

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Geometry

Area and perimeter – Finding the area of trapeziums

v1.0

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. e.g. accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
3.14...	Allow answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q1.

$$0.5 \times 8 \times (10 + 20)$$

oe Condone missing brackets

$$120$$

$$\text{cm}^2$$

M1

A1

B1

[3]

Q2.

$$\frac{1}{2} \times (14 + 20) \times 11 \text{ or } 187$$

oe any correct method to find the area of the trapezium

$$\frac{1}{2} \times 10 \times 7 \text{ or } 35$$

$$\text{oe eg } \frac{1}{2} \times 10 \times 7 \times \sin 90$$

M1

$$222$$

M1

A1

Additional Guidance

Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts

Ignore Pythagoras' theorem, trigonometry or perimeter calculations

$$14 \times 11 + \frac{1}{2} \times 6 \times 11$$

M1

Missing brackets must be recovered

$$\text{eg1 } \frac{1}{2} \times 20 + 14 \times 11 \text{ and } 187$$

M1

$$\text{eg2 } \frac{1}{2} \times 20 + 14 \times 11$$

M0

$$20 \times 11 = 220$$

M0M0A0

[3]

Q3.

$$\frac{1}{2} \times (2.8 + 2.1) (\times h)$$

or $2.45(h)$

*oe eg $2.1(h) + 0.5(h) \times 0.7$
any letter
may be implied*

M1

$$\frac{1}{2} \times (2.8 + 2.1) \times h = 39.2$$

or

$$(2.8 + 2.1) \times h = 39.2 \times 2$$

or

$$39.2 \div 2.45$$

or

$$78.4 \div 4.9$$

oe equation or calculation

M1dep

16

SC1 8

A1

Additional Guidance

Different letter used eg $2.1h + 0.5x \times 0.7$ is M0 unless recovered

[3]

Q4.

$$\frac{1}{2} (PQ + SR) \times 8 = 48$$

oe

M1

$$(PQ + SR) = 48 \times 2 \div 8$$

$$\text{or } (PQ + SR) = 12$$

Implied by values on diagram

$$\text{eg } PQ = 10 \text{ and } SR = 2$$

M1dep

Set of points that fit $PQ + SR =$ their 12

$$\text{eg } P(2, 0) Q(6, 0) R(9, 8) S(1, 8)$$

M1

Correct set of points such that

$$PQ + SR = 12 \text{ and } PQ > SR$$

$$\text{eg } P(2, 0) Q(9, 0) R(8, 8) S(3, 8)$$

A1

Additional Guidance

$$(PQ + SR) \times 8 = 48$$

M0

$$PQ + RS = 6$$

M0

$$P(1, 0) Q(3, 0) R(6, 8) S(2, 8)$$

M1 A0

$$PQ + RS = 12$$

M1 M1

$$P(3, 0) Q(11, 0) R(5, 8) S(9, 8)$$

M1 A0

For a correct set of points

P and Q must each have y -coordinate 0

R and S must each have y -coordinate 8

[4]

Q5.

$$(a) \frac{15+30}{2} \times 20$$

oe

M1

$$450$$

A1

$$(b) \text{ their } 450 \times 95$$

M1

$$42750$$

ft their 450

A1ft

[4]

Q6.

(a) $\frac{1}{2} \times (40 + 24) \times 16$
oe

M1

512

A1

(b) $\pi \times 4 \times 4$
oe

M1

[50.2, 50.3] **or** 16π

A1

(c) $\frac{\text{their } [50.2, 50.3]}{\text{their } 512}$
(= [0.098, 0.0982422])

M1

[9.8, 9.82422]

*ft their 512 and their [50.2, 50.3]
Allow 10 with correct method seen
SC1 [90.18, 90.2]*

A1ft

[6]

Q7.

(a) $\frac{1}{2} \times (280 + 198) \times 86$ oe
or $198 \times 86 + \frac{1}{2} \times (280 - 198) \times 86$
or $280 \times 86 - \frac{1}{2} \times (280 - 198) \times 86$

M1

20554

A1

(b) their $20\,554 \div 4047$ or 5.08 or
5.07... or 5.1
 $4047 \div 7 = 578.(14...)$

M1

their 5.08×7
their $20\,554 \div \text{their } 578.(14...)$

M1dep

35.5... or 35.56 or 35.7

A1

35

Rounding down

Q1ft

[6]

Q8.

(a) $\frac{1}{2} (6.5 + 8.3) \times 3.2$

23.68 or 23.7

M1

A1

(b) their 23.68×200

M1

4736 or 4740

A1 ft

[4]

Q9.

