

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Statistics

Drawing bar charts

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) No and 23 and 25
or
No and 2 more

B2*B1 23 or 25**No may be implied by wording***Additional Guidance**

Check table for working

Ignore incorrect use of inequalities

23 is less than 25 so Shamira's wrong (box not ticked)

B2

- (b) Fully correct bar chart:
- Bars or axis labelled with types of vehicle (accept C, B, V, L)
 - four bars with equal widths
 - equal gaps or no gaps between the bars
 - all heights correct for their frequencies

*correct or ft their frequencies from (a) but not 0**B2 3 criteria met**B1 2 criteria met***B3ft****Additional Guidance**

Mark intention throughout

Condone a different gap between the vertical axis and the first bar, to the other (equal) gaps

Vertical lines can score a maximum of B2

Points can score a maximum of B1

[5]**Q2.**

Linear scale from zero used for frequency

B1

Bars at correct heights and equal widths with equal gaps

B1

Bars labelled

B1

Vertical axis labelled

*eg Number of students, frequency**Vertical axis can be horizontal for a horizontal bar chart***B1****[4]**

Q3.

Alternative method 1 – using the given scale

(O) $20 \div 5$ or (A) $8 \div 2$ or 4

or (O) $5 \div 20$ or (A) $2 \div 8$ or $\frac{1}{4}$
oe

M1

their 4×3 or $3 \div$ their $\frac{1}{4}$

or

their $4 \times$ their $(5 + 3 + 2) - 20 - 8$

or 12

*20 – 8 implies M2
may be on diagram*

M1dep

Correct width bar, in the correct position, drawn to height of 12
mark intention, ignore any shading

A1

Alternative method 2 – using squares

(O) $10 \div 5$

or (A) $4 \div 2$

or 2 (squares)

M1

their 2×3

or 6 (squares)

*10 – 4 implies M2
may be on diagram*

M1dep

Correct width bar, in the correct position, drawn to height of 12
mark intention, ignore any shading

A1

Additional Guidance

$(20 + 8) \div (5 + 2)$

M1

$(10 + 4) \div (5 + 2)$

M1

[3]

Q4.

(a) 8

B1

(b) 16

B1

(c) Physics and French

either order

mark intention eg accept P and F

B1

Additional Guidance

Condone incorrect spelling

(d) All six of the following criteria correct:

- width of bar
- overall height of bar
- correct gap from previous bar
- bar split in half horizontally
- appropriate shading/labelling
- 'history' label correct and in correct place

B1 any 5 of the criteria correct

B2

Additional Guidance

Apply a generous interpretation to their attempt to shade

The shading for the boys needs to be darker than the shading for the girls

(the part of the bar for the girls can be left unshaded)

Accept label(s) of 'boys' and/or 'girls' instead of shading

Ignore any numbers on bars, eg labelled 9 and 9

[5]

Q5.

Linear scale from zero used for frequency

B1

Bars at correct heights and equal widths with equal gaps

B1

Bars labelled

B1

Vertical axis labelled

eg Number of students, frequency

Vertical axis can be horizontal for a horizontal bar chart

B1

[4]

Q6.

- (a) $100 - 70 - 24$
or
 $70 + 24 (= 94)$ and $100 - \text{their } 94$
or
 $200 - 56 - 32 - 12 - 70 - 24$
oe
Accept sight of 94 or 194

M1

6

A1

- (b) Structure (equal widths)
If gaps present, must be equal

B1

Heights correct $\pm \frac{1}{2}$ square
(70, 24 and their 6)
B1 ft two correct heights ft their 6

B2 ft

- (c) Holidays abroad
or
Cannot tell with valid reason
Ticks Holidays abroad - more had a holiday abroad in 2011
Ticks Can't Tell - there is only one year's data
Ticks Can't Tell - references recession or weather
oe

B1

- (d) (Easier) for comparison
oe

B1

[7]

Q7.

(a) 20

B1

(b) Mathematics

(c) (i) Attempts a dual bar chart

Allow errors if intention clear

B1

Structure correct

*Bars paired, vertical scale numbered, horizontal scale labelled,
key/labels for Nick and Jen*

B1

Heights all correct

*Using their scale, linear between
40 and 90*

B1 all but one or two heights correct

B2

Alternative method 1

Turns Nick's pictogram into a bar chart, scales structure and heights correct

Vertical scale and horizontal labels

Structure including equal gaps

Heights

B2 for two correct

B1 for one correct

Max B3

Alternative method 2

Turns Jen's bar chart into a pictogram, structure, number of symbols, key

B2 two of structure, number of symbols and key

B1 one of structure, number of symbols and key

Max B3

(ii) 3 correct comparisons

B1 ft 2 correct comparisons

eg English was Jen's best score but

Mathematics was Nick's best score ft their diagram

B2 ft

A comparative statement for Nick and Jen for one subject
or totals or means or ranges

Strand (iii)

Q1

[9]

Q8.

