**GCSE Mathematics (1MA1)**

**Themed papers – Surface area and volume**

**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** |
| (a) | Cuboid | B1 | This mark is given for the correct answer only |
| (b) | 12 | B1 | This mark is given for the correct answer only |

**Question 2 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 30 × 6 × 19 = 3420 | P1 | This mark is given for a process to find the volume of the container |
| × 3420 = 2280 | P1 | This mark is given for a process to find the volume of water in the container |
| 2280 ÷ 275 = 8.29… | P1 | This mark is given for a process to find out how many cups can be filled |
| 8 cups | A1 | This mark is given for the correct answer only |

**Question 3 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 0.40 × 0.30 × 0.35 = 0.042 | 1 | This mark is given for finding the volume of one box |
| 2.4 × 1.5 × 1.4 = 5.04 | 1 | This mark is given for finding the volume of the van |
| 5.04 ÷ 0.42 = 120 | 1 | This mark is given for finding how many boxes will fit in the van |
| 120 ÷ 3 = 40 | 1 | This mark is given for finding how long it will take Chloe to put the boxes in the van |
| (b) | She will not be able to load as many boxes, so it will take less time | 1 | This mark is given for a correct statement |

**Question 4 (Total 6 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) |  | M1 | This mark is given for a drawing of an isosceles diagram |
| A1 | This mark is given for a fully correct diagram with correct dimensions |
| (b) | × 6 × 5 = 15 | M1 | This mark is given for a method to find the area of one triangular face |
| (4 × 15) + (6 × 6) = 60 + 36 | M1 | This mark is given for a method to find the total surface area of the pyramid, including the base |
| 96 | A1 | This mark is given for the correct answer (96) only |
| cm3 | B1 | This mark is given for correct units seen |

**Question 5 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 8.42 – 7.22 = 18.72 | P1 | This mark is given for using Pythagoras to find the length of the missing side |
| √18.72 = 4.33 | P1 | This mark is given for a complete process to find the length of the missing side |
| 4.33 × 7.2 ÷ 2 = 15.59 | P1 | This mark is given for a process to find the area of the triangular face |
| 15.59 × 18 | P1 | This mark is given for a complete process to find the volume of the prism |
| 280.6 | A1 | This mark is given for an answer in the range 280 – 281 |

**Question 6 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
| (a) | 2 × 2 × 2 = 8 | M1 | This mark is given for a method to find volume of one cube |
| Yes, since 6 × 8 = 48 | C1 | This mark is given for a correct comment with supporting evidence |
| (b)(i) | or | B1 | This mark is given for  a 2 × 3 × 1 cuboid (4 cm × 6 cm × 2 cm)  or  a 1 × 6 × 1 cuboid (2 cm × 12 cm × 2 cm) |
| (ii) | 8, 24, 12 or  4, 24, 24 | M1 | This mark is given for finding areas of 3 or more faces of their cuboid and adding |
| 8 + 8 + 24 + 24 + 12 + 12 = 88  or 4 + 4 + 24 + 24 + 24 + 24 = 104 | A1 | This mark is given for a correct answer for the cuboid drawn |

**Question 7 (Total 4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working an or answer examiner might expect to see** | **Mark** | **Notes** |
|  | 249 ÷ 6 = 49 | 1 | This mark is given for finding the area of one face |
| √49 = 7 | 1 | This mark is given for finding the length of the side of the cube |
| 7 × 7 × 7 | 1 | This mark is given for an attempt to find the volumeof the cube |
| 343 | 1 | This mark is given for the correct answer only |

**Question 8 (Total 5 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | (2 × 6 × 8) + (2 × 6 × 18) + (2 × 8 × 18) =  96 + 216 + 288 cm2 | P1 | This mark is given for a process to find the area of at least three faces of the cuboid |
| 600 cm2 | P1 | This mark is given for a complete process to find the surface area of the cuboid |
| = 100 cm2  √100 = 10 cm | P1 | This mark is given for a process to find the length of one side of the cube |
| Volume of cuboid = 6 × 8 × 18 = 864 cm3  Volume of cube = 10 × 10 × 10 = 1000 cm3 | P1 | This mark is given for a process to find the volumes of the cube and the cuboid |
| Volumes are different so Janet is not correct | A1 | This mark is given for a correct conclusion supported by correct working |

