

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Number

Using the correct order of operations

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.

$$(12^2 =) 144$$

or

$$(\sqrt{36} =) 6 \text{ or } \left(\frac{1}{3} \times \sqrt{36} =\right) 2$$

implied by correct answer

$$\text{accept } (\sqrt{36} =) \pm 6 \text{ or } \left(\frac{1}{3} \times \sqrt{36} =\right) \pm 2$$

M1

$$(12^2 =) 144$$

and

$$\left(\frac{1}{3} \times \sqrt{36} =\right) 2$$

implied by correct answer

$$144 \times \frac{1}{2}$$
$$\frac{432}{6}$$

or 6 *oe fraction implies M1M1*

$$\text{accept } \left(\frac{1}{3} \times \sqrt{36} =\right) \pm 2$$

M1dep

$$72$$

accept ± 72

SC2 288

A1

Additional Guidance

-72 only

M1M1A0

Condone missing brackets if recovered

eg $12^2 \div \frac{1}{3} \times 6$ with answer 72

M1M1A1

$$\frac{144}{\frac{1}{3} \times 6}$$

with no further correct work

M1M0A0

Using a decimal for $\frac{1}{3}$ must be recovered

[3]

Q2.

$(2^2 + 5 =) 9$

or $4 \times 2^2 + 4 \times 5$

or $-4 \times 2^2 + -4 \times 5$

or $(-)36$

oe

M1

$100 - \text{their } 36 \text{ or } 64$

oe

M1dep

8

accept ± 8

A1

Additional Guidance

$100 - 4 \times 4 + 4 \times 5$ or $100 - 16 + 20$ not recovered

M0M0A0

[3]

Q3.

$a + 3$ or $3 + a$

B1

[1]

Q4.

$(A =) 26$

may be implied by correct answer

B1

$(B =) 10$

may be implied by correct answer

B1

260

ft their A $\times$ their B if at least B1 awarded

SC2 400 or 52

SC1 55

B1ft

Additional Guidance

SC2 400 from $A = 40$ and $B = 10$

SC2 52 from $A = 26$ and $B = 2$

SC1 55 from $8 \times 3 + 2 \times 21 - (15 - 4)$

Answer 260 with no incorrect values seen for A and B

B1B1B1

[3]

Q5.

34

*B1 (60 ÷ 2 =) 30
or
(their 60 ÷ 2) + 4 evaluated*

B2

Additional Guidance

Condone poor notation

eg $60 \div 2 = 30 + 4 = 34$

B2

$60 \div 2 = 20$, answer 24

B1

$60 \div 2 = 20$, $20 + 4 = 25$

B1

$60 \div 2 = 20$, $20 + 4$ (no attempt at evaluation)

B0

Condone $2 \div 60 = 30$ (recovery seen)

B1

$60 \div 6 = 10$

B0

[2]

Q6.

10

B1

36

*ft 46 – their 10
SC1 174*

B1ft

[2]

Q7.

344

B1

39

B1

305

ft their 344 – their 39 if either B1B0 or B0B1 awarded

B1ft

Additional Guidance

If their division results in a decimal answer, allow correct rounding to 0dp or better for the B1ft

eg $234 \div 6 = 38.333$, $344 - 38.3 = 305.7$ (may have answer 306)

B1B0B1ft

eg 344, $234 \div 6 = 20.3$, answer 324

B1B0B1ft

Negative, fractional and decimal answers are acceptable on ft

[3]

Q8.

2160

may be implied by 240 or 10 800

B1

5 × their 2160

9

or 5×240

or $10\,800 \div 9$

or 1200

oe

M1

1473

A1

Additional Guidance

Accept 0.55 or 0.56 or better for $\frac{5}{9}$

eg $\frac{5}{9}$ (2160) + 273 (no indication that they know to multiply by $\frac{5}{9}$)

B1M0A0

eg $\frac{5}{9} \times (2160) + 273$

B1M1A0

eg 2130, $5 \times 2130 \div 9$

B0M1A0

[3]

Q9.

$(\sqrt{121}) = 11$ or -11

or $121 = 11^2$ or $121 = 11 \times 11$ seen

oe

B1

13 – 10 or 3

or $(13 - 10)^2$ or 3^2 or 3×3 or 9

M1

2 or – 20

ft their 11

A1ft

Additional Guidance

Accept 2 and –20

B1M1A1ft

$11 - 16^2$ or $11 - 256$ or -245

B1M0A0

$11 \times 9 = 99$

B1M1A0

$\sqrt{121} = 60.5$, $60.5 - 3^2 = 51.5$

B0M1A1ft

$60.5 - 3^2 = 51.5$

B0M1A0ft

[3]

Q10.

18

B1

[1]

Q11.

$$2 + 0 + 1 - 7 = -4$$

$$\text{or } 2 - 0 + 1 - 7 = -4$$

B1

$$2 \times 0 \times 1 \times 7 = 0$$

$$\text{or } 2 \times 0 \div 1 \times 7 = 0$$

$$\text{or } 2 \times 0 \times 1 \div 7 = 0$$

$$\text{or } 2 \times 0 \div 1 \div 7 = 0$$

Allow any brackets in pairs for first four

$$\text{or } 2 \times 0 \times (1 + 7) = 0$$

$$\text{or } 2 \times 0 \div (1 + 7) = 0$$

Allow - instead of + for last two

B1

$$(2 + 0) \times (1 + 7) = 2^4$$

$$\text{or } (2 - 0) \times (1 + 7) = 2^4$$

$$\text{or } 2 \times (0 + 1 + 7)$$

B1

Additional Guidance

In all cases, allow extra pairs of brackets which do not alter the result of the calculation

e.g. in 3rd calculation $((2 + 0) \times (1 + 7)) = 2^4$

B1

Brackets can be used in the place of a multiplication sign

e.g. in 2nd calculation $2 \times 0(1 + 7) = 0$

B1

Each gap must have a bracket or an operator in

Allow additional + or - signs in any gap, if correct

e.g. in 1st calculation $2 + 0 + 1 + - 7 = -4$

B1

[3]

Q12.

