

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Number

Finding percentages 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.

Alternative method 1

200×0.17 or 2×17 or 34 or 1.17 seen
oe

234

M1

A1

Alternative method 2

$200 \div 10 + 200 \div 10 \div 2 + 200 \div 100 \times 2$
oe

234

M1

A1

[2]

Q2.

Alternative method 1

6300×2.58
oe

16254

M1

A1

Alternative method 2

Fully correct build up method
eg $100\% = 6300$
and $50\% = 6300 \div 2$ or 3150
and $1\% = 6300 \div 100$ or 63
and
 $2 \times 6300 + \text{their } 3150 + 8 \times \text{their } 63$

16254

M1

A1

[2]

Q3.

$10\% \text{ of } 20 = 20\% \text{ of } 10$
Any unambiguous indication

B1

[1]

Q4.

17

B1

[1]

Q5.

(a) $0.7 \times 986 (= 690.2)$
oe

M1

690.20(p)

Strand (i)
690.20 seen ignore further working
SC1 295.80
Do not accept 690.2

Q1

(b) Circles C and E only

B1 both correct and one other
B1 one correct, 0 or 1 wrong

B2

[4]

Q6.

5

B1

[1]

Q7.

Alternative method 1

4200×0.38 or 1596
1.38 seen

M1

5796

A1

Alternative method 2

$4200 \div 10 \times 3 + 4200 \div 10 \div 2 + 4200 \div 100 \times 3$
or 1596

M1

5796

A1

Alternative method 3

$4200 \div 10 \times 4 \times 4200 \div 100 \times 2$

M1

or 1596

A1

[2]

Q8.

Alternative method 1

$$7800 \times 1.69$$

oe

13 182

M1

A1

Alternative method 2

Fully correct build up method

eg 100% = 7800

and 50% = $7800 \div 2$ or 3900

and 1% = $7800 \div 100$ or 78

and

$7800 + \text{their } 3900 + 19 \times \text{their } 78$

13 182

M1

A1

[2]

Q9.

Alternative method 1

$$5400 \times 0.27 \text{ or } 1458$$

1.27 seen

6858

M1

A1

Alternative method 2

$$5400 \div 10 \times 2 + 5400 \div 10 \div 2 + 5400 \div 100 \times 2$$

or 1458

6858

M1

A1

Alternative method 3

$$5400 \div 10 \times 3 - 5400 \div 100 \times 3$$

or 1458

6858

M1

A1

[2]

Q10.

Correct method or evaluation for the 25% or the 15%
 or
 correct multiplier for the increase or the decrease seen
eg 28×0.25 or 7
or 40×0.15 or 6
or
1.25 or 0.85 oe

M1

Correct method or evaluation for either calculation
eg $28 + 28 \times 0.25$ or 35
or 40×0.85 or 34

M1dep

Correct method or evaluation for **both** calculations

M1dep

35 with 34 seen

*oe**eg 28 increased by 25% with 35 and 34 seen***A1****Additional Guidance**

28×1.25 or 35

M1M1

40×0.85 or 34

M1M1

28×1.25 or 35 **and** 40×0.85 or 34

M1M1M1

Build-up methods must be correct or show correct method for each step

eg 1 $10\% = 2.8$, $5\% = 1.4$, $25\% = 7$

M1

eg 2 $10\% = 2.8$, $5\% = 2.8 \div 2 = 1.8$, $25\% = 7.4$ (error in build-up but method shown for that step)

M1

eg 3 $10\% = 2.8$, $5\% = 1.8$, $25\% = 7.4$ (error in build-up and method not shown for that step)

M0

35 and 34 seen and 35 chosen by eg circling

M3A1

For 28×0.25 , do not accept $28 \times 25\%$ unless recovered

[4]

Q11.

