

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Number

Finding factors and using divisibility tests

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.

30

B1

[1]

Q2.

- (a) Division set up, with 8 and a remainder 3 seen in correct position
Or $830 \leq \text{answer} < 840$ but not 834

$$\begin{array}{r} 8 \\ 8 \overline{) 91374} \end{array} \quad \text{or} \quad \begin{array}{r} 8 \\ 9 \ 1 \ 7 \ 4 \\ \underline{8 \ 8} \\ 3 \end{array}$$

M1

834

A1

Additional Guidance

Build up method or chunking method must lead to $830 \leq \text{answer} < 840$ to score M1 or better

[2]

Q3.

45

B1

Additional Guidance

Mark the answer line. If this is blank, mark the working

If values are given in one or more forms, either on the answer line or in working with nothing on the answer line, all values must be correct

$\frac{270}{6}$
eg1 $\frac{270}{6} = 45$ on answer line

B1

eg2 $\frac{270}{6}$ and $44\frac{5}{6}$ in working with answer line blank

B0

Do not allow unprocessed answers eg $\frac{270}{6}$

B0

[1]

Q4.

Alternative method 1

$68 \div 10$

M1

6.8 or 6 remainder (8) or 6

May be implied

A1

7 *ft their 6.8 rounded up*

A1ft

Alternative method 2

Lists multiples of 10 up to at least 60 or counts down in 10s to at least 8

Allow one error

M1

$6 \times 10 = 60$

or $7 \times 10 = 70$ *May be implied*

A1

7

A1ft

[3]

Q5.

0.73

B1 0.7(...) or digits 73 seen

B2

Additional Guidance

Condone .73

B2

Condone .7(...)

B1

0.7.3

B1

[2]

Q6.

(b) 16

B1

(c) 135

B1

[2]

Q7.

536

*B1 for $6432 \div 12$
or digits 536 eg 0.0536 53600*

B2

[2]

Q8.

9

B1

[1]

Q9.

1, 5, 7 and 35

*any order
B1 for any two or three correct values*

B2

Additional Guidance

Their correct values must be identified as answers, and not given in, for example, a list of the first ten integers or as values in a calculation

If more than 4 answers given, maximum B1 if at least two correct

[2]

Q10.

$832 \div 4$

oe or full build up method

M1

208

A1

[2]

Q11.

(b) 406.23

Ignore further work e.g rounding

B1 $400 \leq \text{answer} < 410$

B1 digits 40 623 (not 406.23)

B2

Additional Guidance

0406.23

B2

Ignore trailing zeros eg 406.230000

B2

406.23 in division calculation and 406 on answer line

B2

406.23 in division calculation and 46.23 on answer line cannot be considered a transcription error and cannot be ignored as further work

B1

[2]

Q12.

(a) 0.31

oe

eg .31

B1

Additional Guidance

Final answer 31 (even if 0.31 seen in working)

B0

[1]

Q13.

Alternative method 1

2.14

oe

B1 answer of 2.1(...) except 2.14

B1 0.214 or 21.4 or 214 or 2140

B2

Alternative method 2

Divides by 2, 2 and 3 in any order

or divides by 3 and 4 in either order

or divides by 2 and 6 in either order

oe

Attempts at all divisions must be made using a valid method

M1

2.14

oe

A1

Additional Guidance

$25.68 \div 2 = 12.84$

$25.68 \div 3 = 8.56$

$25.68 \div 4 = 6.42$

$25.68 \div 6 = 4.28$

Use of remainders is B0 e.g. $25.68 \div 12 = 2$ remainder 1.68

B0B0

Do not accept rounding up to 26 or 30 or truncation to 25

e.g. $26 \div 12 = 2.1666\dots$

B0B0

$2\frac{7}{50}$

(possibly from multiplying numerator and denominator by 1000 and cancelling the subsequent fraction)

B2

[2]

Q14.

$$278 \div 15$$

or

Build up in 15s eg $15 + 15 \dots$ or 15, 30, ...

or

Build down from 278 in 15s

eg $278 - 15, \dots$ or 278, 263, ...*May build up or down in 30s, 45s or 90s***M1**

