**GCSE Mathematics (1MA1)**

**Themed papers – Statistical diagrams: Frequency trees and tree 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**

|  |
| --- |
| **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 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 45  23  22  4  18  7  16 | C1 | This mark is given for correctly placing at least one piece of the data given in the question (22 or 16) |
| C1 | This mark is given for finding at least one unknown piece of data (4, 18, 7 or 23) |
| C1 | This mark is given for a completely correct probability tree |

**Question 2 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 23  10  10  23  85  177  23  177  85  10  13  92 | 1 | This mark is given for two correct frequencies in the diagram |
|  | 1 | This mark is given for 4 correct frequencies in the diagram |
|  | 1 | This mark is given for a fully correct frequency tree |
| (b) |  | 1 | This mark is given for either a numerator of 13 or a denominator of 23 |
|  | 1 | 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** |
| --- | --- | --- | --- |
| (a) | 75  29  120 | C1 | This mark is given for putting 75 and 29 in the correct places on the frequency tree |
| 16  45  75  29  120 | C1 | This mark is given for deducing 120 – 75 = 45 and 45 – 29 = 16 and placing 45 and 29 in the correct places on the frequency tree |
| 16  45  75  29  120  61  14 |  | This mark is given for deducing 30 – 16 = 14 and 74 – 14 = 61 and placing 14 and 61 in the correct places for a fully correct frequency tree |
| (b) |  | B1 | This mark is given for the correct answer only |

**Question 4 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 48  8  80 | C1 | This mark is given for placing 48 or 8 in the correct position on the frequency tree |
| 48  8  32  24  80 | C1 | This mark is given for calculating 80 – 48 = 32 and 32 – 8 = 24 and placing them in the correct position on the frequency tree |
| 37  48  8  32  24  80  117 | C1 | This mark is given for calculating 61 – 24 = 37 and 48 – 37 = 11 and placing them in the correct position on the fully complete frequency tree |
| (b) |  | M1 | This mark is given for  with *a* < 61 or  with *b* > 37 |
|  | A1 | This mark is given for the correct answer only (or an equivalent fraction) |

**Question 5 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) |  | B2 | These marks are given for all four probabilities correct  (1 mark is given for two or three probabilities correct) |
| (b) | × | M1 | This mark is given for a method to find a probability Amina takes two red balls |
|  | A1 | This mark is given for the correct answer only (or an equivalent fraction) |

**Question 6 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 60 and 32 in correct place | M1 | This mark is given for a start to interpret the information |
|  | 32 ÷ 4 × 3 = 24 | M1 | This mark is given for working out the number of boys having school lunch |
|  | 60 – 32 **AND** “28” ÷ 2 | M1 | This mark is given for working out the number of girls and the number of girls having school lunch or packed lunch |
|  | 14  14  8  24  28  32  60 | A1 | This mark is given for the frequency tree completed correctly. |

**Question 7 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 21  27 | C1 | This mark is given for starting to interpret information, using one correct frequency from 21 or 27 |
|  | 21  27  **39** | C1 | This mark is given for at least one correct additional value  60 – 21 = 39 |
|  | **6**  **15**  27  **39**  21 | C1 | This mark is given for communicating all information correctly  39 – 27 = 12  18 – 12 = 6  21 – 6 = 15 |
| (b) | 12 or 39  **12** | M1 | with *a* < 39 **or**  with *b* > 12 |
|  |  | A1 | This mark is given for the correct answer only |

**Question 8 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | First spin: ,  Second spin: , , , | B2 | This mark are given for finding all six probabilities correctly  (B1 given for finding four of the probabilities correctly) |
| (b) | × | M1 | This mark is given for finding a method to work out the combined probability |
|  | A1 | This mark is given for the correct answer only |

**Question 9 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | and  on left hand branches | B1 | This mark is given for the correct answers only, |
| , ,  and  on right hand branches | B1 | This mark is given for the correct answers only |
| (b) | = | M1 | This mark is given for a method to find the probability that neither dice will land on 6 |
|  | A1 | This mark is given for the correct answer only |

**Question 10 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | , | B1 | This mark is given for two correct answers only |
| , , , | B1 | This mark is given for four correct answers only |
| (b) | × | M1 | This mark is given for a method to find the probability of two red pens |
|  | A1 | This mark is given for a correct answer only |

**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 | 14 | Jun-18 | 2F | 3 | Probability | P1 | 2 | **89** | 2.66 | 2.95 | 2.92 | 2.83 | 2.58 | 1.92 | 0.92 |
| 2a | 12a | Nov-17 | 2F | 3 | Probability | P1, | 2 | **90** | 2.71 | 2.91 | 2.85 | 2.77 | 2.57 | 2.1 | 1.1 |
| 2b | 12b | Nov-17 | 2F | 2 | Probability | P3 | 1 | **73** | 1.46 | 1.77 | 1.68 | 1.51 | 1.23 | 0.7 | 0.17 |
| 3a | 15a | Nov-19 | 1F | 3 | Probability | P1 | 2 | **89** | 2.68 | 2.92 | 2.85 | 2.73 | 2.41 | 2.05 | 1.49 |
| 3b | 15b | Nov-19 | 1F | 1 | Probability | P2 | 1 | **55** | 0.55 | 0.71 | 0.63 | 0.56 | 0.45 | 0.33 | 0.22 |
| 4a | 17a | Nov-18 | 1F | 3 | Probability | P1 | 2 | **88** | 2.63 | 2.88 | 2.79 | 2.68 | 2.41 | 2 | 1.5 |
| 4b | 17b | Nov-18 | 1F | 2 | Probability | P3 | 2 | **55** | 1.1 | 1.51 | 1.35 | 1.13 | 0.79 | 0.47 | 0.21 |
| 5a | 27a | Nov-18 | 1F | 2 | Probability | P8 | 1 | **8** | 0.15 | 0.76 | 0.31 | 0.11 | 0.03 | 0.02 | 0 |
| 5b | 27b | Nov-18 | 1F | 3 | Geometry | G3 | 3 | **0** | 0.01 | 0.21 | 0.02 | 0.01 | 0.01 | 0.01 | 0 |
| 6 | 16 | Mock Set 4 | 3F | 4 | − | − | − | **−** | − | − | − | − | − | − | − |
| 7a | 12a | Mock Set 1 | 1F | 3 | − | − | − | **−** | − | − | − | − | − | − | − |
| 7b | 12b | Mock Set 1 | 1F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
| 8a | 22a | Mock Set 3 | 2F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
| 8b | 22b | Mock Set 3 | 2F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
| 9a | 23a | Mock Set 2 | 1F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
| 9b | 23b | Mock Set 2 | 1F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
| 10a | 25a | Mock Set 1 | 3F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
| 10b | 25b | Mock Set 1 | 3F | 2 | − | − | − | **−** | − | − | − | − | − | − | − |
|  |  |  |  | **43** |  |  |  |  |  | **16.62** | **15.4** | **14.33** | **12.48** | **9.6** | **5.61** |