

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Statistics

Calculating the mean, median, mode and range

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) 4

B1

(b) $3 + 4 + 4 \dots$ or 48

and

their $48 \div 8$

their 48 must be from a seen attempt to total the values

M1

6

A1

[3]

Q2.

Median ticked

and

a valid reason for not using mode (eg there is no mode)

and

a valid reason for not using mean (eg 82 will affect the mean disproportionately)

B1

median ticked

or

valid reason to reject mean or valid reason to reject mode with any box or no box ticked

B2

Additional Guidance

Accept any indication in place of a tick

Ignore non-contradictory statements alongside a correct reason

Median ticked with reasons "There is no mode" and "82 would skew the mean"

B2

No box or mode ticked with reason "Not mean, because of the 82"

B1

No box or mean ticked with reason "Not mode, all the numbers are different"

B1

No box or mode ticked with statement that 82 is very large

B0

Condone "one number" or for "82" in reason for mean if intention is clear, e.g.

"One of the numbers is far bigger than the others"

Do not accept reasons for the mean indicating that 12.7 is too high unless 82 is also mentioned

Do not accept reasons given with the wrong measure

eg "It cannot be the mean as they're all different"

Do not accept a reason which simply defines mean and mode

Giving reasons for mode and mean does not imply a selection of median – the box must be ticked to achieve both marks

Median ticked with two valid reasons which are not attributed to median and mode

eg median ticked and "There is not a repeated number" and "82 is far too high to calculate the average"

B2

Otherwise, reasons must be attributed

[2]

Q3.

15 from 6 6 8 9 21

B2 5 integers with at least two criteria

- *mode 6 or*
- *median 8 **and***
- *total 50*

do not award B2 for mode and median only

B1 5 integers with any one of these criteria

- *mode 6*
- *median 8*
- *total 50*

B3

[3]

Q4.

False
True
True
True
True
False

B3 for 5 correct

B2 for 4 correct

B1 for 3 correct

B4

Additional Guidance

Accept any clear indication as their answer

[4]

Q5.

True
True
False

B2 two correct

B1 one correct

B3

Additional Guidance

Accept any indication, but if a tick and crosses are used in the same row, mark the tick

A row with more than one tick is incorrect for that row

[3]

Q6.

- (a) Orders the numbers to at least the sixth number from either end

1 2 2 3 4 5 (... ..)

or

8 6 5 5 5 4 (... ..)

(... ..) 5 4 3 2 2 1

or

(... ..) 4 5 5 5 6 8

or

4 and 5 indicated

$$\frac{4+5}{2}$$

or

2

M1

4.5 with no errors in working

oe eg $4\frac{1}{2}$

A1

Additional Guidance

4/5

M1A0

4,5 (cannot accept as 4.5)

M1A0

Allow 4 and 5 to be the only ones not crossed out as '4 and 5 indicated'

M1

eg 1 2 2 3 4 5 5 6 6 8 and answer 4.5 (error in ordering)

M1A0

eg 1 2 3 3 4 5 5 5 6 8 and answer 4.5 (error in ordering)

M1A0

Ignore any + signs between ordered values unless the total is then calculated and used in this part

- (b) $(5 + 6 + 1 + 3 + 5 + 5 + 8 + 4 + 2 + 2) \div 10$
or $41 \div 10$

Allow one value omitted or incorrect if method clear

M1

$$4.1 \text{ or } 4\frac{1}{10}$$

A1

Additional Guidance

Answer of 4 with correct working or 4.1 seen

M1A1

Answer of 4 without correct working and without 4.1 seen

M0A0

Condone missing first and/or final bracket for M1

If their total is not 41, all additions must be shown or implied

eg they write $5 + \dots + 2 = 42$ and $42 \div 10$

eg they write $5 + 6 + 1 + \text{etc} = 24$ and $24 \div 10$

M1A0

(both clearly implying that they are adding up all the numbers – minimum is two of the values shown as being added)

but, for example, $42 \div 10$ (no other working)

M0

Method mark could be scored for work at top of page, above, but not in, part (a)

It cannot be assumed that work done in part (a) is intended for part (b)

$$\frac{41}{10} \text{ or } \frac{4.1}{1}$$

Answer of $\frac{41}{10}$ or $\frac{4.1}{1}$ or 4 r(emainder) 1

M1A0

[4]

Q7.

7 from list 1 1 2 3 8

B2 5 integers with at least two criteria

- mode 1 or
- median 2 **and**
- total 15

B1 5 integers with any one of these criteria

- mode 1
- median 2
- total 15

B3

[3]

Q8.

