

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Statistics

Finding averages from grouped data

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.

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]

Q2.

(a) 20 – 2 minutes 50 seconds
oe

M1

17 minutes 10 seconds
SC1 17.1 or 17.5

A1

Additional Guidance

SC is for those who understand range and calculation but do not work out the timing correctly.

(b) Valid reason
eg Median is in $10 < t \leq 15$ class (so does not include 10 minutes)

B1

[3]

Q3.

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]

Q4.

(a) 20 – 3 minutes 40 seconds
oe

M1

16 minutes 20 seconds

A1

(b) Valid reason
*eg Median is in $10 < t \leq 15$ class
(so does not include 10 minutes)*

B1

[3]

Q5.

Any two of

16×5 or 80

22×15 or 330

13×25 or 325

9×35 or 315

implied by 1050

M1

(their 80 + their 330 + their 325 + their 315) $\div$ 60

oe

must be sum of four numbers

condone missing final bracket

M1dep

17.5 or $\frac{1050}{60}$

oe value eg $17\frac{1}{2}$

A1

Additional Guidance

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

Ignore simplification or conversion attempt after correct answer seen

Answer 17 or 18 with 17.5 seen

M2A1

17.5 in working with $10 < v \leq 20$ on answer line

M2A0

17.5 then answer doubled

M2A0

[3]

Q6.

(a) $2 \leq t < 4$

(b) **Alternative method 1**

B1

$32 + 19 + 20$ or 71 and 80×0.9

Or $(32 + 19 + 20) \div 80 \times 100$ or 88.75

oe

M1

71 and 72 and No

Or 88(.75)(%) or 89(%) and No

Accept 88(.75)(%) and Yes because it rounds to 90

A1

Alternative method 2

$7 + 2$ or 9 and 80×0.1

or

$(7 + 2) \div 80 \times 100$ or 11.25

oe

M1

9 and 8 and No

or

11(.25)(%) or 12(%) and No

A1

[3]

Q7.

(a) Mid values seen

5, 15, 25
or 5.005, 15.005, 25.005
or 5.01, 15.01, 25.01

B1

$$5 \times 42 + 15 \times 30 + 25 \times 8$$

Accept use of mid values 5.005, 15.005, 25.005 or 5.01, 15.01, 25.01

Allow one error

eg one mid value incorrect or one calculation incorrect

M1

$$\text{their } 860 \div 80$$

M1dep

$$10.75 \text{ or } 10.76 \dots$$

SC2 for 5.75 or 5.76 or 15.75 or 15.76

A1

(b) Indicates higher

B1

Valid reason eg more people wait for 10 – 20 mins and 20 – 30 mins in the second group

B1

[6]

Q8.

$$100 \div 2 \text{ or } 50(\text{th}) \text{ or } 50.5(\text{th})$$

M1

$$1 < t \leq 2$$

A1

[2]

Q9.

(a) $4 \leq t < 6$

B1

(b) **Alternative method 1**

$$18 + 10 + 16 + 12 \text{ or } 56 \text{ and}$$

$$60 \times 0.9$$

or

$$(18 + 10 + 16 + 12) \div 60 \times 100 \text{ or } 93.3 \dots$$

oe

M1

56 and 54 and Yes

or 93(.33)(%) and Yes

A1

Alternative method 2

$$4 \text{ and } 60 \times 0.1$$

or

$$4 \div 60 \times 100 \text{ or } 6.66$$

oe

M1

4 and 6 and Yes

or

6(.66)(%) or 7(%) and Yes

A1

[3]

Q10.

