

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Number

Finding fractions of amounts with a calculator

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.

$5 \div 4$ oe eg 1 hour 15 minutes

M1

75

A1

[2]

Q2.

$36 \div 9 \times 11$ oe $36 \div 9$ and $36 + 2 \times 4$

M1

44

A1

Additional Guidance

Only 36×1.2

M0A0

$11 \div 9 = 1.2$ and 36×1.2

M1A0

$11 \div 9 = 1.2$ and 36×1.2 Answer 43.2 (or 43)

M1A0

$11 \div 9 = 1.2$ and 36×1.2 Answer 44 (even after 43.2 seen)

M1A1

Only $\frac{11}{9}$ of 36

M0

$\frac{11}{9} \times 36$

M1

[2]

Q3.

(a) $\frac{4}{5}$ oe fraction

B1

(b) their $\frac{4}{5} \times 20$

or

$\frac{16}{20}$

or 4 : 5 and 16 : 20

oe

M1

16

SC1 25

A1

Additional Guidance

If their $\frac{4}{5} \times 20$ gives a non-integer number of boys, then either the correct method

or full value must be seen for M1

The method mark may be implied by the correct ft integer value eg (a) $\frac{5}{20}$ (b) 5

B0M1A0

[3]

Q4.

(a) **Alternative method 1**

$$\frac{5}{7}$$

$$\times 168 \text{ or } 120$$

oe eg $168 \div 7 \times 5$

implied by 48

allow $0.71(4\dots)$ or $71(.4\dots)\%$ for $\frac{5}{7}$

M1

$$\frac{1}{3}$$

$$\times (168 - \text{their } 120)$$

or

$$\frac{1}{3}$$

$$\times 48 \text{ or } 16$$

or

$$\left(1 - \frac{1}{3}\right) \times (168 - \text{their } 120)$$

or

$$\left(1 - \frac{1}{3}\right) \times 48 \text{ oe}$$

must subtract their 120 from 168

with $10 < \text{their } 120 < 150$

allow $0.33(3\dots)$ or $33(.3\dots)\%$ for $\frac{1}{3}$

allow $0.66(6\dots)$ or 0.67 or $66(.6\dots)\%$

or 67% for $\left(1 - \frac{1}{3}\right)$

16 is M1M1

M1

$$32(.00\text{p}) \quad \text{SC2 80 SC1 40}$$

A1

Alternative method 2

$$\left(1 - \frac{5}{7}\right)$$

$$\times 168 \text{ or } 48$$

oe eg $168 \div 7 \times 2$

allow $0.28(6\dots)$ or 0.29 or $28(.6\dots)\%$

or 29% for $\left(1 - \frac{5}{7}\right)$

$$\frac{1}{3}$$

$$\times \text{their } 48 \text{ or } 16$$

or

$$\left(1 - \frac{1}{3}\right) \times \text{their } 48$$

oe $18 < \text{their } 48 < 100$

allow $0.33(3\dots)$ or $33(.3\dots)\%$ for $\frac{1}{3}$

allow $0.66(6\dots)$ or 0.67 or $66(.6\dots)\%$

or 67% for $\left(1 - \frac{1}{3}\right)$

16 is M1M1

$$32(.00\text{p})$$

$$\text{SC2 80 SC1 40}$$

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

$$\frac{5}{7} \times 168 = 120, 120 \div 3 = 40, \text{ Answer } 40$$

M1M0A0 (or SC1)

$$\frac{5}{7} \times 168 = 120, 120 \div 3 = 40, \text{ Answer } 80$$

SC2

Alt 1

Allow $0.71(4\dots)$ or $71(.4\dots)\%$ for $\frac{5}{7}$ and $0.33(3\dots)$ or $33(.3\dots)\%$ for $\frac{1}{3}$
eg $0.71 \times 168 = 119.28$