- (a) 9

Ignore working which may be for 4(b)

B1

- (b) 5 7 9 9 10

*Numbers arranged in ascending or descending order **and** a clear indication that 9 is the middle number*

or

A clear and complete statement that 9 is the middle number when you arrange them in order

B1

[2]

Q9.

7, 8, 9, 11, 11, 11

7, 7, 9, 11, 11, 11

7, 9, 9, 11, 11, 11

B2 All three conditions met but not all whole numbers

B2 two conditions met with six numbers (need not be integers)

B1 one condition met with six numbers (need not be integers)

Numbers do not have to be in order.

B3

Additional Guidance

Mark answer line unless blank, then look for an obvious set of 6 numbers.

Must be 6 numbers.

7, 9, $9\frac{1}{2}$, $10\frac{1}{2}$, 11, 11

Mode, range and median but not all whole numbers

B2

7 8 10 11 11 11

Mode and range

B2

7 8 9 10 11 11

Mode and range

B2

8 9 10 10 11 12

Mode and range

B2

8 9 10 11 12 11

Mode and range (order not important)

B2

7.5, 8, 10, 11, 11, 11.5

Mode and range

B2

8 9 10 10 11 11

Median

B1

[3]

Q10.

(a) 4

B1

(b) 1, 1, 2, 3
 or 1, 1, 4, 4
 or 1, 2, 3, 4
 or 1, 2, 5, 5
 or 1, 3, 4, 5
 or 1, 3, 6, 6
 or 1, 4, 5, 6
 or 2, 2, 3, 5
 or 2, 2, 5, 6
 or 2, 3, 4, 6

Numbers do not have to be in order

*B1 for any set of 4 **whole** numbers between 1 and 6 with middle two values when ordered that differ by an odd number*

*SC1 for a correct answer that uses **whole** numbers greater than 6 and/or 0, eg 3, 4, 5, 8*

$2 \times \text{range} = (\text{sum middle two values} + 1)$

B2

Additional Guidance

5, 1, 3, 4

B2

1, 1, 4, 5

B1

2, 2, 3, 4

B0

4, 1, 4, 5

B0

1, 3, 4, 8

B0

4, 5, 6, 10

SC1

0, 0, 1, 1

SC1

[3]

Q11.

Five numbers with mode 8 and median 12

B1 five numbers with mode 8

eg 2 5 8 8 8 or 8 10 19 4 8

or

five numbers with median 12

eg -3 6 12 14 20

or 7 10 18 12 16

B2

Additional Guidance

8 8 12 16 25

B2

8 8 8 8 8

B1

12 12 12 12 12

B1

Do not allow bimodal sets of numbers for mode 8 but median may still be 12

eg 8 8 12 12 13

B1

eg 7 7 8 8 10

B0

A set of four or more than five numbers may score B1 if the mode is 8 and the median is 12

eg 8 8 11 13 20 21

B1

eg 8 8 16 17

B1

[2]

Q12.

Definitely true

Cannot be true

Might be true

B1 for each

any clear indication

B3

Additional Guidance

Only a cross in a row, mark the cross

A tick and cross(es) in a row – mark the tick

More than one tick in a row scores B0 for that row

[3]

Q13.

(a) (Alina range) 14

B1

(Sue median) 21

SC1 14 and 21 not correctly assigned

B1

(b) Alina and valid reason involving range

eg Alina and lower range

ft their range for Alina

B1ft

Additional Guidance

Quoted values must be correct for their part (a)

Condone “spread” for “range”

Part (a) Alina range 21 then indicates Sue, with Her range is lower

B1ft

Any reason involving median

B0

Alina, her scores are close(r) together (no mention of range)

B0

No range calculated in part (a)

B0

[3]

Q14.

Mode is 9

do not allow a bimodal list

B1

Middle two numbers (in numerical order) add to 26

B1

Range = 11

B1

Additional Guidance

There must be 6 numbers to award B3, but first and third marks may be awarded for a set of 5 numbers

If B3 cannot be awarded for their answer, award the best mark from boxes or in working (including legible, crossed out working) for up to B2

[3]

Q15.

