
| **25(c)** | The points/data/plots/results don't reach 195 | | B1 |
| | The points/data/plots/results don't reach that far | | B1 |
| | The points/data/plots/results stop at 185 | | B1 |
| | The pattern/trend/correlation may change after the points/data/plots/results | | B1 |
| | The pattern/trend/correlation may change | | B0 |
| | It doesn't fit the pattern/trend/correlation | | B0 |
| | Line is not long enough | | B0 |
| | No points at/near/around/close to 195 | | B0 |
| | 195 is anomalous   or   195 is an outlier | | B0 |
| | Not enough data | | B0 |
| | This data is not on the graph | | B0 |
| | It is too different to the other points | | B0 |
| | Ignore extra statements that do not contradict a valid reason | | |

| Question | Answer | Mark | Comments |
|----------|--------|------|----------|
| **26** | **Alternative method 1** | | |
| | $110 \div 2$ or 55<br>or<br>$2 \div 110$ or $0.018(1...)$ or 0.0182<br>or<br>$44 \div 110$ or 0.4<br>or<br>$110 \div 44$ or 2.5 | M1 | oe |
| | $44 \div (110 \div 2)$ or 0.8 or $\dfrac{4}{5}$ | M1dep | oe eg 2880<br>or calculation that would evaluate to 0.8<br>eg $2 \div 110 \times 44$<br>or<br>$44 \div 110 \times 2$<br>or<br>$2 \div (110 \div 44)$<br>or<br>$\dfrac{110 + 44}{110 \div 2} - 2$ or $2.8 - 2$ |
| | 48 | A1 | |
| | **Alternative method 2** | | |
| | $110 \div 2 \div 60$<br>or $0.916...$ or 0.917 or 0.92<br>or<br>$2 \times 60 \div 110$<br>or $1.09(0...)$ or 1.091 | M1 | oe |
| | $44 \div (110 \div 2 \div 60)$ | M1dep | oe calculation that would evaluate to 48<br>eg $44 \times 2 \times 60 \div 110$ |
| | 48 | A1 | |

**Additional Guidance is on the next page**

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

| | **Additional Guidance** | | |
|---|---|---|---|
| **26 cont** | Ignore units for M marks  eg 55 miles | | M1 |
| | Do not award A1 if premature approximation for 48 seen | | |
| | eg | | |
| | (Alt 1)  0.018 × 44 = 0.8      Answer 48 | | M2A1 |
| | (Alt 1)  0.018 × 44 = 0.792  and   0.792 × 60 = 47.52    Answer 48 | | M2A0 |
| | (Alt 2)  44 ÷ 0.917 = 48 | | M2A1 |
| | (Alt 2)  44 ÷ 0.917 = 47.9    Answer 48 | | M2A0 |
| | (Alt 2)  44 × 1.09 = 48 | | M2A1 |
| | (Alt 2)  44 × 1.09 = 47.96     Answer 48 | | M2A0 |
| | 48 followed by answer 2 h 48 min | | M2A0 |
| | 48 followed by answer 168 min | | M2A0 |
| | Allow M1 even if not subsequently used | | |
| | Alt 1 Working in seconds leading to 2880 | | M2 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **27** | $a = 7$ | B2 | B1  $3ax - 10a$ <br><br> or  $3ax = 21x$  or  $3ax - 21x = 0$ <br><br> or  $3a = 21$  or  $3a - 21 = 0$ <br><br> or  $21 \div 3$  oe <br><br> or  $-10a = 2b$  oe |
| | $b = -35$ | B1ft | ft  $-5 \times$ their $a$  where  $a \neq 0$ |

<table>
<tr><td colspan="3" align="center"><b>Additional Guidance</b></td></tr>
<tr><td>Ignore collection error if correct expansion seen <br> eg  $3ax - 10a - 21x + 2b = 0$  (should be $- 2b$)</td><td>B1</td></tr>
<tr><td>Ignore incorrect simplification if correct expansion seen <br> eg  $3ax - 10a = -7ax$</td><td>B1</td></tr>
<tr><td>Allow   eg $a \times 3x$ for $3ax$</td><td></td></tr>
<tr><td>Allow   eg $a3x$ for $3ax$</td><td></td></tr>
<tr><td>Embedded 7 with  $a = 7$  not stated <br> eg $7(3x - 10)$  or  $7 \times 3x = 21x$  or  $21 \div 7 = 3$</td><td>B1</td></tr>
<tr><td>Allow B1 even if not subsequently used</td><td></td></tr>
</table>

| Question | Answer | Mark | Comments |
|---|---|---|---|
| **28** | $\dfrac{180 - 56}{2}$  or  62 | M1 | oe <br> may be on diagram |
| | 180 + their 62 <br> or  360 – 56 – their 62 | M1dep | oe <br> eg 62 + 62 + 118 |
| | 242 | A1 | |