M1

$$0.33 \times (168 - 119.28) = 16.08, \text{ Answer } 32.64$$

M1A0

Do **not** allow $\frac{5}{7} = 0.7$ or $\frac{2}{7} = 0.3$ or $\frac{1}{3} = 0.3$ or $\frac{2}{3} = 0.7$
eg $0.7 \times 168 = 117.6$

M0

$$0.3 \times (168 - 117.6) = 15.12, \text{ Answer } 35.28$$

M0A0

Second mark of Alt 1 is independent

$$\text{eg } 0.7 \times 168 = 117.6 \text{ (unacceptable to use } 0.7 \text{ for } \frac{5}{7})$$

M0

$$(168 - 117.6) \div 3 = 16.8$$

M1A0

Second mark of Alt 2 is independent

$$\text{eg } 0.3 \times 168 = 50.4 \text{ (unacceptable to use } 0.3 \text{ for } \frac{2}{7})$$

M0

$$0.33 \times 50.4 = 16.63$$

M1A0

Calculation shown as eg $71\% \times 168$

M1

(b) It is less than the answer to part (a)

B1

[4]

Q5.

Alternative method 1 of 6

$$64 \times \frac{3}{8} \text{ or } 24$$

or

$$78 \times \frac{7}{13} \text{ or } 42$$

or

$$6 \times 78 \times \frac{7}{13} \text{ or } 252$$

oe

$$64 \times \frac{5}{8} \text{ or } 40$$

or

$$78 \times \frac{6}{13} \text{ or } 36$$

or

$$6 \times 78 \times \frac{6}{13} \text{ or } 216$$

M1

$$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$$

or their 24 + their 252

or 276

oe

$$64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$$

or their 40 + their 216

or 256

M1dep

$$64 + 6 \times 78 \text{ or } 64 + 468 \text{ or } 532$$

M1

$$\text{their } 532 \div 2 \text{ or } 266$$

dep on 3rd method mark only

M1dep

266 and 276 and Yes

or

266 and 256 and Yes

A1

Alternative method 2 of 6

$$64 \times \frac{3}{8} \text{ or } 24$$

or

$$78 \times \frac{7}{13} \text{ or } 42$$

or

$$6 \times 78 \times \frac{7}{13} \text{ or } 252$$

oe

$$64 \times \frac{5}{8} \text{ or } 40$$

or

$$78 \times \frac{6}{13} \text{ or } 36$$

or

$$6 \times 78 \times \frac{6}{13} \text{ or } 216$$

M1

$$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$$

or their 24 + their 252

or 276

oe

$$64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$$

or their 40 + their 216

or 256

M1dep

$$64 + 6 \times 78 \text{ or } 64 + 468 \text{ or } 532$$

M1

their 532 – their 276

dep on M1M1M1

their 532 – their 256

M1dep

256 and 276 and Yes

A1

Alternative method 3 of 6

$$64 \times \frac{3}{8} \text{ or } 24$$

or

$$78 \times \frac{7}{13} \text{ or } 42$$

or

$$6 \times 78 \times \frac{7}{13} \text{ or } 252$$

oe

$$64 \times \frac{5}{8} \text{ or } 40$$

or

$$78 \times \frac{6}{13} \text{ or } 36$$

or

$$6 \times 78 \times \frac{6}{13} \text{ or } 216$$

M1

$$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$$

or their 24 + their 252

or 276

oe

$$64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$$

or their 40 + their 216

or 256

M1dep

$$64 \div 2 \text{ or } 32$$

and

$$(6 \times 78) \div 2 \text{ or } 468 \div 2 \text{ or } 234$$

M1

their 32 + their 234 or 266

dep on 3rd method mark only

M1dep

266 and 276 and Yes

or

266 and 256 and Yes

A1

Alternative method 4 of 6

$$64 \times \frac{3}{8} \text{ or } 24$$

