

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Statistics

Interpreting frequency tables and two-way tables

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) $12.2(0) - 8.65$
or answer with 55p
or 355 oe

M1

3.55 accept 3.55
SC1 6.85 or 685p (Company B used)

A1**Additional Guidance**

Answer with 55p
eg 4.55 or 455p

M1A0

eg 455

M0A0

Condone £3.55p

M1A1

- (b) 7.25×12 or 725×12
oe eg $7 \times 12 + 0.25 \times 12$
accept repeated addition of twelve 7(.)25s

M1

Correct vertical method of long multiplication with at least one of 1450
and 7250 correct

or

Correct set up of grid method with at least three products correct

or

Correct set up of Gelosia method with at least three products correct

or

$10 \times 725 = 7250$ and $2 \times 725 = 1450$ attempted with at least one correct

or

$12 \times 700 = 8400$ and $12 \times 20 = 240$ and $12 \times 5 = 60$ attempted with at least
one correct

oe

allow a placeholder space to be present instead of a physical
zero in vertical method

M1dep

87(.00)

SC2 103.80 or 146.40
or 169.20 or 190.8(0) or 256.2(0)
or 250.2(0) or 315.6(0)
SC1 8.65×12 or $12.2(0) \times 12$
or $14.1(0) \times 12$ or $15.9(0) \times 12$
or 21.35×12 or 20.85×12
or $26.3(0) \times 12$

A1**Additional Guidance**

Condone 87.0

M2A1

Accept answers in pence

Condone p after their final answer eg £87.00p

Method of repeated addition must have no more than one error. If broken
down into groups, the one error made may be seen multiple times

[5]

Q2.

(a) 1 : 2

B1

(b) $\frac{15}{15+5} (\times 100)$ or $\frac{15}{20} (\times 100)$
or $\frac{3}{4} (\times 100)$

M1

75

A1

[3]

Q3.

Alternative method 1

(a =) $12 \div 3$ or 4

M1

$2b$ + their $a = 24$

or $2b + 4 = 24$

or $b = 10$

M1

$2 \times$ their a + their $b + 2c = 30$

or $8 + 10 + 2c = 30$

or $2c = 12$

or $c = 6$

or sum of middle column is

$30 -$ their a

M1

22, 26 and 18

SC2 first and third column totals correct

SC1 totals of $3a + b$, $a + b + 2c$, $2a + b$

A1

Alternative method 2

(a =) $12 \div 3$ or 4

M1

$2b$ + their $a = 24$

or $2b + 4 = 24$

or $b = 10$

M1

$(12 + 24 + 30) -$ their totals for first and third columns

or $66 -$ their 22 – their 18

M1

22, 26 and 18

SC2 first and third column totals correct

SC1 totals of $3a + b$, $a + b + 2c$, $2a + b$

A1

[4]

Q4.

- (a) $40 + 90 - 32 - 38$
or $40 + 90$ or 130
or $32 + 38$ or 70
or $40 - 32$ or 8
or $90 - 38$ or 52 oe

60

M1

A1

Additional Guidance

Check table for working

Up to M1 may be awarded for correct work, with no or incorrect answer, even if seen amongst multiple attempts

- (b) **Alternative method 1**

$$\frac{40+32}{200} \text{ or } \frac{72}{200} \text{ or } \frac{36}{100} \quad \text{oe}$$

M1

36

SC1 64

A1

Alternative method 2

$$\frac{40}{200} \times 100 \text{ or } \frac{20}{100} \text{ or } 20$$

or

$$\frac{32}{200} \times 100 \text{ or } \frac{16}{100} \text{ or } 16$$

$$\frac{36}{100}$$

oe

M1

36

SC1 64

A1

Alternative method 3

$$(40 + 32) \div 2$$

or

$$40 \div 2 \text{ or } 20$$

or

$$32 \div 2 \text{ or } 16 \quad \text{oe eg } 72 \times 0.5$$

M1

36

SC1 64

A1

Additional Guidance

72 out of 200 or $72 \div 200$

M1

72% of 200

M0

Build up method, eg

$$10\% = 20, 5\% = 20 \div 2 = 10, 1\% = 20 \div 10 = 2, 10 + 5 + 1 = 16(\%)$$

M1

$$10\% = 20, 5\% = 10, 1\% = 0.5, 10 + 5 + 0.5 = 15.5(\%) \text{ (method not shown for 1\%)}$$

M0

[4]

Q5.

