**GCSE Mathematics (1MA1)**

## Themed papers – Area and Perimeter

**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.<br><br>P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.<br><br>A1 – accuracy mark. This mark is generally given for a correct answer following correct working.<br><br>B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.<br><br>C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.<br><br>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 |
|---|---|---|---|
| | $PQ = 45 \div 10 = 4.5$<br>$BC = 4.5$ | P1 | This mark is given for a process to use the area of $PQRS$ to find the lengths of $PQ$ and $BC$ |
| | $26 - (2 \times 4.5)$ | P1 | This mark is given for a process to use the perimeter of $ABCD$ to find the length $AB$ |
| | $AB = 17 \div 2$ | P1 | This mark is given for a process to to find the length $AB$ |
| | 8.5 | A1 | This mark is given for the correct answer only |

**Question 2 (Total 5 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $5^2 + 12^2$ | P1 | This mark is given for the start of a process of Pythagoras e.g. 52 + 122 |
| | $\sqrt{(5^2 + 12^2)} = 13$ | P1 | This mark is given for a process to find the length of the diagonal |
| | $5 + 5 + 12 + 12 + 13 = 47$ | P1 | This mark is given for a process to add all the lengths |
| | $47 \times 1.5$ | P1 | This mark is given for multiplying the total length by 1.5 |
| | 70.5 (kg) | 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 |
|---|---|---|---|
| | Area of trapezium $= \frac{1}{2}h(a + b)$<br>$= \frac{1}{2} \times 4 \times (2 + 7)$<br>$= 18$ | M1 | This mark is given for a method to find the area of the trapezium |
| | Triangle of area 18 (e.g. base 9, height 4) | A1 | This mark is given for a correct diagram with area 18 |

**Question 4 (Total 5 marks)**

| Part | Working an or answer examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $FE = (28 – 6 – 6) \div 2$ (= 8)<br>or<br>$AB = (28 – 6 – 6 – 3 – 3) \div 2$ (= 5) | P1 | This mark is given for a process to process to find the distance *FE* or *AB* |
| | $AFE = \frac{4 \times 8}{2}$ (= 16)<br>$CDE = \frac{6 \times 3}{2}$ (= 9)<br>$\frac{5 \times 4}{2}$ (= 10)<br>$\frac{2 \times 3}{2}$ (= 3) | P1 | This mark is given for a process to process to find area of a triangle in the diagram |
| | $8 \times 4 + 2 \times 3 – (16 + 9)$<br>or $\frac{5 \times 4}{2} + \frac{2 \times 3}{2}$<br>or $(6 \times 8) – (5 \times 2) – (16 + 9)$ | P1 | This mark is given for a process to complete process for shaded area |
| | 13 | A1 | This mark is given for the correct answer only |
| | $m^2$ | C1 | This mark is given independently for stating the correct units |

**Question 5 (Total 5 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $\frac{1}{2} \times 7 \times (10 + 16) = 91$ | P1 | This mark is given for a process to calculate the area of the trapezium |
| | $91 \div 2 = 45.5$ | P1 | This mark is given for a process to work out how many litres of paint are needed |
| | $45.5 \div 5 = 9.1$<br>so 10 tins needed | P1 | This mark is given for a process to work out how many tins are needed (rounded up to the nearest whole number) |
| | $10 \times 16.99 = 169.90$ | P1 | This mark is given for a process to find out the total cost of the paint needed |
| | No, John does not have enough money. | C1 | This mark is given for a correct conclusion supported by working |

**Question 6 (Total 5 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $2 \times \pi \times 0.8^2 = 4.021$ | P1 | This mark is given for a process to find the area of the top and bottom of the tank |
| | $2\pi \times 0.8 \times 1.8 = 9.047$ | P1 | This mark is given for a process to find the curved surface area of the tank |
| | $4.021 + 9.047\ldots = 13.069$ | P1 | This mark is given for a process to find the total surface area of the tank |
| | $3 \times 13.068 = 39.204$ | P1 | This mark is given for a process to find the total surface area of three tanks |
| | Jeremy only has enough paint to cover 35 $m^2$ so Jeremy does not enough paint to completely cover 3 tanks | C1 | This mark is given for a correct conclusion supported by correct working |