or

$$78 \times \frac{7}{13} \text{ or } 42$$

or

$$6 \times 78 \times \frac{7}{13} \text{ or } 252$$

oe

M1

$$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$$

or their 24 + their 252

or 276

oe

M1dep

$$64 + 6 \times 78 \text{ or } 64 + 468 \text{ or } 532$$

M1

their 276 ÷ their 532 or 0.51... or 0.52

or

their 532 ÷ their 276 or 1.9... or 1.93

oe

dep on M1M1M1

M1dep

532 and 276 and 0.51... or 0.52 and Yes

or

532 and 276 and 1.9... or 1.93 and Yes

A1

Alternative method 5 of 6

$$64 \times \frac{3}{8} \text{ or } 24$$

or

$$78 \times \frac{7}{13} \text{ or } 42$$

or

$$6 \times 78 \times \frac{7}{13} \text{ or } 252$$

oe

$$64 \times \frac{5}{8} \text{ or } 40$$

or

$$78 \times \frac{6}{13} \text{ or } 36$$

or

$$6 \times 78 \times \frac{6}{13} \text{ or } 216$$

M1

$$64 \times \frac{3}{8} + 6 \times 78 \times \frac{7}{13}$$

or their 24 + their 252

or 276

oe

$$64 \times \frac{5}{8} + 6 \times 78 \times \frac{6}{13}$$

or their 40 + their 216

or 256

M1dep

their 276×2 or 552

their 256×2 or 512

M1dep

$$64 + 6 \times 78 \text{ or } 64 + 468 \text{ or } 532$$

M1

532 and 552 and Yes

or

532 and 512 and Yes

A1

Alternative method 6 of 6

$$\frac{1}{2} - \frac{3}{8} \text{ or } \frac{1}{8}$$

or

$$\frac{7}{13} - \frac{1}{2} \text{ or } \frac{1}{26}$$

oe

M1

$$64 \times \text{their } \frac{1}{8} \text{ or } 8 \text{ (under)}$$

or

$$78 \times \text{their } \frac{1}{26} \text{ or } 3 \text{ (over)}$$

oe

M1dep

$$78 \times \text{their } \frac{1}{26} \times 6 \text{ or } 18 \text{ (over)}$$

oe

M1dep

$$64 \times \text{their } \frac{1}{8} \text{ or } 8 \text{ (under)}$$

and

$$78 \times \text{their } \frac{1}{26} \times 6 \text{ or } 18 \text{ (over)}$$

oe

May be subtracted

M1dep

8 under (half) and 18 over (half) and Yes

or

10 over (half) and Yes

A1

Additional Guidance

Condone $\frac{24}{64}$ for 24 or $\frac{42}{468}$ for 42 or $\frac{252}{468}$ for 252 for first method mark
276 and 10 over (266) and Yes implies 266 and 276 and Yes

M1M1M1M1A1

In Alt 2 256 and 276 and Yes

M1M1M1M1A1

In Alt 4 accept working with unused seats leading to
their $256 \div \text{their } 532$ or $0.4\dots$ or 0.49
or their $532 \div \text{their } 256$ or $2.07\dots$ or 2.08

[5]

Q6.

(a) 8 squares shaded

B1

(b) 2 squares shaded

B1

[2]

Q7.

Alternative method 1

$24 \div 4 \times 3$ or 18

oe

M1

their 18×60 or 1080

oe

1080 implies M2

M1dep

1080 and $\frac{3}{4}$ (of a day)

A1

Alternative method 2

24×60 or 1440

oe

M1

their $1440 \div 4 \times 3$ or 1080

oe

1080 implies M2

M1dep

1080 and $\frac{3}{4}$ (of a day)

A1

Alternative method 3

$24 \div 4 \times 3$ or 18

oe

M1

$1000 \div 60$

or $16(.6\dots)$ or 16.7 or 17

may be seen in either order (M marks not dependent)

[16 h 36 m, 16 h 42 m] implies division 16 or 17 may be embedded

M1

$16(.6\dots)$ or 16.7 or 17 or [16 h 36 m, 16 h 42 m]
and

18 and $\frac{3}{4}$ (of a day)