Alternative method 1

Any three of

$[9.5, 10.5] \times 22$ or $[209, 231]$

and

$[29.5, 30.5] \times 9$ or $[265.5, 274.5]$

and

$[49.5, 50.5] \times 6$ or $[297, 303]$

and

$[69.5, 70.5] \times 3$ or $[208.5, 211.5]$

or

1000

M1

(their $[209, 231]$

+ their $[265.5, 274.5]$

+ their $[297, 303]$

+ their $[208.5, 211.5]$) $\div 40$

or

$1000 \div 40$

oe

condone bracket error if working seen

e.g. $220 + 270 + 300 + 210 \div 40$

M1dep

25

A1

$\frac{35}{\text{their } 25}$ or $\frac{7}{5}$ or 1.4

oe e.g. $1 + \frac{35 - \text{their } 25}{\text{their } 25}$

M1

140

ft their 25 with 3rd M1 scored

A1ft

Alternative method 2

Any three of

$[9.5, 10.5] \times 22$ or $[209, 231]$

and

$[29.5, 30.5] \times 9$ or $[265.5, 274.5]$

and

$[49.5, 50.5] \times 6$ or $[297, 303]$

and

$[69.5, 70.5] \times 3$ or $[208.5, 211.5]$

or

1000

M1

35×40 or 1400

M1

1000 and 1400

A1

$$\frac{\text{their 1400}}{\text{their 1000}} \text{ or } \frac{7}{5} \text{ or } 1.4$$
$$+ \frac{\text{their 1400} - \text{their 1000}}{\text{their 1000}}$$

oe e.g.
dep on M2M

M1dep

140

*ft their 1400 and their 1000
with M3 scored*

A1ft

Additional Guidance

Alt 1 Correct products seen in the table but a different method not using their products used for the mean shown in the working lines

e.g. $40 \div 4 = 10$ can score a maximum of M0M0A0M1A1ft

Alt 1 $1000 \div 4 (= 250)$ is not a misread

NB The dependency of the M marks and the requirement for applying A1ft are different for the two alternative methods

Alt 1 3rd M1

Allow any number for their 25 (unless it contradicts their mean)

Alt 1 3rd M1 and A1ft

If there is a mean for the boys allow the M mark to be implied by a correct ft answer

e.g. from a mean of 250 allow M1A1ft for 14%

For A1ft allow answers to the nearest whole number or better

Further work after working out the percentage is 3rd M0

e.g. Mean = 25

M1M1A1

$$\frac{35}{\text{their 25}} \times 100 = 140$$

$140 - 100 = 40$ Answer 40

M0A0

[5]

Q11.

$$10 < t \leq 15$$

B1

[1]

Q12.

$$1 < t \leq 2$$

B1

[1]

Q13.

2.5(0) × 11 or 27.5(0)
or 7.5(0) × 7 or 52.5(0)
or 12.5(0) × 2 or 25

M1

their 27.5(0) + their 52.5(0) + their 25
or 105

sum of fx

M1dep

their 105 ÷ 20 or 5.25

M1dep

5.25 and correct conclusion

oe

eg 5.25 and women gave more

A1

Additional Guidance

$$105 \div 3 = 35$$

M1M1M0A0

[4]

Q14.

55 × 1 or 55
or 70 × 6 or 420
or 90 × 13 or 1170

M1

their 55 + their 420 + their 1170
or 1645

sum of fx

M1dep

their 1645 ÷ 20 or 82.25

M1dep

82.25 and correct conclusion

oe

eg 82.25 and men were faster.

A1

Additional Guidance

$$1645 \div 3 = 548.3333$$

M1M1M0A0

[4]

Q15.

$[0, 5] \times 20 + [5, 10] \times 48 + [10, 15] \times 30 + [15, 20] \times 22$
or 1170 *Must add 4 products*

M1

their $1170 \div 120$

M1dep

9.75 or $\frac{39}{4}$ or $9\frac{3}{4}$

A1

Additional Guidance

$1170 \div 120$ or 9.75 with $5 < x \leq 10$ on answer line

M2A0

Do not allow M1 for working in the table if a different method is used in working lines

[3]

Q16.

(a) 2.5×12 or 30

and

7.5×7 or 52.5

and

$12.5 (\times 1)$

or

95

allow one incorrect midpoint

or $[2, 3] \times 12$ and $[7, 8] \times 7$

and $[12, 13] (\times 1)$

ignore $t \geq 15$ row

M1

their 30 + their 52.5 + their 12.5
12 + 7 + 1

or $95 \div 20$

$t \geq 15$ product must be 0 if seen

condone bracket error seen eg $30 + 52.5 + 12.5 \div 20$

M1dep

4.75

*accept 4.8 or 5 if full working shown using **correct** midpoints*

A1

Additional Guidance

Two correct from 30, 52.5 and 12.5 implies the first mark and could be used to score up to M2

M1

Midpoints used in the ranges $[2, 3]$, $[7, 8]$ and $[12, 13]$ must be seen

eg

2.5×12 and 7×7 and $12 (\times 1)$

or 3×12 and 7×7 and $13 (\times 1)$

NB These could be used to score up to M2

M1

Correct products seen in the table but a different method shown in the working lines

eg $20 \div 4 = 5$

M0

(b) Lower than part (a)

B1

[4]

Q17.