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]

Q9.

(a) Cam

B1

(b) Bars of heights 15, 30 and 35 in the correct positions

*B1 for at least one correct bar
or all 3 heights correct*

B2

(c) 25 chosen

M1

65

A1

[5]

Q10.

(a) (i) 40

B1

(ii) their $40 + 80 + 60 (= 180)$

Allow one error or omission

M1

$250 - \text{their } 180$

Must subtract all three months

M1

Bar drawn to 70

SC1 bar drawn to their 70

A1

(b) $80 - 30$ or 5×10

Condone $80 - 25$ for M1

M1

50

Must show working SC1 50 no working SC1 $8 - 3 = 5$

A1

(c) (i) $80 + 50 + 30 + 70 (= 230)$

or $4 \times 50 (= 200)$

Condone $8 \times 50 (= 400)$

M1

$250 + \text{their } 230 + \text{their } 200$

or $\text{their } 400 + \text{their } 230 (= 630)$

M1

680

$430 \Rightarrow \text{M1 M0 A0}$

$630 \text{ seen} \Rightarrow \text{M1 M1 A0}$

A1

(ii) $0.5 \times \text{their } 680$
oe

340

M1

A1 ft

[11]

Q11.

- (a) At least four correct frequencies

May be seen in frequency table or implied by bars

M1

Five bars drawn to 1, 1, 10, 3, 5 in any order, but matching the continent labels if given

A1

Frequency axis correctly scaled, starting at 0, with at least two numbers given

Ignore scaling beyond their tallest bar

Must be using a scale of at least 0.5 cm per unit

B1

Correct structure – equal width bars, gaps **and** labels

Strand (ii) Logical organised working

Must have gaps of equal width between bars

Labels may be eg frequency or (number of) concerts

and continent names (may be on bars)

Q1

Additional Guidance

Evidence for the M mark could be found in or around the table, or from the bar heights

Condone bars of different widths for all but the Q mark

If no vertical scale is shown, assume 1 square = 1 concert or $\frac{1}{2}$ square = 1 concert

Vertical line graph can score all but the Q mark

Horizontal or vertical bar chart can score full marks

Allow vertical label to be 'Concerts' or 'Numbers' but not 'Tally'

(b) $\frac{5}{20}$

oe

Accept '5 out of 20' or '1 in 4' for this mark

M1

$\frac{1}{4}$

SC1 for fully simplifying any fraction

A1

[6]

Q12.

(a) 50

B1

(b) Bicycle

B1

(c) 35 and 25 **chosen**

or 35 – their 25

or their 35 – 25

$3\frac{1}{2}$ and $2\frac{1}{2}$ **chosen**

or $3\frac{1}{2}$ – their $2\frac{1}{2}$ or their $3\frac{1}{2}$ – $2\frac{1}{2}$ or 1 symbol

M1

10

A1

(d) Attempts a suitable graph with 3 or 4 bars

Condone vertical line graph

M1

Heights correct 50, 35, 20, 25

ft their part (a)

A1 one error

± ½ small square

A2ft

Numerical axis correctly scaled

Linear between 0 and their tallest bar

B1

Bar chart with labels **and** equal width bars **and** equal gaps

Strand (ii)

Labels may be eg frequency or number of people and car, bus,

bicycle, tram

Must have gaps

Q1

[9]

Q13.

(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]

Q14.

Linear scale starting at 0 and increasing in 1s on vertical axis
 Vertical axis labelled frequency or f or number
 Title given or horizontal axis labelled (types of) bird(s)
 Bars labelled with four bird names (allow R, S, W, L)
 Four bars with equal widths
 Equal gaps or no gaps between four bars
 All heights correct

Bar chart could be horizontal

B3 for all criteria met

B2 for 5 or 6 criteria met

B1 for 3 or 4 criteria met

correct or fit their increasing scale

B3

Additional Guidance

Mark intention throughout

If grid is blank, allow axes to be transposed

If axes and labels do not match the orientation of the bar chart then only the marks for criteria 3 (must be a title), 5, 6 and 7 may be awarded

B1 max

All values not needed for axis scale e.g. 0 can be implied but spacing must be linear

Scale of 2 units per square does not meet the first criterion

Allow words after 'Number' on axis label e.g. 'Number seen', 'Number of birds'.

