

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Geometry

Understanding similarity and finding unknown sides in similar shapes

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.

C

B1

[1]

Q2.

9

B1

[1]

Q3.

$$\frac{QS}{PT}$$

B1

[1]

Q4.

Alternative method 1

$$\frac{28}{35} = 0.8 \text{ and } \frac{40}{50} = 0.8$$

or

$$\frac{35}{28} = 1.25 \text{ and } \frac{50}{40} = 1.25$$

or

$$\frac{28}{40} = 0.7 \text{ and } \frac{35}{50} = 0.7$$

or

$$\frac{40}{28} = 1.42857... \text{ and } \frac{50}{35} = 1.42857...$$

oe

decimal values must be the same, but may be correctly rounded or truncated

B1

Alternative method 2

$$35 \times \frac{40}{50} = 28 \text{ or } 35 \div \frac{50}{40} = 28$$

or

$$28 \times \frac{50}{40} = 35 \text{ or } 28 \div \frac{40}{50} = 35$$

or

$$50 \times \frac{28}{35} = 40 \text{ or } 50 \div \frac{35}{28} = 40$$

or

$$40 \times \frac{35}{28} = 50 \text{ or } 40 \div \frac{28}{35} = 50$$

oe calculation including all four values

$$\text{eg } \frac{35 \times 40}{50}$$

B1**Additional Guidance**

Calculations must be shown

Accept decimal truncation but truncated values must be the same

$$\text{eg } \frac{40}{28} = 1.42 \text{ and } \frac{50}{35} = 1.42$$

B1

$$\frac{28}{35} = \frac{40}{50} \text{ and } 28 \times 50 = 35 \times 40 \text{ and } 1400 = 1400$$

$$\text{or } \frac{28}{35} = \frac{40}{50} \text{ and } 28 \times 50 = 1400 \text{ and } 35 \times 40 = 1400$$

B1

$$28 \times 1.25 = 35 \text{ and } 40 \times 1.25 = 50 \text{ (oe ALT1)}$$

B1

$$28 \times 1.25 = 35 \text{ and } \frac{50}{40} = 1.25$$

B1

$$28 \times 1.25 = 35$$

B0

$$\text{Answers as fractions without a common denominator eg } \frac{28}{35} = \frac{40}{50}$$

B0

$$\frac{28}{40} = 1.4 \text{ and } \frac{50}{35} = 1.4$$

B0

$$\frac{28}{7} = \frac{40}{10} = 4 \text{ and } \frac{35}{7} = \frac{50}{10} = 5$$

B0**[1]**

Q5.

$$210 \div 2 \times 5$$

$$\text{or } 105 \times 5 \text{ or } 1050 \div 2$$

or

$$210 : 525$$

oe

$$\text{e.g. } 210 \times 2.5 \text{ or } 420 + 105$$

M1

$$525$$

A1

Additional Guidance

Further work after reaching 525

M0A0

[2]

Q6.

$$\times 3$$

B1

[1]

Q7.

$$8 \div 5 \text{ or } 19.2 \div 12$$

$$\frac{8}{5} \text{ or } \frac{19.2}{12} \text{ or } 1.6$$

or

$$12 \div 5 \text{ or } 19.2 \div 8$$

$$\frac{12}{5} \text{ or } \frac{19.2}{8} \text{ or } 2.4$$

oe use of a valid pair of sides to make an appropriate calculation or value

eg $5 \div 8$ or 0.625

or

$5 \div 12$ or $[0.416, 0.417]$

M1

$$8 \div 5 = 19.2 \div 12 \text{ or } \frac{8}{5} = \frac{19.2}{12}$$

or

$$12 \div 5 = 19.2 \div 8 \text{ or } \frac{12}{5} = \frac{19.2}{8}$$

oe showing sides are in proportion

eg $5 \div 8 = 12 \div 19.2$

or

$$\frac{5}{12} = \frac{8}{19.2}$$

A1

Additional Guidance

For A1 equating may be implied by two calculations or two fractions with correct evaluation

eg $8 \div 5 = 19.2 \div 12$ is implied by $8 = 5 \times 1.6$ and $19.2 = 12 \times 1.6$

M1A1

For A1 equating may be implied by calculations

eg1 $8 \div 5 = 19.2 \div 12$ is implied by $8 \div 5 = 1.6$ and $12 \times 1.6 = 19.2$

