

**GCSE (9–1)**

**Mathematics**

**J560/02: Paper 2 (Foundation tier)**

General Certificate of Secondary Education

**Mark Scheme for November 2022**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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## MARKING INSTRUCTIONS

### PREPARATION FOR MARKING RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.
3. Log-in to RM Assessor then mark and annotate the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

### MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader via the RM Assessor messaging system.
5. Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners should give candidates the benefit of the doubt and mark the crossed out response where legible.
6. When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.
7. On each blank page the annotation **BP** must be inserted to confirm that the page has been checked. For additional objects (if present), a tick must be inserted on each page to confirm that it has been checked.

8. There is a NR (No Response) option. Award NR (No Response)
- if there is nothing written at all in the answer space
  - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
  - OR if there is a mark (e.g. a dash, a question mark) which is not an attempt at the question.

The hash key (#) on your keyboard will enter NR.

Note: Award 0 marks for an attempt that earns no credit (including copying out the question).

9. The RM Assessor **comments box** is used by the Principal Examiner or your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

If you have any questions or comments for your Team Leader, use the RM Assessor messaging system.

10. Assistant Examiners should send a brief report on the performance of candidates to their Team Leader (Supervisor) by the end of the marking period. Please follow the direction of your Team Leader about which questions you should report on and how to submit your report. Your report should contain notes on particular strengths displayed as well as common errors or weaknesses.
11. Annotations available in RM Assessor. These **must** be used whenever appropriate during your marking.

| Annotation                                                                          | Meaning                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|   | Correct                                                                                       |
|  | Incorrect                                                                                     |
|  | Benefit of doubt                                                                              |
|  | Follow through                                                                                |
|  | Ignore subsequent working (after correct answer obtained), provided method has been completed |
|  | Method mark awarded 0                                                                         |

|      |                            |
|------|----------------------------|
| M1   | Method mark awarded 1      |
| M2   | Method mark awarded 2      |
| A1   | Accuracy mark awarded 1    |
| B1   | Independent mark awarded 1 |
| B2   | Independent mark awarded 2 |
| MR   | Misread                    |
| SC   | Special case               |
| ^    | Omission sign              |
| BP   | Blank page                 |
| SEEN | Seen                       |

For a response awarded zero (or full) marks a single appropriate annotation (cross, tick, M0 or ^) is sufficient, but not required.  
For responses that are not awarded either 0 or full marks, you must make it clear how you have arrived at the mark you have awarded and all responses must have enough annotation for a reviewer to decide if the mark awarded is correct without having to mark it independently.

**It is vital that you annotate standardisation scripts fully to show how the marks have been awarded.**

**Subject-Specific Marking Instructions**

12. **M** marks are for using a correct method and are not lost for purely numerical errors.  
**A** marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.  
**B** marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.  
**SC** marks are for special cases that are worthy of some credit.
13. The following abbreviations are commonly found in GCSE Mathematics mark schemes.
- **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
  - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
  - **nfw** means **not from wrong working**.
  - **oe** means **or equivalent**.
  - **rot** means **rounded or truncated**.
  - **soi** means **seen or implied**.
  - **dep** means that the marks are **dependent** on the marks indicated. You must check that the candidate has met all the criteria specified for the mark to be awarded.
  - **with correct working** means that full marks **must not** be awarded without some working. The required minimum amount of working will be defined in the guidance column and **SC** marks given for unsupported answers.
14. Anything in the mark scheme which is in square brackets [...] is not required for the mark to be earned, but if present it must be correct.
15. Unless the command word requires that working is shown and the working required is stated in the mark scheme, then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.
- Do not award the marks if the answer was obtained from an incorrect method, i.e. incorrect working is seen and the correct answer clearly follows from it.
16. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct. For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, e.g.  $FT\ 180 \times (their\ '37' + 16)$ , or  $FT\ 300 - \sqrt{(their\ '52' + 72)}$ . Answers to part questions which are being followed through are indicated by e.g.  $FT\ 3 \times their\ (a)$ .

17. In questions **with no final answer line**, make no deductions for wrong work after an acceptable answer (i.e. **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.
18. In questions **with a final answer line and incorrect answer given**:
  - (i) If the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.
  - (ii) If the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.
  - (iii) If the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded if there is no other method leading to the incorrect answer. Use the **M0**, **M1**, **M2** annotations as appropriate and place the annotation ✕ next to the wrong answer.
19. In questions **with a final answer line**:
  - (i) If one answer is provided on the answer line, mark the method that leads to that answer. A correct step, value or statement that is not part of the method that leads to the given answer should be awarded **M0** and/or **B0**.
  - (ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.
  - (iii) If more than one answer is provided on the answer line and there is more than one method provided, award marks for the poorer response unless the candidate has clearly indicated which method is to be marked.
20. In questions with **no final answer line**:
  - (i) If a single response is provided, mark as usual.
  - (ii) If more than one response is provided, award marks for the poorer response unless the candidate has clearly indicated which response is to be marked.

21. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the **MR** annotation. **M** marks are not deducted for misreads. If a candidate corrects the misread in a later part, do not continue to follow through, but award **A** and **B** marks for the correct answer only.
22. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.
23. Ranges of answers given in the mark scheme are always inclusive.
24. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.
25. If in any case the mark scheme operates with considerable unfairness consult your Team Leader.



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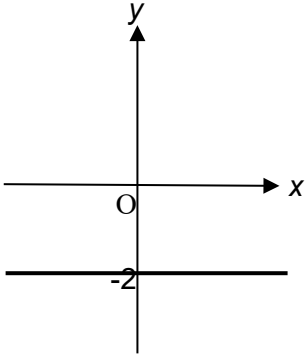
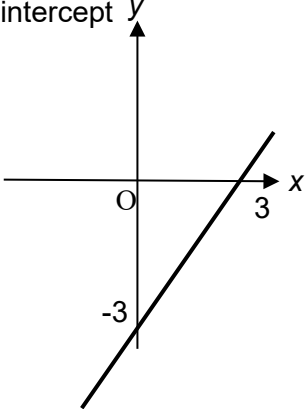
Mark Scheme

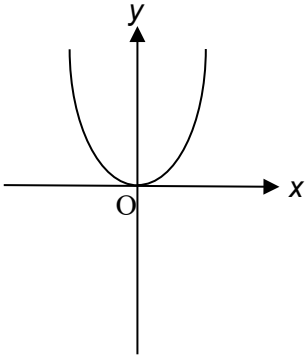
Nov 2022

| Question |     |      | Answer                                                                                                                  | Marks      | Part marks and guidance                                 |                                                                                                                                                           |
|----------|-----|------|-------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | (a) |      | Not used the key oe<br><br>8                                                                                            | 1<br><br>1 |                                                         | e.g. Each circle is 4 students/not 1 student<br>Misinterpreted/Not interpreted the key<br><br><u>or reverse:</u> ½ a circle should have been drawn        |
| 1        | (b) |      |                                        | 1          |                                                         |                                                                                                                                                           |
| 2        | (a) | (i)  | 3                                                                                                                       | 1          |                                                         |                                                                                                                                                           |
| 2        | (a) | (ii) | 4                                                                                                                       | 1          |                                                         |                                                                                                                                                           |
| 2        | (b) |      | [±]150                                                                                                                  | 3          | B1 for 25<br>B1 for [±]6                                | Not embedded e.g. 6 x 6 = 36                                                                                                                              |
| 3        | (a) |      | 6.55                                                                                                                    | 1          |                                                         |                                                                                                                                                           |
|          | (b) |      | [0].6                                                                                                                   | 1          |                                                         |                                                                                                                                                           |
| 4        | (a) |      | $4\frac{3}{4}$                                                                                                          | 1          |                                                         |                                                                                                                                                           |
| 4        | (b) |      | $\frac{16}{9}$                                                                                                          | 1          |                                                         |                                                                                                                                                           |
| 4        | (c) |      | No and [0].875<br>or No and $\frac{39}{50}$<br>or No and $0.78 = \frac{780}{1000}$ and $\frac{7}{8} = \frac{875}{1000}$ | 2          | B1 for 0.87 to 0.88<br>or<br>M1 for $\frac{78}{100}$ oe | Allow equivalents for no e.g. incorrect<br>Allow for 2 marks $\frac{87.5}{100}$ with $\frac{78}{100}$<br>Also allow 87.5[%] with 78[%] seen<br><br>See AG |