- (a) mode = 8

May be implied from answer $\frac{8}{27}$ **B1**

$$2 + 3 + 6 + 7 + 9 \text{ or } 27$$

*Allow one error or omission if working shown***M1**

$$\frac{9}{27} \text{ or } \frac{1}{3}$$

*oe
ft their mode***A1ft**

- (b) 8 – 4 or 4

or

$$8 - 3 \text{ or } 5$$

M1

Range of 3A is smaller

and

4 and 5

*SC1 4 to 8 and 3 to 8 seen oe***A1**

- (c)
- $\frac{29 + 1}{2}$
- or 15th value identified

M1

6

A1**[7]****Q16.**

12 24 30 41

*B1**their median = $2 \times$ their LQ with the first eight values in order
and their UQ and their last number $\geq$ their median**or**their UQ = $2.5 \times$ their LQ with the first ten numbers in order and
their last number $\geq$ their UQ**or**their range = $2 \times$ their interquartile range with all values in
order***B2****Additional Guidance**

Take the boxes to be the LQ, median, UQ and highest value in that order

Decimal values can score up to B1

eg 11.5 23 29 40 has median = $2 \times$ LQ**B1**

Ignore blank boxes for B1

If all boxes are blank, mark the working lines

[2]

Q17.

8 and 10

B2 for any whole number combination that satisfies the median equal to the mean.

There are an infinite number.

Common ones are

(1, 12), (2, 11), (3, 10), (4, 9), (5, 8), (2, 6), (6, 7), (9, 14), (10, 18), (11, 22)

(11 + n, 22 + 4n), (15, 18), (16, 17), (any pair greater than 11 that total 33).

B1 for any decimal combination that satisfies the median equal to the mean.

There are an infinite number.

Common ones are

(7.5, 8), (8.5, 12), (8.5 + n, 12 + 4n).

B3

Alternative Method 1

$$22 + x + y = 5x \text{ oe}$$

M1

$$4x - y = 22 \text{ oe}$$

M1

8 and 10

A1

Alternative Method 2

Chooses values for x and y (which may be the same) where both are between 7 and 11 inclusive and calculates mean correctly or compares total to $5x$.

e.g. 8 and 9 chosen, Mean = $39 \div 5 = 7.8$ or total = $39 \neq 40$

NB an attempt at another pair of values implies rejection of first pair

M1

Chooses two further values for x and y where both are between 7 and 11 inclusive and calculates mean correctly or compares total to $5x$.

e.g. 9 and 10 chosen, Mean = $41 \div 5 = 8.2$ or total = $41 > 40$

M1

8 and 10

A1

[3]

Q18.

(a) 5

B1

(b) $3 + 5 + 5 + \dots$ or $56 (\div 8)$

M1

7

A1

[3]

Q19.

1 2 4 4
or
1 3 5 5
or
2 3 5 5
or
1 4 6 6
or
2 4 6 6
or
3 4 6 6

*B1 a set of 4 numbers between 1 and 6 with a single mode
Or a set of 4 numbers between 1 and 6 with median
identified/calculated
SC1 for 1 1 3 3
or 2 2 4 4
or 3 3 5 5
or 4 4 6 6
or 1 1 1 1 or 2 2 2 2 etc (up to 6 6 6 6)*

B2

[2]

Q20.

(a) Northern (Italy)

B1

(b) At least two of 9, 8 and 6

M1

9, 8 and 6 and Southern (Italy)

SC1 for 6 and Southern with no other working

A1

(c) $(10 + 5 + 11 + 7 + 12) \div 5$

or $45 \div 5$

Condone missing brackets

$5 \times 9 = 45$ (embedded answer)

M1

9

SC1 for 35.4

A1

(d) Central (Italy) and valid reason

Strand (ii)

e.g. mean between 5 and 13

all temperatures are between 5 and 13

only one that has 9 in it

above 5 and below 10

Q1ft

[6]

Q21.

Version 1 for marking amended paper with slowest time given in table 10.54
 $(10.03 + 10.61 + 10.08)(\div 3)$

Correct method for mean of any three or all five of Oscar's times

M1

30.72 or 10.24

A1

$(10.23 \times 5 - 9.15 - 10.54)(\div 3)$

M1

31.46 or 10.48(...) or 10.49

Accept 10.5 with correct working

A1

their 10.24 and their 10.48(...) or their 10.49 and correct ft decision
 or

their 30.72 and their 31.46 and correct ft decision

Allow rounding or truncating throughout

A1 ft

Version 2 used to mark paper with slowest time given in table 10.45

$(10.03 + 10.61 + 10.08)(\div 3)$

Correct method for mean of any three or all five of Oscar's times

M1

30.72 or 10.24

A1

$(10.23 \times 5 - 9.15 - 10.45)(\div 3)$

M1

31.55 or 10.5(1...) or 10.52

Accept 10.5 with correct working

A1

their 10.24 and their 10.5(1...) or their 10.52 and correct ft decision
 or

their 30.72 and their 31.55 and correct ft decision

Allow rounding or truncating throughout

A1 ft**[5]****Q22.**

(a) Writes the numbers in order of size: 20 21 23 23 24 (25 25 25 31)

Allow one error / omission / extra

or

31 25 25 25 24 (23 23 21 20)

M1

24

A1

(b) 25

B1**[3]**

Q23.

