**GCSE Mathematics (1MA1)**

**Themed papers – Indices**

**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 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 6 × 6 × 6 × 6 × 6 = 7776 | B1 | This mark is given for the correct answer only |

**Question 2 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 2 × 2 × 2 = 8 | B1 | This mark is given for the correct answer only |

**Question 3 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 2 × 2 × 2 × 2 = 16 | B1 | This mark is given for the correct answer only |

**Question 4 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 3 × 3 × 3 × 3 × 3 = 243 | B1 | This mark is given for the correct answer only (or an equivalent fraction) |

**Question 5 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 625 | B1 | This mark is given for the correct answer only |

**Question 6 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 12*t* | B1 | 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) | 15*fg* | 1 | This mark is given for the correct answer only |
| (b) | *t*2 | 1 | This mark is given for the correct answer only |

**Question 8 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | d5 | B1 | 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) | 7*ab* | B1 | This mark is given for the correct answer only |
| (b) | *y*3 | B1 | This mark is given for the correct answer only |
| (c) |  | M1 | This mark is given for a method to find expressions for both the numerator and the denominator of the fraction |
|  | A1 | This mark is given for the correct answer only |

**Question 10 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 6*f* | B1 | This mark is given for the correct answer only |
| (b) | 16*mn* | B1 | This mark is given for the correct answer only |
| (c) | 2*t*2 | B1 | This mark is given for the correct answer only |

**Question 11 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 2*y*3 | B1 | This mark is given for the correct answer only |
| (b) | *m*(*m* + 1) | B1 | This mark is given for the correct answer only |

**Question 12 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 7 | B1 | This mark is given for the correct answer only |
| (b) | 256 | B1 | This mark is given for the correct answer only |

**Question 13 (Total 2 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | 8 | B1 | This mark is given for the correct answer only |
| (b) | 5 × 5 × 5 = 125 | B1 | This mark is given for the correct answer only |

**Question 14 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 6 | B1 | This mark is given for the correct answer only |
| (b) | 5 | B1 | This mark is given for the correct answer only |
| (c) | 100*a* = 102*a*, 1000*b* = 103*b* | M1 | This mark is given for writing 100*a* or 1000*b* as a power of 10 |
| 102*a* × 103*b* = 102*a* + 3*b*  thus *w* = 2*a* + 2*b* | B1 | This mark is given for a correct conclusion |

**Question 15 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 6 – 2 = 4 | B1 | This mark is given for a correct answer only |

**Question 16 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | *p*(2 × 5)  = *p*10 | B1 | This mark is given for the correct answer only |
| (b) | =  × *x*(7 – 3) × *y*(3 – 1) | M1 | This mark is given for a method to simplify the fraction |
| 2*x*4*y*2 | A1 | This mark is given for a correct answer only |

**Question 17 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | *m*6 | B1 | This mark is given for the correct answer only |

**Question 18 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | -27 | B1 | This mark is given for the correct answer only |

**Question 19 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | -8 | B1 | This mark is given for the correct answer only |

**Question 20 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | *t*6 | B1 | This mark is given for the correct answer only |
| (b) | *w*5 | B1 | This mark is given for the correct answer only |

**Question 21 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 3 × 4 × *y*2 × *y*3 = 12*y*5 | B1 | This mark is given for the correct answer only |

**Question 22 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 15*p*6*r*5 | B1 | This mark is given for the correct answer only |

**Question 23 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 35*u*3*w*7 | B1 | This mark is given for the correct answer only |

**Question 24 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  | =  = 35 – 3 = 32 | M1 | This mark is given for using the laws of indices to simplify the expression |
| 9 | A1 | This mark is given for the correct answer only |

**Question 25 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) | 35 × 34 = 35+4 (= 39)  or  35 ÷ 32 = 35-2 (= 33)  or  34 ÷ 32 = 34−2 (= 32) | M1 | This mark is given for a first step using a rule of indices |
| 37 | A1 | This mark is given for the correct answer only |
| (b) | 1 | B1 | This mark is given for the correct answer only |
| (c) |  | B1 | This mark is given for the answer shown (or for 0.111…) |

**Question 26 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
| (a) | *m*3 + 4 = *m*7 | B1 | This mark is given for the correct answer only |
| (b) | 53 × *n*3 × *p*3 × 3 = 125*n*3*p*9 | B2 | These marks are given for the correct answer only  (B1 is given for 2 out of 3 terms correct in a single product) |
| (c) | × *q*9 – 6 × *r*4 –1 = 8*q*6*r*3 | B2 | (B1 is given for 2 out of 3 terms correct in a single product) |