**Question 7 (Total 5 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $2.5 \times 4x = 10x$<br>$7 \times (2x - 3) = 7(2x - 3)$ | P1 | This mark is given for a process to find an expression for the area of rectangle **A** and rectangle **B** |
| | $10x = 14x - 21$ | P1 | This mark is given for a process to form an equation for the two rectangles |
| | $4x = 21$ | P1 | This mark is given for a process to find the value of $x$ |
| | $x = 5.25$ | A1 | This mark is given for a correct answer only |
| | Perimeter of **B** $= 2 \times ((2 \times 5.25 - 3) + 7)$<br>$= 2 \times 14.5$<br>$= 29$ | B1 | This mark is given for substituting to find a value for the perimeter of rectangle **B** |

**Question 8 (Total 3 marks)**

| Part | Working an or answer examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $2x + 3 + 5x - 2 + 5x + 3 =$ | P1 | This mark is given for stating the perimeter algebraically |
| | $\frac{12x + 4}{4} =$ | P1 | This mark is given for a process to simplify to $12x + 4$ and divide by 4 |
| | $3x + 1$ | 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 |
|---|---|---|---|
| | $2x + 6 = 5x - 9$ | 1 | This mark is given for forming an equation |
| | $3x = 15$<br>$x = 5$ | 1 | This mark is given for rearranging and solving for $x$ |
| | $(2 \times 5) + 6 = 16$<br>or<br>$(5 \times 5) - 9 = 16$ | 1 | This mark is given for substituting 5 into the side length |
| | $48 \div 16 = 3$<br>so $y = 3$ | 1 | This mark is given for the correct answer only |

**Question 10 (Total 5 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | Width = $x$<br>Length = $x + 7$ | 1 | This mark is given for forming expressions for the length and width of the rectangle |
| | $x + x + 7 + x + x + 7 + 7 + x + x + 7 + x + x + 7 + 7 = 70$<br>$8x + 42 = 70$ | 1 | This mark is given for forming an equation for the width of the shape |
| | $x = \frac{70 - 42}{8}$ | 1 | This mark is given for finding an expression for $x$ |
| | width = 3.5, length = 10.5 | 1 | This mark is given for finding values for the width and the length of the shape |
| | $4 \times 3.5 \times 10.5 = 147$ | 1 | This mark is given for finding the area of the shape |

**Question 11 (Total 4 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $\frac{1}{2} \times AE \times 24 \sin 30° = 6AE$ | P1 | This mark is given for a process to find the area of one of triangle *AFE* (and thus the area of triangle *BCD*) |
| | $2 \times 6AE = 12AE$ | P1 | This mark is given for a process to find the area of the rectangle *ABDE* |
| | Let $AB = x$ and $AE = 3x$<br>Then $12 \times 3x = 3x \times x$<br>$36x = 3x^2$ | P1 | This mark is given for a process to use the ration *AB*:*AE* = 1: 3 and use the area of the rectangle *ABDE* to find the length *AE* |
| | $36 = 3x$<br>$AE = 36$ | A1 | This mark is given for the correct answer only |

**Question 12 (Total 5 marks)**

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $(x - 1)(3x - 2) = 3x^2 - 5x + 2$<br>$\frac{1}{2} 2x^2 = x^2$ | P1 | This mark is given for deriving expressions for the areas of both the rectangle and triangle |
| | $2x^2 - 5x + 2 > 0$ | P1 | This mark is given for finding an inequality |
| | $(2x - 1)(x - 2) > 0$ | P1 | This mark is given for finding a method to solve the inequality |
| | $x > 2$ and $x > \frac{1}{2}$ | P1 | This mark is given for finding the two critical values |
| | $x > 2$ only (since $x - \frac{1}{2} < 0$) | A1 | This mark is given for the correct answer only |