- (a)
- $21 + 20 + 29 + 22 + 24$
- or 116

*Allow one error or omission***M1**their total $\div 5$ *Condone $21 + 20 + 29 + 22 + 24 \div 5$* **M1**

23.2

*May be implied***A1**

23

*ft any decimal seen that is correctly rounded***B1ft**

- (b) 9

B1

- (c) Agrees
- and**
- Chris' mean is 23

Agrees **and** Chris' total is 116 and Tommy's total is 150*Strand (iii)*

or

*eg Tommy scored 150 runs which is more than Chris**eg True as all Chris' scores are under 30 ft their mean or total from (a)*

or

Correct **comparative** comment on means or total runs**Q1ft**

- (d) Agrees and Chris' range is 9

Strand (iii)

or

*eg Chris had a lower range so he was more consistent*Correct **comparative** comment about the range*ft their range from (b)***Q1ft****[7]****Q24.**

- 2 6 8 8 (in any order)

*B2 for any two of:**four numbers with a total of 24;**four numbers with a median of 7;**four numbers with **one** mode of 8.**B1 for one of the above.**SC1 for 24 seen in the working space.***B3****[3]**

Q25.

5, 12, 29 (any order)

Range 24 median 12

B2 correct values, median and/or range wrong or missing

B1 incorrect values but median and range correct for them

SC1 any student who gives 29 as range and 6 as median

B3

Alternative method

for students using **all** 6 numbers for the range (29) or median (6)

Also award B3 for any of these sets

Numbers (any order)	Range	Median
0, 3, 12	12	6
0, 3, 12	29	6
0, 3, 12	12	3
0, 5, 12	12	6
0, 5, 12	29	6
0, 5, 12	12	5
0, 7, 12	12	6
0, 7, 12	29	6
0, 7, 12	12	7
5, 12, 29	29	6
5, 12, 29	24	6
5, 12, 29	29	12

SC1 any student who gives 29 as range and 6 as median

B3

[3]

Q26.

5, 5 and 14

Any order

Conditions are

three positive numbers

mode 5

median 5

range 9

B1 for 2 or 3 conditions satisfied

B2

Additional Guidance

There are four condition to meet:

1. All three numbers must be positive

2. The mode must be 5

3. The median must be 5

4. The range must be 9

5, 5, -4 (satisfies three conditions but not positive)

B1

5, 5, blank (satisfies two conditions)

B1

Candidates who put more than 3 numbers score B0

Candidates who put 1 number score B0

[2]

Q27.

- (a) 15 and 10 in either order

B1 15 with a number less than or equal to 15

or

two numbers with a total of 25

B2

- (b) 17 and 11 in either order

B1 two numbers giving a range of 6 for set C

or

two numbers with a total of 28

B2

[4]

Q28.

- (a) 0, 7, 12
or 0, 7, 29
or 3, 7, 12
or 3, 7, 29
or 5, 7, 12
or 5, 7, 29

Any order

B1

- (b) 0, 3, 7
or 0, 5, 7
or 5, 7, 12

Any order

B1

- (c) Correct method for the mean of any three numbers

M1

- 0, 3, 12
or 0, 5, 7
or 0, 7, 29
or 3, 5, 7
or 3, 7, 29
or 5, 7, 12
or 7, 12, 29

Any order

A1

- (d) 5, 12, 29 (any order)
Range 24 median 12

B2 correct values, median and/or range wrong or missing

B1 incorrect values but median and range correct for them

SC1 any student who gives 29 as range and 6 as median

B3

Alternative method

for students using **all** 6 numbers for the range (29) or median (6)

Also award B3 for any of these sets

Numbers (any order)	Range	Median
0, 3, 12	12	6
0, 3, 12	29	6
0, 3, 12	12	3
0, 5, 12	12	6
0, 5, 12	29	6
0, 5, 12	12	5
0, 7, 12	12	6
0, 7, 12	29	6
0, 7, 12	12	7
5, 12, 29	29	6
5, 12, 29	24	6
5, 12, 29	29	12

SC1 any student who gives 29 as range and 6 as median

B3

[4]

Q29.