**Question 27 (Total 1 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | or 0.125 | B1 | This mark is given for the 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 | 5 | Nov-19 | 2F | 1 | Number | N6 | 1 | 95 | 0.95 | 0.99 | 0.98 | 0.97 | 0.88 | 0.73 | 0.4 |
| 2 | 5b | Nov-18 | 1F | 1 | Number | N6 | 1 | 89 | 0.89 | 0.99 | 0.95 | 0.91 | 0.8 | 0.63 | 0.52 |
| 3 | 1 | Jun-17 | 1F | 1 | Number | N6 | 1 | 70 | 0.7 | 0.93 | 0.88 | 0.78 | 0.58 | 0.3 | 0.11 |
| 4 | 3 | Jun-18 | 2F | 1 | Number | N7 | 1 | 84 | 0.84 | 0.99 | 0.97 | 0.91 | 0.77 | 0.52 | 0.24 |
| 5 | 4 | Spec Set 2 | 2F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 6 | 6a | Jun-18 | 1F | 1 | Algebra | A1 | 1 | 87 | 0.87 | 0.96 | 0.93 | 0.89 | 0.84 | 0.77 | 0.58 |
| 7a | 3a | Nov-17 | 2F | 1 | Algebra | A4 | 1 | 83 | 0.83 | 0.88 | 0.86 | 0.84 | 0.8 | 0.71 | 0.56 |
| 7b | 3b | Nov-17 | 2F | 1 | Algebra | A1 | 1 | 84 | 0.84 | 0.91 | 0.89 | 0.86 | 0.81 | 0.62 | 0.33 |
| 8 | 7c | Spec Set 1 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 9a | 8a | Jun-19 | 2F | 1 | Algebra | A1 | 1 | 83 | 0.83 | 0.96 | 0.92 | 0.86 | 0.78 | 0.64 | 0.35 |
| 9b | 8b | Jun-19 | 2F | 1 | Algebra | A1 | 1 | 68 | 0.68 | 0.87 | 0.81 | 0.73 | 0.61 | 0.41 | 0.16 |
| 9c | 8c | Jun-19 | 2F | 2 | Algebra | A4 | 1 | 31 | 0.61 | 1.17 | 0.87 | 0.62 | 0.39 | 0.17 | 0.04 |
| 10a | 4a | Spec Set 1 | 2F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 10b | 4b | Spec Set 1 | 2F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 10c | 4c | Spec Set 1 | 2F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 11a | 17a | Mock Set 1 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 11b | 17b | Mock Set 1 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 12a | 11a | Spec Set 1 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 12b | 11b | Spec Set 1 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 13a | 15a | Jun-19 | 1F | 1 | Number | N7 | 1 | 74 | 0.74 | 0.96 | 0.91 | 0.8 | 0.62 | 0.38 | 0.15 |
| 13b | 15b | Jun-19 | 1F | 1 | Number | N7 | 1 | 74 | 0.74 | 0.96 | 0.92 | 0.82 | 0.64 | 0.36 | 0.11 |
| 14a | 21a | Nov-17 | 2F | 1 | Algebra | A4 | 1 | 54 | 0.54 | 0.8 | 0.68 | 0.55 | 0.4 | 0.23 | 0.09 |
| 14b | 21b | Nov-17 | 2F | 1 | Algebra | A4 | 1 | 61 | 0.61 | 0.81 | 0.71 | 0.63 | 0.49 | 0.32 | 0.13 |
| 14c | 21c | Nov-17 | 2F | 2 | Algebra | N6, A4 | 2 | 1 | 0.02 | 0.13 | 0.02 | 0.01 | 0.01 | 0.01 | 0 |
| 15 | 24 | Mock Set 2 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 16a | 26a | Nov-19 | 1F | 1 | Algebra | A4 | 1 | 46 | 0.46 | 0.69 | 0.56 | 0.46 | 0.33 | 0.22 | 0.13 |
| 16b | 26b | Nov-19 | 1F | 2 | Algebra | A4 | 1 | 41 | 0.81 | 1.53 | 1.21 | 0.78 | 0.34 | 0.2 | 0.07 |
| 17 | 16c | Spec Set 1 | 2F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 18 | 5 | Spec Set 1 | 1F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 19 | 3c | Spec Set 2 | 1F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 20a | 19b | Spec Set 2 | 1F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 20b | 19c | Spec Set 2 | 1F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 21 | 17d | Mock Set 3 | 3F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 22 | 28a | Mock Set 4 | 3F | 2 | − | − | − | − | − | − | − | − | − | − | − |
| 23 | 24b | Spec Set 2 | 2F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 24 | 20 | Nov-18 | 1F | 2 | Number | N6, N7 | 1 | 16 | 0.31 | 1.08 | 0.48 | 0.28 | 0.14 | 0.1 | 0.06 |
| 25a | 20a | Mock Set 3 | 1F | 2 | − | − | − | − | − | − | − | − | − | − | − |
| 25b | 20b | Mock Set 3 | 1F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 25c | 20c | Mock Set 3 | 1F | 1 | − | − | − | − | − | − | − | − | − | − | − |
| 26a | 20a | Jun-18 | 2F | 1 | Algebra | A4 | 1 | 68 | 0.68 | 0.93 | 0.86 | 0.75 | 0.56 | 0.29 | 0.09 |
| 26b | 20b | Jun-18 | 2F | 2 | Algebra | A4 | 1 | 5 | 0.1 | 0.4 | 0.17 | 0.07 | 0.02 | 0 | 0 |
| 26c | 20c | Jun-18 | 2F | 2 | Algebra | A4 | 1 | 27 | 0.54 | 1.35 | 0.9 | 0.51 | 0.2 | 0.04 | 0.01 |
| 27 | 22b | Nov-17 | 1F | 1 | Number | N3 | 1 | 2 | 0.02 | 0.15 | 0.03 | 0.01 | 0.01 | 0 | 0 |
|  |  |  |  | **51** |  |  |  |  | **13.61** | **19.44** | **16.51** | **14.04** | **11.02** | **7.65** | **4.13** |