

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Probability

One markers

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.

☐	The number rolled is even
☒	The number rolled is greater than 1
☐	The number rolled is less than 5
☐	The number rolled is prime

B1
[1]

Q2.

A or B or both

B1
[1]

Q3.

$A \cup B'$

B1
[1]

Q4.

$\frac{1}{6}$ or 0.16(6...) or 0.167 or 0.17 or 16(.6...) % or 16.7% or 17%
oe fraction

B1

Additional Guidance

Ignore conversion attempt to fraction, decimal or percentage (but not ratio) after correct probability seen

Do not allow eg 1 in 6 or 1 out of 6 unless the correct probability seen.

Do not allow ratio

Ignore words if correct probability seen

[1]

Q5.

0.8

B1
[1]

Q6.

0.4

B1
[1]

Q7.

Valid reason

eg sum of probabilities is not 1

B1

Additional Guidance

Ignore irrelevant statements alongside a correct statement

eg the sum of the probabilities is not 1 and the probabilities are not percentages

B1

Do not ignore incorrect statements alongside a correct statement

eg the sum of the probabilities is 0.11 not 1

B0

They add up to 1.1

B1

They add up to 110%

B1

It is 0.1 too much

B1

One of the probabilities is 0.1 too much

B1

It should be something like 0.1, 0.2, 0.3, 0.4

B1

B should be 0.4

B1

They don't add up correctly

B0

They add up to 0.11

B0

It's not a fair spinner

B0

[1]

Q8.

200

B1

[1]

Q9.

$\frac{1}{3}$

B1

[1]

Q10.

$\frac{1}{6}$

B1

[1]

Q11.

A'

B1

[1]

Q12.

$$\frac{3}{5}$$

B1

[1]

Q13.

Only intersection shaded
mark intention

B1

[1]

Q14.

$$\frac{3}{5}$$

oe fraction, decimal or percentage

B1

[1]

Q15.

$$\frac{1}{6}$$

Any unambiguous indication

B1

[1]

Q16.

A or B or both

B1

[1]

Q17.

$$\frac{2}{6}$$

B1

[1]

Q18.

$P(A \cap B')$

B1

[1]

Q19.

$A \cap B$

B1

Arc, centre A , radius 4 cm on grid

at least a quarter-circle ± 2 mm radius

ignore any other arcs

B1

Correct straight line equidistant from B and C

their line must intersect any two of the five grid vertices $(0, 3)$,

$(3, 4)$, $(6, 5)$, $(9, 6)$, $(12, 7)$

± 2 mm

Correct enclosed region identified

± 2 mm for the line at $(0, 3)$, $(6, 5)$ and the arc at $(6, 6)$, $(2, 10)$

B1

region may be identified by labelling R or by shading

implies B3

B1

[1]

Q20.

A and B

B1

[1]

Q21.

0.3

B1

[1]

Q22.

$\frac{9}{25}$

B1

[1]

Q23.

$\frac{1}{16}$

B1

[1]

Q24.

0.26

B1

[1]

Q25.

6

B1

[1]

Q26.

$\frac{4}{9}$

B1

[1]

Q27.

Ticks Yes and valid explanation

eg ticks Yes and she has thrown more often

B1

Additional Guidance

Ignore incorrect or irrelevant statements alongside correct statements, unless contradictory

Ticks No

B0

Ticks Yes and 60 is more than 40

B1

Ticks Yes and 60 is 20 more than 40

B1

Ticks Yes and 60 is 10 more than 40 (ignore incorrect value 10)

B1

Ticks Yes and she has more data to look at

B1

Ticks Yes and her number of throws is higher

B1

Ticks Yes and Bianca used more throws which gives her a higher chance of getting heads

B1

Ticks Yes and Adam has less number of throws and has more heads (ignore irrelevant has more heads)

B1

Ticks Yes and Bianca throws more coins

B1

Ticks Yes and she threw it 60 times, Adam only 40

B1

Ticks Yes and she threw it 60 times, Adam 40

B0

Ticks Yes and she threw it 60 times and got 20

B0

Ticks Yes and the probability is $\frac{20}{60}$

B0

Ticks Yes and because her total is higher

B0

[1]