- (a) $(1 + 1 + 10 + 2 + 10 + 1 + 3) \div 7$ or $1 + 1 + 10 + 2 + 10 + 1 + 3$
 oe Allow one error or omission

M1

4 or 28 and 35

A1

(range =) 9

Range

B1

Ed's scores are higher on average

or Danni's scores are more varied

oe ft their values for mean or totals or range

Strand (iii)

Supporting answers with explanation and evidence

Q1

Ed's scores are higher on average (or in total)

and Danni's scores have bigger range

oe

ft their values for mean or totals and range

B1 ft

- (b) Danni and valid reason or Ed and valid reason

eg (Danni) only one that scored 10 (Ed) more consistent

B1 ft**[6]****Q30.**

- (a) 10, 10, 10, 11, 11, 12, 12, 13, 13, 15

Ordering. All 10 or 6 from either end

M1

11.5

A1

- (b) $10 + 10 + 10 + \dots$ or 117 seen

Attempt at Σx **M1**Their $117 \div 10$ **M1**

11.7

Ignore rounding to 12 if 11.7 seen

A1

- (c) Her average was (close to) 12

or

Mean or median rounds to/is about 12

B1**[6]****Q31.**

11 chosen with no other number less than 11 chosen

B1 4×10 or 40**M1**

23

SC1 for 2 numbers with a total of 34

A1**[3]**

Q32.

$6 \times 10 - (12 + 7 + 15 + 3)$
or $60 - 37$ or 23

*implied by two numbers with a total of 23
eg -11 and 34*

M1

Two positive numbers with a total of 23

A1

Two positive numbers which make the range of the list 19

eg a and 22, where $3 \leq a \leq 22$

B1

Additional Guidance

2 and 21 is the only fully correct answer

M1A1B1

11.5 and 11.5

M1A1B0

1 and 22

M1A1B0

0 and 23

M1A0B0

[3]

Q33.

9

B1

6

B1

[2]

Q34.

- (a) Subtracting two amounts with one correct

$124 - 79.5$

or

124 and 79.5 chosen

$79.5 + 44.5 = 124$

M1

44.50

*Condone 44.5***A1**

- (b)
- $124 + 79.5(0) + 122.5(0) + 96 + 85$
- or 507

*Allow one error or omission***M1**their total $\div 2$ *Condone bracket error ie*

$124 + 79.5(0) + 122.5(0) + 96 + 85 \div 2$ or $464.5(0)$ for M2

M1

253.50

*Strand (i) Correct notation**253.5 is M2Q0**SC2 760.50**SC1 760.5***Q1****Alternative method**At least **two** of these divisions

$124 \div 2$

or 62

$79.5(0) \div 2$

or 39.75

$122.5(0) \div 2$

or 61.25

$96 \div 2$

or 48

$85 \div 2$

or 42.5(0)

M1

their 62 + their 39.75 + their 61.25 + their 48 + their 42.50

*Allow one omission***M1**

253.50

*Strand (i) Correct notation**253.5 is M2Q0**SC2 760.50**SC1 760.5***Q1****Additional Guidance**If they do further division, mark the **whole** method eg $507 \div 2 \div 2$ M1M0**[5]**

Q35.

(Median =) $\frac{2x+6x}{2}$
or $4x (= 12)$ seen

oe

M1

$x = 3$

oe

A1

3, 6, 18 and 33 seen

or their $3 + 2(\text{their } 3) + 6(\text{their } 3) + 11(\text{their } 3)$

or their 3, 6, 18 and 33 seen

or (Mean =) $\frac{x+2x+6x+11x}{4}$

Allow one error

M1

$\frac{3+6+18+33}{4}$ or $\frac{20x}{4}$ or $5x$

or their $5x$

or $(\text{their } 3 + 2(\text{their } 3) + 6(\text{their } 3) + 11(\text{their } 3)) \div 4$

M1dep

15

ft $5 \times \text{their } x \text{ value}$

A1ft

[5]

Q36.

