**GCSE Mathematics (1MA1)**

**Themed papers – Probability and Statistical Diagrams**

**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 5 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | 1 – 0.45 = 0.55    0.55 | B1 | This mark is given for finding the probability of not winning on Saturday in correct position |
| 1 – 0.67 = 0.33  1 – 0.35 = 0.65    0.55  0.35  0.65  0.67 | B1 | This mark is given for the branches for the Sunday game correct |
| (b) | 0.45 × 0.33 = 0.1485  0.55 × 0.35 = 0.1925 | M1 | This mark is given for finding the probability of one win on Saturday and not on Sunday and a win on Sunday but not on Saturday |
| 0.1485 + 0.1925 | M1 | This mark is given for a correct method to find the total probability |
| 0.341 | A1 | This mark is given for the correct answer only |

**Question 2 (Total 5 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | 1 – 0.15 = 0.85 | M1 | This mark is given for finding the probability of ‘not late’ |
| 0.85  0.85  0.85  0.15  0.15  0.15 | A1 | This mark is given for a fully correct diagram |
| (b) | 0.85 × 0.85 = 0.7225 | M1 | This mark is given for a method to find the probability of being not late on both days |
| 1 – 0.7225 | M1 | This mark is given for a method to find the probability that Mary’s train will be late on **at least** one of the two days |
| 0.2775 | C1 | This mark is given for the correct answer only |

**Question 3 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Britain** | **Italy** | **Spain** | **Total** | | **Male** |  | **8** |  | **38** | | **Female** | **11** |  |  |  | | **Total** | **32** |  | **12** | **60** |   Number of males preferring to holiday in Britain = 32 – 11 = 21  Total number of people who preferring to holiday in Italy = 60 – (32 + 12) = 16  Total number of females = 60 – 38 = 22   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Britain** | **Italy** | **Spain** | **Total** | | **Male** | **21** | 8 |  | 38 | | **Female** | 11 |  |  | **22** | | **Total** | 32 | **16** | 12 | 60 | | P1 | This mark is given for a process to find a first value |
| Number of males preferring to holiday in France = 38 – (21 + 8) = 9  Number of females preferring to holiday in Italy = 16 – 8 = 8   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Britain** | **Italy** | **Spain** | **Total** | | **Male** | 21 | 8 | **9** | 38 | | **Female** | 11 | **8** |  | 22 | | **Total** | 32 | 16 | 12 | 60 | | P1 | This mark is given for a process to find a second value |
| 12 – 9 or 22 – (11 + 8) = 3   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Britain** | **Italy** | **Spain** | **Total** | | **Male** | 21 | 8 | 9 | 38 | | **Female** | 11 | 8 | **3** | 22 | | **Total** | 32 | 16 | 12 | 60 | | P1 | This mark is given for a complete process to find the number of females who preferred to holiday in Spain |
|  | A1 | This mark is given for the correct answer only |

**Question 4 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) | 6  9  6  9  1 5 8  2  3 4 7 | M1 | This mark is given for placing numbers 6 and 9 in the intersection of *A* and *B* |
|  | M1 | This mark is given for placing numbers 1, 5 and 8 in set A only  **or**  the number 2 in set B only  **or**  the numbers 3, 4 7 outside *A* ∪ *B* |
| C1 | This mark is given for a fully correct Venn diagram |
| (b) | There are 2 numbers in *A* ∩ *B*  There are 9 numbers in the universal set | M1 | This mark is given for one of these two statements seen |
|  | A1 | This mark is given for a correct answer only |

**Question 5 (Total 6 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | *A* *B*  3 9 5  15  21 27 25    1, 7, 11, 13, 17, 19, 23, 29 | B1 | This mark is given for labels on the Venn diagram |
| M1 | This mark is given for 15 shown in the intersection |
| M1 | This mark is given for  5 and 25 in only set *B*  or  3, 9, 21 and 27 in only set *A*  or  1, 7, 11, 13, 17, 19, 23, 29 in |
| C1 | This mark is given for all numbers correctly placed in the Venn Diagram |
| (b) | where *a* ≥ 7 or , where *b* ≤ 15 | P1 | This mark is given for a correct numerator or denominator |
|  | A1 | This mark is given for the correct answer only |

**Question 6 (Total 6 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) |  | C4 | Four marks are given for a fully correct Venn diagram  (3 marks for at least 6 numbers in the correct position)  (2 marks for at least 4 numbers in the correct position)  (1 mark for at least 2 numbers in the correct position) |
| (b) | *A* ∩ *B* = {8} | M1 | This mark is given for finding the number of members of *A* ∩ *B* |
|  | A1 | This mark is given for the correct answer only |

**Question 7 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | The denominator for the 2nd student is incorrect (it should be 29)  or  The probabilities for the 2nd student do not add up to 1 (they ad to ) | C1 | This mark is given for a correct comment |
| (b) | No, the probabilities should be multiplied together rather than added | C1 | This mark is given for a correct conclusion with a supporting comment |

