

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Number

Finding the highest common factor (HCF)

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.

4 and 60 **and** 12 and 20

*B1 one correct
or one correct and one incorrect
or two correct and one incorrect
Any indication*

B2

[2]

Q2.

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]

Q3.

Identifies at least 1 pair of factors

2 (x) 36, 3 (x) 24, 4 (x) 18, 6 (x) 12, 8 (x) 9
or 2 (x) 2 (x) (2) (x) 3 (x) 3
Do not accept 1 (x) 72

M1

18

SC1 for 6 or 9 or $2 \times 3 \times 3$

A1 ft

[2]

Q4.

9

*B1 answer 3 or 3^2 or 3×3
or $81 = 3^4$ or 3 (x) 3 (x) 3 (x) 3*

B2

[2]

Q5.

Alternative method 1

$$2 (\times) 5 (\times) 11 = 110$$

M1

22

SC1 11

A1

Alternative method 2

List of factors of 110 **and** 132 up to 22 with 2 errors or omissions

(1), 2, 5, 10, 11, 22 (55, 110)

and

(1), 2, 3, 4, 6, 11, 12, 22

(33, 44, 66, 132)

M1

22

SC1 11

A1

Additional Guidance

(1, 55, 110) and (1, 33, 44, 66, 132) are not omissions

[2]

Q6.

6

B1 answer 2 or answer 3

or answer 2 ($\times$) 3

or

answer 2, 3, 6

or

(1) 2 3 4 6 (12)

or

(1) 2 3 6 9 (18)

or

(12 $\Rightarrow$) 2 ($\times$) 2 ($\times$) 3 or 2² ($\times$) 3

or

(18 $\Rightarrow$) 2 ($\times$) 3 ($\times$) 3 or 2 ($\times$) 3²

B2

Additional Guidance

If correct answer 6 is obtained from a list of factors, then the list must contain no errors

For use of prime factors, allow in repeated division or a factor tree or a Venn diagram or inclusion of 1

List of factors may be seen in factor pairs (allow repeats)

eg (1 $\times$ 12) 2 $\times$ 6 3 $\times$ 4

B1

[2]

Q7.

(a) 4

B1 answer 1 or 2

B2

[2]

Q8.

15

*B1 answer 3
or answer 5
or answer 3 (×) 5
or (75 =) 3 (×) 5 (×) 5 or (75 =) 3 (×) 5²
or (105 =) 3 (×) 5 (×) 7
or (1) 3 5 15 25 (75)
or (1) 3 5 7 15 21 35 (105)*

B2

Additional Guidance

NB 15 from 3 + 5 + 7 does not score unless working for B1 seen elsewhere

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

eg1 3 5 5 in repeated division or factor tree for 75

B1

eg2 3 5 7 inside one circle of a Venn diagram

B1

eg3 3 5 inside the intersection of a Venn diagram

B1

For products of prime factors, repeated division, factor trees and Venn diagrams, ignore inclusion of factors of 1

A repeated division needs to reach the final prime factor but does not need to reach 1

B1 can be awarded even if LCM is subsequently worked out

List of factors may be seen as factor pairs

[2]

Q9.

5

B1

[1]

Q10.

- (a) Pair of values of form $2x$ and kx
where x is an integer > 5
and k is an odd integer > 2
eg 12 and 18 or 100 and 250
- B1**
- (b) Ticks No with valid reason including that one number could be 2 and that multiplying by an even number (or 2) gives an even answer
- eg1 Ticks No and a could be 2
and the others will be odd
and even $\times$ odd $\times$ odd = even*
- eg2 Ticks No (and b could be 2)
and $27 \times 4 \times 5 = 540$*
- eg3 Ticks No and $125 \times 9 \times 2 = 2250$*
- eg4 Ticks No and a, b or c could be 2 and
multiplying by an even gives an even*
- B1 No with partial reason*
- eg1 Ticks No and a could be even*
- eg2 Ticks No and $c = 2$*
- eg3 Ticks No and odd $\times$ odd $\times$ even is even*
- eg4 Ticks No and multiplying by an even gives an even*

B2

Additional Guidance

If a box is not ticked, No can be implied by the reason for B2 and B1
eg1 a could be 2 and the others will be odd and even $\times$ odd $\times$ odd = even

B2

eg2 b could be 2 and $27 \times 4 \times 5 = 540$ which is even

B2

eg3 odd $\times$ odd $\times$ even is even

B1

Allow use of numbers that are not prime for B1

eg1 Ticks No and b could be 2 and $1 \times 4 \times 5 = 20$

B1

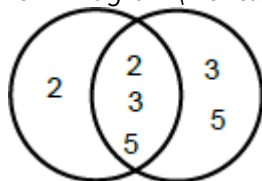
eg2 Ticks No and $4^3 \times 3^2 \times 2 = 1152$

B1

[3]

Q11.

- (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,

B1

- (b) 60 and 450 seen

*Sc1. No working or irrelevant working and answer of 1800***B2****[3]****Q12.**

- (a) Correct product using at least one prime factor

For example $2 (\times) 126$ or $3 (\times) 84$ or $7 (\times) 36$ or $2 (\times) 2 (\times) 63$ or $2 (\times) 3 (\times) 42$ *May be implied**eg in a factor tree or repeated division***M1**

$$2 \times 2 \times 3 \times 3 \times 7 \text{ or}$$

$$2^2 \times 3^2 \times 7$$

A1

- (b) 84

B1**[3]****Q13.**

$$2xy$$

B1**[1]**

Q14.

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

or

$$a = \frac{4056}{2^3 \times 3}$$

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

$$52728 \times 6$$

or

$$24336 \times 13$$

oe

$$\text{eg } 144 \times (\text{their } 13)^3$$

$$16 \times 9 \times 2197$$

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]