Alternative method 1

Mid values seen (continuous data)

5, 15, 25, 35 and 45

Allow one error

M1

All products seen for their mid values

4×5 or 20

8×15 or 120

9×25 or 225

3×35 or 105

1×45 or 45

or 515

Allow one calculation error

M1dep

their $(20 + 120 + 225 + 105 + 45) \div 25$

their $515 \div 25$

or 20.6 or 21

or 22×25 or 550

M1dep

20.6 or 21 and no

SC2 15.6 or 16 and no

or 16.6 or 17 and no

or 25.6 or 26 and yes

or 515 and 550 and no

or 390 or 400 or 415 or 425 and 550 and no

or 640 or 650 and 550 and yes

A1

Alternative method 2

Mid values seen (discrete data)

5.5, 15.5, 25.5, 35.5 and 45.5

Allow one error

M1

All products seen for their consistent mid points

4×5.5 or 22

8×15.5 or 124

9×25.5 or 229.5

3×35.5 or 106.5

1×45.5 or 45.5

or 527.5

Allow one calculation error

M1dep

their $(22 + 124 + 229.5 + 106.5 + 45.5) \div 25$

their $527.5 \div 25$

or 21.1 or 21

or 22×25 or 550

M1dep

21.1 or 21 and no

SC2 15.6 or 16 and no

or 16.6 or 17 and no

or 25.6 or 26 and yes

or 527.5 and 550 and no

or 390 or 400 or 415 or 425 and 550 and no

or 640 or 650 and 550 and yes

A1

Additional Guidance

Beware, sight of 5 is not necessarily the first mid value as there are 5 groups

Beware, the middle of the middle class is 25

[4]

Q18.

(a) $15 < x \leq 25$

B1

(b) Mid values seen

10, 20, 30, 40 and 50

or 10.005, 20.005, 30.005, 40.005, 50.005

or 10.01, 20.01, 30.01, 40.01, 50.01

B1

$10 \times 14 (+) 20 \times 12 (+) 30 \times 11$

$(+) 40 \times 2 (+) 50 \times 1$

or $140 (+) 240 (+) 330 (+) 80 (+) 50$

or 840

Accept use of mid values 10.005, 20.005

etc or 10.01, 20.01 etc

Allow one error

eg one mid value incorrect

or one calculation incorrect

M1

their $840 \div 40$

M1dep

21 or 21.01

Accept 21.005

SC2 for 16 or 16.005 or 16.01

or 21.5(0) or 21.505 or 21.51

or 26 or 26.005 or 26.01

or 791.25

A1

Additional Guidance

21 and then states answer is in $15 < x \leq 25$ class is fw and can be ignored

4 marks

$140 + 240 + 330 + 80 + 50 \div 40 = 21$ (recovered)

4 marks

$$\frac{140 + 240 + 330 + 80 + 50}{40} = 791.25$$

B1M1M1A0

$140 + 240 + 330 + 80 + 50 \div 40 = 791.25$

B1M1

Answer 791.25 implies at least B1M1

840

B1M1

$840 \div 5 = 168$

B1M1M0

140, 240, 330, 80, 50

B1M1

168 with no working

M0

Note: Two or more midpoints incorrect

B0M0

[5]

Q19.

Midpoints used

31, 33, 35, 37

At least 3 seen

B1

$(31 \times 3) + (33 \times 9) + (35 \times 6) + (37 \times 2)$

Or $93 + 297 + 210 + 74$

Attempt at $\sum fx$ with x values on or between class boundaries

M1

Their $674 \div 20$

M1

33.7

Allow 34 from correct working seen

A1

[4]

Q20.

