

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Number

Finding the lowest common multiple (LCM)

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.

100

B1

[1]

Q2.

(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. $1 \times 18, 2 \times 9, 3 \times 6$

B1

e.g. $1 \times 18, 2 \times 9, 3 \times 6, 4 \times 4$

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. $1 \times 18, 2 \times 9, 3 \times 6, 18 \times 1, 9 \times 2, 6 \times 3$

B1

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

(b) 60

B1 any common multiple of 12 and 15 e.g. 120, 180

B1 at least the first two multiples correct for each of 12 and 15 (ignore errors after first two)

B1 ($12 = 2(\times)2(\times)3$ and ($15 = 5(\times)3$ and $2(\times)2(\times)5(\times)3 ((\times)3)$ (or the equivalent work seen in a correct Venn diagram)

B2

Additional Guidance

Answer 60 with error(s) seen may be B0 or B1 but cannot be B2

These error(s) may occur after the 60 – but cannot be ignored

If they have listed both multiples and factors, they must choose multiples to score

For B2, 60 must be chosen and not just at the end of a list of multiples

[4]

Q3.

Alternative method 1

Correctly lists first three bus times to X or Y

ie

7 25, 7 50, 8 15, ...

or

7 20, 7 40, 8 00, ...

Accept any notation for time eg 7.20, 7:20

7 20, 0720, 7-20, 20 past 7, 720

M1

Continues **both** lists at least as far as a common time

ie

7 25, 7 50, 8 15, 8 40, ...

and

7 20, 7 40, 8 00, 8 20, 8 40, ...

Allow one error up to and including their common time, ignore errors after.

M1dep

8.40 (am) or 08 40 or after/in 100 minutes or after/in 1h 40 minutes

SC2 No other working and any time that is 7 am + 100n minutes, eg 10 20, 12 00, 13 40 etc..

A1

Alternative method 2

Correctly lists first three multiples of 25 or 20

ie

25, 50, 75, ...

or

20, 40, 60, ...

25 × 4 and 20 × 5

M1

Stops both lists at 100 or identifies 100 or 1 hour 40 minutes

M1dep

8.40 (am) or 08 40 or after/in 100 minutes or after/in 1h 40 minutes

SC2 No other working and any time that is 7 am + 100n minutes, eg 10 20, 12 00, 13 40 etc..

A1

Additional Guidance

7 25, 7 50, 8 15, 8 40, 9 05, ...

M1

7 20, 7 40, 8 00, 8 20, 8 40, 9 00, ..

M1dep

(Answer =) 8 40 pm

pm is wrong.

A0

(No working)

(Answer =) 8 40 pm

Method by implication

M2

7 25, 7 50, 8 05, 8 30, 8 55, 9 20

Second list correct for 3 values.

M1

7 20, 7 40, 8 00, 8 20, 8 40, 9 00 9 20
One error in first list.

M1dep

(Answer =) 9 20
Both lists taken to a common value.

A0

7 25, 7 50, 8 10, 8 30, 9 00, 9 15
Second list correct for 3 values.

M1

7 20, 7 40, 8 00, 8 20, 8 40, 9 00
Both lists taken to a common value but more than one error in first list.

M0dep

(Answer =) 9 00

A0

25, 50, 75, 80,
At least one list correct for 3 values.

M1

20, 40, 60, 80,
Does not get to 100

M0

(Answer =) 8 10

A0

7 00, 25, 50, 8 15, 40, 9 05, ...

M1

7 00, 20, 40, 8 00, 20, 40, 9 00
Intention to list times clear

M1dep

8 40

A1

As question asks for 'When..' rather than 'What time..' then the students do not have to say 8.40 but could qualify it as a length of time **after** 7am. If so then the wording must be clear.

7 25, 7 50, 8 15, 8 40, 9 05, ...

M1

7 20, 7 40, 8 00, 8 20, 8 40, 9 00, ..
Must make it clear that the time is after 7 (am)

M1dep

(Answer =) 1 h 40 after 7

A1

7 25, 7 50, 8 15, 8 40, 9 05, ...

M1,

7 20, 7 40, 8 00, 8 20, 8 40, 9 00, ..
Not clear that the time is after 7 am

M1dep

(Answer =) 1 h 40

A0

[3]

Q4.

Alternative method 1

Lists the multiples of two of 10, 8, 5

10, 20, 30, 40, ...

8, 16, 24, 32, 40, ...

5, 10, 15, ..., 40, ...

Writes out all the multiples to at least 40

M1

40

May be implied by correct number of boxes

A1

4 and 5 and 8

ft their multiple of 40

B1ft

Alternative method 2

Lists the prime factors of two of

10, 8, 5

$10 = 2 \times 5$

$8 = 2 \times 2 \times 2$

$5 = 5 (\times 1)$

M1

$2 \times 2 \times 2 \times 5$

May be implied by correct number of boxes

A1

4 and 5 and 8

ft their multiple of 40

B1ft

[3]

Q5.