| Question |     |  | Answer                                                                       | Marks | Part marks and guidance                                                                                                   |                                                                                                              |
|----------|-----|--|------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 5        |     |  | $2 \times 2 \times 3 \times 3$<br>Or<br>$2^2 \times 3^2$                     | 2     | <b>B1</b> 2, 2, 3, 3 as answer<br><b>Or</b><br><b>M1</b> for attempt at factor tree or ladder with 2 correct stages shown | B1 could be seen as a correct complete tree/ladder                                                           |
| 6        | (a) |  | 140<br>and<br>[vertically] opposite angles                                   | 2     | <b>B1</b> for either                                                                                                      | Accept<br><u>angles</u> on a [straight] <u>line</u> [= 180]<br>if 40 is shown on the diagram/working         |
| 6        | (b) |  | 40<br>and<br><u>angles</u> on a [straight] <u>line</u><br>[= 180]            | 2     | <b>B1</b> for either                                                                                                      | Accept<br><u>angles</u> at a <u>point/full turn</u> [=360]<br>if 140, 140 and 40 shown on<br>diagram/working |
| 7        |     |  | 2                                                                            | 2     | <b>M1</b> for 12 or -10<br>or $4 \times 3 + 5 \times -2$ <b>oe</b>                                                        | Not 12x or -10y                                                                                              |
| 8        | (a) |  | $\frac{13}{20}$                                                              | 2     | <b>M1</b> for $\frac{65}{100}$                                                                                            |                                                                                                              |
| 8        | (b) |  | 16                                                                           | 2     | <b>M1</b> for 0.16 [ $\times 100$ ] or $\frac{4}{25}$ [ $\times 100$ ] <b>oe</b>                                          |                                                                                                              |
| 8        | (c) |  | 300                                                                          | 3     | <b>M2</b> for $250 \times 1.2$ <b>oe</b><br><b>or M1</b> for $250 \times 0.2$ <b>oe</b>                                   | M1 Implied by 50<br>Allow M1 for complete attempt at chunking<br>e.g. 10%=25 [repeated twice] <b>oe</b>      |
| 9        | (a) |  | 240 with working                                                             | 2     | <b>B1</b> for rounded value of 80 or 3<br><br>If 0 scored<br><b>SC1</b> for 80.0 and 3.0 and 240.0 as answer              | For 2 marks 80 and 3 must be seen                                                                            |
| 9        | (b) |  | No <b>oe</b><br>and<br>[because] the answer should be close to 240 <b>oe</b> | 1     |                                                                                                                           | Eg<br>No his answer is ten times too big<br>No the decimal point is in the wrong place<br><br>See AG         |

| Question |  |  | Answer                   | Marks | Part marks and guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------|--|--|--------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10       |  |  | 400 with correct working | 6     | <p><b>M1</b> for <math>2 \times 1.15 + 3 \times 0.70</math> <b>oe</b> or <math>2.3[0] + 2.1[0]</math><br/><b>A1</b> for <math>4.4[0]</math></p> <p>AND</p> <p><b>M1</b> for <math>(7 - \text{their } 4.4[0])</math> <b>oe</b><br/><b>A1</b> for <math>2.6[0]</math></p> <p>AND</p> <p><b>M1</b> for <math>\text{their } 2.6[0] \div 1.3[0] [\times 200]</math><br/><b>A1FT</b> for <math>\text{their } 2.6[0] \div 1.3[0]</math> rounded down <math>\times 200</math></p> <p>If <b>0</b> or <b>1</b> scored, instead award<br/><b>SC2</b> for answer 400 with no or insufficient working<br/>If <b>0</b> scored, instead award<br/><b>SC1</b> for <math>2.6[0]</math> with no or insufficient working</p> | <p>“Correct working” requires evidence of at least two M marks and one A mark</p> <p>Allow working in pence provided consistent units used</p> <p><math>4.4[0]</math> implies M1A1</p> <p>Could be Implied by<br/><math>\text{their } 4.4[0] + \text{their } 2.6[0] + \text{their ‘change’}</math><br/>[=<math>7.0[0]</math>]</p> <p>Implied by list <math>1.3[0], 2.6[0], [3.9[0], \dots]</math><br/>up to one less than <math>\text{their } 2.6[0]</math><br/>or Embedded <math>2 \times 1.3[0] = 2.6[0]</math></p> <p><u>Alternative Method:</u> For first M1A1 M1A1</p> <p>M1 for <math>7 - 2 \times 1.15</math> or <math>7 - 3 \times 0.70</math><br/>A1 for <math>4.7[0]</math> or <math>4.9[0]</math><br/>AND<br/>M1 for <math>7 - 2 \times 1.15 - 3 \times 0.70</math><br/>or <math>\text{their } 4.7[0] - 3 \times 0.70</math><br/>or <math>\text{their } 4.9[0] - 2 \times 1.15</math><br/>A1 for <math>2.6[0]</math></p> |

| Question |     |  | Answer                                                                                                                                                                   | Marks | Part marks and guidance                                                                                                                                                        |                                                     |
|----------|-----|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 11       | (a) |  | <p>Correct sketch with -2 indicated as y-intercept</p>                                  | 2     | B1 for a horizontal line below the x axis                                                                                                                                      | Condone good freehand<br>Line must be at least 10mm |
| 11       | (b) |  | <p>Correct sketch with -3 indicated as y-intercept and 3 indicated as x-intercept</p>  | 3     | <p>B1 for line with positive gradient</p> <p>and</p> <p><b>B1 DEP</b></p> <p>for a line with -3 indicated as y-intercept<br/>or for a line with 3 indicated as x-intercept</p> | Condone good freehand<br>Line must be at least 10mm |