16 or 17 may be embedded

A1

Alternative method 4

24×60 or 1440

oe

M1

$1000 \div$ their 1440 ($\times 100$)

or $\frac{25}{36}$ or 0.69... or 69(...)%

oe

$\frac{25}{36}$ or 0.69... or 69(...)% implies M2

M1dep

$$\frac{25}{36} \text{ and } \frac{27}{36} \text{ and } \frac{3}{4} \text{ (of a day)}$$

or

$$0.69... \text{ and } 0.75 \text{ and } \frac{3}{4} \text{ (of a day)}$$

or

$$69(...)\% \text{ and } 75\% \text{ and } \frac{3}{4} \text{ (of a day)}$$

A1

Additional Guidance

Ignore units for the M marks but they must be correct, if given, for the A mark

$\frac{3}{4}$ of 24 is insufficient method unless a correct method or 18 is seen

Once $1000 \div 60$ or 16 or 16.6... or 16.7 or 17 is seen in Alt method 3, ignore any incorrect conversion to hours and minutes. If the student only shows hours and minutes, they must be in the given range.

Do not accept $\frac{3}{4}$ (of a day) in equivalent form e.g. 1080 or 18

A0

[3]

Q8.

$$\frac{3}{5} \times 900$$

$$\text{or } 900 \div 5 \text{ or } 180$$

oe

$$540$$

M1

A1

[2]

Q9.

$$(a) \quad 1400 \times 0.11$$

oe

$$154$$

M1

A1

$$(b) \quad \frac{4}{5} \times 295$$

$$\text{or } 295 \div 5 \text{ or } 59$$

oe

$$236$$

M1

A1

[4]

Q10.

(a) $\frac{6}{7}$

(b) 23

(c) 81

B1

B1

B1

[3]

Q11.

$\frac{20}{100} \times 320$

or $320 \div 5$

or $32 (\times 2)$ seen oe
or 10% is 32

M1

64

A1

65

B1

$\frac{1}{2}$ of 130 miles

*Strand (iii) Correct conclusion from their answers
ft their 64 and 65
Allow ft only if M1 awarded
oe*

Q1ft

[4]

Q12.

0.4 or 0.8 or 220 or 700
oe

M1

$2.2 + 2 \times 0.4 + 7$

or

10 or 1000 oe
allow mixed units
10 or 1000 implies M2

M1

$\frac{7}{10}$ or $\frac{700}{1000}$

oe fraction
SC2 0.7(0) or 70%

A1

Additional Guidance

Ignore simplification attempts after a correct fraction is seen

$\frac{7}{10}$ in working with 0.7 on answer line

M1M1A0

Condone eg 0.80p for first M1

Do not allow eg £220 for first M1

[3]

Q13.

(a) 3

B1

(b) 12

B1

(c) $17 + 3$ or 20

or

$17 + 3 + 12 + 5$ or 37
oe

M1

$$\frac{20}{37}$$

oe fraction

A1

Additional Guidance

Check diagram for working

Ignore simplification attempts after a correct fraction is seen

Do not ignore any attempts to convert to a decimal or percentage

eg answer $\frac{20}{37} = 0.54$

M1A0

[4]

Q14.

195

B1

[1]

Q15.

Alternative method 1

15^2 or 225

M1

their $225 \div 9$ or 25

oe

M1dep

5

A1

Alternative method 2

$\sqrt{9}$ or 3

or

$\sqrt{\frac{1}{9}}$ or $\frac{1}{3}$

M1

$15 \div$ their 3

or

$15 \times$ their $\frac{1}{3}$

oe

Mdep

5

A1

Alternative method 3

$\left(\frac{x}{15}\right)^2 = \frac{1}{9}$

oe

M1

$(x^2 =) \frac{15^2}{9}$ or 25

oe

M1dep

5

A1

Additional Guidance

$3x = 15$

M1M1

$5^2 = 25$ without 5 on answer line

M1M1A0

1 : 3 or 3 : 1

M1

[3]

