

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Algebra

Plotting & Sketching graphs of quadratic functions

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.

- (a) 0 and 3 in the correct positions
B1 0 or 3 in the correct position

B2

Additional Guidance

x	-3	-2	-1	0	1
y	3	0	-1	0	3

- (b) Plots at least three points correctly
correct or ft their table in (a)
 $\pm \frac{1}{2}$ small square
points may be implied by graph passing through them

M1

Correct graph drawn through the five correct points
 $\pm \frac{1}{2}$ small square
smooth quadratic curve

A1

Additional Guidance

Correct graph drawn without plotting the correct points

M1A1

Ignore any extra points plotted
 Ignore any part of graph drawn for $x < -3$ or $x > 1$
 Ruled straight lines

A0

[4]

Q2.

- (a)

x	-3	2	3
y	7	2	7

B1

- (b) Plots at least four points correctly

M1

ft their points from part (a)
 $\pm \frac{1}{2}$ small square

Correct graph drawn through the seven correct points
 $\pm \frac{1}{2}$ small square
smooth quadratic curve

A1

Additional Guidance

Correct graph drawn without plotting the correct points

M1A1

[3]

Q3.

(a)

x	-2	-1	0	1	2	3
y	4	0	-2	-2	0	4

B1 1 or 2 values correct

B2

(b) 5 or 6 points plotted correctly

Correct or fit their table in (a)

Tolerance of ± 1 small square

Points can be implied by graph passing through them

M1

Correct smooth parabolic curve

*Tolerance of ± 1 small square for the six **correct** points from the table*

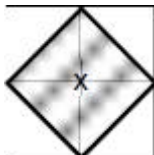
and y-coordinate of minimum point in the range $-2.5 \leq y \leq -2.1$

No further tolerance for the minimum

A1

Additional Guidance

Tolerance of ± 1 small square means it is on the edges of or within the shaded area



Ignore extra points plotted

If their table in (a) has points that are beyond the grid these points will not be able to be plotted correctly

Ignore any curve drawn for $x < -2$ or $x > 3$

Curve passing through all correct points within tolerance

M1A1

Ruled straight lines

A0

[4]

Q4.

(-1, 6)

B1

[1]

Q5.

$\sqrt[4]{81}$ or $81^{\frac{1}{4}}$ or $k = 3$

may be seen on diagram and is implied by $p = 9$

M1

(their value for k)² = $2^2 + c$

or $9 = 4 + c$

or $c = 5$

does not need to be evaluated

M1

$r^2 + \text{their } 5 = 43.44$

or

$\sqrt{43.44 - \text{their } 5}$ or $\sqrt{38.44}$

oe equation

dep on previous mark

M1dep

6.2

A1

Additional Guidance

Coordinate (2, 9) implies $p = 9$

[4]

Q6.

At least 1 point from

(-2, 8) (-1, -1) (0, -4) (1, -1)

(2, 8) (3, 23) (4, 44)

Seen or implied

If only seen plotted allow ± 0.5 square

M1

At least 3 correct points from

(-2, 8) (-1, -1) (0, -4) (1, -1) (2, 8)

plotted correctly (± 0.5 square)

and attempt to join their points with a

smooth curve (± 0.5 square)

M1

$[-0.75, -0.95]$

A1

$[1.45, 1.65]$

A1

Additional Guidance

For first M1 allow (3, 23) or (4, 44) even though they cannot be plotted

[4]