Any three of

$$1 + 2 + 3 + 4 = 10$$

$$1 \times 2 \times 3 + 4 = 10$$

$$1 + 2 + 3 \times 4 = 15$$

$$1 + 2 \times 3 \times 4 = 25$$

B1 for each

B3

[3]

Q13.

Valid explanation

or

correct calculation

*eg she hasn't multiplied 2 by 3**or* $3 \times 2 = 6$ *or**answer is 18***B1****Additional Guidance**

A correct calculation may be seen by Sofia's work

It should be 3×6 **B1**

It should be 18

B1 $3 \times 6 = 18$ **B1**

3 should be 6

B1

Needs to multiply everything in the brackets (by 3)

B1

She should have done the brackets first

B1

She should have added 4 and 2 first

B1She did 3×4 but not 3×2 **B1**

She didn't use BIDMAS and work out the brackets first

B1

Accept highlighting the second 3 as the error (with no subsequent incorrect calculation seen) eg It shouldn't be + 3

B1

A correct calculation or answer 18 with any or no explanation

B1

A correct explanation alongside an incorrect calculation

B0

She didn't use BODMAS / BIDMAS

B0

She didn't expand / multiply out the brackets correctly

B0

3 should be 2

B0

It should be 14

B0

The brackets are in the wrong place

[1]

Q14.

All 3 correct matches

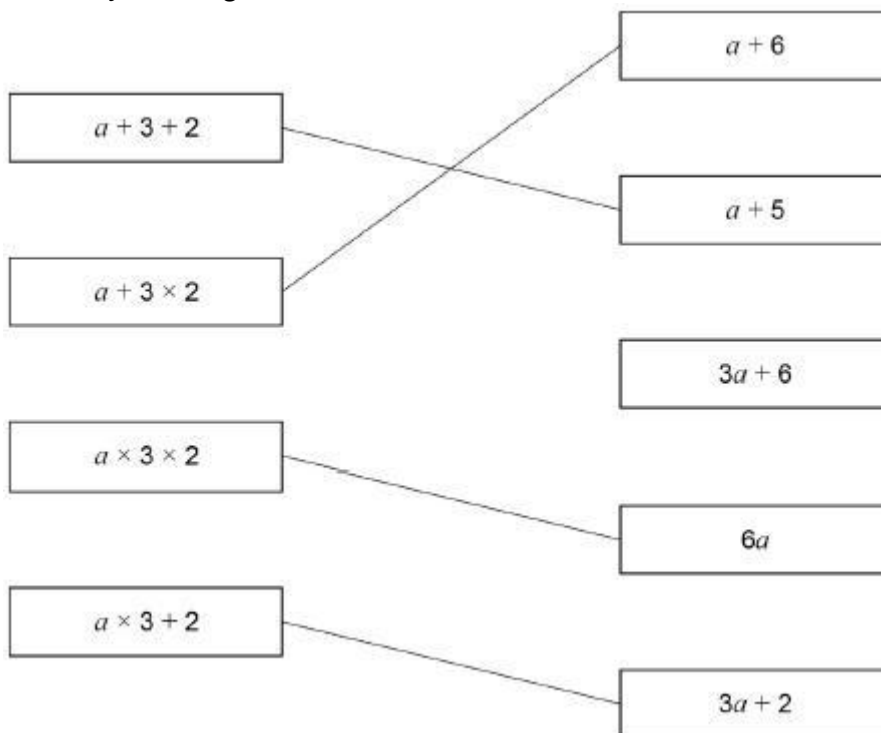
B1 each correct match

B3

Additional Guidance

Two different matches from left hand column is choice for that box

Allow any unambiguous indication



B3

[3]

Q15.

$$4 \div 4 + 4 \div 4$$

or

$$4 \times 4 \div (4 + 4)$$

or

$$(-4 - 4) \div 4 + 4$$

or

$$4 \div ((4 + 4) \div 4)$$

or

$$(4 \div (4 + 4)) \times 4$$

Any correct calculation

B1

$$(4 + 4 + 4) \div 4$$

or

$$(4 \times 4 - 4) \div 4$$

Any correct calculation

B1

[2]

Q16.

(a) $1 + 2 \times 4$ or $1 + 4 \times 2$ or $4 + 1 \times 5$ or $4 + 5 \times 1$ or $5 + 4 \times 1$ or $5 + 1 \times 4$

B1

(b) $4 \times 3 - 1 \times 5$ or $4 \times 3 - 5 \times 1$
or $5 \times 3 - 2 \times 4$ or $5 \times 3 - 4 \times 2$

3 is placed in question so other answers are irrelevant

B1 for any correct expression i.e. not using given numbers or repetition or correct expression but with '3' moved from position.

e.g. $3 \times 5 - 1 \times 8$

$3 \times 3 - 1 \times 2$

Negative answer B0

B2

(c) $3 + 4 + 5 = 12$

B1 for any correct expression using 'incorrect' digits e.g. 0 or repeating digits

e.g. $1 + 4 + 5 = 10$

B2

[5]