(a) 2nd

B1

(b)	$(4 + 2 + 4 + 8 + 8 + 7 + 9 + 5) \div 10$ or $(6 + 12 + 15 + 14) \div 10$ or $(25 + 22) \div 10$ or $2.5 + 2.2$ or $47 \div 10$ <i>Condone the omission of brackets</i> <i>Accept one error or omission in reading from diagram</i>	M1
4.7	oe	A1
Additional Guidance		
5 on answer line with 4.7 in working		M1A1
4 on answer line with 4.7 in working		M1A0
$(4 + 2 + 4 + 8 + 8 + 7 + 9) \div 10$ is one omission $(4 + 2 + 4 + 8 + 8 + 7 + 9 + 6) \div 10$ is one error $(6 + 12 + 15 + 13) \div 10$ assume one error $(25 + 23) \div 10$ assume one error $2.5 + 2.3$ assume one error		M1
Do not accept further calculation after 4.7 seen		
$47 \div 10 = 4.7$		
$4.7 \times 4 = 18.8$		M1A0
Use of away goals only, treat as misread from the words in part (a)		
$(2 + 8 + 7 + 5) \div 10$ or 2.2 condone the omission of brackets		M1A0
5 on answer line without working		M0A0
$(6 + 12 + 15) \div 10$ assume two omissions		M0A0

(c) Alternative method 1	
4 + 4 + 8 + 9 and 2 + 8 + 7 + 5 or 25 and 22	
Accept one error in reading from diagram	M1
3	A1
Alternative method 2	
4 – 2 or 2	
and 4 – 8 or –4	
and 8 – 7 or 1	
and 9 – 5 or 4	
Accept one error in reading from diagram	
Differences may be seen on the diagram	M1
3	A1
Additional Guidance	
25 – 22 = 3	M1A1
4 – 2 = 2 and 4 – 8 = –4 and 8 – 6 = 2 and 9 – 5 = 4 is one reading error	M1
4 – 2 = 2 and 4 – 8 = 4 and 8 – 7 = 1 and 9 – 5 = 4	M1
4 + 4 + 8 + 9 and 2 + 7 + 7 + 5 is one reading error	M1
24 – 21 = 3	A0
1 st 2 2 nd 4 3 rd 1 4 th 4 is one error in calculation without working	M0A0
1 st 2 3 rd 1 4 th 4 is one omission	M0A0
24 – 21 = 3 with no other working	M0A0
4 + 4 + 8 + 8 and 2 + 8 + 6 + 5 is two reading errors	M0
24 – 21 = 3	A0

- (d) No and valid reason
eg Indicates that one or more home teams might have won a game or games by a lot of goals

B1

Additional Guidance

In numerical examples relating to results, the total home goals must be more than the total away goals and there cannot be more home wins than away wins

eg

No, the scores could have been 2-0 6-0 0-3 0-2 2-2 3-3 3-3 4-4 4-4 1-1

B1

No, the scores could have been 2-0 6-0 0-3 0-2 and then all draws

B1

If scores are given, assume home team first

Use of 'they' implies the home team in a statement relating to a team

eg No, because they could score more just in one game

B1

No, the home team scored 0 in 9 matches and 25 in the final game

B1

No, the home team may have scored lots in one game

B1

No, multiple goals could be scored by a home team in one game

B1

No, the away team win a lot of games by one goal and lose by a lot of goals in one game

B1

Yes with or without an explanation

B0

No, the away team win a lot of games by one goal

B0

No, multiple goals could be scored in one game

B0

No, more goals scored at home but it doesn't mean that they won more

B0

No, we don't know how many goals were scored in each game

B0

No, the home team scored more goals in some games than others

B0

[6]

Q37.

- (a) mode A = 6 **or** mode B = 4
or
6 (with 9) **and** 4 (with 12) chosen

(mode A =) 6 **and** (mode B =) 4 **and** Yes

M1

A1

- (b) (range A =) 7 – 2 or 5
or
(range B =) 6 – 3 or 3

(range A =) 5 **and** (range B =) 3 **and** Yes

M1

A1

[4]

Q38.

(a) 11

B1

Additional Guidance

Must be seen in this part

(b) 3 4 4 5 9 10 12 14

or

14 12 10 9 5 4 4 3

or

3 4 4 9 5 9

or

14 12 10 9 5

or

$$\frac{5+9}{2}$$

or

5 and 9 chosen

allow one omission, extra or transcription error in a full list

M1

7

A1

Additional Guidance

Allow the ordered list to be seen by the given list or in part (a) even if part (b) is blank but not if the mean is calculated in part (b)

Correct ordering but calculates mean

M0A0

Answer 7.6...