100 – 60 or 40
or 40% seen

$$\frac{60}{100} \times 850 \text{ or } 510$$

M1

their 40

$$\frac{40}{100} \times 850 \text{ or } 340$$

850 – their 510 or 340

M1dep

$$\frac{1700}{\text{their } 340}$$

M1dep

5

A1

Alternative Method

100 – 60 or 40
or 40% seen

$$1 - 0.6 \text{ or } 0.4$$

M1

(1700 =) 200%

$$1700 \div 850 \text{ or } 2$$

M1

$$200 \div 40$$

$$\text{their } 2 \div 0.4$$

M1dep

5

A1

Additional Guidance

5 with no working scores full marks

[4]

Q12.

$$2 \times 2.5(0) \text{ or } 5(.00)$$

M1

$$0.3 \times \text{their } 5 \text{ or } 1.5$$

or

$$1 - 0.3 \text{ or } 0.7$$

or

$$100 - 30 \text{ or } 70$$

oe

M1

$$\text{their } 5 - \text{their } 1.5$$

or

$$\text{their } 0.7 \times 5 \text{ or } 3.5$$

oe dep on 2nd M1

M1dep

$$3.50$$

A1

[4]

Q13.

Method to calculate the increase on the salary or the decrease to the bonus

$$\text{eg } 26\,000 \times 0.06 \text{ or } 1560$$

$$\text{or } 4000 \times 0.09 \text{ or } 360$$

or decimal multiplier 1.06 or 0.91

oe fraction

M1

Method to calculate the value of the increased salary or the decreased bonus

$$\text{eg } 26\,000 \times 1.06 \text{ or } 27\,560$$

$$\text{or } 4000 \times 0.91 \text{ or } 3640$$

or

Method to calculate the difference between the increase on the salary and the decrease to the bonus

$$\text{eg their } 1560 - \text{their } 360 \text{ or } 1200$$

$$31\,200 \text{ implies } M2$$

M1dep

Method to calculate the decimal multiplier or percentage of the total annual pay

$$\text{eg } \frac{31\,200}{30\,000}$$

or

$$1.04 \text{ or } 104(\%)$$

oe

or

Method to calculate the decimal multiplier or percentage change in the total annual pay

$$\text{eg } \frac{\text{their } 1560 - \text{their } 360}{26\,000 + 4000}$$

$$\text{or } \frac{1200}{30\,000}$$

or

$$0.04 \text{ or } 4(\%)$$

oe

M1

4(%) increase

A1

Additional Guidance

For first M mark do not accept a misread of increase for decrease eg 1.09

M0

$$26\,000 \times 1.06 = 27\,560 \text{ and } 4000 \times 1.09 = 4360$$

$$27\,560 + 4360 = 31\,920 \text{ and } \frac{31\,200}{30\,000}$$

M1M1M1A0

$$24\,440 + 4360 = 28\,800 \text{ and } \frac{28\,800}{30\,000}$$

M0M0M1

$$100 + 6 = 106\%$$

M0

$$26\,000 \times 1.06\%$$

M1M0

[4]

Q14.

3×250 or 750

M1

1470×12 or 17 640

M1

538 000 – 464 500 or 73 500

M1

their $73\,500 \times 0.28$ or 20 580

oe

Dep on 3rd M1

M1dep

their 17 640 + their 20 580 + their 750 or 38 970

Dep on 3rd and 4th M1

Must be adding salary, profit share and bonus

M1dep

38 970 and No

A1

Additional Guidance

For the last method mark, the 3rd and 4th M must have been awarded, but allow the addition of any number of months' salary and any number of £250 bonuses (at least one month of salary and at least one month of bonus)

$1470 + 20\,580 + 250$

M0M0M1 M1depM1depA0

20 580

3rdM1 4thM1dep

Build up method for 28% must be correct or method shown for incorrect parts

eg1 1% of 73 500 = 730, 28% = 20 440 (will also lose the 5th Mdep)

4th M0dep

eg2 1% of 73 500 = $73\,500 \div 100 = 730$, 28% = 20 440

4th M1dep

eg3 10% of 73 500 = 7350, 1% = 73.5, 28% = 2058 (and 5th Mdep0)

4th M0dep

eg4 10% of 73 500 = 7350, 1% = $7350 \div 10 = 73.5$, 28% = $7350 + 7350 + 588 = 15\,288$

4th M1dep

[6]

Q15.

