**GCSE Mathematics (1MA1)**

**Themed papers – Buttons and Counters**

**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 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | ×  = | P1 | This mark is given for a process to find the probability of choosing a green counter followed by a blue counter |
| ×  = | P1 | This mark is given for a process to find the probability of choosing a blue counter followed by a green counter |
| + | P1 | This mark is given for a process to find the probability of choosing one counter of each colour |
| (=) | A1 | This mark is given for the correct answer only |

**Question 2 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 3 + 17 represents 80% of the counters | P1 | This mark is given for using 1 – 0.2 = 0.8 |
| 3 : 17 : 5 | P1 | This mark is given for a process to find the ratio of purple counters |
|  | A1 | This mark is given for a correct answer only (or decimal equivalent) |

**Question 3 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 1 – 0.45 – 0.25 = 0.3 | P1 | This mark is given for a process to find the sum of the unknown probabilities |
| 2*x* + *x* = 0.3  *x* = 0.1  P(red) = 0.2, P(white) = 0.1 | P1 | This mark is given for a process to find the probabilities of taking red and white counters |
| Number of counters in the bag =  = 40  Number of red counters = 40 × 0.2 | P1 | This mark is given for a process to find the number of red counters |
| 8 | A1 | This mark is given for the correct answer only |
| (b) | 0.5 multiplied by an odd number will never be a whole number of counters, so there must be an even number of marbles in the box | C1 | This mark is given for a correct explanation |

**Question 4 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 0.65 × (1 – 0.65) + 0.65 × (1 – 0.65) | M1 | This mark is given for a method to find the probability that counters of different colours are found |
| 0.455 | A1 | This mark is given for a correct answer only |
| (b) | 78 ÷ 0.65 = 120 | M1 | This mark is given for a method to find the total number of counters |
| 120 – 78 = 42 | A1 | This mark is given for a correct answer only |

**Question 5 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | =  *p* = | M1 | This mark is given for a method to find an estimate for the value for *p* |
| 72 | A1 | This mark is given for the correct answer only |

**Question 6 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 1 – (0.2 + 0.35 + 0.4) = 0.05 | 1 | This mark is given for the correct answer only |
| (b) | 20 | 1 | This mark is given for stating that (at least) 20 counters are required |
| The number of counters of each colour must be a whole number | 1 | This mark is given for a correct explanation |

**Question 7 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | = | P1 | This mark is given for a process to find an initial relationship between *r* and *g* |
| = | P1 | This mark is given for a process to find a second relationship between *r* and *g* |
| 7*g* = 3(*r* + *g*) = 3*r* + 3*g*  4*g* = 3*r*  13(*g* + 3) = 6(*r* + *g* + 5)  13*g* + 39 = 6*r* + 6*g* + 30  7*g* + 9 = 6*r* | P1 | This mark is given for simplifying the expressions for the relationships found |
| 4*g* = 3*r*  7*g* + 9 = 6*r*  7*g* + 9 = 8*g* | P1 | This mark is given for a process to form simultaneous equations to be solved |
| *g* = 9  *r* = 12 | A1 | This mark is given for the correct answer only (12 red, 9 green) |

**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 | 17 | June 2017 | 1H | 4 | Probability | P8 | 3 | 63 | 2.50 | 3.87 | 3.68 | 3.30 | 2.72 | 1.94 | 1.04 | 0.39 | - | - | 0.14 |
| 2 | 16 | June 2018 | 1H | 3 | Probability | P4 | 3 | 46 | 1.39 | 2.85 | 2.41 | 1.88 | 1.39 | 0.93 | 0.46 | 0.11 | - | - | 0.03 |
| 3a | 6a | June 2018 | 3H | 4 | Probability | P4, A21, R6 | 3 | 76 | 3.04 | 3.84 | 3.64 | 3.42 | 3.17 | 2.83 | 2.34 | 1.68 | - | - | 1.06 |
| 3b | 6b | June 2018 | 3H | 1 | Probability | P4 | 2 | 46 | 0.46 | 0.77 | 0.67 | 0.57 | 0.47 | 0.38 | 0.27 | 0.14 | - | - | 0.06 |
| 4a | 16b | Nov 2018 | 2H | 2 | Probability | P9 | 1 | 42 | 0.84 | 1.90 | 1.85 | 1.61 | 1.52 | 1.14 | 0.75 | 0.28 | - | - | 0.17 |
| 4b | 16a | Nov 2018 | 2H | 2 | Probability | P9 | 1 | 27 | 0.54 | 1.90 | 1.56 | 1.38 | 1.17 | 0.83 | 0.33 | 0.11 | - | - | 0.04 |
| 5 | 11 | Nov 2019 | 1H | 2 | Statistics | S1 | 2 | 26 | 0.51 | 1.78 | 1.49 | 1.23 | 1.00 | 0.72 | 0.26 | 0.11 | - | - | 0.06 |
| 6a | 10a | Nov 2017 | 3H | 1 | Probability | P4 | 1 | 82 | 0.82 | 1.00 | 0.97 | 0.99 | 0.99 | 0.96 | 0.89 | 0.76 |  |  | 0.55 |
| 6b | 10b | Nov 2017 | 3H | 2 | Probability | P1 | 2 | 14 | 0.29 | 1.38 | 1.18 | 1.09 | 1.00 | 0.59 | 0.24 | 0.07 |  |  | 0.03 |
| 7 | 22 | June 2019 | 1H | 5 | Probability | P8, A19 | 3 | 12 | 0.62 | 3.61 | 1.37 | 0.52 | 0.23 | 0.11 | 0.04 | 0.01 | - | - | 0.01 |
|  |  |  |  | **26** |  |  |  |  | **11.01** | **22.9** | **18.82** | **15.99** | **13.66** | **10.43** | **6.62** | **3.66** | **-** | **-** | **2.15** |