

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Ratio, Proportion and Rates of Change

Estimating and measuring, using appropriate units

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.

Please note, *actual measurements may have changed slightly on export/printing.*

(a) [208°, 212°]

B1

(b) [6.8, 7.2]

May be implied by correct answer

B1

[340, 360]

ft their $[6.8, 7.2] \times 50$

B1ft

[3]

Q2.

Please note, *actual measurements may have changed slightly on export/printing.*

[48, 52]

may be seen on diagram but answer line takes precedence

B1

Additional Guidance

Ignore other angles measured

[1]

Q3.

Please note, *actual measurements may have changed slightly on export/printing.*

[54, 58]

may be seen on diagram but answer line takes precedence

B1

Additional Guidance

Answer in a different unit

B0

[1]

Q4.

Please note, *actual measurements may have changed slightly on export/printing.*

(a) [68, 72]

B1

Check diagram for working but answer line takes precedence

(b) [30, 34]

B1

Additional Guidance

Check diagram for working but answer line takes precedence

[2]

Q5.

Please note, *actual measurements may have changed slightly on export/printing.*

(a) Measure [8, 8.4]

B1

their [8, 8.4] $\times 80$

M1

their [8, 8.4] $\times 80 \div 100$

M1

[6.4, 6.72] or 6 or 7

ft their [8, 8.4] $\times 80 \div 100$

A1ft

(b) Estimate is low as road not straight

oe

B1

Estimate is low if average speed is lower

or

Estimate is high if average speed is higher

oe

B1

[6]

Q6.

4 (cm) **and** 6 (cm) seen

[3.9, 4.1], [5.9, 6.1]

Accept measurements in mm, ie [39, 41] and [59, 61] Units need not be stated

B1

$0.5 \times$ their 4 $\times$ their 6

$0.5 \times$ their 4 $\times$ their 6 $\times \sin 90$

M1

[11.5, 12.5]

Accept answer only for full marks

A1ft

[3]

Q7.

(a) [8.9, 9.1]

B1

(b) [53, 57]

B1

[2]

Q8.

(a) [158, 162]

B1

(b) 1.20(p) or 120p

*ft their weight in (a)***B1ft**(c) $1.20 + 1.60 (= 2.80)$ $1.20 - 1.10 (= 0.10 \text{ or } 10)$ **M1** $1.10 + 1.40 (= 2.50)$ $1.60 - 1.40 (= 0.20 \text{ or } 20)$ **M1**

£0.30 or 30p

*SC1 $2.30 (-) 1.90 = 40p$ oe**SC1 $2 \times 1.60 (-) 2 \times 1.40 = 40p$ oe**SC1 $2 \times 1.20 (-) 2 \times 1.10 = 20p$ oe***A1**(d) Attempts to build up to within 750 ± 100 with weights less than or equal to 500 (no total needed)**or**

Subtracts from 750 with weights less than or equal to 500

*oe $750 \div n$ with n a positive integer***M1**

Shows two or more weights, less than or equal to 500, that total 750

eg $500 (+) 250 (= 750)$ $375 \times 2 (= 750)$ *SC1 Shows two or more weights, with one more than 500, that total 750***A1****[7]****Q9.**

(a) kilometres

B1

(b) litres

B1

(c) grams

B1**[3]****Q10.**

(a) [068, 072]

*Strand (i)***Q1**

(b) 095

*If both answers are correct apart from missing the leading zeros in (a) and (b) eg answers 70 and 95, award 0, 1***B1****[2]****Q11.****Please note**, actual measurements may have changed slightly on export/printing.

[31, 34]

B1**[1]**

Q12.

[4.6, 5.0]

B1 3 ($\times 1.6$)

or

their 3×1.6 evaluated

B2

[2]

Q13.

