

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Statistics

Calculating the mean

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.

Alternative method 1

6×18 or 108

$$(16.2 + 18.1 + 15.9 + 17.8 + 21 + x) \div 6 = 18$$

M1

their 108 – $(16.2 + 18.1 + 15.9 + 17.8 + 21)$

oe eg complete repeated subtraction.

Look for total written under or by table.

M1dep

19

SC1 89 seen

A1

Alternative method 2

18 – each value in table, eg

1.8, –0.1, +2.1, +0.2, –3

Allow one error

M1

Totals their subtractions

their $(1.8 + -0.1 + 2.1 + 0.2 + -3)$ or 1

and adds to 18

M1dep

19

A1

Additional Guidance

$$16.2 + 18.1 = 34.2, 34.2 + 15.9 = 60.1$$

$$60.1 + 17.8 = 77.9, 77.9 + 21.0 = 88.9$$

$$6 \times 18 = 118$$

M1

$$118 - 88.9 = 30.9$$

M1dep, A0

$$(16.2 + 18.1 + 15.9 + 17.8 + 21 + x) \div 6 = 18$$

M1

$$x = 118 - 89.7$$

M1dep

$$x = 28.3$$

A0

Allow incorrect solution of equation if full method

$$1.8 - 0.1 + 2.1 + 0.3 - 3 = 1.1$$

M1

19.1

M1dep, A0

[3]

Q2.

(a) Pearl or 1.7

B1

(b) $\frac{3}{5}$

oe

B1

(c) $5 \times 58 (= 290) + 64 (= 354)$
 $(64 - 58) \div 6 (= 1)$

M1

Their $354 \div 6$

$58 + \text{their } 1$
 $NB \frac{58 \times 5}{6} + \frac{64}{6} \text{ is } M2$

M1dep

59

SC1 1.645 for mean of six heights

A1

[5]

Q3.

Alternative method 1 – algebra based on Sunita's age

5×3 or 15

may be implied by their algebraic total of the three ages being divided by 3

M1

$x - 1$ or $2x$
or $4x - 1$

oe expressions
any letter throughout

M1

$x + \text{their } (x - 1) + \text{their } 2x = \text{their } 15$
or $4x - 1 = \text{their } 15$

$\frac{x + x - 1 + 2x}{3} = 5$
oe equation eg
dep on M1M1

M1dep

$(x =) 4$

correct solution to their equation
if the solution has a decimal part allow truncation or rounding to the nearest whole number

M1dep

8

A1

Alternative method 2 – algebra based on Joel’s age

5 × 3 or 15

may be implied by their algebraic total of the three ages being divided by 3

M1

$\frac{y}{2}$ or $\frac{y}{2} - 1$
or $2y - 1$

*oe expressions
any letter throughout
 $2y - 1$ must not come from $y + y - 1$*

M1

$y + \text{their } \frac{y}{2} + \text{their } (\frac{y}{2} - 1) = \text{their } 15$

$$\frac{y + \frac{y}{2} + \frac{y}{2} - 1}{3} = 5$$

*oe equation eg
dep on M1M1*

M1dep

$2y + \text{their } y + \text{their } (y - 2) = 2 \times \text{their } 15$
or $4y - 2 = 30$
or $2y - 1 = 15$

their equation with no denominator

M1dep

8

A1

Alternative method 3 – trial and improvement

5 × 3 or 15

may be implied by their total of the three ages being divided by 3

M1

Trial of three numbers which fit the criteria, with either their sum correctly evaluated or their sum divided by 3

*eg $2 + 1 + 4 = 7$
or $(2 + 1 + 4) \div 3$
condone missing brackets*

M1

Second trial of three numbers which fit the criteria, with either their sum correctly evaluated or their sum divided by 3

*dep on previous M1
eg $3 + 2 + 6 = 11$
or $(3 + 2 + 6) \div 3$
condone missing brackets*