| Question |     |  | Answer                                                                                              | Marks | Part marks and guidance                                                         |                                                                |
|----------|-----|--|-----------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------|----------------------------------------------------------------|
| 11       | (c) |  | Correct sketch<br> | 1     | curve, correct shape                                                            | Condone intention to curve at point (0,0) and length of curve. |
| 12       | (a) |  | $3x + 3$                                                                                            | 1     |                                                                                 |                                                                |
| 12       | (b) |  | $3d^2 - 6d$                                                                                         | 2     | B1 for $3d^2$ or $-6d$                                                          |                                                                |
| 13       | (a) |  | $\frac{6}{7}$ oe                                                                                    | 1     |                                                                                 |                                                                |
| 13       | (b) |  | $\frac{5}{12}$ oe                                                                                   | 2     | M1 for $\frac{8k}{12k}$ or $\frac{3k}{12k}$ seen where k is a positive integer. | May be seen as part of a single fraction e.g. $\frac{8-3}{12}$ |

| Question |  |  | Answer | Marks | Part marks and guidance                                                                                                                                                                                                                                                                                                           |                                                                                                                                                  |
|----------|--|--|--------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 14       |  |  | 3.6 oe | 3     | <p><b>M2</b> for <math>6x + 4x = 27 + 9</math> oe</p> <p>OR</p> <p><b>M1</b> for <math>10x - 9 = 27</math> or <math>10x = k</math><br/>or <math>6x = 36 - 4x</math> or <math>kx = 36</math></p> <p>AND</p> <p><b>M1</b> for <math>x = \frac{b}{a}</math> FT <i>their</i> <math>ax = b</math> seen</p>                             | e.g. $x = \frac{36}{10}$ oe                                                                                                                      |
| 15       |  |  | 3      | 4     | <p><b>M3</b> for <math>\frac{690 - 600}{5 \times 600} [\times 100]</math> oe</p> <p>or <b>M2</b> for <math>\frac{690 - 600}{5}</math> oe or for <math>\frac{690 - 600}{600}</math> oe</p> <p>or <b>M1</b> for <math>690 - 600</math> or <math>\frac{690}{600}</math> or for <math>\frac{600 \times r \times 5}{100}</math> oe</p> | <p>Eg <math>\frac{18}{600} [\times 100]</math> or implied by [0].03</p> <p>M2 implied by 18 or [0].15 or 15%</p> <p>M1 implied by 90 or 1.15</p> |

| Question |     |  | Answer                          | Marks | Part marks and guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |
|----------|-----|--|---------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16       |     |  | 1 : 5 with correct working      | 5     | <p><b>M1</b> for <math>360 \div 12</math> or <math>\frac{(12-2) \times 180}{12}</math> <b>oe</b></p> <p><b>A1</b> for 30 or 150</p> <p>AND</p> <p><b>M1</b> for <i>their</i> interior + <i>their</i> exterior = 180</p> <p><b>A1</b> for 30 and 150</p> <p>If <b>0</b> or <b>1</b> scored, instead award</p> <p><b>SC2</b> for answer 1 : 5 with no or insufficient working</p> <p>If <b>0</b> scored, instead award</p> <p><b>SC1</b> for <math>k : 5k</math> or for answer 5 : 1 or for 30 and 150 with no or insufficient working</p> | <p>“Correct working” requires evidence of at least one pair of M1A1</p> <p>30 and/or 150 could be on the diagram</p> <p>Where <math>k &gt; 1</math> and an integer</p> |
| 17       | (a) |  | 4 : 1 <b>oe</b>                 | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Accept 1 : 0.25                                                                                                                                                        |
|          | (b) |  | $\frac{7}{3}$ or $2\frac{1}{3}$ | 2     | <b>M1</b> for $\frac{14}{6}$ <b>oe</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                        |
| 18       |     |  | 2, 3, 4                         | 3     | <p><b>B2</b> for 2 correct and no extras or all 3 correct and one extra</p> <p>OR</p> <p><b>M2</b> for <math>2 \leq x &lt; 5</math></p> <p>or</p> <p><b>M1</b> for <math>2 \leq x</math> or <math>x &lt; 5</math></p>                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                        |