- (a) Midpoints seen or implied
5, 15, 25, 35, 45

B1

their $\sum fx$

*This mark is for the sum of their midpoints $\times$ frequencies but
condone one error*

$$5 \times 5 + 15 \times 22 + 25 \times 28 + 35 \times 21 + 45 \times 4$$

$$\text{or } 25 + 330 + 700 + 735 + 180$$

$$\text{or } 1970$$

$$5 \times 5 = 25$$

$$15 \times 22 = 330$$

$$25 \times 28 = 700$$

$$35 \times 21 = 735$$

$$45 \times 4 = 180$$

M1

their $\sum fx \div 80$

$$\text{their } 1970 \div 80$$

M1dep

$$24.6(\dots)$$

Accept 25 with working shown

A1

- (b) $5 + 22 + 28$ or 55

$$21 + 4 \text{ or } 25$$

M1

$$\frac{5 + 22 + 28}{80}$$

$$\times 100$$

$$\frac{21 + 4}{80}$$

$$\times 100$$

M1

$$68(\dots)(\%) \text{ or } 69 \text{ and No}$$

$$31(\dots)(\%) \text{ and no}$$

A1

Alternative Method

$$5 + 22 + 28 \text{ or } 55$$

$$21 + 4 \text{ or } 25$$

M1

$$\frac{70}{100}$$

$$\times 80 \text{ or } 56$$

$$\frac{30}{100}$$

$$\times 80 \text{ or } 24$$

M1

$$55 \text{ and } 56 \text{ and No}$$

$$\text{or } 56 \text{ is in the } 30 - 40 \text{ group so No}$$

$$24 \text{ and } 25 \text{ and No}$$

A1

[7]

Q21.

(a) 13

B1

(b) Cannot tell

B1

(c) $20 < x \leq 30$

B1

[3]

Q22.

(a) $200 < t \leq 240$

B1

(b) $16 \times 220 (= 3520)$ or $4 \times 260 (= 1040)$

Attempt at fx using one correct midpoint

or $4 \times 300 (= 1200)$ or $2 \times 380 (= 760)$

or $2 \times 460 (= 920)$ or $2 \times 500 (= 1000)$

or

8440

M1

(their 3520 + their 1040 + their 1200 + their 0 + their 760 + their 0 + their 920 + their 1000) $\div 30$

1055 implies M1M0A0

7473.(...) implies M1M1A0

M1 dep

281 or 282 or 281.3 (...)

SC2 301.(3..) or 261.(3..)

A1

(c) Ticks modal class and gives valid reason oe

the mean is affected by a few (older) slower times

eg Current performance in this class

or

This class has shorter times

or

older / slower times irrelevant to current performance

B1

[5]

Q23.

(a) Mid values seen

5, 15, 25

or 5.005, 15.005, 25.005

or 5.01, 15.01, 25.01

B1

$5 \times 18 (+) 15 \times 15 (+) 25 \times 7$

Accept use of mid values 5.005, 15.005, 25.005 or 5.01, 15.01, 25.01

Allow one error

eg one mid value incorrect or one calculation incorrect

M1

their $490 \div 40$

M1dep

12.25 or 12.26

SC2 for 7.25 or 7.26

or 17.25 or 17.26

A1

(b) Indicates lower

B1

Valid reason

eg (£)4.50 is less than (£)5 and (£)23.40 is less than (£)25

B1

[6]

Q24.

- (a) One correct midpoint seen or consistent attempts at midpoints

M1

At least one value of fx attempted

For consistent midpoints; if correct:

$$0.15 \times 31 (= 4.65)$$

$$0.25 \times 42 (= 10.5)$$

$$0.35 \times 19 (= 6.65)$$

$$0.45 \times 8 (= 3.6)$$

M1

Their total fx divided by 100

dep on M2

$$25.4 \div 100 \text{ if correct}$$

M1 dep

0.254

SC2 0.204 or 0.304

Accept answer 0.25 only if correct $\sum fx$ seen

A1

- (b) Plotted at correct midpoints (allow one error)

Correct plots are (0.15, 31), (0.25, 42), (0.35, 19), (0.45, 8)

M1

Fully correct graph

A1

- (c) She is faster on average with her glasses

oe comment on mean or modal class

ft their mean value from part (a)

B1ft

The range of times is similar

oe comment on range or accept interquartile range without calculation

B1**[8]**

Q25.

