**GCSE Mathematics (1MA1)**

**Themed papers – Estimate**

**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 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  |  | B1 | This mark is given for the correct answer only |

**Question 2 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) | 1.6 m – 2 m | B1 | This mark is given for an answer in the range 1.6 m to 2 m |
| (b) | Scale factor in the range 5 to 6 | M1 | This mark is given for a scale factor in the range 5 to 6 |
| 8 m – 12 m | A1 | This mark is given for an answer in the range 8 m to 12 m |

**Question 3 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  |  | 1 | This mark is given for evidence of finding that the height of the building is 2.5 times the length of the bus |
| 30 | 1 | This mark is given for an answer in the range 27 – 30 |

**Question 4 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 2 cm : 150 cm  12 cm : 900 cm | P1 | This mark is given for a scale factor found |
| 9 |  | This mark is given for the correct answer in the range 8 to 10 |

**Question 5 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | Tree = 4.5 cm  Wall = 1.5 cm  Tree is 3 times taller than the wall | M1 | This mark is given for a scale factor in the range 2.5 – 3.5 |
|  | 15 ÷ 3 = 5  Height of wall is 5 (feet) | A1 | This mark is given for an answer in the range 4 – 6 |

**Question 6 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  | *H* = (4 × 110) + 12 | M1 | This mark is given for a method to use the formula to find an estimate of the height of the building |
| 452 | A1 | This mark is given for a correct estimate of the height of the building |
| × 100 = 2.26…(%) | M1 | This mark is given for a method to find the percentage difference between the estimate and the real height |
| The difference between the estimate and the real height is less than 5% | A1 | This mark is given for a correct conclusion supported by correct working |

**Question 7 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  |  | 1 | This mark is given for using 600, 5 or 4 in an approximation |
| ≈  = 30 | 1 | This mark is given for finding an appropriate approximation for the calculation shown |
| Ami’s answer is closest | 1 | This mark is given for a correct explanation with supporting working |

**Question 8 (Total 5 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | *π* × 102 | M1 | This mark is given for the recall of the formula for the area of a circle (*π r* 2), used with the correct radius |
| 3 × 102 | M1 | This mark is given for an estimate using an approximate value of *π* and the correct radius |
| 300 ÷ 45 or 300 ÷ 50 | M1 | This mark is given for an estimate to find the number of boxes of grass seed required |
| 6 or 7 or 8 | A1 | This mark is given for an estimate in the range 6 – 8 boxes supported by estimates chosen |
| (b) | An underestimate; the true area is greater so Balena could need more boxes | C1 | This mark is given for a correct explanation |

**Question 9 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) | 2, 2, 7, 5 | P1 | This mark is given for rounding one dimension correctly |
| (2 × 2) + (7 × 5) | P1 | This mark is given for a process to add estimates of the areas of the two rectangles |
| 39 | A1 | This mark is given for the correct answer only |
| (b) | An underestimate, since all numbers have been rounded down | C1 | This mark is given for a correct statement |

**Question 10 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | e.g. rain, school day, measurement error | C1 | This mark is given for a correct reason for low attendance in hot weather |
| (b) | Positive | B1 | This mark is given for the correct answer only |
| (c) |  | B1 | This mark is given for answer in range 15 – 25 |
| (d) | e.g. data out of range, number of children will be negative | C1 | This mark is given for a correct explanation of why it would not be sensible to use the scatter graph |

**Question 11 (Total 6 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a)(i) |  | B1 | This mark is given for a line of best fit drawn on the scatter diagram |
| 490 minutes | B1 | This mark is given for an answer in the range 480 – 500 |
| (a)(ii) | Data is only a sample  Line of best fit can vary  Scale cannot be read exactly | C1 | This mark is given for one of the possible reasons shown |
| (b)(i) |  | M1 | This mark is given for a method to find the gradient of the line of best fit |
| = 9.5 | A1 | This mark is given for an answer in the range 9.4 – 9.8 |
| (b)(ii) | Speed in miles per minute | C1 | This mark is given for a correct interpretation of the line of best fit |

**Question 12 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 700 pen sets to buy at 90p each | P1 | This mark is given for a process to estimate |
| 700 × 90p = | P1 | This mark is given for a process to estimate the total cost |
| £630 (or 63000p) | A1 | This mark is given for the correct answer only |
| (b) | An overestimate, since all the figures have been rounded up | C1 | This communication mark is given for a correct statement with reasons |