| Question |     |  | Answer           | Marks | Part marks and guidance                                                                           |                                                                                           |    |    |    |
|----------|-----|--|------------------|-------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----|----|----|
| 19       | (a) |  |                  | 1     |                                                                                                   |                                                                                           |    |    |    |
|          |     |  | 2                |       |                                                                                                   |                                                                                           | 5  | 8  |    |
|          |     |  | 2                |       |                                                                                                   |                                                                                           | 4  | 7  | 10 |
|          |     |  | 5                |       |                                                                                                   |                                                                                           | 7  | 10 | 13 |
|          |     |  | 8                |       |                                                                                                   |                                                                                           | 10 | 13 | 16 |
| 19       | (b) |  | $\frac{2}{9}$ oe | 2     | FT <i>their</i> completed table<br>M1 for 4 and 16 identified FT <i>their</i> table and no others | Do not accept ratio or words<br>isw conversion/cancelling<br>M1 implied by $\frac{2}{15}$ |    |    |    |
| 20       | (a) |  | $\frac{2}{5}$    | 1     | Accept any equivalent fraction                                                                    | isw attempts to simplify to a fraction                                                    |    |    |    |



| Question |     | Answer                  | Marks | Part marks and guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|-----|-------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20       | (b) | 55[%]                   | 4     | <p><b>M3</b> for <math>1 - \left( \frac{18}{100} \div \text{their } \frac{2}{5} \right)</math> <b>oe</b></p> <p>or for <math>\frac{\text{their } 40 - 18}{\text{their } 40}</math> <b>oe</b></p> <p>or <b>M2</b> for <math>\frac{18}{100} \div \text{their } \frac{2}{5}</math> <b>oe</b></p> <p>or for <i>their</i> 40 – 18 <b>oe</b></p> <p>or <b>M1</b> conversion of values to a common form</p> <p>e.g <i>their</i> 40% or <math>\frac{18}{100}</math> or <math>\frac{82}{100}</math> seen</p> <p>or <i>their</i> 0.4 <b>and</b> 0.18 or <i>their</i> 0.4 <b>and</b> 0.82 seen</p> <p>OR</p> <p>Alternative method using a value for the number of sweets</p> <p>eg if using 50 sweets ...</p> <p><b>M3</b> for fraction of Layla’s share <math>\frac{20 - 9}{20}</math></p> <p>or <b>M2</b> for Layla eats 20 – 9</p> <p>or <b>M1</b> for Layla receives 20 or is left with 9</p> | <p>M3 implied by 0.55 <b>oe</b></p> <p><i>their</i> 40 is <i>their</i> (a) converted to %, accept both 40 and 18 as decimals for M3 or M2</p> <p>Accept FT conversion to 2 figs rot</p> <p>M2 implied by 0.45 <b>oe</b>, 45[%] or 22[%]</p> <p>M3 for any fraction leading to 0.55</p> <p>M2 for 40%FT for <i>their</i> (a) of <i>their</i> sweets – 18% of <i>their</i> sweets</p> <p>M1 for 40%FT for <i>their</i> (a) of <i>their</i> sweets or 18% of <i>their</i> sweets</p> |
| 21       | (a) | Point correctly plotted | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Accuracy $\pm \frac{1}{2}$ small square radially, use overlay as a guide                                                                                                                                                                                                                                                                                                                                                                                                          |
| 21       | (b) | 320                     | 2     | <p><b>B1</b> for answer <b>figs</b> 32</p> <p>or for 4160 or 4480</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Don’t accept percentages.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Question |     | Answer                                     | Marks | Part marks and guidance                                                                                              |                                                                                                                                                                                                                                                                                                                               |
|----------|-----|--------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21       | (c) | Only part of vertical scale is shown<br>oe | 1     |                                                                                                                      | e.g. Because the population axis starts at 4000, 4.0 [thousand]<br>Vertical axis does not start at 0<br>She may have just looked at the steepness of the graph <b>and</b> not the scale of the graph/numbers<br>Accept it only goes up by 540<br><br>See AG<br>Any incorrect statements/incorrect specific values scores zero |
| 21       | (d) | Increasing trend continues oe              | 1     |                                                                                                                      | e.g. The population growth will continue the same as in previous years<br>People will not leave the village and the increase continues<br>If a number is given with the increase then it should be at least 60<br><br>See AG<br>Any incorrect specific value(s) scores zero                                                   |
| 22       | (a) | Circle radius 3 cm                         | 2     | <b>B1</b> for circle any radius<br>or for 3 indicated as the radius<br><br>or for correct circle with internal lines | Allow freehand for 2 marks<br>or for B1 If vertical and horizontal diameters are consistent<br><br>6 indicated as the diameter implies B1<br>B1 could be implied on a diagram<br><br>but condone for 2 marks if correct circle and internal lines are diameter or radius                                                      |