$$15 \times 7.2 \quad \text{or} \quad 108$$

and

$$18 \times 7.6 \quad \text{or} \quad 136.8$$

and

$$7 \times 8 \quad \text{or} \quad 56$$

oe

implied by 300.8

allow one product or fx value to be incorrect

M1

$$(108 + 136.8 + 56) \div 40$$

or

$$\frac{188}{25}$$

$$300.8 \div 40 \quad \text{or} \quad \frac{188}{25}$$

oe

do not allow if any exact fx or Σ fx value is approximated

M1dep

$$7.52$$

accept 7.5 if 7.52 in working lines with no incorrect method

A1

Additional Guidance

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

$$15 \times 7.2 \quad 18 \times 7.6 \quad 7 \times 8$$

M1

$$(108 + 137 + 56) \div 40 \quad (\text{fx value 137 is approximated})$$

M0

$$108 + 136.8 + 56 = 300.8$$

M1

$$300 \div 40 \quad (\Sigma \text{fx value 300 is approximated})$$

M0

M1dep Missing brackets must be recovered

eg $108 + 136.8 + 56 \div 40$ not recovered

M1M0

$$7.52 \text{ in working with answer } 7.4 \leq d < 7.8$$

M2A0

[3]

Q26.

(a)

	✓
	✓

B1

- (b) 101×65 or 6565 or
 64×75 or 4800 or
 25×85 or 2125 or
 10×95 or 950 or 14 440

Attempt at fx using one correct midpoint
3610 implies M1M0A0

M1

(their 6565 + their 4800 + their 2125 + their 950) $\div$ 200
Condone missing brackets eg 13494.75 implies M1M1A0

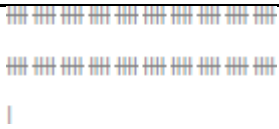
M1dep

72.2

SC2 77.2 or 67.2
Accept 70 or 72 with fully correct working

A1

(c)

	101
	66
	29
	14

B1 all frequencies correct
or
all tallies correct
or
two rows correct

B2

- (d) frequency polygon and histogram

B1

[7]

Q27.

- (a) 15×24 or 360
and
 40×76 or 3040
and
 55×52 or 2860
and
 75×48 or 3600
or
9860

allow one incorrect midpoint

M1

$(\text{their } 360 + \text{their } 3040 + \text{their } 2860 + \text{their } 3600) \div 200$

or

$9860 \div 200$

condone bracket error seen

eg $360 + 3040 + 2860 + 3600 \div 200$

M1dep

49.3

accept 49 if full working shown using correct midpoints

A1

Additional Guidance

Four values or products with three correct from 360, 3040, 2860 and 3600

implies the first mark and could be used to score up to M2

Correct products seen in the table or working but a different method

shown in the working lines eg $200 \div 4$

M0

Ignore attempts to convert to minutes and seconds after 49.3 seen

eg 49 min 18 s or 49 min 30 s

49.3 in working with answer $30 \leq t < 50$

M2A0

- (b) $24 \div 30$ or 0.8
 or
 $76 \div 20$ or 3.8
 or
 $52 \div 10$ or 5.2
 or
 $48 \div 30$ or 1.6

implied by a correct bar

or
 four frequency densities in correct proportion
eg 8 and 38 and 52 and 16

M1

At least three of 0.8 and 3.8 and 5.2 and 1.6
implied by at least three bars in correct proportion

M1dep

At least 3 bars in correct proportion with matching scale on vertical axis
 or
 at least 3 bars in correct proportion with a matching key

M1dep

Fully correct histogram with scale on vertical axis or a key

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

A1

ignore frequency polygon if included

Additional Guidance

Allow up to M2 even if not subsequently used
 Correct bars must have correct widths

[7]

Q28.

2×6 or 12
and
 7×11 or 77
and
 12×3 or 36
or
125

*may be seen in table
at least two correct products or their values*

M1

their 12 + their 77 + their 36
20

or $\frac{125}{20}$ or $125 \div 20$ or $6\frac{1}{4}$

*oe
condone bracket error if working seen
eg condone $12 + 77 + 36 \div 20$*

M1dep

6.25

A1

Additional Guidance

6.25 in working, 6 on answer line

M1M1A0

$125 \div 3$

M1M0A0

Correct product(s) seen in the table but a different method not using their product(s) used for the mean is chosen

eg 125 in table but mean calculated as $20 \div 3 = 6.7$

M0M0A0

[3]

Q29.