$\frac{5}{100} \times 2500$ or 125

oe

1.05 seen

M1

2500 + their 125 or 2500×1.05 or 2625

oe

M1dep

their $2625 \div 12$ or 218.75

or 220×12 or 2640

M1dep

2625 and 2640 or 218.75 and Yes

A1

[4]

Q16.

Alternative method 1

300×0.19 or 57

oe

300×19 or 5700

M1

$\frac{5}{100} \times \text{their } 57$ or 2.85

or 1.05 seen

oe

$\frac{5}{100} \times \text{their } 5700$ or 285

or 1.05 seen

M1dep

their 57 + their 2.85

or their 57×1.05

their 5700 + their 285

or their 5700×1.05 or 5985

M1dep

59.85

A1

Alternative method 2

$\frac{5}{100} \times 0.19$

or 0.0095

or 1.05 seen

oe

$\frac{5}{100} \times 19$

or 0.95

or 1.05 seen

M1

their $0.0095 + 0.19$

or 1.05×0.19

or 0.1995

oe

their $0.95 + 19$

or 1.05×19

or 19.95

M1dep

their 0.1995×300

their 19.95×300 or 5985

or $1.05 \times 19 \times 3$

M1dep

59.85

A1

Alternative method 3

$$\frac{5}{100} \times 300$$

or 15

or 1.05 seen

oe

M1

their 15 + 300

or 1.05×300

or 315

oe

M1deptheir $0.19 \times$ their 315 *$19 \times$ their 315 or 5985***M1dep**

59.85

A1**Additional Guidance**

Pick out any correct step, e.g.

$$300 \div 19 \times 1.05$$

M1M1M0A0

$$300 \times 0.5 \times 0.19$$

M1M0M0A0Beware, 10% of 19 = 1.90, 5% of 19 = 0.95, $1.90 + 0.95 = 2.85$ (Alt 2)**M1M0M0A0**

If a choice of methods is seen, mark the best

[4]**Q17.****Alternative method 1**

$$100 - 40 - 28 \text{ or } 32$$

M1

$$\text{their } 32 \div 100 \times 275$$

oe

 *0.32×275 scores M2***M1dep**

88

A1**Alternative method 2**

$$40 \div 100 \times 275 \text{ or } 110$$

or

$$28 \div 100 \times 275 \text{ or } 77$$

oe

M1

$$275 - \text{their } 110 - \text{their } 77$$

M1dep

88

A1**[3]**

Q18.

Alternative method 1

$$\frac{1500}{600} \text{ or } 2.5$$

$$\text{or } \frac{600}{1500} \text{ or } 0.4 \text{ oe}$$

M1

$$3.3 \times 2.5 \text{ or } 8.25$$

$$9.6 \div 2.5 \text{ or } 3.84$$

$$\frac{15}{100} \times 9.6 \text{ or } 1.44$$

$$\text{or } 0.85 \text{ seen}$$

M1

$$\frac{15}{100} \times 9.6 \text{ or } 1.44$$

$$\text{or } 0.85 \text{ seen } \frac{15}{100} \times 3.84$$

$$\text{or } 0.576$$

$$\text{or } 0.85 \text{ seen}$$

$$9.6 - \text{their } 1.44$$

$$\text{or } 0.85 \times 9.6$$

$$\text{or } 8.16$$

M1

$$9.6 - \text{their } 1.44 \text{ or } 8.16$$

$$\text{or } 0.0064 \times 0.85$$

$$3.84 - 0.576$$

$$\text{or } 0.85 \times 3.84$$

$$\text{their } 8.16 \div 2.5$$

M1dep

$$8.25 \text{ and } 8.16$$

$$3.26 \text{ or } 3.264 \text{ or } 3.27$$

A1

1500 g pack identified

Strand(iii) correct conclusion for their values provided method marks have been awarded

Q1ft

Alternative method 2

$3.3 \div 600$ or 0.0055 (price per 1g)
 $3.3 \div 6$ or 0.55 (price per 100g)