(a) $60(^{\circ})$ seen or implied

Accept [58, 62]

May be on the diagram

B1

$$\frac{360}{60} \times 3 \text{ oe}$$

Accept these valid statements

$20(^{\circ})$ seen

$9 \text{ films} = 180(^{\circ})$

$3 (+) 6 (+) 9$

$$\frac{360}{60} (= 6)$$

$$\frac{1}{6}$$

$$60 \times 6$$

M1

18

*SC1 Comedy angle $120^{\circ} (\pm 2(^{\circ}))$ used **and** answer 9*

A1

(b) $[118^{\circ}, 122^{\circ}] \div$ their 60×3

or 6 seen (may be on the diagram in the Romance section)

3×2 or romance is double comedy

M1

3

A1

[5]

Q14.

Please note, *actual measurements may have changed slightly on export/printing.*

[4.9, 5.1] seen or [2.9, 3.1] seen

M1

their $(5 + 3 + 5 + 3)$

M1

16

[15.6, 16.4]

*Do not ignore further work if using a clearly incorrect method
seen for final answer*

A1

[3]

Q15.

(a) [2.7, 2.9]

*If answer in mm, accept [27mm, 29mm]
Ignore further working if answer seen, e.g calculating area or circumference*

B1

(b) [5.4, 5.8]

*ft their (a) $\times 2$
Ignore further working if answer seen, e.g calculating area or circumference*

B1ft

(c) d equals $2r$

oe
or r equals $\frac{1}{2}d$

*Accept $d = 2r$
Do not accept $d = r^2$
diameter equals twice radius
radius is half the diameter*

B1

[3]

Q16.

Attempt to count shaded squares

or $5 \times 2 (+3)$

or $3 \times 3 (+4)$

or $5 \times 3 (-2)$

or $35 - 22$

Answer [9, 15] implies M1

M1

13

A1

cm^2

Units mark

B1

[3]

Q17.

grams

*ignore any numerical values given
accept g, ounces or oz*

B1

[1]

Q18.

100 grams

B1

2 litres

B1

5 metres

B1

[3]

Q19.

1.5 (cm) or 6 (cm) seen
 or
 scale factor = 4 (can be indicated on diagram)

Accept [1.4, 1.6]

Accept [5.9, 6.1]

Accept [3.6, 4.4]

B1

$2 \times \text{their } 6 \div \text{their } 1.5$ oe

or $2 \times \text{their } [3.6, 4.4]$

M1

8

Accept [7.2, 8.8]

A1

[3]

Q20.

(a) 165

B1

(b) 350 seen

350 – their 165

M1

185

A1ft

[3]

Q21.

(a) [66, 70]

B1

(b) [46, 50]

B1

(c) 56×19 or $1100 \div 19$ or $1100 \div 56$

M1

1064 or 57.89... or 19.6(...)

Accept 1060, 58, 57.9, 57.8, 57, 20

A1

No

Strand (iii)

Correct conclusion from their clear working

Dependent on M1

Q1 ft

[5]

Q22.

(a) 40 millimetres

B1

(b) 5 grams

B1

(c) 40 centilitres

B1

[3]

Q23.

(a) Kilograms

Allow kg

B1

(b) Grams

Allow g

B1

(c) Litres

Allow l

B1

[3]

Q24.

(a) 500

B1

(b) 1200 (grams) seen or implied or values with a total of 1.2

Values must not exceed 0.8

M1

Values with a total of 1200

Values must not exceed 800

eg 300×4 or 800 and 400

A1

[3]

Q25.

Centimetres

B1

Litres

B1

Grams

B1

[3]

Q26.

$2.85 \times 0.72 \times 0.9$ oe

$285 \times 72 \times 90$

M1

1.8(468)

$1\,846\,800$

A1

m^3

cm^3

B1

Additional Guidance

Accept any rounding to 2 sf or more without working seen,

eg 1.85 or 1 850 00

[3]

Q27.

Please note, actual measurements may have changed slightly on export/printing.