Also allow e.g. Amount of birds

Title must include the word bird

Condone different gap between the vertical axis and the first bar with other gaps equal or no other gaps

If no axis scale, bars with heights 2, 5, 3, 1 meet heights criterion

Points only or vertical lines can score the marks for criteria 1, 2, 3, 4 and 7

B2 max

[3]

Q15.

(a) 4

B1

(b) February

B1

Additional Guidance

Accept any indication of February eg Feb

B1

(c) All five of the following criteria

- horizontal bar split at 5
 - correct width of bar
 - overall height of bar is 20
 - correct gap from April bar
 - correct shading or labelling
- B1 horizontal bar split at 5 or (Cycle =) 5
 or the following four criteria*
- correct width of bar
 - overall height of bar is 20
 - correct gap from April bar
 - correct shading or labelling

B2

Additional Guidance

Mark intention

Accept Walk bar unshaded

Either shading or labelling correct means shading or labelling criteria is met

For B2, correct shading or labelling must be Cycle at the bottom of the bar and Walk at the top of the bar

For B1, correct shading or labelling must be Cycle at the bottom of the bar and Walk at the top of the bar but not necessarily in a 5 / 15 split

Horizontal bar split at 5 can be indicated by correct shading of bar up to 5
Cycle = 5 may be implied by a bar drawn to 5 or a line at 5

[4]

Q16.

(a) $\frac{9}{16}$

oe fraction, decimal or percentage eg 0.5625 or 56.25%

B1

Additional Guidance

Ignore incorrect simplification or conversion of a correct probability to a fraction, decimal or percentage but not a ratio

eg1 $\frac{9}{16}$ 0.55

B1

eg2 $\frac{9}{16}$ 9 : 16

B0

Ignore words alongside a correct probability

eg1 $\frac{9}{16}$ unlikely

B1

eg2 9 out of 16 $\frac{9}{16}$

B1

Do not accept answer given in words or as a ratio eg 9 out of 16

B0

- (b) Linear scale starting at 0 and increasing in 1s or 2s on vertical axis
Vertical axis labelled frequency or f or Number or How many
Bars or horizontal axis labelled with four types of juice (accept A, G, O, M)
Four bars with equal widths
Equal gaps or no gaps between the four bars
All four heights correct
bar chart could be horizontal
bars may be in any order
B3 for all criteria met
B2 for 4 or 5 criteria met
B1 for 3 criteria met
or a fully correct 2-bar or 3-bar chart

B3

Additional Guidance

Mark intention throughout

If axes and labels do not match the orientation of the bar chart then only criteria 4, 5 and 6 may be awarded

B1 max

All values not needed for axis scale. For example 0 can be implied, but spacing must be linear

Allow words after 'Number' on axis label, eg 'Number chosen' or 'Number of people'

Condone a different gap between the vertical axis and the first bar to the other, equal gaps

If no scale or a non-linear scale is given, bars with heights 6, 1, 4, 5 squares meet the height criterion

Allow heights criterion if their heights match their labels for their nonlinear scale and it is linear between 1 and 6

Points only or vertical lines can score the marks for criteria 1, 2, 3 and 6

B2 max**[4]**

Q17.

- (a) All composite bars with correct widths and heights as
 Tuesday 8 and 6
 Wednesday 10 and 3
 Thursday 6 and 6
 Friday 12 and 4
B1 one composite bar correct
or
all four email sections correct at the bottom of composite bars
or
all four text sections correct at the top of composite bars
or
four bars with total heights 14, 13, 12 and 16 (no or incorrect divisions)
or
widths different but all four composite bars correct

B2**Additional Guidance**

Bars drawn freehand with clear intention of correct widths and heights

B2

Mark intention for heights but Wednesday height must be [6.4, 6.6] cm

Condone incorrect shading or lack of shading

- (b) $12 + 8 + 10 + 6 + 12$ or 48
or
 $5 + 6 + 3 + 6 + 4$ or 24
or
 $12 + 8 + 10 + 6 + 12 + 5 + 6 + 3 + 6 + 4$ or 72
may be seen near table
addition may be implied by a total at the bottom of a column

M1

$$\frac{48}{72}$$

*oe fraction***A1**

$$\frac{2}{3}$$

ft M1A0 with their fraction < 1 seen, if it can be simplified and it is fully simplified

A1ft**Additional Guidance**

$$\frac{2}{3}$$

 $\frac{2}{3}$ changed to decimal or percentage**M1A1A0**

Do not allow misreads from the table

[5]**Q18.**

- (a) Correct bar in correct position

B1**Additional Guidance**

Mark intention

Shading not required

- (b) 9

B1**[2]**