(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]

Q30.

16×2 or 32 or
 $7 \times x$ or $7x$ or
 20×12 or 240 or
 10×17 or 170 or
 $16 + x + 20 + 10$ or $46 + x$
oe

M1

$16 \times 2 + 7 \times x + 20 \times 12 + 10 \times 17$
or
 $16 \times 2 + 7x + 240 + 170$ or
 $442 + 7x$

oe

Must be the sum of 4 products

Award if correct expression seen, even if in an incorrect equation

M1

their $(32 + 7x + 240 + 170) =$
 $8.5 \times$ their $(16 + x + 20 + 10)$
or
their $(442 + 7x) =$
 $8.5 \times$ their $(46 + x)$

oe equation

ft their sum of at least 3 products, one of which must be $7 \times x$

ft sum of at least 3 frequencies, one of which must be x

M1

their $442 -$ their $(8.5 \times 46) =$
 $8.5x - 7x$

oe equation

dep on 3rd M1

Expands and rearranges their equation

Allow one sign or expansion error

M1dep

34

Answer 34 with no incorrect working gains 5 marks

A1

[5]

Q31.

- (a) 1.5×6 or 9
 or 3.5×4 or 14
 or 5×2 or 10
 or 4.5×4 or 18
 or 2.5×4 or 10
 oe
values 9, 14, 10 or 18 must be in the correct row in the table or linked to the correct bar on the histogram

M1

$1.5 \times 6 \times 3$ or 9×3 or 27
 or
 $3.5 \times 4 \times 8$ or 14×8 or 112
 or
 $5 \times 2 \times 11$ or 10×11 or 110
 or
 $4.5 \times 4 \times 14$ or 18×14 or 252
 or
 $2.5 \times 4 \times 18$ or 10×18 or 180
 or
 681

oe
values 27, 112, 110, 252 or 180 must be in the correct row in the table

M1dep

$(\text{their } 27 + \text{their } 112 + \text{their } 110 + \text{their } 252 + \text{their } 180) \div (\text{their } 9 + \text{their } 14 + \text{their } 10 + \text{their } 18 + \text{their } 10)$
 or
 $681 \div 61$

oe full correct method
 eg $(\text{their } 27 + \text{their } 112 + \text{their } 110 + \text{their } 252 + \text{their } 180) \div 61$

M1dep

[11.16, 11.2]

accept 11 with M3 scored and no errors

A1

Additional Guidance

Up to M2 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts

Time, x , (hours)	Frequency	Midpoint	
$0 \leq x < 6$	9	3	27
$6 \leq x < 10$	14	8	112
$10 \leq x < 12$	10	11	110
$12 \leq x < 16$	18	14	252
$16 \leq x < 20$	10	18	180

M1M1

Time, x , (hours)	Frequency	Midpoint	
$0 \leq x < 6$	9	3	27
$6 \leq x < 10$	16	8	128
$10 \leq x < 12$	10	11	110
$12 \leq x < 16$	20	14	280
$16 \leq x < 20$	10	18	180

M1M1

Time, x , (hours)	Frequency	Midpoint	
$0 \leq x < 6$	1.5	3	4.5
$6 \leq x < 10$	3.5	8	28
$10 \leq x < 12$	5	11	55
$12 \leq x < 16$	4.5	14	63
$16 \leq x < 20$	2.5	18	45

$$(4.5 + 28 + 55 + 63 + 45) \div (1.5 + 3.5 + 5 + 4.5 + 2.5)$$

$$= 195.5 \div 17 = 11.5$$

MOA0

(b) Valid reason

eg the data is grouped
or the exact values are not used
or the midpoints are estimates

B1**Additional Guidance**

Because we are using midpoints

B1

Midpoint is an average

B1

There are no raw data

B1

Numbers are rounded

B0

There are no data to use

B0

The answer is a decimal

B0

Valid reason with an irrelevant statement

B1**[5]**