<table>
<tr><td colspan="2" align="center"><b>Additional Guidance</b></td></tr>
<tr><td>62 seen even if not subsequently used</td><td>M1</td></tr>
<tr><td>Answer (0)62</td><td>M1M0A0</td></tr>
<tr><td>56 only</td><td>M0</td></tr>
<tr><td>242 seen but answer given as 62</td><td>M1M0A0</td></tr>
<tr><td>242 seen but then further work eg 360 – 242 and answer 118</td><td>M1M0A0</td></tr>
</table>

| Question | Answer | Mark | Comments |
|---|---|---|---|
| | **Alternative method 1** | | |
| **29** | 21 – 17  or  17 – 21<br><br>or  17 + 4  or  21 – 4<br><br>or  (difference is) 4<br><br>or  (7th term =) 21 + 4  or  25<br><br>or  (4th term =) 17 – 4  or  13 | M1 | may be seen as  17   21<br><br>               4<br><br>allow (difference is) –4 |
| | 17 + (100 – 5) × 4<br><br>or  17 + 95 × 4<br><br>or  17 + 380<br><br>or<br><br>21 + (100 – 6) × 4<br><br>or  21 + 94 × 4<br><br>or  21 + 376<br><br>or<br><br>17 – 4 × 4 + 99 × 4<br><br>or  1 + 99 × 4<br><br>or  1 + 396<br><br>or<br><br>17 – 5 × 4 + 100 × 4<br><br>or  –3  + 100 × 4<br><br>or  –3  + 400 | M1dep | must be using 4<br><br>oe calculation that would evaluate to 397<br><br>5th term + 95 × 4<br><br><br><br>6th term + 94 × 4<br><br><br><br><br><br>1st term + 99 × 4<br><br><br><br><br><br>0th term + 100 × 4 |
| | 397 | A1 | |
| | **Alternative method 2** | | |
| | $4n$ | M1 | oe eg $n$ × 4 |
| | $4n – 3$ | A1 | oe |
| | 397 | A1 | |

**Additional Guidance is on the next page**

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

| | Additional Guidance | |
|---|---|---|
| **29 cont** | Term to term rule described eg Add on 4 each time | M1 |
| | $a + 5d = 21$, $a + 4d = 17$ only | M0 |
| | Difference shown as 4 then eg $n + 4$ | M1 |
| | Only eg $n + 4$ or $3n + 4$ | M0 |
| | $4n - 3$ seen even if not subsequently used | M1A1 |
| | $4n$ seen eg $4n + 13$ even if not subsequently used | M1 |
| | Correct list going up in 4s stopping at 397 | M1M1A1 |
| | List going up in 4s with an error or not reaching 397 | M1M0A0 |
| | No subtraction seen and incorrect difference eg 17　21<br>　　　　　　　　　　　　　　　　　　+3 | M0 |
| | Alt 2　allow $n4$ | M1 |
| | $4n - 3 = 100$ | M1A1A0 |
| | Allow M1 even if not subsequently used | |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 30 | $\begin{pmatrix} 11 \\ 19 \end{pmatrix}$ | B2 | B1    unsimplified equivalent single vector<br><br>eg $\begin{pmatrix} 3 \times 2 + 5 \\ 3 \times 7 - 2 \end{pmatrix}$<br><br>or  answer $\begin{pmatrix} 11 \\ m \end{pmatrix}$  or  answer $\begin{pmatrix} n \\ 19 \end{pmatrix}$<br><br>or  $\begin{pmatrix} 6 \\ 21 \end{pmatrix}$ seen |

| Additional Guidance | |
|---|---|
| Condone fraction line for B2 or B1<br><br>eg $\left( \dfrac{11}{19} \right)$ | B2 |
| Answer $\begin{pmatrix} 11 \\ m \end{pmatrix}$ must have $m$ as a numerical value | |
| Answer $\begin{pmatrix} n \\ 19 \end{pmatrix}$ must have $n$ as a numerical value | |
| Must see the vector brackets to award any marks in the working<br><br>eg $\begin{matrix} 11 \\ 19 \end{matrix}$ or $\dfrac{11}{19}$ or $\begin{matrix} 6+5 \\ 21-2 \end{matrix}$ or $\begin{matrix} 6 \\ 21 \end{matrix}$ | B0 |
| Unsimplified version may be awarded in the working but must be seen as a single vector<br><br>eg $\begin{pmatrix} 6+5 \\ 21-2 \end{pmatrix}$ | B1 |
| $\begin{pmatrix} 6 \\ 21 \end{pmatrix}$ may be awarded in the working if seen as a vector | B1 |

| Question | Answer | Mark | Comments |
|---|---|---|---|
| 31 | 120 000 × 1.05  or  126 000 | M1 | oe  eg 120 000 + 0.05 × 120 000<br><br>may be implied by eg 144 000 |
| | 120 000 × 1.05$^4$<br><br>or $\dfrac{583\ 443}{4}$ | M1dep | oe  eg their 126 000 × 1.05  or 132 300<br>and<br>their 132 300 × 1.05  or 138 915<br>and<br>their 138 915 × 1.05 |
| | 145 860(.75)  or  145 860.8(0)<br>or  145 861  or  145 900<br>or  146 000 | A1 | if no value given implied by M2 seen and 150 000 |
| | 150 000 | B1ft | ft any answer seen with > 2sf<br>condone 150 000.00 |

**Additional Guidance**

| | |
|---|---|
| 126 000 × 1.05$^3$ | M1M1 |
| Answer only<br>145 860(.75) or 145 860.8(0) or 145 861 or 145 900 or 146 000 | M1M1A1B0 |
| Answer only 150 000 | Zero |
| For year on year working allow rounding/truncation if method shown for up to M2A0B1ft<br>eg  126 000 × 1.05 = 132 000<br>and 132 000 × 1.05 = 138 000<br>and 138 000 × 1.05 = 144 900  Answer 140 000 | M1<br><br>M1A0B1ft |
| 120 000, 126 000, 132 000, 138 000, 144 000 with no method shown does not imply truncation, this is just adding on 6 000 each year | M1M0A0 |
| 120 000 + 4 × 0.05 × 120 000  or  120 000 + 0.2 × 120 000  implies M1 | M1M0A0 |
| Misreads can score up to M2A0B1ft | |
| Treat calculating 5 years as a misread but otherwise the wrong number of years eg 120 000 × 1.05$^2$ will score a maximum of M1M0A0B1ft | |