| Question |     | Answer                                                                                                                     | Marks | Part marks and guidance                                                                       |                                                                                                                                                                                                        |
|----------|-----|----------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22       | (b) | Rectangle 6 cm (width) by 4 cm (height)                                                                                    | 2     | <b>B1</b> for any rectangle with no internal lines or for correct rectangle but good freehand | All lines must be ruled for 2 marks.<br><br>If <u>both</u> (a) and (b) are reversed but otherwise correct allow SC2 for both correct or SC1 for one correct                                            |
| 23       |     | $[(\frac{1}{10})^2 =] \frac{1}{100}$ or 0.01<br>$[\sqrt{0.25} =] 0.5$ or $\frac{1}{2}$<br>$[4^{-1}] = \frac{1}{4}$ or 0.25 | M3    | M1 for each                                                                                   | For all method marks accept oe %'s<br>If e.g. $[(\frac{1}{10})^2 =] \frac{1}{100} = 0.1$ then M0<br><br>Accept – 0.5 or $\pm 0.5$ oe for $\sqrt{0.25}$ or $\frac{5}{10}$                               |
|          |     | No oe<br><br>and<br><br>$(\frac{1}{10})^2, 4^{-1}, \sqrt{0.25}$                                                            | A1    |                                                                                               | Accept equivalents<br>Accept No oe and $4^{-1}$ and $\sqrt{0.25}$ need to swap places oe<br><br>If – 0.5 oe for $\sqrt{0.25}$ , then accept order<br><br>is $\sqrt{0.25}, (\frac{1}{10})^2, 4^{-1}$ oe |

| Question |  |  | Answer                          | Marks | Part marks and guidance                                                                                                                                                                                                                                                     |                                                                                                                                                |
|----------|--|--|---------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 24       |  |  | No oe<br>and $\frac{34}{64}$ oe | 5     | M4 for $\frac{3}{8} \times \frac{3}{8} + \frac{5}{8} \times \frac{5}{8}$ oe<br>or<br>M3 for $\frac{3}{8} \times \frac{3}{8}$ or $\frac{5}{8} \times \frac{5}{8}$ oe<br>or<br>B2 for $\frac{3}{8}$ and $\frac{5}{8}$ oe<br>or<br>B1 for $\frac{3}{8}$ oe or $\frac{5}{8}$ oe | M3, B2 or B1 may be seen on the diagram or in working. Diagram does not need to be labelled.<br><br>Accept equivalent decimals and percentages |

| Question |  |  | Answer                  | Marks | Part marks and guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                              |
|----------|--|--|-------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25       |  |  | 10 with correct working | 6     | <p><b>M1</b> for <math>\frac{24 \times 4}{2}</math></p> <p><b>M1</b> for height of rectangle = <i>their</i> <math>\frac{24 \times 4}{2} \div 8</math></p> <p><b>A1</b> for [height of rectangle =] 6</p> <p>AND</p> <p><b>M2</b> for <math>\sqrt{8^2 + (their\ 6^2)}</math> or better<br/>or <b>M1</b> for <math>[d^2 = ]\ 8^2 + (their\ 6)^2</math></p> <p>If <b>0</b>, <b>1</b> or <b>2</b> scored, instead award<br/><b>SC3</b> for answer 10 with no or insufficient working<br/>If <b>0</b> or <b>1</b> instead award<br/><b>SC2</b> for [height of rectangle =] 6 with no or insufficient working<br/>If <b>0</b> scored, instead award<br/><b>SC1</b> for [area of triangle =] 48 with no or insufficient working</p> | <p>“Correct working” requires evidence of at least M1A1 AND M1</p> <p>M1 Allow embedded e.g. <math>8 \times 6 = 48</math></p> <p>Could be shown on the diagram</p> <p><i>their</i> 6 must be clearly identified as the height of the rectangle, e.g. written on the diagram.</p> <p>Eg SC3 Insufficient working includes statement that 6, 8, 10 is a Pythagorean triple</p> |

