

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Algebra

Substituting into expressions

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.

Always true
Sometimes true

B1 one correct

B2

Additional Guidance

Accept any indication, but if a tick and crosses are used in the same row, mark the tick

A row with more than one tick is incorrect for that row

[2]

Q2.

$(-4)^2 + 7 \times -4$ or $-4(-4 + 7)$

or 16 or -28

oe eg $(-4)^2 + 7(-4)$

M1

-12

SC1 -44

A1

Additional Guidance

SC is for $-4^2 + 7 \times -4 = -16 - 28 = -44$

Embedded 16 or -28 seen eg $16 + 7x$ without correct answer

M1A0

Values may be implied

eg1 $(-4)^2 + 7 \times 4 = 44$ 16 is implied

M1A0

eg2 only answer 44

M0A0

Further correct work eg $16 - 28 = -12$, Answer 3x

M1A1

Further incorrect work eg $16 - 28 = -12$, Answer -12x

M1A0

+ -28 is the same as -28

M1

Only $-4^2 + 7 \times -4$

M0A0

$-4^2 + 7 \times -4 = -16 + 28 = 12$

M0A0

16x does not imply 16

M0A0

[2]

Q3.

$$3 \times 13 + 4 \times -2$$

or

$$(3r =) 39 \text{ or } (4t =) -8$$

oe

$$31$$

M1

A1

Additional Guidance

$$39 + 8$$

M1A0

39 or -8 may be implied by a calculation eg $3 \times 13 + 4 \times 2 = 47$

M1A0

47 only does not imply 39

M0A0

Values are not implied by incorrect expressions eg only $39r$

M0

Incorrect further work

A0

[2]

Q4.

$$60$$

B2

*B1 $10^2 - 4 \times 10$ or $10^2 - 4(10)$
or 100 or 40 or -40 seen or implied*

Additional Guidance

Embedded correct value eg $100 - 4a = 96a$

B1

Further correct work eg $100 - 40 = 60$, Answer $6a$

B2

Further incorrect work eg $100 - 40 = 60$, Answer $60a$

B1

Values may be implied

$$\text{eg } 10^2 - 4 = 96 \text{ implies } 100$$

B1

eg 96 only does not imply 100

B0

Incorrect calculations cannot imply a value eg $10^2 - 4a = 96a$

B0

$100a$ does not imply 100

B0

[2]

Q5.

$$x - 4$$

B1

[1]

Q6.

Sometimes true
Always true
Always true
Never true

B1 for each

B4

Additional Guidance

Allow any unambiguous indication
eg all 4 correct boxes contain a cross with all other boxes blank

B4

A row with one tick and some crosses – mark the tick
A row with more than one tick is B0 for that row
Mark the boxes not the working lines

[4]

Q7.

n^2

B1

[1]

Q8.

is greater than *allow >*

B1

is equal to *allow =*

B1

is equal to *allow =*

B1

is less than *allow <*

B1

Additional Guidance

Do not allow $\geq$ or $\leq$ or $\equiv$
Do not allow contradictions eg $<$ is greater than

[4]

Q9.

☐	$x + 10$ is always positive
☐	$x + 10$ is always negative
☐	$x + 10$ cannot be zero
☒	x could be positive or negative or zero

B1

[1]

Q10.

- (a) 6, 15, 24, 60 in any order

*B1 for 6, 15, 24, 60 with no more than one additional value
or three correct values with no more than one incorrect value*

B2

Additional Guidance

Ignore repeated values for B2 and B1

6, 10, 15, 24, 60

B1

6, 10, 15, 24

B1

6, 10, 15, 24, 36

B0

$2 \times 3, 5 \times 3, 2 \times 12, 5 \times 12$

B0

6xy, 15xy, 24xy, 60xy

B0

- (b) $\frac{2-12}{2}$

or one correctly evaluated trial with correct substitutions for

$x = 2$ or 5 and $y = 3$ or 12

or two correct values from $-\frac{10}{2}, -\frac{1}{2}, -\frac{7}{5}, \frac{2}{5}$ oe

or two correct values from $-5, -0.5, -1.4, 0.4$ oe

$$\frac{2-3}{2} = -\frac{1}{2} \text{ oe}$$

$$\text{or } \frac{5-12}{5} = -\frac{7}{5} \text{ oe}$$

$$\text{or } \frac{5-3}{5} = \frac{2}{5} \text{ oe}$$

M1

$$-\frac{10}{2} \text{ or } -5$$

A1

Additional Guidance

Two separate correct values can be in either fraction or decimal form

$2 - 12 \div 2 = -5$ (recovered)

M1A1

$2 - 12 \div 2$

M0A0

An example of an incorrect substitution with different values of x

$$\text{eg } \frac{5-12}{2} = -\frac{7}{2}$$

[4]

Q11.

a^2

B1

[1]

Q12.

8×25 or 200

or

25^2 or 625

oe

M1

8×25 or 200

and $25^2 - b$ or $625 - b$

or

$25^2 - 8 \times 25$ or $625 - 200$

oe

may be seen in an equation

M1dep

425

A1

Additional Guidance

Embedded answer

M1M1A0

[3]