

8300

GCSE MATHEMATICS

Foundation tier – Questions by Topic – Mark Scheme

Statistics

Drawing pie chart

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.

90 seen or

[88°, 92°] drawn on pie chart

allow missing or incorrect label

M1

$\frac{20}{60}$

$\times 360$ or 120 seen

oe eg $360 \div 3$

or [118°, 122°] drawn on pie chart

allow missing or incorrect label

M1

Fully correct pie chart with unambiguous labels and all angles $\pm 2^\circ$

A1

Additional Guidance

All three labels (or a key) needed for the A1 but accept eg No, Yes, Rest or N, Y, M or N, Y, R

$\frac{1}{4}$

eg for No do not accept 15 (people) or $\frac{1}{4}$ or 90 as the label

Not using the given radius will score a maximum of M2

[3]

Q2.

(a) $360 - 75 - 165$ or 120 *oe*

M1

their $120 \div 4$ or 30

or their $120 \div 4 \times 3$ or 90

oe

implied by one correctly drawn angle in pie chart $\pm 2^\circ$

M1dep

30° sector labelled Green or G

and

90° sector labelled Red or R

$\pm 2^\circ$

line must be ruled

A1

Additional Guidance

Both sectors must be correctly labelled with letters or words for the accuracy mark

(b) $\frac{75}{360}$ or $\frac{360}{75}$ or $\frac{600}{360}$ or $\frac{360}{600}$

oe

eg $75 \div 360$

eg 0.208... or 0.21 or 4.8

or 1.66... or 1.67 or 0.6

M1

125

A1

Additional Guidance

125 out of 600

M1A1

$\frac{125}{600}$

M1A0

[5]

Q3.

- (a) Exactly ten options
 WW VS VC VM
 SS SC SM
 CC CM
 MM

or

exactly sixteen options

WW VS VC VM
 SV SS SC SM
 CV CS CC CM
 MV MS MC MM

may be given as words

B1

any six correct options from the sixteen options

B2

Additional Guidance

Both correct sixteen options listed and correct ten options listed

B2

- (b) **Alternative method 1**

$360 \div 180$ or 2

implied by a correct angle

or

implied by a correctly drawn angle in pie chart $\pm 2^\circ$

M1

Any two of

$45 \times \text{their } 2$ or 90°

$75 \times \text{their } 2$ or 150°

$50 \times \text{their } 2$ or 100°

$10 \times \text{their } 2$ or 20°

implied by any two correctly drawn angles in pie chart $\pm 2^\circ$

M1dep

Pie chart with four sectors drawn, two of which are correctly drawn with angles from 90° , 150° , 100° and 20°

$\pm 2^\circ$

lines must be ruled

M1dep

Fully correct pie chart and sectors labelled with flavours

$\pm 2^\circ$

lines must be ruled

A1

Alternative method 2

$45 \div 180 \times 100$ or 25%

or

$75 \div 180 \times 100$ or $41\frac{2}{3}\%$ or 42%

or

$50 \div 180 \times 100$ or $27\frac{7}{9}\%$ or 28%

or

$10 \div 180 \times 100$ or $5\frac{5}{9}\%$ or 6%

oe

M1

Any two of

$45 \div 180 \times 360$ or 90°

$75 \div 180 \times 360$ or 150°

$50 \div 180 \times 360$ or 100°

$10 \div 180 \times 360$ or 20°

implied by any two correctly drawn angles in pie chart $\pm 2^\circ$

M1dep

Pie chart with four sectors drawn, two of which are correctly drawn with angles from 90° , 150° , 100° and 20°

$\pm 2^\circ$

lines must be ruled

M1dep

Fully correct pie chart and sectors labelled with flavours

$\pm 2^\circ$

lines must be ruled

A1

Additional Guidance

All four sectors must be correctly labelled with letters or words for the accuracy mark

[6]

Q4.

- (a) One correct method eg $0.3 \times 360 (= 108 \text{ degrees})$

M1

All correct angles drawn $\pm 2^\circ$

108, 72, 180

A1 one correct angle calculated or drawn

A2

Structure correct

Strand (iii)

3 sector pie chart with labels in correct order of size

Q1

- (b) $5 + 3 + 2 (= 10 \text{ (cups)})$

1 cup = 8

M1

$80 \div \text{their } 10 \times 5$

oe their 8×5

Award M2 for $80 \div 2$

M1

40

If 40 seen with cola, ignore further work

A1

- (c) (i) Any correct comment

eg orange most in morning

If quantified must be correct

B1

- (ii) Lemonade

B1**[9]**

Q5.

(a) $360 - 72 - 90$ or 198

oe

$100(\%) - 20(\%) - 25(\%)$ or 55(%)

M1

their $198 \div 3 (\times 2)$ or 66 or 132

Correct line drawn implies M1M1

their $55 \div 3 (\times 2)$ or 18(.3...) or 36(.6...) or 37

M1

Correct line drawn within 2° and sections labelled correctly

L in the section with $[130^\circ, 134^\circ]$

M in the section with $[64^\circ, 68^\circ]$

A1

Additional Guidance

Correct line drawn must be a ruled line for A mark

Angles may be on the diagram

Mark diagram first, if line out of tolerance, check working for method marks

(b) $16\,200 \div 360$ or 45

or $360 \div 16\,200$ or 0.022...

or $16\,200 \times \frac{72}{360}$
oe

M1

3240

A1

Additional Guidance

Do not ignore further working

$16\,200 - 3240 = 12\,960$

M1A0

$\frac{3240}{16200}$ on answer line

M1A0

$16\,200 \div 4 \div 90$

M1

$16\,200 \div 5$

M1

20% of 16 200 without further correct working

M0

[5]

Q6.

90°

B1

[1]

Q7.

$$360 \div 5 \times 2$$

$$\text{or } 360 \div 15 \times 4$$

M1

144° sector **drawn**

Tolerance 2°

A1

Major sector divided into two sectors with the larger sector labelled 'No' and the smaller sector labelled 'Don't know'

Strand (ii) Logical organised working

Accept any unambiguous representation of No and Don't know, eg N and D

Q1

[3]

Q8.

Fully correct labelled pie chart

B3 Two or three correct sectors and four sectors labelled correctly

B3 Fully correct but incomplete or no labels

Spain 180°

Portugal 90°

Turkey 30°

B2 All angles calculated

Other 60°

B2 Two or three sectors correct but incomplete or no labels

Tolerance $\pm 2^\circ$

B1 At least one angle calculated in table

B1 One sector drawn and labelled correctly

B4

[4]