**Question 13 (Total 6 marks)**

| Part | Working an or answer examiner might expect to see | Mark | Notes |
|---|---|---|---|
| | $x^2 = xy + 66$ | P1 | This mark is given for establishing a relationship between the areas of the rectangle and the square |
| | $(3y + 4)^2 = y(3y + 4) + 66$ | P1 | This mark is given for a process to form an equation in one variable |
| | $= 6y^2 + 20y - 50 = 0$<br>so $2(3y^2 + 10y - 25) = 0$ | P1 | This mark is given for a process to form an equation to be solved |
| | $2(3y - 5)(y + 5) = 0$ | P1 | This mark is given for a process to solve |
| | $y = \frac{5}{3}$ | P1 | This mark is given for a selection of a positive number as the only solution, and substituting to find other variable |
| | width = $1\frac{2}{3}$ (cm), length = 9 (cm) | A1 | This mark is given for a completely correct solution |

## Mark scheme for 1MA1 Higher themed papers: Area and Perimeter

**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 | 7 | June 2019 | 1H | 4 | Algebra | A19, A21, G16 | 3 | 92 | 3.67 | 3.95 | 3.91 | 3.86 | 3.79 | 3.65 | 3.17 | 1.85 | - | - | 0.80 |
| 2 | 5 | June 2017 | 1H | 5 | Geometry | R11, G20 | 3 | 66 | 3.29 | 4.62 | 4.22 | 3.88 | 3.56 | 3.00 | 1.92 | 0.87 | - | - | 0.55 |
| 3 | 3 | June 2018 | 3H | 2 | Geometry | G16 | 2 | 66 | 1.32 | 1.91 | 1.79 | 1.65 | 1.45 | 1.13 | 0.70 | 0.37 | - | - | 0.20 |
| 4 | 4 | Mock Set 1 | 2H | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | 5 | Nov 2018 | 2H | 5 | Number | N13, R11, G16 | 3 | 55 | 2.76 | 4.80 | 4.47 | 4.18 | 4.15 | 3.67 | 2.70 | 1.54 | - | - | 0.73 |
| 6 | 6 | June 2019 | 3H | 5 | Geometry | N2, R10, G14, G17 | 3 | 53 | 2.65 | 4.66 | 4.07 | 3.34 | 2.57 | 1.80 | 1.14 | 0.62 | - | - | 0.38 |
| 7 | 3 | Mock Set 3 | 2H | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8 | 3 | Mock Set 2 | 1H | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9 | 6 | Nov 2017 | 1H | 4 | Algebra | G16, , A4, A21 | 2 | 28 | 1.13 | 4.00 | 3.50 | 3.16 | 2.69 | 2.21 | 1.23 | 0.44 | | | 0.21 |
| 10 | 6 | Nov 2017 | 3H | 5 | Geometry | G16, G17, A21 | 3 | 19 | 0.96 | 4.88 | 4.47 | 3.89 | 3.17 | 2.34 | 0.75 | 0.15 | | | 0.03 |
| 11 | 14 | June 2019 | 3H | 4 | Geometry | R4, R5, G16, G23 | 3 | 16 | 0.65 | 2.98 | 1.50 | 0.67 | 0.32 | 0.15 | 0.07 | 0.04 | - | - | 0.03 |
| 12 | 23 | Nov 2017 | 1H | 5 | Algebra | A22, G16, N1 | 1 | 5 | 0.24 | 4.38 | 3.15 | 1.58 | 0.84 | 0.41 | 0.12 | 0.03 | | | 0.01 |
| 13 | 21 | Mock Set 2 | 1H | 6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | **58** | | | | | **16.67** | **36.18** | **31.08** | **26.21** | **22.54** | **18.36** | **11.8** | **5.91** | **0** | **0** | |