**GCSE Mathematics (1MA1)**

**Themed papers – Expand and Factorise**

**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 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 5*p* + 15 – 2 + 4*p* | M1 | This mark is given for a method to expand the brackets in the expression |
| 9*p* + 13 | A1 | This mark is given for the correct answer only |

**Question 2 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | *x*2 + 5*x* – 9*x* – 45 | M1 | This mark is given for three terms correct |
| *x*2 – 4*x* – 45 | A1 | This mark is given for the correct answer only |
| (b) | 3(3*x*2 + 2*x*) | M1 | This mark is given for a partial factorisation |
| 3*x*(3*x* + 2) | A1 | This mark is given for the correct answer only |

**Question 3 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  |  | M1 |  |
|  | A1 | This mark is given for the correct answer or and equivalent |

**Question 4 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (b) | (*x* 7)(*x* 5) | M1 | This mark is given for finding the two numbers that multiply to make 35 |
| (*x* – 7)(*x* + 5) | A1 | This mark is given for a correct answer only |

**Question 5 (Total 3 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | (2*x* + 1)(*x* + 3) = 2*x*2 + 7*x* + 3  **or**  (*x* + 3)(3*x* + 7) = 3*x*2 +16*x* + 21 | M1 | This mark is given for a method to find the product of any two linear expressions |
| (2*x*2 + 7*x* + 3)(3*x* + 7) =  (2*x* + 1)(3*x*2 +16*x* + 21) = | M1 | This mark is given for a method to multiply out two products with at least half the terms correct |
| 6*x*3 + 35*x*2 + 58*x* + 21 | 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** |
|  | (*x* + 1)(*x* + 2) *= x*2 + *x* + 2*x* + 2  or  (*x* + 2)(*x* + 3) *= x*2 + 2*x* + 3*x* + 6  or  (*x* + 1)(*x* + 3) *= x*2 + *x* + 3*x* + 3 | M1 | This mark is given for a method to find the product of any two of three linear expressions |
| (*x* + 3)(*x*2 + *x* + 2*x* + 2)  or  (*x* + 1)(*x*2 + 2*x* + 3*x* + 6)  or  (*x* + 2)(*x*2 + *x* + 3*x* + 3)  *= x*3 + *x*2 + 2*x*2 + 3*x*2 + 2*x +* 3*x* + 6*x* + 6 | M1 | This mark is given for a for method to find the full expansion of three brackets |
| *x*3 + 6*x*2 + 11*x* + 6  (*a* = 1, *b* = 6, *c* = 11, *d* = 6) | A1 | This mark is given for the correct answer only |

**Question 7 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | √5(√8 + √18) = √5√8 + √5√18 | M1 | This mark is given for expanding brackets |
|  | = √40 + √90  = √4√10 + √9√10  = 2√10 + 3√10 | M1 | This mark is given for finding an expression in terms of √10 |
|  | = (2 + 3)√10  = 5√10  *a* = 5 | A1 | This mark is given for the correct answer only |

**Question 8 (Total 3 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
|  | (3*x* + 2)(2*x* + 1) = 6*x*2 + 5*x* + 2  or  (2*x* + 1)(*x* – 5) = 2*x*2 – 9*x* – 5 | M1 | This mark is given for a method to find the product of any two linear expressions |
| (6*x*2 + 5*x* + 2)(*x* – 5)  or  (3*x* + 2)(2*x*2 – 9*x* – 5) | M1 | This mark is given for a method to find the product of the quadratic expression formed with the remaining term |
| 6*x*3 – 23*x*2 – 33*x* – 10 | A1 | This mark is given for the correct answer only |

**Question 9 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | (*x* + 2)(*x* + 8) = *x*2 + 10*x* + 16 | M1 | This mark is given for a method to find the product of two brackets |
| (*x*2 + 10*x* + 16)(*x* – 4)  = *x*3 – 4*x*2 + 10*x*2 – 40*x* + 16*x* – 64 | M1 | This mark is given for finding six terms |
| *x*3 + 6*x*2 – 24*x* – 64 | 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) | 2*x*2 – 5*x* – 12 = (2*x* + 3)(*x* – 4) | M1 | This mark is given for factorising the denominator |
| *x*2 – 16 = (*x* + 4)(*x* – 4) | M1 | This mark is given for factorising the numerator |
|  | A1 | This mark is given for the correct answer only |