(a) 8

B1

(b) 11

B1

[2]

Q6.

(a) 3

B1

(b)

	Tennis	Basketball	Football	Total
Boys	3	3	5	11
Girls	5	2	2	9
Total	8	5	7	20

Accept tallies for inner 6 boxes

B3 for 2 rows with totals

B3 for 2 columns with totals

B3 1 row and 1 column with totals

B2 for 2 rows without totals

B2 for 2 columns without totals

B2 1 row and 1 column without totals

B2 for all totals

B1 for 1 row without total

B1 for 1 column without total

B1 for totals for rows

B1 for totals for columns

B4

[5]

Q7.

(a) 7 + 8 or 15

M1

$$\frac{15}{20}$$

May be implied

A1

$$\frac{3}{4}$$

ft their fraction siimplified to lowest terms

B1ft

(b) 8 + 1 or 9 seen or implied

M1

$$\frac{9}{20} \text{ oe}$$

$$\text{SC1 } \frac{11}{20} \text{ oe}$$

A1

[5]

Q8.

- (a) $(0 +) 2 + 4 + 5 + 2 + 3 + 2 + 1 (+ 0)$ oe
Allow one error, omission or extra

M1

19

SC1 17 (exactly one A*)
 or 21 (counts A* A* twice)
 or 81 (no A*)

A1

- (b) $6 + 3 + 9 + 2 + 3 + 8 (+ 0) + 2 + 4 + 5$
Allow one error, omission or extra
 or $6 + 12 + 13 + 11$

Allow one error

or

- $6 + 3 + 2 (+ 0) + 9 + 3 + 2 + 8 + 4 + 5$
Allow one error, omission or extra
 or $11 + 14 + 12 + 5$

Allow one error

M1

42

SC1 30 ($G < H$)
 or 70 ($G \geq H$)

A1

[4]

Q9.

- (a) 33

B1

- (b)

	Y	N	
W		17	
M			45
	51	29	

B2 Three correct entries

B1 One or two correct entries

B3

[4]

Q10.

- (a) 14

B1

- (b) $3 (+) 1 (+) 5 (+) 2 (+) 8 (+) 1$
Allow one error or omission
Accept clear indication on the diagram

M1

20

A1

[3]

Q11.

(a) 11

B1

(b) (purple classic =) 10

May be implied by a numerator of 10

$\frac{10}{80}$

oe implies M1

M1

$\frac{1}{8}$

SC1 fraction with denominator 80 fully simplified

A1

(c) 14

B1

(d) 17

B1

[5]

Q12.

- (a) $120 - 97$ or $89 - 70 + 31 - 27$
 oe or 19 or 4 seen

M1

23

*SC1 answer 46***A1**

- (b) 15

*for Wednesday***B1**

24

*for Thursday***B1**

- (c) $\frac{30}{120}$ seen

*oe fraction, decimal, percentage***M1** $\frac{1}{4}$ *SC1 $\frac{15}{43}$* *SC1 any seen fraction correctly cancelled to simplest form***A1**

- (d) $\frac{50}{150}$ or attempts to make a comparison
Seen or implied

M1

$\frac{1}{3}$ or $\left(\frac{1}{4} = \right) \frac{50}{200}$ or both values correct in appropriate comparison
Fraction/decimal/percentage

A1

Their yes with fractions with either same numerator (oe)
 or same denominator
 or with both values as decimals or both values as percentages
 or appropriate diagrams

*Strand (iii)**Supporting answers with explanations and evidence*

ft their $\frac{1}{4}$ from 3c and their $\frac{1}{3}$

Q1**Alternative method** $\frac{150}{4}$ *May be implied by diagram***M1**

37.5

A1Yes ($50 > 37.5$)**Q1****[9]**

Q13.