[17, 21]

B1 for [15, 17] or [21, 23]

B1 for scale factor [9, 12]

B2

[2]

Q28.

(a) 680

B1

(b) 1.6(00)

oe eg $1\frac{3}{5}$

B1

[2]

Q29.

(a) $315 \div 37.5$ or 8.4

oe

M1

8.40

A1

(b) No, her yearly pay is more
and $4 \times 12 = 48$
and not 52

oe

B1 for partial working

eg No, her yearly pay is more

and $4 \times 12 = 48$

or 52 weeks = in a year

or More than 4 weeks in a month

B2

[4]

Q30.

[18, 22]

B1 for [16, 18) or (22, 24]

B1 for scale factor [9, 12]

B2

[2]

Q31.

Please note, *actual measurements may have changed slightly on export/printing.*

Alternative method 1: one side measured

7.4 (cm)

or 74 (mm)

$\pm 2 \text{ mm}$

or 2.9 (inches)

allow [2.8, 3)

B1

their 7.4×3 or their 74×3

or their 2.9×3

or

[21.6, 22.8] or [216, 228]

or [8.4, 9)

oe

their 7.4 must be [7, 8]

their 74 must be [70, 80]

their 2.9 must be [2.6, 3.2]

M1

[21.6, 22.8] cm

or

[216, 228] mm

or

[8.4, 9) inches

ft their 7.4 or their 2.9 with B0M1 awarded

A1ft

Alternative method 2: more than one side measured

Each side measured as

7.4 (cm)

or 74 (mm)

$\pm 2 \text{ mm}$

or 2.9 (inches)

allow [2.8, 3)

B1

their 7.4 + their 7.4 + their 7.4

or their 74 + their 74 + their 74

or their 2.9 + their 2.9 + their 2.9

or

[21.6, 22.8]

or [216, 228]

or [8.4, 9)

oe

their 7.4 must be [7, 8]

their 74 must be [70, 80]

their 2.9 must be [2.6, 3.2]

M1

[21.6, 22.8] cm

or

[216, 228] mm

or

[8.4, 9) inches

ft their 7.4 or their 2.9 with B0M1 awarded

Additional Guidance

In alternative method 2 the sides do not have to be equal

eg

7.5, 7.5, 7.6

= 22.6

Cannot access the A mark as there are no units.

eg

sides measured as 7.6, 7.6, 7.7

$7.6 + 7.6 + 7.7$

= 22.9 cm

Cannot gain the B mark as 7.7 is out of range

eg

75, 80, 80

answer 235 mm

80 is out of range for the B mark but in range for the M mark. Method mark implied by correct answer for their values

Further work after the correct answer seen eg 7.4 and $22.2 \div 2 = 11.1$ cm

Ignore subsequent rounding once correct answer is seen

Accept correct units seen with their answer in the working, even if missing from the answer line, provided they are not contradicted.

Ignore any measurement of the height for the B mark

A1ft

B1

M1A0ft

B0

M1

A1ft

B0

M1A1ft

B1M1A0

[3]

Q32.

- (a) $240 \div 10$ or $120 \div 5$ or 24
or
 240×6 or 120×12 or 1440

M1

24 litres per minute

or

1440 litres per hour

oe eg 24 l/min or 0.4 litres per second

A1

Additional Guidance

M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts

Units may be abbreviated but must be the correct units for their correct rate eg allow 0.4 l/s or 0.4 lps for 0.4 litres per second

M1A1

Do not ignore further incorrect attempts to change units eg 24 litres per minute and 0.4 litres/hour on the answer line

M1A0

- (b) Horizontal line from (10, 240) to (30, 240)

$\pm \frac{1}{2}$ small square

B1

Straight line from their (30, 240) to (12 + their 30, 0)

$\pm \frac{1}{2}$ small square for (12 + their 30, 0)

B1ft

Additional Guidance

Mark intention

No horizontal line and straight line from (10, 240) to (22, 0)

B0B1ft

[4]