Q16.

$$160 \times \frac{3}{4} \text{ or } 160 \times \frac{2}{5}$$

M1

$$160 \times \frac{3}{4} = 120$$

M1

$$160 \times \frac{2}{5} = 64$$

$$(120 - 56) \div 2 (= 32)$$

M1

Their 120 – their 64 (= 56)

Or $120 - 56 = 64$

$$32 \times 5 (= 160)$$

A1

Alternative 1

$$\frac{3}{4} - \frac{2}{5} (= \frac{7}{20})$$

or $0.75 - 0.4$

M1

$$\frac{7}{20} = 56$$

$$0.35 = 56$$

M1

$$56 \div 7 (= 8)$$

M1

$$8 \times 20$$

A1

Alternative 2

$$\frac{75}{100} - \frac{40}{100}$$

M1

$$\frac{35}{100} \text{ or } 35\%$$

M1

$$56 \div 160 (= 0.35)$$

M1

35%

A1

Alternative 3

$$\frac{3}{4}x - 56 = \frac{2x}{5}$$

M1

$$15x - 1120 = 8x$$

M1

$$7x = 1120$$

M1

$$1120 \div 7 (= 160)$$

A1

[4]

Q17.

(a) $175 \times \frac{28}{11}$ oe

Condone $175 - 175 \times \frac{28}{11}$ oe

49

M1

A1

(b) $242 \times \frac{2}{11}$ oe

Condone $242 - 242 \times \frac{2}{11}$ oe

44

M1

A1

Saturday and 49 and 44

*Strand (iii) Supporting answers with evidence
ft correct decision for their 49 and their 44 if at least one M
mark has been scored in parts (a) and / or (b)*

Q1

[5]

Q18.

- (a) All composite bars with correct widths and heights as

Tuesday 8 and 6

Wednesday 10 and 3

Thursday 6 and 6

Friday 12 and 4

*B1 one composite bar correct**or**all four email sections correct at the bottom of composite bars**or**all four text sections correct at the top of composite bars**or**four bars with total heights 14, 13, 12 and 16 (no or incorrect divisions)**or**widths different but all four composite bars correct***B2****Additional Guidance**

Bars drawn freehand with clear intention of correct widths and heights

B2

Mark intention for heights but Wednesday height must be [6.4, 6.6] cm

Condone incorrect shading or lack of shading

- (b)
- $12 + 8 + 10 + 6 + 12$
- or 48

or $5 + 6 + 3 + 6 + 4$ or 24*or* $12 + 8 + 10 + 6 + 12 + 5 + 6 + 3 + 6 + 4$ or 72*may be seen near table**addition may be implied by a total at the bottom of a column***M1**

$$\frac{48}{72}$$

*or fraction***A1**

$$\frac{2}{3}$$

*ft M1A0 with their fraction < 1 seen, if it can be simplified and it is fully simplified***A1ft****Additional Guidance**

$$\frac{2}{3}$$

 $\frac{2}{3}$ changed to decimal or percentage**M1A1A0**

Do not allow misreads from the table

[5]

Q19.

(a) 1.99×6 or $199 \times 6 (= 1194)$

M1

11.94

SC1 119.40

SC1 12 (.00)

A1

(b) $\frac{1}{2}$

B1 equivalent fraction to $\frac{1}{2}$ eg $\frac{30}{60}$

or B1 $\frac{n}{60}$ seen with its correct simplest form

SC1 50%

SC1 0.5

B2

(c) 10% circled

Any clear indication

B1

(d) Questionnaire/survey/interview

oe telephone everyone

B1

[6]

Q20.

1.68×320 or 217.6

oe

M1

537.6

A1

$900 \div 8 \times 5$

oe

M1

562.5

A1

Correct method and conclusion based on their values calculated

Strand (iii)

Q1

[5]

Q21.

$\frac{x}{x+y}$

B1

[1]

Q22.

1 : 2

B1

[1]