

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Number

Rounding integers

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.

6.92

first answer

B1

7.18

second answer

B1

[2]

Q2.

(a) Five thousand, four hundred and seventy two

B1

(b) 2457

B1

(c) 7425

B1 for 7542 or any other odd number using these 4 digits

B2

(d) 5500

B1

[5]

Q3.

(a) Five thousand (and) two hundred (and) forty seven

B1

(b) 5200

B1

(c) 7542

B1

(d) 2574

B1 for 2457 or any number ending in 2 or 4 using all 4 cards

B2

[5]

Q4.

(a) Six thousand two hundred (and) seventeen

Condone spelling mistakes if intention clear

B1

(b) 6220

B1

(c) 1267

B1

(d) 2761

B1

[4]

Q5.

(a) Three thousand eight hundred (and) forty

B1

(b) 5012

B1

(c) 400

oe

Accept (four) hundred(s)

B1

(d) 3000

B1

(e) Any correct method of a subtraction with not more than one error

M1

142

SC1 152 or 242

A1

[6]

Q6.

(a) One thousand(,) six hundred (and) seven

All in words

B1

(b) 50 or ten(s)

Accept in words or figures

B1

(c) 18 000

Accept in words

B1

[3]

Q7.

Alternative method 1

Three whole numbers that each are less than 80 and have units digit 4

or

States that each number must have units digit 4

M1

82

A1

Alternative method 2

Correctly evaluated trial for three whole numbers, none of which are a multiple of 10, and that, when rounded, total 70

eg $33 + 33 + 13 = 79$

M1

82

A1

Additional Guidance

$39 + 33 + 13 = 85$ ($40 + 30 + 10 = 80$)

M0

Beware 82 from incorrect values, e.g. $39 + 24 + 19 = 82$

MOA0

Ignore incorrectly evaluated trials that do not solely lead to the answer

[2]

Q8.

Any two of 60, 50 and 100

$$\frac{60 \times 50}{100}$$

60 and 50 may be implied by 3000

M1

30

A1

Additional Guidance

30 with no working

M0A0

28.1... (from original values) and then rounded to 30

M0A0

[2]

Q9.

30

B1

20

B1

(30 and 20 and) 600

ft their 30 × their 20 with B1B0 or B0B1

SC1 (31 × 18 =) 558, answer 560

B1ft

Additional Guidance

Answer only 600 with no working

B1B1B1

Answer 558 with neither 30 nor 20 seen

B0B0B0

30 × 18 with answer 540

B1B0B1ft

31 × 20 with answer 620 and answer 600 (ignore further work)

B0B1B1ft

31 × 20 with answer 600

B0B1B0ft

[3]

Q10.

80 or 10 or 40

M1

80 and 10 and 40 seen

$$\frac{80 \times 10}{40}$$

or 40 with two correct

M1

20 from correct approximations

A1

Additional Guidance

20 without correct approximations

M0M0A0

[3]

Q11.

(262 rounded to) 260 or
 (19.8 rounded to) 20 or
 $26 \div 2$

M1

13

A1**Additional Guidance**13 embedded eg $260 \div 13 = 20$ **M1A0**Beware, 13 may not get full marks eg $262 \div 20 = 13.1$, answer 13**M1A0** $300 \div 20$ **M1A0****[2]****Q12.****Alternative method 1**

$40 \div 3$ or $13(.3\dots)$ or 13 r(emainder)1 or $39 \div 3$ or 13
 3, 6, 9, ..., 39

M1

14

A1**Alternative method 2**

Three integers, in any order, which add to 40

eg $10 + 10 + 20$ or $15, 17, 8$ or $16 : 14 : 10$ **M1**

14

A1**Additional Guidance**

Mark the values given, ignore any reference to names for M1

Use the scheme that awards the better mark

 $40 \div 3 = 13.1$ answer 14**M1A0**

13, 13, 14 on answer line (any order) with no indication 14 is chosen

M1A0

Answer 14 with trial 12, 12, 14 seen (comes from wrong working)

M0A0

12, 12, 16

M1 $12 + 12 + 16 = 40$ **M1** $12 + 12 + 16 = 38$ (incorrect total)**M0**

14
 Answer 40

M1A0

14 : 40

M1A0

14 out of 40 or 14 in 40

M1A1**[2]**

Q13.

