**GCSE Mathematics (1MA1)**

**Themed papers – Upper and Lower Bounds**

**Compiled from student-friendly mark schemes**

**Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn’t show follow-through marks (marks that are awarded despite errors being made) or special cases.**

**It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.**

**NOTES ON MARKING PRINCIPLES**

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| --- |
| **Guidance on the use of codes within this mark scheme** |
| M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.  P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.  A1 – accuracy mark. This mark is generally given for a correct answer following correct working.  B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.  C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.  Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer). |

**Question 1 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 4.755 ≤ *n* < 4.765 | B2 | These marks are given for the correct answer only  (One mark is given for 4.755 or 4.765 or 4.764 seen) |

**Question 2 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 8.3 ≤ *y* < 8.4 | B1 | This mark is given for either 8.3 or 8.4 seen in the correct position |
| B1 | This mark is given for the correct answer only |

**Question 3 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | = 0.625 | 1 | This mark is given for the correct answer only |
| (b) |  | 1 | This mark is given for 9.75 and 9.85 seen |
| 9.75 ≤ *x* < 9.85 | 1 | This mark is given for the correct answer only |

**Question 4 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 7.3 ≤ *x* < 7.4 | B2 | These two marks are given for a correct answer only  (B1 is given for numbers 7.3 and 7.4 seen) |

**Question 5 (Total 2 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
|  | 7 ≤ *N* < 8 | M1 | This mark is given for identifying the numbers 7 and 8 |
| A1 | This mark is given for the correct answer only |

**Question 6 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  | 5.365 ≤ *p* < 5.375  2.85 ≤ *s* 2.95 | B1 | This mark is given for the upper and lower bounds of *p* and *s* |
| Upper bound for *m* = | M1 | This mark is given for using the two lower bounds for *p* and *s* to find the upper bounds for *m* |
| 0.0654 (to 3 significant figures) | A1 | This mark is given for the correct answer only |

**Question 7 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | *a*: 6.425 or 6.435 (or 6.434999...)  *b*: 5.5135 or 5.5145 (or 5.5144999…) | B1 | This mark is given for finding a bound of *a* or a bound of *b* |
|  | P1 | This mark is given for a process to use the upper bounds and lower bounds in an expression |
| Lower bound for *v* =  Upper bound for *v* = | P1 | This mark is given for choosing the correct upper and lower bounds |
| = 1.079(4027...)  = 1.080(3403...) | A1 | This mark is given for finding 1.079... and 1.080... (both values must clearly come from correct working) |
| 1.08; both the upper bound and the lower bound round to this value | C1 | This mark is given for a correct answer and explanation |

**Performance data:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q** | **Taken from** | | | **Total Marks available** | **TOPIC** | **Spec Ref** | **AO** | **% Mean marks** | **Edexcel mean averages Marks of candidates who achieved grade:** | | | | | | | | | | |
| **Q** | **Series** | **Paper** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **U** |
| 1 | 7 | June 2017 | 2H | 2 | Number | N15 | 1 | 45 | 0.9 | 1.72 | 1.46 | 1.19 | 0.92 | 0.63 | 0.32 | 0.1 | - | - | 0.02 |
| 2 | 6 | June 2019 | 2H | 2 | Number | N15 | 1 | 20 | 0.39 | 1.1 | 0.6 | 0.37 | 0.28 | 0.27 | 0.28 | 0.24 | - | - | 0.22 |
| 3a | 5a | Nov 2017 | 3H | 1 | Number | N3 | 1 | 14 | 0.14 | 0.75 | 0.74 | 0.49 | 0.45 | 0.28 | 0.13 | 0.03 | - | - | 0.02 |
| 3b | 5b | Nov 2017 | 3H | 2 | Number | N15 | 1 | 21 | 0.41 | 1.62 | 1.38 | 1.18 | 0.98 | 0.77 | 0.42 | 0.18 | - | - | 0.06 |
| 4 | 8 | Mock Set 3 | 3H | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | 9 | Nov 2018 | 2H | 2 | Number | N15 | 1 | 1 | 0.02 | 0.4 | 0.32 | 0.09 | 0.02 | 0.01 | 0.01 | 0.01 | - | - | 0 |
| 6 | 16 | Mock Set 3 | 2H | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7 | 20 | Mock Set 1 | 3H | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  |  |  |  | **19** |  |  |  |  | **1.86** | **5.59** | **4.5** | **3.32** | **2.65** | **1.96** | **1.16** | **0.56** | **-** | **-** | **0.32** |