M1

$9.6 \div 1500$ or 0.0064
 $9.6 \div 15$ or 0.64
 $9.6 \times \frac{15}{100}$ or 1.44
or 0.85 seen

M1

$\frac{15}{100} \times 0.0064$ or 0.00096
or 0.85 seen

$\frac{15}{100} \times 0.64$ or 0.096
or 0.85 seen
 $9.6 - 1.44$
or 0.85×1.44
or 8.16

M1dep

their 0.0064 – their 0.00096
or 0.85×0.0064
or 0.0054(4)
their 0.64 – their 0.096
or $0.85 \times \text{their } 0.64$
or 0.544
 $8.16 \div 15$ or 0.544

M1dep

0.0055 and 0.00544
0.55 and 0.544

A1

1500 g pack identified
Strand(iii) correct conclusion for their values provided method marks have been awarded

Q1ft

Alternative method 3

$3.3 \div 600$ or 0.0055 (price per 1 g)

M1

$$\frac{15}{100} \times 9.6 \text{ or } 1.44$$

or 0.85 seen

$$9.6 \div 2.5 \text{ or } 3.84$$

$$\frac{15}{100} \times 9.6 \text{ or } 1.44$$

or 0.85 seen

M1

$9.6 - \text{their } 1.44$

or 0.85×9.6

or 8.16

$$\frac{15}{100} \times 3.84$$

or 0.85 seen

or 0.576

$9.6 - \text{their } 1.44$

or 0.85×9.6

or 8.16

M1

their $8.16 \div 1500$ or 0.00544

$$3.84 - 0.576$$

or 0.85×3.84

their $8.16 \div 2.5$

M1dep

0.0055 and 0.00544

$$3.26 \text{ or } 3.27$$

A1

1500 g pack identified

Strand(iii) correct conclusion for their values provided method marks have been awarded

Q1ft

Alternative method 4

600 ÷ 3.3 or 181.8...

3.30 × 5 or 16.50

M1

$\frac{15}{100} \times 9.6$ or 1.44

or 0.85 seen

$\frac{15}{100} \times 9.6$ or 1.44

or 0.85 seen

M1

9.6 – their 1.44

or 0.85 × 9.6

or 8.16

9.6 – their 1.44

or 0.85 × 9.6

or 8.16

M1

1500 ÷ their 8.16 or 183.8...

their 8.16 × 2 or 16.32

M1

181.8... and 183.8 ...

16.32 and 1650

A1

1500 g pack identified

Strand(iii) correct conclusion for their values provided method marks have been awarded

Q1ft

[6]

Q19.

$$\frac{6}{100} \times 23.5(0) (= 1.41)$$

oe

M1

their $1.41 + 23.5(0) (= 24.91)$

oe 1.06 \times 23.5(0) M2

M1 dep

their $24.91 \times 4 (= 99.64)$

or

$100 \div \text{their } 24.91 (= 4.(\dots))$

$100 \div 4 (= 25)$

M1

Yes and 99.64

or

Yes and 4.(...)

Yes and 24.91 (<) 25

A1

Alternative method 1

$4 \times 23.5(0) (= 94)$

M1

$$\frac{6}{100} \times \text{their } 94 (= 5.64) \text{ or } 100 - \text{their } 94 (= 6)$$

oe

M1

their $94 + \text{their } 5.64 (= 99.64)$

or

$\frac{\text{their } 6}{\text{their } 94} \times 100 (= 6.(\dots))$

oe 1.06 \times 94 M3 dep on second M1

M1 dep

Yes and 99.64 or Yes and 6.(...)

A1

Alternative method 2

$100 \div 4 (= 25)$

M1

their $25 - 23.5(0) (= 1.5(0))$

M1

$$\frac{\text{their } 1.5(0)}{23.5(0)} \times 100 (= 6.(\dots))$$

M1

Yes and 6.(...)