**Question 11 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  | 3*x*2 – 8*x* – 3 = (3*x* + 1)(*x* – 3) | M1 | This mark is given for expanding the brackets of the numerator |
| 2*x*2 – 6*x* = 2*x*(*x* – 3) | M1 | This mark is given for expanding the brackets of the denominator |
| = | A1 | This mark is given for cancelling (*x* – 3) for the correct answer |

**Question 12 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | (*a* + *b*)(*a* – *b*) | B1 | This mark is given for a correct answer only |
| (b) | (*x*2 + 4 + *x*2 – 2)(*x*2 + 4 – *x*2 + 2) | M1 | This mark is given for using *a* = *x*2 + 4 and *b* = *x*2 – 2 |
| = (2*x*2 + 2)(6) | M1 | This mark is given for a method to multiply out the brackets to find an expression of the form *cx*2 + *d* |
| = 12*x*2 + 12  = 12(*x*2 + 1) | A1 | This mark is given for a correct answer only |

**Question 13 (Total 8 marks)**

| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| (a) | (*x* – 2)(2*x* + 3)  = 2*x*2 – 4*x* + 3*x* – 6 | M1 | This mark is given for a method to find the expansion of two linear expressions |
| (2*x*2 – 4*x* + 3*x* – 6)(*x* + 1)  = 2*x*3 –­ 4*x*2 + 3*x*2 – 6*x* + 2*x*2 – 4*x* + 3*x* – 6 | M1 | This mark is given for a method to multiply out all three linear expressions |
| 2*x*3 + *x*2 – 7*x* – 6 | A1 | This mark is given for the correct answer only |
| (b) | 4 + *n* – 2 = –3 | M1 | This mark is given for a method to combine indices |
| *n* = –3 – 4 + 2  *n* = –5 | A1 | This mark is given for the correct answer only |
| (c) | *x* = | M1 | This mark is given for substituting *a* = 5, *b* = –4 and *c* = –3 into the formula for the quadratic equation |
| *x* =  *x* =  and | M1 | This mark is given for simplifying as shown |
| *x* = 1.27 and –0.472 | A1 | This mark is given for two correct answers only |

**Question 14 (Total 1 mark)**

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

**Question 15 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 3 correct terms or 4 terms ignoring signs | M1 | This mark is given for a method to find the product of any two linear expressions |
|  | M1 | This mark is given for a method of 6 products, 4 of which are correct |
|  | A1 | This mark is given for fully accurate working to give the required result |

**Question 16 (Total 1 mark)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | The constant term should be −6 not +6 | C1 | This communication mark is given for correct evaluation of result shown |

**Question 17 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | (*x* + 2)(2*x* – 3) = 2*x*2 + 4*x* – 3*x* – 6 | M1 | This mark is given for multiplying out two brackets with at least three terms out of four correct |
| (2*x*2 + *x* – 6)(3*x* + 1) =  6*x*3 + 2*x*2 + 3*x*2 + *x* – 18*x* – 6 | M1 | This mark is given for a complete method to multiply all three brackets |
| 6*x*³ + 5*x*² – 17*x* – 6 | A1 | This mark is given for the correct answer only |

**Question 18 (Total 2 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | (3(*x* – *y*) – 2)(*x* – *y*) | M1 | This mark is given for identifying (*x* – *y*) as a common factor |
| (3*x* – 3*y* – 2)(*x* – *y*) | A1 | This mark is given for the correct answer only |

**Question 19 (Total 3 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | = | B1 | This mark is given for the correct answer only |
| (b) | 2(25 – *y*2) | M1 | This mark is given for taking out a factor of 2 |
| 2(5 + *y*)(5 – *y*) | A1 | 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) | Maryam’s second line should contain +4 rather than –4 | C1 | This mark is given for a correct explanation |
| (b) | Josh’s reasoning gives +6*x* rather than –6*x* | C1 | This mark is given for a correct explanation |