**Question 13 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) |  | B1 | This mark is given for one root correct |
| – 1.2 and 3.2 | B1 | This mark is given for a second root correct |
| (b) | (1, – 5) | B1 | This mark is given for the correct answer only |

**Question 14 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 40 × 300 | M1 | This mark is given for approximations of 40 or 300 in a product |
| 12 000 | A1 | This mark is given for accurate answer |
| (b) | An overestimate since both estimates in the calculation are greater than the exact values | C1 | This mark is given for a correct conclusion with a reason given |

**Question 15 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | (11 × 3) + (13 × 8) + (15 × 14) + (17 × 4) + (19 × 1) = 435 | M1 | This mark is given for finding *fx* using midpoints |
| 434 ÷ 30 | M1 | This mark is given for finding the total divided by the number of days |
| 14.5 | A1 | This mark is given for the correct answer only |

**Question 16 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | |  |  |  |  | | --- | --- | --- | --- | | **Colour** | red | yellow | green | | **Probability** |  |  |  | | M1 | This mark is given for at least one probability with a denominator of 11 shown |
| A1 | This mark is given for a completely correct table |
| (b) | 68 ÷ | P1 | This mark is given for as process to find the total number of counters |
| 249 | A1 | This mark is given for the correct answer only (accept 250) |

**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** | **5** | **4** | **3** | **2** | **1** | **U** |
| **1** | 3 | Mock Set 3 | 2F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **2a** | 13a | Jun-17 | 1F | 1 | Ratio | R2 | 1 | **45** | 0.45 | 0.66 | 0.55 | 0.46 | 0.36 | 0.25 | 0.13 |
| **2b** | 13b | Jun-17 | 1F | 2 | Ratio | R2, G14 | 2 | **45** | 0.89 | 1.37 | 1.11 | 0.88 | 0.69 | 0.51 | 0.3 |
| **3** | 8 | Nov-17 | 3F | 2 | Ratio | R2, G15 | 1 | **44** | 0.87 | 1.51 | 1.08 | 0.86 | 0.64 | 0.39 | 0.11 |
| **4** | 17 | Jun-19 | 3F | 2 | Ratio | R2 | 2 | **37** | 0.74 | 1.31 | 0.99 | 0.74 | 0.53 | 0.31 | 0.15 |
| **5** | 16 | Mock Set 4 | 1F | 2 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **6** | 20 | Nov-19 | 2F | 4 | Algebra | A2, R9 | 2 | **35** | 1.38 | 2.84 | 2.09 | 1.34 | 0.51 | 0.17 | 0.05 |
| **7** | 20 | Nov-17 | 1F | 3 | Number | N6, N14 | 1 | **30** | 0.9 | 2.08 | 1.44 | 0.86 | 0.39 | 0.17 | 0.12 |
| **8a** | 18a | Jun-17 | 1F | 4 | Geometry | G17,N14 | 3 | **26** | 1.04 | 2.91 | 1.74 | 0.7 | 0.21 | 0.04 | 0.01 |
| **8b** | 18b | Jun-17 | 1F | 1 | Number | N14 | 3 | **8** | 0.08 | 0.27 | 0.12 | 0.03 | 0.01 | 0 | 0 |
| **9a** | 13a | Mock Set 1 | 1F | 3 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **9b** | 13b | Mock Set 1 | 1F | 3 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **10a** | 25a | Mock Set 1 | 2F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **10b** | 25b | Mock Set 1 | 2F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **10c** | 25c | Mock Set 1 | 2F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **10d** | 25d | Mock Set 1 | 2F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **11a** | 19a | Mock Set 3 | 2F | 3 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **11b** | 19b | Mock Set 3 | 2F | 3 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **12a** | 12a | Mock Set 2 | 1F | 3 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **12b** | 12b | Mock Set 2 | 1F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **13a** | 25a | Mock Set 2 | 2F | 2 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **13b** | 25b | Mock Set 2 | 2F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **14a** | 12a | Mock Set 3 | 1F | 2 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **14b** | 12b | Mock Set 3 | 1F | 1 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **15** | 25 | Mock Set 3 | 2F | 3 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **16a** | 22a | Mock Set 3 | 3F | 2 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
| **16b** | 22b | Mock Set 3 | 3F | 2 |  | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** | **−** |
|  |  |  |  | **55** |  |  |  | **270** | 6.35 | 12.95 | 9.12 | 5.87 | 3.34 | 1.84 | 0.87 |