18 (. ...) from a division method

or

Build up to 270 or at least 264

or

Build down to 8 or at most 14

*Condone 18.8 for M2**Allow one error***M1**

19

*Correct working**eg 19 and 285 seen**or 19 (and 18) and 270 seen**or 19 and 18.5... seen**or 19 and 18 remainder 8 seen***A1****Alternative Method**

$$15 \times 20 \text{ or } 15 \times 19 \text{ or } 15 \times 18$$

M1

$$15 \times 18 = 270 \text{ or } 15 \times 19 = 285$$

Allow an error of ± 14 **M1**

19

*Correct working**eg 19 and 285 seen**or 19 and 18 and 270 seen***A1****Additional Guidance**

Answer only of 19 M1M1A1

15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240, 255, 270, ...

278, 263, 248, 233, 218, 203, 188, 173, 158, 143, 128, 113, 98, 83, 68, 53, 38, 23, 8, ...

[3]**Q15.**

40

*condone 040***B1****[1]****Q16.**

$$40 \div 8 \text{ or } 5 \times 8 (= 40)$$

*oe eg 8, 16, 24, 32 ... seen***M1**

5

A1**[2]**

Q17.

121 and 132

B1

[1]

Q18.

(a) 35

any clear indication

B1

(b) 12

any clear indication

B1

[2]

Q19.

(a) 120, 150 and 180 with none incorrect

any order

*B1 Two correct multiples in range with at most one incorrect
or all three correct with any other multiples of 30
or another group of exactly three multiples of 30*

B2

(b) 8

B1

[3]

Q20.

(a) 6

B1 for answer of 2 or 3 or 2×3

B1 for $24 = \{2, 2, 2, 3\}$ or $2 \times 2 \times 2 \times 3$

or $42 = \{2, 3, 7\}$ or $2 \times 3 \times 7$

or

one pair of factors of 24

(not 1×24) eg 2×12 , 3 and 8, $24 \div 4 = 6$ (oe)

and *one pair of factors of 42 (not 1×42)*

eg 2×21 , 3 / 14, (6, 7) (oe)

or $(24 =) \{1, 2, 3, 4, 6, 8, 12, 24\}$

or $(42 =) \{1, 2, 3, 6, 7, 14, 21, 42\}$

B2

[2]

Q21.

(a) 20

B1

(b) 18

B1

[2]

Q22.

1, 2, 4, 5, 10, 20

any order

B1 5 or 6 correct values with up to 2 incorrect values

or

4 correct values with 0 or 1 incorrect values

or

3 correct values with 0 incorrect values

B2

Additional Guidance

Allow values given in pairs

eg 1×20 , 2×10 , 4×5 6 factors

B2

eg (2, 10), (4, 5)

B1

Repeated values score max B1

eg 1, 2, 4, 5, 10, 10, 20

B1

eg 1, 2, 2, 5

B1

If a prime factor tree or similar is used then the factors must be identified

[2]

Q23.

(a) Accept any two whole numbers ending in a 0 or 5

eg 0, 5, 10, 15, 20

B1

(b) Any two of 1, 2, 3, 6, 9 or 18

B1

[2]

Q24.

(c) 25 or 45

Allow both

B1

[1]

Q25.

(a) 27

B1

(b) 20

B1

[2]

Q26.

- (a) 1, 2, 3, 6, 9, 18

B1 the 6 correct values, some or all repeated, with no incorrect values

or 5 or 6 correct values with up to 2 incorrect values

or 4 correct values with 0 or 1 incorrect values

or 3 correct values with 0 incorrect values

B2

Additional Guidance

Use of products or 'coordinates' is B1 max for at least 2 correct products with 0 or 1 incorrect products

e.g. 1×18 , 2×9 , 3×6

B1

e.g. 1×18 , 2×9 , 3×6 , 4×4

B1

Lists with repeated values cannot score B2, but ignore repeated values in any format for B1

e.g. 1, 2, 3, 3

B1

e.g. 1×18 , 2×9 , 3×6 , 18×1 , 9×2 , 6×3

B1

If a prime factor 'tree' or similar is used, factors must be identified

[2]

Q27.