M1dep

4, 3 and 8 selected as their final combination
*any order
implies M4*

M1dep

8

A1

Additional Guidance

Up to M4 may be awarded for correct work seen in multiple attempts even if not subsequently used

Correct expressions, but the sum of the three ages is equated to 5 eg $4x - 1 = 5$

M0M1M0M0A0

In alt 1, the correct value of x or the correct age for Joel for their two terms for Beth and Joel, with one correct, implies the first 4 marks
eg x and $x + 1$ and $2x$, with $x = 3.5$ or answer 7

M1M1M1M1A0

In alt 2, the correct value of y for their two terms for Sunita and Beth, with one correct, implies the first 4 marks

eg y and $\frac{y}{2}$ and $(\frac{y}{2} + 1)$, with $y = 7$ or answer 7

M1M1M1M1A0

In alt 1 and alt 2, condone missing brackets in equations if not recovered for up to M1M1M1

eg $x + x - 1 + 2x \div 3 = 5$ not recovered

M1M1M1M0A0

[5]

Q4.

70×5 or 350

M1

their $350 - (65 + 80 + 76 + 69)$

M1dep

their 350 - 290

60

A1

Additional Guidance

Embedded answer of 60 is 2 marks

[3]

Q5.

(a) 16.9

B1

(b) their 16.9×2 oe

$[(2.5 + 15) + (1.7 + 15) + \dots] \times 2 \div 5$

M1

33.8

SC1 for 3.8

A1ft

[3]

Q6.

(a) $44 + 38 + 48 + 55 + 60 (= 245)$
Allow one error or omission

M1

their total $\div 5$
Condone $44 + 38 + 48 + 55 + 60 \div 5$

M1

49
SC2 197

A1

(b) $41 \times 40 (= 1640)$ or $41 \times 0.4(0) (= 16.4(0))$
oe

M1

$60 - 41 (= 19)$ **and**
 their $19 \times 10 (= 190)$ or
 their $19 \times 0.1 (= 1.9(0))$
oe

M1

their $16.40 -$ their 1.90 or
 their $1640 -$ their 190
dependent on M2

M1 dep

14.50
Strand (i)
Do not accept 14.5
SC2 19.90 SC1 19.9 or 1990
SC2 22.10 SC1 22.1 or 2210

Q1

[7]

Q7.

$x + x + 3 + 4x (\div 3)$ *oe*

M1

$(6x + 3) \div 3$
Condone missing brackets

M1dep

$2x + 1$

A1

[3]

Q8.

Alternative method 1: find total

$$4 \times 10 \text{ or } 40$$

oe

M1

$$\text{their } 40 - 5 - 8 - 9$$

oe their 40 must be greater than 22

M1

$$18$$

A1

Alternative method 2: trial and improvement

One trial evaluated correctly

$$\text{eg trials } 12, \frac{5+8+9+12}{4} = 8.5$$

M1

The correct trial evaluated correctly

M1dep

$$18$$

A1

Additional Guidance

Embedded 18 without being selected as answer

M2A0

[3]

Q9.

Alternative method 1

$$90 \times 5 \text{ or } 450$$

$$\frac{72+83+88+97+x}{5}$$

$$\text{or } \frac{340+x}{5}$$

$$\text{or } \frac{340+x}{5}$$

oe

any letter or symbol

M1

$$90 \times 5 - 72 - 83 - 88 - 97$$

or

$$90 \times 5 - 340$$

or

$$72 + 83 + 88 + 97 + x = 90 \times 5$$

or

$$340 + x = 90 \times 5$$

oe

any symbol

equations must have fraction eliminated

M1dep

$$110$$

A1

Alternative method 2

Trial of any value with mean correctly evaluated

also allow if given to the next or previous integer

eg1 trial of 100

$$\frac{72+83+88+97+100}{5} = 88$$

eg2 trial of 78

$$\frac{340+78}{5} = 83 \quad (\text{or } 84 \text{ or } 83.6)$$

ignore trials with mean not evaluated or incorrectly evaluated

M1

Trial of 110 with mean evaluated to 90

$$\frac{72+83+88+97+110}{5} = 90$$

eg

this mark implies M1M1

M1dep

110

A1

Alternative method 3

$$\frac{72+83+88+97}{4} \quad \text{or} \quad \frac{340}{4} \quad \text{or } 85$$