M0A0

NB $3 + 4 = 7$

M0A0

Answer 7 from any or no list but not from $3 + 4$

M1A1

[3]

Q39.

- (a) 0 and 5 identified

M1

5

A1

Additional Guidance

0 – 5 or 0 to 5 and answer 5

M1A1

0 – 5 or 0 to 5 without answer 5

M1A0

$30 \div 6 = 5$

M0A0

$\frac{3+4}{2}$

- (b)

2

or

$\frac{30+1}{2}$

or 15.5

or

(between) 15th and 16th (value)

or

identifies 3 and 4

or

correct numbers listed in either order to at least 16th value

0, 0, 1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4

or

5, 5, 5, 5, 5, 5, 4, 4, 4, 4, 4, 4, 4, 4, 3

M1

3.5

A1

Additional Guidance

Correct ordered list of at least 16 terms starting from 0 or 5

M1

1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5

correct ordered list starting from 5

M1

$\frac{3+4}{2}$

$\frac{3+4}{2} = 3.5$ and 3 or 4 houses written on answer line

M1A0

(c) **Alternative method 1**

185 000 + 239 000 + 136 000
or 560 000

M1

their 560 000 $\times$ 0.02
oe

M1dep

11 200

SC1 33 600

A1

Alternative method 2

185 000 $\times$ 0.02 or 3700
or
239 000 $\times$ 0.02 or 4780
or
136 000 $\times$ 0.02 or 2720
oe

M1

185 000 $\times$ 0.02 + 239 000 $\times$ 0.02 + 136 000 $\times$ 0.02
or
their 3700 + their 4780 + their 2720
oe

M1dep

11 200

SC1 33 600

A1

Alternative method 3

185 000 $\times$ 1.02 or 188 700
or
239 000 $\times$ 1.02 or 243 780
or
136 000 $\times$ 1.02 or 138 720
oe

M1

(185 000 + 239 000 + 136 000) $\times$ 1.02 or 571 200
or
their 188 700 + their 243 780 + their 138 720
oe

M1dep

11 200

SC1 33 600

A1

Additional Guidance

560 000 + 11 200

M1M1A0

560 000 $\times$ 0.02 = 11 200 with 11 200 $\times$ 3

M1M0A0

[7]

Q40.

(a) 9

B1

(b) 3 9 9 9 12 14 15 16 18 18 20

or

20 18 18 16 15 14 12 9 9 9 3

or

3 9 9 9 12 14

or

20 18 18 16 15 14

allow one miscopy, extra or omission in full ordered list

M1

14

A1

Additional Guidance

Answer only of 14

M1A1

14 from an incorrect list will be M1 max

eg 3 9 9 9 12 14 15 16 18 19 20 Answer 14

M1A0

List ordered but clearly used for mean or mode or range in (b)

eg1 3 + 9 + 9 + 9 + 12 + 14 + 15 + 16 + 18 + 18 + 20 = 143 Answer 13

M0A0

eg2 3 9 9 9 12 14 15 16 18 18 20 = 143 Answer 13

M0A0

eg3 3 + 9 + 9 + 9 + 12 + 14 + 15 + 16 + 18 + 18 + 20 Answer 13

M0A0

eg4 3 9 9 9 12 14 15 16 18 18 20 Answer 9 (mode)

M0A0

eg5 3 9 9 9 12 14 15 16 18 18 20 Answer 17 (range)

M0A0

Answer 13 may come from value between 12 and 14

eg1 3 9 9 9 12 14 15 16 18 18 20 Answer 13 (bod)

M1A0

eg2 3 9 9 9 12 14 15 16 18 20 Answer 13

M1A0

Allow the ordered list to be seen by the given list

[3]

Q41.

(a) 4

M1

(b) 7 + 4 + 9 + or 50

M1

6.25

A1

[3]

Q42.

(a) 4

B1

(b) 2 4 4 8 10 11 12 15

or

2 4 4 8 10

or

15 12 11 10 8

or

8 and 10

or

$18 \div 2$

or

8 + 1

2th or 4.5th value

full list of numbers in either order

allow one missing, extra or transcription error in an otherwise

full list of numbers

list of first or last five numbers in either order

allow only a transcription error in a list of the first or last five numbers

oe works out the position of the median in the list

M1

9

A1

Additional Guidance

Ordered list in the stem of the question can be assumed to be for part (b) unless contradicted by the working seen in the working space

Numbers in a list may be seen crossed out in an attempt to find the median

Answer 9 from any or no list

M1A1

Puts list in order then finds the mean

M1A0

States 4.5th and gives 11.5 (oe)

M1A0

(c) 13

B1

[4]

Q43.