75

B1

[1]

Q6.

(a) 2×25 or 5×10

*oe eg $50 \div 2 = 25$ **or** branches on a prime factor tree **or** any indication eg (2, 25) of a 'product' that equals 50 **or** 2, 5, 5 **or** 2, 5 and 5 shown as the last numbers of a prime factor tree (allow 1s)*

M1

$2 \times 5 \times 5$

$2^{(1)} \times 5^2$

A1

(b) List of multiples of 40 and 50 to at least 80, 120 and 100, 150

Venn diagram (ft their prime factors for 50 in (a))

M1

$2^3 \times 5^2$ or 200

oe SC1 any multiple of 200

A1

[4]

Q7.

(a) 5

B1

(b) **Alternative method 1**

Lists multiples of

6 to at least 18

and

8 to at least 16

M1

24

SC1 any other common multiple

48, 72 ...

A1

Alternative method 2

(6 =) 2×3

and

(8 =) $2 \times 2 \times 2$

M1

24

A1

[3]

Q8.

720

*B1 at least 3 multiples of 120 (> 120)
and at least 3 multiples of 144 (> 144)
eg 240 360 480
and 288 432 576
or
(120 =) $2 \times 2 \times 2 \times 3 \times 5$
or
(144 =) $2 \times 2 \times 2 \times 2 \times 3 \times 3$
or
(Answer =) $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5$
or (Answer =) $2^4 \times 3^2 \times 5$
or
(Answer =) any multiple of 720 (> 720)
eg 1440 or 17280*

B2

Additional Guidance

Prime factor responses for B1 may be in index form

eg (120 =) $3 \times 5 \times 2^3$

B1

Prime factor responses for B1 may be seen on a factor tree or a Venn diagram or in repeated division

eg1 2 2 2 3 5 on a factor tree for 120

B1

eg2 2 2 2 2 3 3 inside one circle on a Venn diagram

B1

For B1 allow some incorrect multiples if 3 correct of each

eg1 240 380 480 720 900 (3 correct)

and 288 432 576 868 (3 correct)

B1

eg2 Answer 1440 but some incorrect multiples seen

B1

Any multiple of 720 (> 720) given in unsimplified form

eg1 $2^7 \times 3^3 \times 5$

B1

eg2 $2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 3 \times 3$

B1

B1 can still be awarded even if subsequently works out HCF

Answer 720 with some incorrect multiples seen

B2

For products of prime factors, ignore inclusion of $\times 1$

[2]

Q9.

120

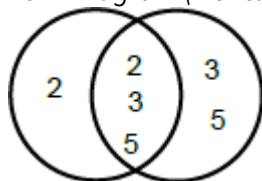
B1

[1]

Q10.

- (a) 30 or $2 \times 3 \times 5$

Venn Diagram (2 circles) with correct values



or Lists of multiples of 60 or 450

eg 120, 180, 240, ...

450, 900,

- (b) 60 and 450 seen

Sc1. No working or irrelevant working and answer of 1800

B1

B2

[3]

Q11.

4 packs of bread rolls and 25 packs of sausages

B2 4n packs of bread rolls and

25n packs of sausages

where n is an integer > 2

e.g. 8 packs of bread rolls and 50 packs of sausages

B1 Works out a common multiple of 8 and 25

e.g.1 8, 80, 160, 200 and 25, 50, 100, 200, 250

e.g.2 $8 \times 25 = 200$

e.g.3 $2^3 \times 5^2 = 200$

or

Indicates a valid number of bread rolls and sausages

i.e. 100m bread rolls and

200m sausages

where m is an integer > 0

SC2 25 packs of bread rolls and 4 packs of sausages

B3

[3]

Q12.**Alternative method 1**

Valid number of bread rolls and cheese slices

e.g. 30 bread and 60 cheese

or 60 bread and 120 cheese

or 90 bread and 180 cheese

or 120 bread and 240 cheese

Valid number means ratio 1 : 2 and can be bought in exact numbers of packs

May be implied by valid number of packs

M1

Valid number of packs of bread rolls and cheese slices

e.g. 2 packs bread and 3 packs cheese

or 4 packs bread and 6 packs cheese

or 6 packs bread and 9 packs cheese

or 8 packs bread and 12 packs cheese

Valid number of packs means ratio 2 : 3

M1dep

Their number of packs of bread $\times 1.88$ and their number of packs of cheese $\times 2.15$

e.g. 15.04 and 25.8(0)