30 or 80 or 10

M1

$$\frac{30 + 80}{10} \text{ or } \frac{110}{10}$$

$$\text{or } \frac{112.62}{10} \text{ or } 11.262$$

M1dep

11 with 30, 80 and 10 seen

A1

Additional Guidance

11 with no working

M0M0A0

[3]

Q14.

Alternative method 1

$$53 \times 3 \text{ or } 159$$

M1

their $159 \div 12$

oe eg $53 \div 4$

*for build up method allow one error, must get as far as 1
minibus below their total number of passengers*

M1dep

13. or 13.2 or 13.25

or 13 r (3) or $13\frac{3}{12}$

or build up method reaches 156 (for 13 minibuses) with no errors

may be implied by correct answer

oe fraction

A1

14

*ft their decimal or remainder value rounded up to the nearest
whole number with M2 scored*

A1ft

Alternative method 2

$$53 \div 12 \text{ or } 4.4... \text{ or } 4 \text{ r } 5$$

$$\text{or } 4\frac{5}{12}$$

M1

their $4.4... \times 3$

$$\text{or } 4\frac{5}{12} \times 3 \text{ or } 12\frac{15}{12} \text{ oe fraction}$$

M1dep

13.(2...) or 13 r (3) or $13\frac{3}{12}$

may be implied by correct answer oe fraction

A1

14

*ft their decimal or remainder value rounded up to the nearest
whole number with M2 scored*

A1ft

Additional Guidance

For answers of 14, please check for incorrect working
eg $159 \div 12 = 14.1$ and answer 14

M2A0A0ft

$159 \div 12$ with result 13.8 and answer 14

M2A0A1ft

$159 \div 12$ with result 13 r 2 and answer 14

M2A0A1ft

159 with build up to 13 minibuses is 158 and answer 14

M2A0A1ft

$159 \div 12$ with no decimal or remainder value and answer 14

M2A2

$159 \div 12 = 13$. Answer 13

M2A1A0

$159 \div 12 = 13$ Answer 13

M2A0

14 with no working

M2A2

$159 \div 12$ with result 13.3 (bod from 13.25) and answer 14

M2A2

$159 \div 12$ with result 13.3 (bod from 13.25) with no final answer

M2A1A0

$53 \div 12 = 4(.) = 5$, $5 \times 3 = 15$, so 15 minibuses (conceptually incorrect)

M1M0A0A0ft

$53 \div 12 = 4.7$, $4.7 \times 3 = 14.1$, so 15 minibuses

M2A0A1ft

For build up method

$53 \times 3 = 159$, $12 \times 13 = 156$

M2A1A0

$53 \times 3 = 159$, $12 \times 13 = 156$, 15 minibuses

M2A1A0

$12 \times 13 = 156$, without their 159 (don't know what they are building up to)

M0A0

Build up method reaches 156 (for 13 minibuses) with no errors and no answer, but says "3 more seats needed"

M2A1A0

[4]

Q15.**(a) Alternative method 1** $820 \div 50$ or $82 \div 5$ *oe e.g. $1640 \div 100$* *e.g. counting up in 50s to at least 800 (allow one error)**e.g. counting down in 50s to less than 50 (allow one error)***M1**

16.4 or 16+ or over 16

*oe e.g. 16 r 20 or 16 with 20 left**allow 16 if 17 is final answer***A1**

17

*ft rounding up from a decimal, fraction or remainder with M1 awarded***A1ft****Alternative method 2**