A1

[4]

Q20.

$$\frac{20}{100}$$

$$\times 130 \text{ or } 26$$

or 1.2 seen

$$\frac{1}{4}$$

$$\times 195 \text{ or } 48.75$$

$$\frac{3}{4}$$

or seen

$$\text{or } \frac{1}{4} \times 200 \text{ or } 50$$

M1

130 + their 26

$$\text{or } 1.2 \times 130$$

$$\frac{3}{4}$$

$$\times 195$$

or 195 – their 48.75

oe

$$\text{or } \frac{3}{4} \times 200$$

or 200 – their 50

M1dep

130 + their 26

$$\text{or } 1.2 \times 130$$

and

$$\frac{3}{4}$$

$$\times 195$$

or 195 – their 48.75

or 156 or 146.25 or 146

oe

130 + their 26

$$\text{or } 1.2 \times 130$$

and

$$\frac{3}{4}$$

$$\times 200$$

or 200 – their 50

or 156 or 150

M1dep

156 and 146.25

or 156 and 146

156 and 150

A1

Just bykes

Strand (iii)

ft their 156 and their 146.25 or 146 or 150 provided both methods are fully correct

Q1ft

[5]

Q21.

$\frac{20}{100} \times 320$
or $320 \div 5$
or $32 (\times 2)$ seen

oe
or 10% is 32

64

M1

65

A1

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]

Q22.

Alternative method 1

80×0.55 or 44
or
 120×0.7 or 84

oe

M1

$80 \times 0.55 + 120 \times 0.7$ or $44 + 84$
or 128

Correct method for both

M1dep

$(80 + 120) \times 0.65$ or 130

or

their $128 \div (80 + 120) \times 100$

or their $128 \div 2$ or 64

65% of total marks available

or

their total score for Riya as a percentage of full marks

M1

128 and 130 and No

oe e.g. No, she needed 130 but was 2 marks short

or

64 and No

oe e.g. 0.64 and 0.65 and No

A1

Alternative method 2 – marks not scored

$$80 \times 0.45 \text{ or } 36$$

or

$$120 \times 0.3 \text{ or } 36$$

oe

M1

$$80 \times 0.45 + 120 \times 0.3 \text{ or } 36 + 36$$

or 72

Correct method for both

M1dep

$$(80 + 120) \times 0.35 \text{ or } 70$$

or

$$\text{their } 72 \div (80 + 120) \times 100$$

or their $72 \div 2$

35% of total marks available

or

their total score for Riya as a percentage of full marks

M1

72 and 70 and No

oe e.g. No, she failed by 2 marks

or

36 and 35 and No

oe e.g. 0.36 and 0.35 and No

A1

Alternative method 3

$$80 \times 0.55 \text{ or } 44$$

oe

M1

$$(80 + 120) \times 0.65 \text{ or } 130$$

65% of total marks available

M1

their 130 – their 44 or 86

and 120×0.7 or 84

or

their 130 – their 44 or 86

and their $86 \div 120 \times 100$ or 71.6...

or 72

dep on M1M1

M1dep

86 and 84 and No

oe e.g. No, she needed 2 more marks on B

or

71.6... or 72 and 70 and No

oe e.g. No, she needed 1.6% more on B

A1

Alternative method 4

$$120 \times 0.7 \text{ or } 84$$

oe

M1

$$(80 + 120) \times 0.65 \text{ or } 130$$

65% of total marks available

M1

their 130 – their 84 or 46

$$\text{and } 80 \times 0.55 \text{ or } 44$$

or

their 130 – their 84 or 46

$$\text{and their } 46 \div 80 \times 100 \text{ or } 57.5$$

dep on M1M1

M1dep

46 and 44 and No

oe e.g. No, she needed 2 more marks on A

or

57.5 and 55 and No

oe e.g. No, she needed 2.5% more on A

A1

Additional Guidance

Build up steps for percentages must be correct or have fully correct method shown for any incorrect steps

eg1 50% = 40, 5% = 16, section A = 56

M0

eg2 50% = 40, 5% = $80 \times 0.05 = 16$, section A = 56

M1

Ignore % signs given with marks e.g. 44%

128 and she needs 2 more marks implies No

M1M1M1A1

$$55 + 70 = 125$$

M0M0

125 → 62.5% and No

M1A0

Allow misread of 55% of 120 and 70% of 80 for method marks

max M3

[4]