(a)

$$36 \times \frac{4}{9} \text{ or } 16 \text{ (Soft)}$$

$$\text{or } 36 \times \frac{5}{9} \text{ or } 20 \text{ (Hard)}$$

$$\text{or } 36 \times \frac{1}{3} \text{ or } 12 \text{ (Dark)}$$

$$\text{or } 36 \times \frac{2}{3} \text{ or } 24 \text{ (Milk)}$$

oe

implied by the numbers in the relevant row or column making the correct total

accept 16 seen in Milk Soft

accept 12 in Dark Hard

M1

	Hard	Soft
Milk	13	11
Dark	7	5

A2 two of Milk Soft = 11, Dark Hard = 7 and Milk Hard = 13

A1 Milk Soft = 11 or Dark Hard = 7

A3

Additional Guidance

	Hard	Soft
Milk	10	11
Dark	7	5

M1A2

	Hard	Soft
Milk	10	11
Dark	10	5

M1A1

For M1 the values must be seen outside the table or implied by the table but also accept 16 seen in Milk Soft or 12 in Dark Hard

	Hard	Soft
Milk	10	16
Dark	5	5

M1

(b)

$$\frac{5}{36} \text{ or } 0.13\dot{8} \text{ or } 13.\dot{8}\%$$

oe fraction, decimal or percentage

accept rounding to 2 sf or better

B1

Additional Guidance

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

Do not allow eg 5 in 36 or 5 out of 36 unless the correct probability seen

Do not allow ratio

Ignore words if correct probability seen

(c)

$$\frac{\text{their } 20}{36} \text{ or } \frac{5}{9} \text{ or } 0.\dot{5} \text{ or } 55.\dot{5}\%$$

oe fraction, decimal or percentage

correct or ft their Hard total from the table

accept rounding to 2 sf or better

B1ft

Additional Guidance

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

Do not allow eg 20 in 36 or 20 out of 36 unless the correct probability seen

Do not allow ratio

Ignore words if correct probability seen

[6]

Q14.

(a) 13

B1

(b) Cannot tell

B1

(c) $20 < x \leq 30$

B1

[3]

Q15.

(a) Sight of one five bar gate

B1

All three tallies correct

B1

All three frequencies correct

ft their tallies

B1ft

(b) Suitable vertical scale with equal increments

B1

Bars on horizontal axis labelled

B1

Three correct bars with equal gaps

ft their scale

B1 for one or two bars of correct height (condone

no or unequal gaps, and unequal widths)

B1 for a vertical line graph with three correct heights

SC2 for correct bar chart with labels for Chocolate (5), Vanilla

(6) and Strawberry (4) with no more than one error

B2ft

[7]

Q16.

(a) $\frac{11}{50}$ or 0.22

oe
B1 for numerator 11
or denominator 50
or 11 out of 50
or 11 in 50
Ignore fw

B2

(b) $1 \times 9 (+) 2 \times 12 (+) 3 \times 18 (+) 4 \times 7 (+) 5 \times 4$
or $9 (+) 24 (+) 54 (+) 28 (+) 20$

oe
Allow one error
May be in table

M1

135

A1

[4]

Q17.

Fully correct bar chart with equal gaps

Bar drawn at height of 10 for bus
Bar drawn at height of 7 for car
Bars drawn at 2 for Train and 1 for Walk
(train = twice walk is the condition)
Total = 20
B3 for correct bar chart but no or unequal gaps
or for 3 conditions met
B2 for 2 conditions met
B1 for 1 condition met

B4

Additional Guidance

Fully correct bar chart has equal width bars, equal width gaps and four correct heights

Accept if students relabel their scale, otherwise follow the mark scheme

The four conditions are:

1. Height 10 for bus
2. Height 7 for car
3. Train height twice as high as walk height
4. Total 20

[4]

Q18.

$a = 2$ and $b = 4$ and $c = 5$

or

$a = 4$ and $b = 2$ and $c = 5$

or

$a = 0$ and $b = 6$ and $c = 5$

B2 $a + b = 6$ with integer values of $a \geq 0$ and $b \geq 1$

B1 $c = 5$

or

$a + b + c = 11$ with integer values of $a \geq 0$ and $b \geq 0$ and $c \geq 0$

or

13th value = 3 and 14th value = 4 stated

or

correct median position indicated on a list

B3

Additional Guidance

Values may be seen alongside or in the table

Blank answer line does not indicate zero for that value eg $a = \underline{\hspace{1cm}}$ $b = 6$ $c = 5$

B1

$a = 2$ $b = 6$ $c = 5$

B1

$a = 11$ $b = 0$ $c = 0$

B1

$a = 6$ $b = 0$ $c = 5$

B1

$a = 6$ $b = 0$ $c = 3$

B0

[3]

Q19.