M1A1

eg2 $8 \div 5 = 19.2 \div 12$ is implied by $\frac{8}{5} \times 12 = 19.2$

M1A1

$$5 \times 19.2 = 8 \times 12$$

M1A1

$$5 \times 19.2 = 96 \text{ and } 8 \times 12 = 96$$

M1A1

Non-contradictory working can be ignored

eg correct response along with area calculations

M1A1

Ignore words eg references to scale factors, enlargement, angles

Working on diagrams may be seen

eg1 Arrows or lines from 5 to 8 and 12 to 19.2 with $\times 1.6$ on them

M1A1

eg2 Arrows or lines from 5 to 8 and 12 to 19.2 with 1.6 on them

M1A0

Arrows or lines must unambiguously link relevant numbers

For $8 \div 5$ or $\frac{8}{5}$ allow $8 : 5$ etc

[2]

Q8.

$$\frac{16}{20} \text{ or } \frac{20}{16} \text{ or } \frac{12}{20} \text{ or } \frac{20}{12}$$

or $12 : 9.6$ or $9.6 : 12$

or $16 : 9.6$ or $9.6 : 16$

oe eg $16 \div 20$

$$\text{eg } \frac{4}{5} \text{ or } \frac{5}{4} \text{ or } \frac{3}{5} \text{ or } \frac{5}{3}$$

eg 0.8 or 1.25 or 0.6 or $1.66\dots$ or 1.67

M1

9.6

oe

A1

Additional Guidance

Award M1 work even if not subsequently used

Ignore further working in an attempt to round after answer 9.6

eg 9.6 in working with answer 10

M1A1

$$12 \times 20 \div 16$$

M1

[2]

Q9.

54

May be on diagram

B1

7.5

6

May be on diagram

B1 for 1 correct

or for answers transposed

B2

Additional Guidance

If answers are in wrong position on answer lines, check working and diagram for clear

indication of possible transcription errors

eg $w = 9 \div 1.5 = 6$ in working, 9 on answer line

B1

$9 \div 1.5 = 6$ in working, 9 on answer line

B0

Answer line takes precedence over diagram eg $x = 54$ on diagram and $x = 81$ on answer line

B0

[3]

Q10.

(a) $6 \div 3$ or 2 or $9 \div 2$
 or $3 \div 6$ or 0.5 or 9×0.5
 or $9 \div 6$ or 1.5 or 3×1.5
 or $6 \div 9$ or $\frac{2}{3}$ or $3 \div \frac{2}{3}$
 oe

4.5

oe

M1

A1

Additional Guidance

Accept embedded answer $4.5 \times 2 = 9$

M1A1

Ignore further working in attempt to round after answer 4.5

e.g. $9 \div 2 = 4.5$ with answer 5

M1A1

'The length is double' without further working

M1A0

'The triangle is double' without further working

M1A0

(b) 53

B1

[3]

Q11.

Alternative method 1

$48 \div 2 \times 3$ or 72

oe

M1

their $72 \div 2$ or 36

$\cos^{-1} \left(\frac{36}{141} \right)$ or 75.2

M1dep

$141^2 - \text{their } 36^2$ or 18 585

ft their base $\div 2$

$\sin(\text{their } 75.2) = \frac{h}{141}$

or $\tan(\text{their } 75.2) = \frac{h}{\text{their } 36}$

M1dep

$\sqrt{141^2 - \text{their } 36^2}$ or $\sqrt{18\,585}$

$141 \times \sin(\text{their } 75.2)$

or $\text{their } 36 \times \tan(\text{their } 75.2)$

M1dep

[136.2, 136.4] or 136

A1

Alternative method 2

141 ÷ 3 or 47

oe

M1

24 and their 47 × 2

or 24 and 94

or 12 and their 47

$$\cos^{-1}\left(\frac{24}{94}\right) \text{ or } 75.2$$

M1deptheir $94^2 - 24^2$ or 8260or $\sqrt{8260}$

or 90.88...

or their $47^2 - 12^2$ or 2065or $\sqrt{2065}$

or 45.44...

$$\sin(\text{their } 75.2) = \frac{h}{\text{their } 94}$$

$$\text{or } \tan(\text{their } 75.2) = \frac{h}{24}$$

M1dep

$$\sqrt{\text{their } 94^2 - 24^2} \times 3 \div 2$$

$$\text{or } \sqrt{8260} \times 3 \div 2$$

$$\text{or } 90.88... \times 3 \div 2$$

$$\text{or } \sqrt{\text{their } 47^2 - 12^2} \times 3$$

$$\text{or } \sqrt{2065} \times 3$$

$$\text{or } 45.44... \times 3$$

$$\text{their } 94 \times \sin(\text{their } 75.2) \times 3 \div 2$$

$$\text{or } 24 \times \tan(\text{their } 75.2) \times 3 \div 2$$

M1dep

[136.2, 136.35] or 136

A1**Additional Guidance**

Values may be seen on diagram in correct positions