

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Algebra

Expanding double brackets

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.

$$x^2 + 5x - x - 5$$

*three or four terms with three correct
 $x^2 + 4x + k$ implies M1*

M1

$$x^2 + 4x - 5$$

A1

Additional Guidance

Further work, e.g. $x^2 + 4x - 5 = 5x - 5$

M1A0

$$y = x^2 + 4x - 5 \text{ or } x^2 + 4x - 5 = 0$$

M1A0

$$x^2 + 4x - 4$$

M1A0

$$x^2 + 4x$$

M1A0

Condone $1x$ for x

e.g. $x^2 + 5x - 1x - 5$

at least M1

Terms may be seen in the grid method or in a list where a plus sign can be implied

[2]

Q2.

$$y^2 - 3y + 8y - 24$$

Allow 1 error

M1

$$y^2 + 5y - 24$$

A1

[2]

Q3.

$$x^2 - 3x + 6x - 18$$

Allow one error

M1

$$x^2 + 3x - 18$$

A1

[2]

Q4.

$$x^2 - 8x - 8x + 64$$

*allow one error or omission
terms may be seen in a grid*

M1

$$x^2 - 16x + 64$$

*Ignore fw e.g. if attempting to solve
Do not ignore fw if attempting to simplify*

A1

Additional Guidance

$$x^2 - 16x (+k) \quad k \neq 64$$

M1A0

$$x^2 - 8x + 64$$

M1A0

$$x^2 - 16x + 64 = -15x^3 + 64$$

M1A0

$$x^2 - 8x + 8x + 64 \text{ (one error)}$$

M1A0

$$x^2 + 8x + 8x + 64 \text{ (one error)}$$

M1A0

$$x^2 - 6x + 8x + 64 \text{ (two errors)}$$

M0A0

$$x^2 + 64 \text{ (two errors)}$$

M0A0

[2]

Q5.

$$x^2 - 2x + 1$$

B1

[1]

Q6.

$$2x^3 - 18x^2y + 5x^2y - 45xy^2$$

exactly 4 terms with 3 correct

terms in any order

may be seen in a grid

implied by $2x^3 - 13x^2y$ with one other term or $-13x^2y - 45xy^2$ with

one other term

M1

$$2x^3 - 18x^2y + 5x^2y - 45xy^2$$

or

$$2x^3 - 13x^2y - 45xy^2$$

terms in any order

do not allow if only seen in a grid

A1

Additional Guidance

A correct term includes the sign (in a grid allow eg $5x^2y$ for $+5x^2y$)

Condone four correct terms followed by incorrect simplification of x^2y terms, otherwise do

not allow further incorrect work

eg1 $2x^3 - 18x^2y + 5x^2y - 45xy^2 = 2x^3 + 13x^2y - 45xy^2$

M1A1

eg2 $2x^3 - 18x^2y + 5x^2y - 45xy^2 = 36x^5y + 5x^2y - 45xy^2$

M1A0

Allow equivalent fully simplified terms eg $5x^2y$ may be seen as $5yx^2$

For M1 allow coefficients to be incorrectly positioned

eg $x^32 - 18x^2y + y5x^2 - 45xy^2$

M1A0

$2x^3 + -18x^2y + 5x^2y + -45xy^2$ has 4 correct terms but needs further simplification to score A1

M1A0

Terms must be processed

eg do not allow $x^2 \times 2x$ for $2x^3$

[2]

Q7.

$$6x^2 - 21xy + 12xy - 42y^2$$

Allow one error

M1

$$6x^2 - 21xy + 12xy - 42y^2$$

Fully correct

A1

$$6x^2 - 9xy - 42y^2$$

ft their four terms

A1ft

[3]

Q8.

$$-2x$$

B1

[1]

Q9.

$(x + 8)(x - 5)$ or $(k =) 3$
or $(x + 5)(x - 8)$ or $(k =) -3$
or $(x + 10)(x - 4)$ or $(k =) 6$
or $(x + 4)(x - 10)$ or $(k =) -6$
or $(x + 20)(x - 2)$ or $(k =) 18$
or $(x + 2)(x - 20)$ or $(k =) -18$
or $(x + 40)(x - 1)$ or $(k =) 39$
or $(x + 1)(x - 40)$ or $(k =) -39$
or $s = 8$ and $t = 5$
or $8 - 5$

oe correct factorisation

M1

3

condone embedded answer $x^2 + 3x - 40$

A1

Additional Guidance

$x^2 + sx - tx - st$ with no further working

M0A0

Ignore incorrect factorisations in working

[2]

Q10.

$$x^2 + 3ax + ax + 3a^2 (\equiv x^2 + bx + 75)$$

or

$$x^2 + 4ax + 3a^2 (\equiv x^2 + bx + 75)$$

or

$$3ax + ax + 3a^2 \equiv bx + 75$$

or

$$4ax + 3a^2 \equiv bx + 75$$

or

$$3a^2 = 75$$

M1

$$a = 5 \text{ and/or } a = -5$$

implied by $(x + 5)(x + 15)$

or $(x - 5)(x - 15)$

implied by answer 20 and/or -20

A1

20 and -20

oe ± 20

A1

[3]

Q11.

$$6x^2 + 8x - 15x - 20$$

$$\text{or } 6x^2 - 7x - 20$$

allow 4 terms with 3 correct

or $6x^2 - 7x + k$, where k is a non-zero number

M1

$$-11x^2 + 22x \text{ or } 5x^2 - 15x - 5$$

M1

$$6x^2 + 8x - 15x - 20$$

$$\text{or } 6x^2 - 7x - 20 \text{ and } -11x^2 + 22x$$

and

$$5x^2 - 15x - 5$$

A1

$$6x^2 + 8x - 15x - 20$$

$$\text{or } 6x^2 - 7x - 20 \text{ and } -11x^2 + 22x$$

and

$$5x^2 - 15x - 5$$

and

$$-25$$

A1

Additional Guidance

Allow terms seen in a grid

Sign errors cannot be recovered

Ignore equating the expression to zero

[4]

Q12.

$$9x^2 + 3x + 3x + 1$$

or

$$9x^2 + 6x + 1$$

or

$$-(8x^2 - 6x) \text{ or } -8x^2 + 6x$$

M1

$$35 + 9x^2 + 3x + 3x + 1 - 8x^2 + 6x$$

or

$$35 + 9x^2 + 6x + 1 - 8x^2 + 6x$$

M1dep

$$x^2 + 12x + 36$$

A1

$$(x + 6)^2$$

allow $(x + 6)(x + 6)$

A1

Additional Guidance

Condone inclusion of $= 0$ in all working

Ignore any solution attempt for $(x + 6)^2 = 0$

Ignore substitution of values

[4]