850

M1 $850 \div 50$ *oe e.g. $85 \div 5$* *e.g. counting up in 50s to try to achieve 850 (allow one error)**e.g. counting down in 50s to at least 50 (allow one error)***M1dep**

17

A1**Additional Guidance**

Incorrect remainders or decimals or fractions cannot score the second mark

e.g. $820 \div 50 = 16.2$ answer 17**M1A0A1ft**

Remainder or decimal not shown, leading to answer of 17 will score full marks

e.g. $820 \div 50 = 16$. answer 17**M1A1A1ft**

A1ft cannot be scored if their division does not yield a remainder

e.g. $820 \div 50 =$ (exactly) 14 answer 14**M1A0A0ft** $800 \div 50$ or 16 implies M1 from Alt 1 $800 \div 50 = 16$ so 17 needed (oe)**M1A1A1**If $82 \div 5$ is attempted, allow 16 r 2 or 16 with 2 left over for the first A1

(b) 13×450

accept repeated addition of thirteen 450s

M1

Correct vertical method of long multiplication with 4500 correct

or

Correct vertical method of long multiplication with at least one of 650 and 5200 correct

or

Correct set up of grid method with at least three of the four or six products correct

or

Correct set up of Gelosia method with at least three of the six products correct

or

$10 \times 450 = 4500$ and $3 \times 450 = 1350$ attempted with at least one correct

or

$13 \times 400 = 5200$ and $13 \times 50 = 650$ attempted with at least one correct

oe

allow a placeholder space to be present instead of a physical zero in vertical method

M1dep

5850

A1

Additional Guidance

For repeated addition method, to score M1dep, answer must end in 50 with a 6 carried into the hundreds column

Students may choose to multiply 13 by 45 using any method, for the method marks. We do not need the zero to be recovered for either method mark, so 13×45 scores at least M1

M2

e.g. $13 \times 45 = 585$ scores M2 even if answer line gives 585

M2

e.g. 13×45 vertical method with 450 correct or at least one of 65 and 520 correct

M2

e.g. 13×45 using grid method with 40 and 5 rather than 400, 50 and 0, with three of the four products correct

M2

e.g. 13×45 using Gelosia method with no zero column, with at least three (of the now four) products correct

[6]

Q16.

2400

B1

[1]

Q17.

40

B1

[1]

Q18.

5

*B1 for 25 or 5² seen
or any value in range (5, 5.92]*

B2

[2]

Q19.

(a) 28 + 94 or 94 + 28

122

M1

A1

(b) 94 – 28

66

M1

A1

70

*SC2 90 – 30 = 60
SC1 90 and 30
SC1 60 with no working*

B1ft

[5]

Q20.

- (a) 390 or 1480

M1

1870

A1

Additional Guidance

Answer only

M1A1

Ignore calculation of 1864 but 1870 only coming from incorrect rounding of 1864 is M0

- (b) Valid explanation referring to **both** of the original numbers being rounded **up**

eg he rounded each number up

or

each rounded number is bigger than the actual number

or

390 is bigger than 385 and 1480 is bigger than 1479

B1

Additional Guidance

Ignore irrelevant, non-contradictory statements

Ignore 1864 alongside a correct explanation

Incorrect rounding or values seen in this part even alongside a correct explanation

B0

The numbers are rounded **up** (to the nearest 10)

B1

385 became 390 and 1479 became 1480

B1

One number increased 5 and the other 1 (so it will be 6 bigger)

B1

385 became 390 and 1479 became 1500

B0

The numbers are rounded to the nearest 10

B0

It's rounding so the answer is bigger

B0

1870 is bigger than 1864

B0

[3]

Q21.

- (a) (Car) C or 12 590

B1

- (b) 13 400 or 17 900 or 12 600
20 or 40 or 10

M1

13 400 and 17 900 and 12 600
20 and 40 and 10

M1dep

17 860 or 17 900
or Car B

40

A1

[4]