APPENDIX Q1a

|    | Response                                                                                                                                                                                                   | Mark |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|    | <b><u>Key not being used/Misinterpreted</u></b>                                                                                                                                                            |      |
| 1  | Not looked at the key                                                                                                                                                                                      | 1    |
| 2  | Counted circles as 1's rather than 4's                                                                                                                                                                     | 1    |
| 3  | Counted the circles but hasn't referred to the key                                                                                                                                                         | 1    |
| 4  | She didn't understand what 1 circle represents ( <i>Misinterpretation of the key</i> )                                                                                                                     | 1    |
| 5  | She didn't understand what one circle 1 circle represents. She didn't add them.                                                                                                                            | 1    |
| 6  | Counted the circles only                                                                                                                                                                                   | 1    |
| 7  | Not counted the circles correctly he added the two circles he was supposed to count $4 + 4 = 8$                                                                                                            | 1    |
| 8  | Mistaken each circles value                                                                                                                                                                                | 1    |
| 9  | Misinterpreted the diagram and circle values                                                                                                                                                               | 1    |
| 10 | Not looked at the key and how many students each circle represents                                                                                                                                         | 1    |
| 11 | Counted a circle per person instead of 8 people ( <i>First part of answer is correct, the second part references the correct answer</i> )                                                                  | 1BOD |
| 12 | counted 1 circle as 1 where it should be 8 ( <i>First part of answer is correct, the second part references the correct answer</i> )                                                                       | 1BOD |
|    |                                                                                                                                                                                                            |      |
|    | <b><u>What the diagram should show</u></b>                                                                                                                                                                 | 1    |
| 13 | Put two circles instead of half a circle ( <i>diagram would have a half a circle if Monday was 2</i> )                                                                                                     | 1    |
| 14 | put two full circles instead of $\frac{1}{2}$                                                                                                                                                              | 1    |
| 15 | Done this wrong because a full circle means 4 students so he should have drawn 1 half circle                                                                                                               | 1    |
|    |                                                                                                                                                                                                            |      |
| 16 | 8 students absent ( <i>Not answering the question</i> )                                                                                                                                                    | 0    |
| 17 | Done that wrong because the circle represents 4 students not 2 ( <i>contradiction</i> )                                                                                                                    | 0    |
| 18 | done full circles                                                                                                                                                                                          | 0    |
| 19 | Said that a whole circle represents 4 students, therefore it is misleading ( <i>to be correct the candidate would have had to say 1 student, as this is not stating what Harper has done incorrectly</i> ) | 0    |
| 20 | Wrote down that 8 students were absent when 2 students was absent ( <i>referencing the key being incorrect, not what harper has done incorrectly</i> )                                                     | 0    |

APPENDIX Q4c

|    | Response                                                                                       | Mark |
|----|------------------------------------------------------------------------------------------------|------|
| No |                                                                                                |      |
| 1  | 0.78 is 78% otherwise known as 78/100 (M1 for 78/100, but no comparison)                       | 1    |
| 2  | The answer would be 78/100 which isn't equivalent to 7/8. (if we saw 39/50 this would score 2) | 1    |
| 3  | 0.78 is 78/100 which doesn't simplify to 7/8. (if we saw 39/50 this would score 2)             | 1    |
|    |                                                                                                |      |
| 4  | you can't use the numerator and denominator together to equal a decimal                        | 0    |
| 5  | 7/8 = 0.9 it is close to a whole number                                                        | 0    |
| 6  | 7/8 is almost a whole fraction so it would be more than 78%                                    | 0    |
| 7  | 78/10 is 0.78                                                                                  | 0    |

APPENDIX Q9b

|    | Response                                                                                                                                                                                                          | Mark |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| No |                                                                                                                                                                                                                   |      |
| 1  | The answer should be 247.38                                                                                                                                                                                       | 1    |
| 2  | The decimal point should be between the 7 and 3                                                                                                                                                                   | 1    |
| 3  | The number is a lot higher than my estimate. I think she placed a decimal point wrong ( <i>The first part is not enough without seeing what their estimate is, 'placed decimal point wrong' scores the mark</i> ) | 1    |
| 4  | His answer should be in 200s not 2000s he must have placed decimal incorrectly                                                                                                                                    | 1    |
| 5  | There should be 2 numbers behind the decimal place and not one                                                                                                                                                    | 1    |
| 6  | Because if you do $80 \times 3$ you'll get 240 ( <i>implies the answer is 10 times too big</i> )                                                                                                                  | 1    |
| 7  | it should be closer to 240 (This is the correct estimate, so no need for calculation to be shown here)                                                                                                            | 1    |
|    |                                                                                                                                                                                                                   |      |
| 8  | His answer was in thousands which is too large (with it should be in the hundreds would have scored the mark)                                                                                                     | 0    |
| 9  | Has not put decimals in                                                                                                                                                                                           | 0    |
| 10 | His answer is too high and shouldn't have a decimal at the end ( <i>First part of answer is not enough to score and 'shouldn't have a decimal at the end' is incorrect</i> )                                      | 0    |
| 11 | The answer that Jamie got is bigger than the estimate by 1 significant figure                                                                                                                                     | 0    |
| 12 | There is only one two digit number so it cannot be above 1000                                                                                                                                                     | 0    |
| 13 | It would be less than 2473.8 due to $80 \times 3$ ( <i>if the candidate had written = 240, this would be enough</i> )                                                                                             | 0    |
| 14 | his answer is significantly larger                                                                                                                                                                                | 0    |
| 15 | there is no way it can be higher than 300 ( <i>not enough as we need to see the calculation of their 'estimate' of 300</i> )                                                                                      | 0    |
| 16 | The place value is not in the correct position ( <i>'place value' not an equivalent for decimal point</i> )                                                                                                       | 0    |