(a) 3.8

B1

(b) $(14.2 + 15.1 + 16.5 + 16.7 + 18) \div 5$

or

$80.5 \div 5$ oe

M1

16.1 SC1 66.1

A1

Additional Guidance

Condone missing brackets in working for M1

Condone 16 after 16.1 seen

[3]

Q44.

mean of grouped data

accept any indication

B1

[1]

Q45.

(a) 1

B1

Additional Guidance

1 with 10 indicated as the greatest frequency eg 1 scores 10

B1

1 (10)

B0

1, 10 is the most

B0

1 and 10

B0

(b) $(0 \times 7 \text{ and}) 1 \times 10 \text{ and } 2 \times 8$
and $3 \times 7 \text{ and } 4 \times 5 \text{ and } 5 \times 3$
or
(0 and) 10 and 16 and 21
and 20 and 15
or 82

allow one error or omission

M1

$$\frac{(0+) 10 + 16 + 21 + 20 + 15}{40}$$

or $82 \div 40$

or their $82 \div 40$

$$\text{oe eg } \frac{82}{40} \text{ or } \frac{41}{20} \text{ or } 2\frac{1}{20}$$

M1dep

2.05

accept 2.1 or 2 with $82 \div 40$ seen

A1

Additional Guidance

$82 \div 6$ or $82 \div 15$

M1M0

$0 \times 7 + 1 \times 10 + 2 \times 8 + 3 \times 7 + 4 \times 5 + 5 \times 2$ (5×2 is one error)
 $77 \div 40 = 1.925$

M1M1A0

$7 + 10 + 16 + 21 + 20 + 15$ (7 is one error)
 $89 \div 40 = 2.225$

M1M1A0

$10 + 21 + 20 + 15$ (16 missing is one omission)
 $66 \div 40 = 1.65$

M1M1A0

$(0 +) 10 + 16 + 21 + 20 + 15 \div 40$ with missing brackets not recovered

M1M0

Correct products or values seen but a different method used is a choice of methods

eg (0) 10 16 21 20 15 followed by $40 \div 6$ or $40 \div 15$

M0

(c) $10 + 8 + 7 + 5 + 3$ or 33

or

$40 - 7$ or 33

or

$$\frac{7}{40}$$

oe

M1

$\frac{33}{40}$

or 0.825 or 82.5%

oe

accept 0.83 or 83%

A1

Additional Guidance

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

Ignore conversion attempt after correct answer seen

33 out of 40

M1A0

33 : 40

M1A0

[6]

Q46.

(a) $(18\,300 + 20\,700 + 21\,500 + 21\,500 + 21\,500 + 99\,000) \div 6$

or $202\,500 \div 6$

oe

allow missing brackets

M1

33 750

SC1 120 000 or [30 166, 30 167]

A1

Additional Guidance

Correct answer followed by rounding eg 33 750 followed by 30 000

M1A1

Special cases are for missing brackets or omitting one 21 500

Addition signs between the numbers with an attempt at a total implies addition

A vertical column of the 6 numbers with an attempt at a total implies addition

Allow misreads but must be dividing by 6

Accept incorrect money notation for the mean

eg1 33 750.0

M1A1

eg2 30 166.6

SC1

- (b) Valid explanation
accept any indication that one of the values is non-typical, or that the mean would be non-typical

B1

Additional Guidance

Ignore any attempt to state the best average

Ignore irrelevant, non-contradictory statements

Accept any indication that 99 000 is **significantly** different

One is an outlier / anomaly / is an odd one out / doesn't fit

B1

The large value boosted the average

B1

The average is too large

B1

(Five are below / most are below and) only one is above the mean

B1

Five are below / most are below (and only one is above) the mean

B1

99 000 / one number is **much** bigger

B1

99 000 / one number is bigger

B0

The range is too large

B0

The numbers are all different

B0

Some numbers are much bigger

B0

Some of the numbers are the same

B0

It is an estimate / it's not exact / it's not accurate

B0

[3]

Q47.

- (a) Same as the LQ (and/or UQ)
oe

B1

- (b) Same as the LQ (and/or UQ)
oe or same as median

B1

- (c) Nothing
oe

B1

[3]

Q48.

- (a) 50

B1

- (b) 64

B1

- (c) 36

B1

[3]