39

B1

[1]

Q20.

This question has been adapted to better suit the style of the current specification

(a) 28

B1

(b) 0

B1

[2]

Q21.

(a) **Alternative method 1**

$$4 + 21 + 28 + [1, 34] \text{ or } [54, 87]$$

or

$$\frac{4}{5}$$

$$\times 35 \text{ or } 28$$

M1

$$8000 \times \frac{\text{their } 81}{100} \text{ or } 6480$$

oe

M1dep

$$233\,280$$

A1

Alternative method 2

$$\frac{8000}{100}$$

$$\times 4 \text{ or } 320$$

and

$$\frac{8000}{100}$$

$$\times 21 \text{ or } 1680$$

and

$$\frac{8000}{100}$$

$$\times 28 \text{ or } 2240$$

and

$$\frac{8000}{100}$$

$$\times [1, 34] \text{ or } [80, 2720]$$

M1

$$\frac{8000}{100} \times 4 + \frac{8000}{100} \times 21 + \frac{8000}{100} \times 28 + \frac{8000}{100} \times \text{their } 28$$

oe

M1dep

$$233\,280$$

A1

(b) Any appropriate explanation

eg1 this is only a sample

eg2 it may not reflect the whole population

eg3 it may be different on another day

B1

[4]

Q22.

(a) 21

B1

(b)

$\frac{55}{100}$ or $\frac{11}{20}$ or 0.55 or 55%

oe fraction, decimal or percentage

B1

Additional Guidance

Ignore incorrect simplification or conversion after correct answer seen

(c) $21 \div 5$ or 4.2

or

$24 \div 5$ or 4.8

or

$37 \div 10$ or 3.7

or

$18 \div 20$ or 0.9

implied by a correct bar

M1

At least three of 4.2 4.8 3.7 0.9

implied by at least three correct bars

M1dep

Fully correct histogram

$\pm \frac{1}{2}$ small square

ignore frequency polygon if included

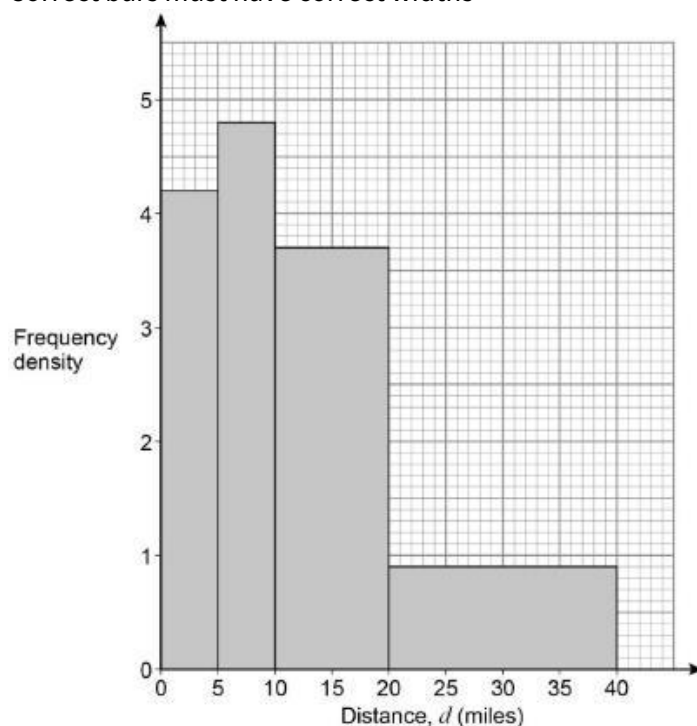
A1

Additional Guidance

Allow up to M2 even if not subsequently used or incorrectly plotted

Allow up to M2 for correct heights seen on a frequency polygon

Correct bars must have correct widths



M1M1A1

[5]