8×10 or 80

or

$0.5 \times 8 \times (14 - 10)$

or $0.5 \times 8 \times 4$ or 16

or

8×14 or 112

oe

may be seen in an incorrect attempt to calculate the

9450

population eg 112

M1

$8 \times 10 + 0.5 \times 8 \times (14 - 10)$

or $8 \times 10 + 0.5 \times 8 \times 4$

or $80 + 16$

or

$8 \times 14 - 0.5 \times 8 \times (14 - 10)$

or $8 \times 14 - 0.5 \times 8 \times 4$

or $112 - 16$

or

$0.5 \times (10 + 14) \times 8$

or 96

oe

may be seen in an incorrect attempt to calculate the

9450

population eg 96

M1dep

their 96×9450

oe

their 96 must be from a calculation using at least two of 8, 10 and 14

M1

907 200

A1

Additional Guidance

The first M1 may be awarded for a correct partial area even if this is seen amongst multiple attempts

eg1 $(8 + 10 + 14) \times 9450 = 302\,400$

M0M0M1A0

eg2 $32 \times 9450 = 302\,400$ (working not seen)

M0M0M0A0

[4]

Q10.

$$\tan 64 = \frac{h}{4}$$

$$\text{or } \tan 26 = \frac{4}{h}$$

$$\text{or } \frac{h}{\sin 64} = \frac{4}{\sin 26}$$

$$\text{oe e.g. } \tan 64 = \frac{h}{15-11}$$

$$\text{or } \tan (90 - 64) = \frac{15-11}{h}$$

$$\text{or } h^2 + 4^2 = \left(\frac{4}{\cos 64} \right)^2$$

any letter

M1

$$4 \tan 64$$

$$\text{or } \frac{4}{\tan 26}$$

$$\text{or } \frac{4}{\sin 26} \times \sin 64$$

or 8.2...

$$\text{oe e.g. } \sqrt{\left(\frac{4}{\cos 64} \right)^2 - 4^2}$$

implies M2

may be seen on diagram

M1dep

$$\frac{1}{2} \times (15 + 11) \times \text{their 8.2...}$$

or

$$\frac{1}{2} \times 4 \times \text{their 8.2..} + 11 \times \text{their 8.2..}$$

oe

$$\text{e.g. } 15 \times \text{their 8.2...} - \frac{1}{2} \times 4 \times \text{their 8.2...}$$

dep on M2

[106.6, 106.62]

accept 107 with working seen

A1

Additional Guidance

3rd M1 is for a total area and may be calculated as

a trapezium or a rectangle + a triangle

or a rectangle – a triangle or a triangle + a triangle

8.2... seen scores M2 even if not subsequently used

Further work after 106.6 e.g. 106.6 + 16.4

M1M1M0A0

[4]

Q11.

Alternative method 1

$$10 \div 4 \text{ or } 2.5$$

$$\text{or } 4 \div 10 \text{ or } 0.4$$

$$\text{or } \frac{1}{2} \times (18 + 10) \times 25 \text{ or } 350$$

oe

M1

$$18 \div \text{their } 2.5$$

$$\text{or } 18 \times \text{their } 0.4 \text{ or } 7.2$$

$$\text{or } 25 \div \text{their } 2.5$$

$$\text{or } 25 \times \text{their } 0.4 \text{ or } 10$$

oe

M1dep

$$\frac{1}{2} \times (18 + 10) \times 25 \text{ or } 350$$

and

$$\frac{1}{2} \times (\text{their } 7.2 + 4) \times \text{their } 10 \text{ or } 56$$

Must see working

M1dep

$$350 - 56 = 294$$

Do not award without working seen

A1

Alternative method 2

$$10 \div 4 \text{ or } 2.5$$

$$\text{or } 4 \div 10 \text{ or } 0.4$$

$$\text{or } \frac{1}{2} \times (18 + 10) \times 25 \text{ or } 350$$

oe

M1

$$(\text{Area scale factor} =) (\text{their } 2.5)^2$$
$$\text{or } (\text{their } 0.4)^2$$

M1dep

$$\text{their } 350 \div (\text{their } 2.5)^2$$
$$\text{or their } 350 \times (\text{their } 0.4)^2 \text{ or } 56$$

Must see working

M1dep

$$350 - 56 = 294$$

Do not award without working seen

A1

[4]

Q12.

$$9 \times 2 + 9 \times 2 + 7 \times 2$$

$$\text{or } 18 + 18 + 14$$

$$\text{or } 11 \times 9 - 7 \times 7$$

$$\text{or } 99 - 49$$

$$\text{or } 11 \times 2 + 7 \times 2 + 7 \times 2$$

$$\text{or } 22 + 14 + 14$$

Fully correct method for working out area A

M1

50

A1

$$\frac{1}{2} (6 + 9) 7$$

$$\text{or } 6 \times 7 + \frac{1}{2} \times 3 \times 7 \text{ or } 42 + 10.5$$

$$\text{or } 9 \times 7 - \frac{1}{2} \times 3 \times 7 \text{ or } 63 - 10.5$$

oe

Fully correct method for working out area B

M1

52.5

A1

B and 2.5

dependent on M1 scored

A1ft

[5]