- 1 or 2 or 5 or 10

B1

[1]

Q28.

- (c) $18 = 2 \times 9$ oe

or 18 is in the 9 times table

or 9 divides into 18 (exactly)

B1

[1]

Q29.

- (a) (i) Multiple of 6 > 20

eg 24, 30, 36, ...

B1

- (ii) 1 or 2 or 4 or 5

B1

[2]

Q30.

- (a) 21 and 35 *B1 for 1 correct (and 1 incorrect)*
or 2 correct and 1 incorrect

B2

- (b) 6 and 10 *B1 for 1 correct (and 1 incorrect)*
or 2 correct and 1 incorrect

B2

[4]

Q31.

(a) 27

(b) 10

B1

B1

[2]

Q32.

8

B1

[1]

Q33.

5

B1

[1]

Q34.

(a) 42

(d) 32

B1

B1

[2]

Q35.

1, 2, 3, 4, 6 and 12

B1 for 4 or 5 correct (and 1 incorrect)

B2

[2]

Q36.

$$\boxed{3} \times \boxed{10}$$

or

$$\boxed{6} \times \boxed{5}$$

either order

B1 uses a factor of 12

and

the product of the two numbers is [24, 36]

or

uses a factor of 40

and

the product of the two numbers is [24, 36]

or *the product of the two numbers is 30*

B2

Additional Guidance

$$\boxed{3} \times \boxed{9}$$

B1

$$\boxed{7} \times \boxed{5}$$

B1

$$\boxed{30} \times \boxed{1}$$

B1

$$\boxed{15} \times \boxed{2}$$

B1

Fractions and / or decimals are acceptable for non-factors for B1
Mark the boxes

[2]

Q37.

1, 2, 3, 6, 9 and 18

B1 for 4 or 5 correct (and 1 incorrect)

B2

[2]

Q38.

16

B1

[1]

Q39.

4

B1

[1]

Q40.

1, 3, 5, 9, 15, 45

any order

B1 5 or 6 correct values with up to 2 incorrect values

or

4 correct values with 0 or 1 incorrect values

or

3 correct values with 0 incorrect values

B2

Additional Guidance

Allow values given in products or 'coordinates'

eg1 1×45 , 3×15 , 5×9

B2

eg2 (1, 45), (3, 15)

B1

Lists with repeated values cannot score B2, but ignore repeated values in any format for B1

eg1 1, 3, 5, 9, 9

B1

eg2 1×45 , 3×15 , 5×9 , 45×1 , 15×3 , 9×5

B1

[2]

Q41.

7

B1

[1]

Q42.

(a) 651 and 602

B1 for one correct (and one incorrect) or

B1 for two correct and 1 incorrect

B2

(b) 7 and 11

B1 for one correct (and one incorrect) or

B1 for two correct and 1 incorrect

B2

[4]

Q43.

At least two common factors of 72 and 120
from 2, 3, 4, 6, 8, 12, 24

or

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$\text{or } 120 = 2 \times 2 \times 2 \times 3 \times 5$$

May be seen on a diagram, eg factor tree

M1

At least two common multiples of 6 and 9 from 18, 36, 54...

M1

(HCF =) 24 selected from factors

or $a = 24$

or (LCM =) 18 selected from multiples

or $b = 18$

oe eg $HCF = 2 \times 2 \times 2 \times 3$

24 can be implied from their numerator

oe eg $LCM = 2 \times 3 \times 3$

18 can be implied from their denominator

$$\text{oe eg } \frac{2 \times 2 \times 2 \times 3}{2 \times 3 \times 3}$$

M1

$$1\frac{1}{3} \text{ or } \frac{4}{3} \text{ or } 1.33\ldots$$

oe

Accept $\frac{24}{18}$

Ignore further incorrect cancelling

A1

Additional Guidance

HCF = 24 and LCM = 18

M1M1M1

HCF = 24

M1M0M1

LCM = 18

M0M1M1

[4]