M1dep

40.84

SC2 27.94 or 42.98

A1**Alternative method 2**

Valid number of sandwiches

e.g. Common multiple of 15 and 20 identified

e.g. 15 30 45 60 75 and 20 40 60

Valid number means can be bought in exact numbers of packs

M1

$1.88 \div 15 + 2.15 \div 10$ or $0.125(\dots) + 0.215$ or $0.340(\dots)$ *Oe Cost of one sandwich*

M1

their $0.340(\dots) \times$ their number of sandwiches *dep on M2*

M1dep

40.84

SC2 27.94 or 42.98

A1**Additional Guidance**

Alt 1 3rd M1 Allow working in pence

Alt 2 2nd M1 Allow working in pence

30 bread and 60 cheese/2 packs bread and 3 packs cheese

2×1.88 or 3.76 **and** 3×2.15 or 6.45 (Answer £10.21)

M3 A0

60 bread and 120 cheese/4 packs bread and 6 packs cheese

4×1.88 or 7.52 **and** 6×2.15 or 12.9(0) (Answer £20.42)

M3 A0

90 bread and 180 cheese/6 packs bread and 9 packs cheese

6×1.88 or 11.28 **and** 9×2.15 or 19.35 (Answer £30.63)

M3 A0

150 bread and 300 cheese/10 packs bread and 15 packs cheese

10×1.88 or 18.8(0) **and** 15×2.15 or 32.25 (Answer £51.05)

M3 A0

SC2 from 120 bread and 120 cheese or 240 bread and 120 cheese

[4]

Q13.

(a) 4

B1 answer 1 or 2

B2

(b) **Alternative method 1**

Lists multiples of
6 to at least 18
And 8 to at least 16

M1

24

*SC1 any other common multiple
48, 72 ...*

A1

Alternative method 2

(6 =) 2×3 and (8 =) $2 \times 2 \times 2$

M1

24

A1

[4]

Q14.

(a) $2^3 \times 3 \times a^2$ or $24a^2$ (= 4056)

4056

or $a = 2^3 \times 3$ or (a^2 =) 169

or $\sqrt{169}$

oe eg $8 \times 3 \times a^2$

M1

13

A1

Additional Guidance

Condone $a^2 \times 24$ for M1

Fully correct prime factor decomposition with values 2, 2, 2, 3, 13, 13
shown without 13 chosen as the final answer

M1A0

Embedded answer $2^3 \times 3 \times 13^2$

M1A0

± 13 or -13

M1A0

$4056 \div 2^3 \times 3$ unless recovered to 169

M0A0

(b) $2^4 \times 3^2 \times a^3$ or $144a^3$

or $2^4 \times 3^2 \times (\text{their } 13)^3$

or $13 \times 4056 \times 2 \times 3$

or 52728×6

or 24336×13

oe eg $144 \times (\text{their } 13)^3$ $16 \times 9 \times 2197$

M1

316 368

ft their 13, which must be an integer > 13

A1ft

Additional Guidance

eg 14 on answer line in part (a) can follow through to $144 \times 14^3 = 395136$

M1A1ft

[4]

Q15.

- (a) 4 and 5 or 4 and 7 or 4 and 9

B1

- (b) Ticks No with valid reason

*eg Ticks No, the smallest value of N is $2 \times 3 \times 5 = 30$.**or Ticks No, you can only get $N = 6$ from $1 \times 2 \times 3$ and 1 is not a prime number.**B1 No with partial reason eg Ticks No and it can't be 1.***B2****Additional Guidance**

If a box is not ticked, No can be implied by the reason for B2 and B1

eg1 the smallest value of N is $2 \times 3 \times 5 = 30$.**B2**eg2 you can only get $N = 6$ from $1 \times 2 \times 3$ and 1 is not a prime number.**B2****[3]****Q16.**

- (a)
- $200 \div 10 (= 20)$
- or**
- $20 \times 10 = 200$
- or**
- $200 \div 20 = 10$

B1

- (b) (Becky) (25 50 75) 100
- and**
- (Chris) (20 40 60 80) 100
-
- 100 (or multiple of 100) as a common multiple*

B1 4×200 *ft 4 from their lowest common multiple
4 must be from Becky's multiples***M1**

800

*ft B0 M1
SC1 1000
SC1 Any multiple of 800***A1ft****Alternative 1**(Becky) (8 16 24 32) 40 **and** (Chris) (10 20 30) 40
*40 (or multiple of 40) as a common multiple***B1** 4×200 *ft 4 from their lowest common multiple
4 must be from Chris's multiples***M1**

800

*ft B0 M1
SC1 1000
SC1 Any multiple of 800***A1ft****Alternative 2** $200 \div 2 (= 100)$ 2 is the difference in speeds**M1**their 100×8 **M1**

800

*SC1 1000
SC1 Any multiple of 800***A1****[4]**