**Question 9 (Total 5 marks)**

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| --- | --- | --- | --- |
| **Part** | **Working or answer an examiner might expect to see** | **Mark** | **Notes** |
|  | 32 ×  = 24 | P1 | This mark is given for a process to find the height of the surface of the water  or |
| 50 × 32 × 20 = 32 000 | to find the volume of the tank |
| 50 × 24 × 20 = 24 000  or  32 000 ×  = 24 000 | P1 | This mark is given for a process to find the volume of the water and sand  or |
| 24 ÷ (5 + 1) × 5 = 4 × 5 = 20 | for a process to divide the height in the ratio 5:1 |
| 24 000 ÷ (5 + 1) × 5 = 4000 × 5 = 20 000 | P1 | This mark is given for a process to divide the volume in the ratio 5:1 |
| 20 × 50 × 20 = 20 000 | or for a process to find the volume of the water |
| 20 000 ÷ 1000 | P1 | This mark is given for a process to convert to litres |
| 20 | A1 | 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** |
| 1a | 5a | Nov-18 | 3F | 1 | Geometry | G12 | 1 | 75 | 0.75 | 0.81 | 0.84 | 0.76 | 0.65 | 0.46 | 0.28 |
| 1b | 5b | Nov-18 | 3F | 1 | Geometry | G12 | 1 | 54 | 0.54 | 0.71 | 0.64 | 0.54 | 0.44 | 0.31 | 0.12 |
| 2 | 23 | Jun-19 | 2F | 4 | Geometry | N14, G16, G14 | 3 | 38 | 1.51 | 3.42 | 2.66 | 1.41 | 0.46 | 0.13 | 0.04 |
| 3a | 16a | Nov-17 | 3F | 4 | Geometry | G16, R11 | 3 | 27 | 1.08 | 2.88 | 1.7 | 1.02 | 0.43 | 0.14 | 0.03 |
| 3b | 16b | Nov-17 | 3F | 1 | Geometry | G16 | 3 | 22 | 0.22 | 0.41 | 0.28 | 0.21 | 0.16 | 0.08 | 0.03 |
| 4a | 23a | Jun-18 | 1F | 2 | Geometry | G2, G13 | 2 | 44 | 0.87 | 1.49 | 1.22 | 0.91 | 0.58 | 0.3 | 0.12 |
| 4b | 23b | Jun-18 | 1F | 4 | Geometry | G17,N2 | 1 | 15 | 0.59 | 1.84 | 0.93 | 0.46 | 0.23 | 0.11 | 0.04 |
| 5 | 26 | Jun-18 | 2F | 5 | Geometry | G16, G20 | 3 | 10 | 0.49 | 2.72 | 0.85 | 0.17 | 0.03 | 0 | 0 |
| 6a | 12a | Jun-17 | 3F | 2 | Geometry | G16 | 1 | 50 | 1 | 1.61 | 1.42 | 1.06 | 0.6 | 0.23 | 0.08 |
| 6bii | 12bi | Jun-17 | 3F | 1 | Geometry | G13, G17 | 3 | 29 | 0.29 | 0.64 | 0.42 | 0.25 | 0.14 | 0.06 | 0.01 |
| 6bii | 12bii | Jun-17 | 3F | 2 | Geometry | G13, G17 | 3 | 9 | 0.18 | 0.76 | 0.27 | 0.07 | 0.01 | 0 | 0 |
| 7 | 13 | Nov-17 | 1F | 4 | Geometry | N6, G16 | 3 | 5 | 0.2 | 1.21 | 0.33 | 0.14 | 0.06 | 0.04 | 0.02 |
| 8 | 29 | Nov-19 | 2F | 5 | Geometry | G16, G17 | 3 | 4 | 0.22 | 1.43 | 0.42 | 0.14 | 0.03 | 0.01 | 0.02 |
| 9 | 21 | Mock Set 3 | 1F | 5 | Geometry | − | − | − | − | − | − | − | − | − | − |
|  |  |  |  | **41** |  |  |  |  | **7.94** | **19.93** | **11.98** | **7.14** | **3.82** | **1.87** | **0.79** |