**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 | 2 | June 2018 | 3H | 2 | Algebra | A4 | 1 | 77 | 1.53 | 1.90 | 1.78 | 1.64 | 1.53 | 1.43 | 1.30 | 1.12 | - | - | 0.86 |
| 2a | 1a | Nov 2019 | 3H | 2 | Algebra | A4 | 1 | 77 | 1.54 | 2.00 | 2.00 | 1.95 | 1.93 | 1.87 | 1.58 | 1.01 | - | - | 0.40 |
| 2b | 1b | Nov 2019 | 3H | 2 | Algebra | A4 | 1 | 70 | 1.40 | 2.00 | 1.95 | 1.89 | 1.74 | 1.64 | 1.42 | 0.93 | - | - | 0.39 |
| 3 | 6 | Spec Set 1 | 3H | 2 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4 | 11b | Mock Set 4 | 1H | 2 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | 18a | June 2019 | 3H | 3 | Algebra | A4 | 2 | 77 | 2.32 | 2.89 | 2.82 | 2.74 | 2.51 | 2.04 | 1.35 | 0.74 | - | - | 0.35 |
| 6 | 10 | June 2017 | 1H | 3 | Algebra | A4 | 2 | 67 | 2.01 | 2.92 | 2.83 | 2.65 | 2.29 | 1.60 | 0.82 | 0.32 | - | - | 0.11 |
| 7 | 13 | June 2018 | 1H | 3 | Number | N8 | 2 | 51 | 1.54 | 2.93 | 2.75 | 2.26 | 1.57 | 0.90 | 0.46 | 0.24 | - | - | 0.12 |
| 8 | 15 | Nov 2019 | 2H | 3 | Algebra | A4 | 1 | 50 | 1.49 | 2.78 | 2.86 | 2.67 | 2.38 | 2.06 | 1.24 | 0.46 | - | - | 0.16 |
| 9 | 11 | Mock Set 3 | 3H | 3 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10 | 14a | June 2017 | 3H | 3 | Algebra | A4 | 1 | 45 | 1.36 | 2.93 | 2.69 | 2.12 | 1.33 | 0.60 | 0.19 | 0.05 | - | - | 0.02 |
| 11 | 17 | June 2018 | 1H | 3 | Algebra | A4 | 1 | 42 | 1.25 | 2.92 | 2.59 | 1.96 | 1.18 | 0.51 | 0.18 | 0.07 | - | - | 0.03 |
| 12a | 15a | June 2018 | 1H | 1 | Algebra | A4 | 1 | 46 | 0.46 | 0.93 | 0.77 | 0.59 | 0.45 | 0.31 | 0.21 | 0.12 | - | - | 0.07 |
| 12b | 15b | June 2018 | 1H | 3 | Algebra | A4 | 1 | 37 | 1.10 | 2.49 | 1.92 | 1.47 | 1.07 | 0.67 | 0.37 | 0.19 | - | - | 0.09 |
| 13a | 9a | Nov 2018 | 3H | 3 | Algebra | A4 | 1 | 48 | 1.44 | 2.90 | 2.68 | 2.77 | 2.41 | 2.05 | 1.23 | 0.63 | - | - | 0.23 |
| 13b | 9b | Nov 2018 | 3H | 2 | Algebra | A4 | 1 | 43 | 0.86 | 1.80 | 1.76 | 1.74 | 1.29 | 1.16 | 0.78 | 0.41 | - | - | 0.14 |
| 13c | 9c | Nov 2018 | 3H | 3 | Algebra | A18 | 1 | 21 | 0.62 | 2.80 | 2.76 | 2.36 | 1.43 | 0.87 | 0.27 | 0.07 | - | - | 0.00 |
| 14 | 13b | Nov 2019 | 1H | 1 | Algebra | A4 | 1 | 2 | 0.02 | 0.44 | 0.22 | 0.08 | 0.04 | 0.01 | 0.00 | 0.00 | - | - | 0.00 |
| 15 | 13 | Spec Set 1 | 2H | 3 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 16 | 16b | Mock Set 1 | 1H | 1 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 17 | 13a | Mock Set 2 | 3H | 3 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 18 | 17a | Mock Set 2 | 1H | 2 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 19a | 10a | Nov 2018 | 1H | 1 | Algebra | A4 | 1 | 8 | 0.08 | 1 | 0.73 | 0.35 | 0.16 | 0.09 | 0.02 | 0.01 | - | - | 0 |
| 19b | 10b | Nov 2018 | 1H | 2 | Algebra | A4 | 1 | 26 | 0.52 | 1.8 | 1.67 | 1.09 | 0.79 | 0.66 | 0.41 | 0.3 | - | - | 0.16 |
| 20a | 5a | Mock Set 3 | 3H | 1 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 20b | 5b | Mock Set 3 | 3H | 1 | Algebra | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  |  |  |  | **58** |  |  | **20** | **787** | **19.54** | **37.43** | **34.78** | **30.33** | **24.1** | **18.47** | **11.83** | **6.67** | **-** | **-** | **3.13** |