APPENDIX Q21c

|    | Response                                                                                                                                                                               | Mark |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1  | It/the graph/ [y] axis/the population/the scale does not start at zero                                                                                                                 | 1    |
| 2  | Hasn't realised the population is only going up by 100 each time, so it isn't a huge increase ( <i>BOD implied axis and info on scale provided – huge increase implies steepness</i> ) | 1    |
| 3  | It has only gone up by 540 [people] ( <i>accept reference to the value of the increase if value is correct</i> )                                                                       | 1    |
| 4  | The graph has gone up by a lot but it is only around 500 ( <i>accept reasonable approximation of increase with steepness implied</i> )                                                 | 1    |
|    |                                                                                                                                                                                        |      |
| 5  | The line on the graphs varied significantly but the value changed by only 600 ( <i>value is incorrect and no ref to steepness</i> )                                                    | 0    |
| 6  | Each big tile is on the graph shows 100 people ( <i>not enough – need to refer to graph not starting as zero or steepness</i> )                                                        | 0    |
| 7  | The steepness on the graph makes him think it has gone up a lot but the graph is going up in 1000s ( <i>1000s is incorrect we would accept 100s or 0.1s</i> )                          | 0    |
| 8  | The y axis is too small so it makes it look like there has been a huge increase ( <i>lacks detail about scale on y axis</i> )                                                          | 0    |
| 9  | The scale makes it look like it has gone up a lot when it really only a little ( <i>not enough – needs to ref steepness and scale</i> )                                                | 0    |
| 10 | He used the steepness of the line to judge the increase ( <i>needs detail about scale</i> )                                                                                            | 0    |
| 11 | The continuing rising of the graph population and not reading the numbers properly ( <i>not enough – steepness and scale needed</i> )                                                  | 0    |
| 12 | Rowan didn't read the graph correct. 2015=4100, 2020=4630. Not a huge increase ( <i>Error with one value 4630 – otherwise we would accept with accurate values also</i> )              | 0    |
| 13 | May have been misled by not reading the graph properly as it only went up by 640 ( <i>specific value given which is incorrect</i> )                                                    | 0    |
| 14 | By not looking at the figures and going by the plots rising. ( <i>implies steepness but too vague with vertical scale</i> )                                                            | 0    |
| 15 | Because of how much the line is rising may seem there is a rapid increase. ( <i>no ref to scale</i> )                                                                                  | 0    |
| 16 | He may think it goes up by thousands, but there has been less than a thousand people                                                                                                   | 0    |
| 17 | By just looking at the plots on the graph and not looking at the actual numbers ( <i>right idea but need to ref steepness and scale</i> )                                              | 0    |
| 18 | As the graph is only going up 100 between each box yet he sees it large by the depth ( <i>not enough - if steepness rather than depth then fine</i> )                                  | 0    |
| 19 | Just because the line gets higher doesn't mean its a huge increase ( <i>need to ref scale</i> )                                                                                        | 0    |
| 20 | Because the line increased by a lot, but the numbers didn't ( <i>not enough – need more detail about the scale</i> )                                                                   | 0    |
| 21 | May have been misled by the sharp diagonal line on the graph ( <i>no detail on scale</i> )                                                                                             | 0    |

APPENDIX Q21d

|    | Response                                                                                                                               | Mark |
|----|----------------------------------------------------------------------------------------------------------------------------------------|------|
| 1  | The population will increase at the same/constant rate                                                                                 | 1    |
| 2  | The population will continue to increase                                                                                               | 1    |
| 3  | The population will increase by [more than] a thousand/600/60                                                                          | 1    |
| 4  | The population will keep growing by birth or migration                                                                                 | 1    |
| 5  | The population will increase by 60, the population increases by more than 60                                                           | 1    |
| 6  | The graph will follow the same trend                                                                                                   | 1    |
| 7  | That the population will carry on rising like the past years                                                                           | 1    |
| 8  | he has estimated this through the constant population increase <i>(trend is implied, ignore constant)</i>                              | 1    |
| 9  | The graph will continue growing in the same way and shape as it was this morning <i>(Fine describes trend – ignore ref to morning)</i> | 1    |
| 10 | because of how the previous years were going he thinks it will stay in that pattern <i>(BOD stay in that pattern for trend)</i>        | 1    |
|    |                                                                                                                                        |      |
| 11 | the birth rate will stay the same <i>(not enough to imply population will increase – deaths etc?)</i>                                  | 0    |
| 12 | 2022 will be greater than 4800 if 2021 is a population of 4740 <i>(not enough as repeats what is in the question)</i>                  | 0    |
| 13 | Blake may not be right as the population was increasing <i>(does not describe the assumption)</i>                                      | 0    |

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