**Question 8 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 0.07 × 0.98 = 0.0686  0.93 × 0.11 = 0.1203 | M1 | This mark is given for one correct product seen |
| 0.0686 + 0.1203 | M1 | This mark is given for a fully correct method to calculate the probability |
| 0.1709 | A1 | This mark is given for the correct answer only |

**Question 9 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | F  G  S  **2**  **8**  **4**  **0** | P1 | This mark is given for a process to show some of the information given |
| F  G  S  2  8  4  **5**  **3**  **22**  0 | P1 | This mark is given for a process to show at least three of the unknown amounts from the information given  5 people speak German and Spanish but not French  3 people speak French and German but not Spanish  22 people speak French but not German or Spanish |
| F  G  S  2  8  4  5  3  22  0  **6** | P1 | This mark is given for a complete process to find the number of people who speak only Spanish (50 – 44 = 6) |
| ×  =  × | P1 | This mark is given for a process to find the probability that two people chosen at random speak only Spanish |
|  | A1 | This mark is given for the correct answer (or an equivalent fraction) |

**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** |
| 1a | 15a | June 2018 | 2H | 2 | Probability | P8/P9 | 3 | 96 | 1.92 | 1.99 | 1.97 | 1.96 | 1.95 | 1.92 | 1.86 | 1.68 | - | - | 1.25 |
| 1b | 15b | June 2018 | 2H | 3 | Probability | P8/P9 | 2 | 65 | 1.96 | 2.92 | 2.81 | 2.63 | 2.24 | 1.57 | 0.82 | 0.33 | - | - | 0.13 |
| 2a | 10a | June 2019 | 2H | 2 | Probability | P6, P4 | 2 | 97 | 1.94 | 1.99 | 1.99 | 1.99 | 1.97 | 1.93 | 1.84 | 1.67 | - | - | 1.3 |
| 2b | 10b | June 2019 | 2H | 3 | Probability | P6, P8 | 1 | 58 | 1.73 | 2.8 | 2.53 | 2.18 | 1.78 | 1.25 | 0.69 | 0.31 | - | - | 0.14 |
| 3 | 8 | June 2018 | 2H | 4 | Probability | P1, P3, S2 | 3 | 80 | 3.18 | 3.75 | 3.53 | 3.37 | 3.24 | 3.08 | 2.80 | 2.28 | - | - | 1.63 |
| 4a | 1a | June 2019 | 3H | 3 | Probability | P6 | 2 | 93 | 2.80 | 2.95 | 2.91 | 2.88 | 2.84 | 2.76 | 2.60 | 2.27 | - | - | 1.66 |
| 4b | 1b | June 2019 | 3H | 2 | Probability | P3, P8 | 1 | 80 | 1.59 | 1.93 | 1.83 | 1.71 | 1.59 | 1.47 | 1.29 | 1.01 | - | - | 0.68 |
| 5a | 1a | June 2017 | 3H | 4 | Probability | P6 | 2 | 80 | 3.20 | 3.75 | 3.54 | 3.37 | 3.24 | 3.08 | 2.81 | 2.32 | - | - | 1.61 |
| 5b | 1b | June 2017 | 3H | 2 | Probability | P3, 8 | 2 | 56 | 1.13 | 1.79 | 1.52 | 1.29 | 1.12 | 0.95 | 0.73 | 0.49 | - | - | 0.26 |
| 6a | 1a | Nov 2018 | 2H | 4 | Statistics | P6 | 2 | 72 | 2.89 | 3.70 | 3.50 | 3.35 | 3.26 | 3.22 | 2.94 | 2.57 | - | - | 1.83 |
| 6b | 1b | Nov 2018 | 2H | 2 | Statistics | P3, P8 | 2 | 37 | 0.74 | 1.90 | 1.68 | 1.17 | 0.89 | 0.86 | 0.72 | 0.50 | - | - | 0.41 |
| 7a | 12a | June 2017 | 2H | 1 | Probability | P9 | 2 | 72 | 0.72 | 0.93 | 0.89 | 0.84 | 0.77 | 0.66 | 0.49 | 0.26 | - | - | 0.1 |
| 7b | 12b | June 2017 | 2H | 1 | Probability | P8 | 2 | 59 | 0.59 | 0.87 | 0.83 | 0.76 | 0.66 | 0.49 | 0.27 | 0.11 | - | - | 0.05 |
| 8 | 11 | Nov 2019 | 3H | 3 | Probability | P6 | 1 | 38 | 1.14 | 3 | 2.62 | 2.57 | 2.24 | 1.57 | 0.67 | 0.24 | - | - | 0.04 |
| 9 | 20 | June 2018 | 3H | 5 | Probability | P8, P9 | 2 | 19 | 0.94 | 3.39 | 2.05 | 1.2 | 0.68 | 0.35 | 0.16 | 0.06 | - | - | 0.03 |
|  |  |  |  | **41** |  |  |  |  | **26.47** | **37.66** | **34.2** | **31.27** | **28.47** | **25.16** | **20.69** | **16.1** | **-** | **-** | **11.12** |