oe

M1

their $85 + 5 \times (90 - \text{their } 85)$

or their $85 + 5 \times 5$

or their $85 + 25$

oe $90 + 4 \times (90 - \text{their } 85)$

M1dep

110

A1

Alternative method 4

$$\frac{72+83+88+97}{5} \quad \text{or} \quad \frac{340}{5} \quad \text{or } 68$$

oe

M1

$5 \times (90 - \text{their } 68)$

or 5×22

oe

M1dep

110

A1

Alternative method 5

$$(90 - 72) + (90 - 83) + (90 - 88) + (90 - 97)$$

or

$$18 + 7 + 2 - 7 \text{ or } 20$$

$$\text{oe eg } (72 - 90) + (83 - 90) + (88 - 90) + (97 - 90)$$

$$\text{or } 90 \times 4 - 72 - 83 - 88 - 97$$

$$\text{or } -18 - 7 - 2 + 7 \text{ or } -20$$

90 + their 20

$$\text{oe eg } 90 - \text{their } -20$$

M1dep

110

A1

Additional Guidance

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

Embedded 110 scores M1M1A0 using Alt 2 (even if a different answer is given)

Condone eg Alt 3 $72 + 83 + 88 + 97 \div 4$

M1

No further marks unless recovered

Alt 5 1st M1 Subtractions must be consistent

Condone 110% for 110

[3]

Q10.

$$3 \times 21 \text{ or } 63$$

M1

$$4 \times 22 \text{ or } 88$$

M1

their 88 – their 63

dependent on M2

M1dep

25

A1

[4]

Q11.

(a) 8

B1

(b) 1×7 and 2×5 and 3×4 and
 4×1 and 5×3
or
7 and 10 and 12 and 4 and 15
or
48

oe
allow one error or omission

M1

$(7 + 10 + 12 + 4 + 15) \div 20$
or $48 \div 20$
or their $48 \div 20$

oe eg $\frac{48}{20}$ or $\frac{12}{5}$ or $2\frac{2}{5}$
without working their 48 must be the correct sum of their products

M1dep

2.4

SC1 33.75

A1

Additional Guidance

$48 \div 5$

M1M0

$1 \times 7 + 2 \times 5 + 3 \times 4 + 4 \times 1 + 5 \times 5$ (5×5 is one error)

M1

$58 \div 20 = 2.9$

M1A0

$8 + 10 + 12 + 4 + 15$ (8 is one error)

M1

$49 \div 20 = 2.45$

M1A0

Answer 2 after 2.4 seen

M1M1A0

$7 + 10 + 12 + 4 + 15 \div 5$ not recovered

M1M0

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

eg 7 10 12 4 15 followed by $20 \div 5$ or $20 \div 15$

M0

[4]

Q12.

Alternative method 1

102×68.5 or 6987

or

85×72.4 or 6154

or

13 141

values may be seen by the table

M1

$$\frac{102 \times 68.5 + 85 \times 72.4}{102 + 85}$$

or $\frac{13\,141}{187}$

or 70.2(7...) or 70.3

oe

M1dep

70.2(7...) and Yes

or

70.3 and Yes

A1

Alternative method 2

102×68.5 or 6987

or

85×72.4 or 6154

or

13 141

values may be seen by the table

M1

$(102 + 85) \times 70$

or 187×70

or 13 090

oe

M1

13 141 and 13 090 and Yes

A1

Additional Guidance

Yes may be implied eg $70.27 > 70$

M1M1A1

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

[3]

Q13.

16.04×5 or 80.2

M1

their $80.2 - 15.2 - 15.9 - 16.1 - 16.8$

or 16.2

oe

M1dep

16.2 and No

A1

[3]

Q14.**Alternative method 1**

6×4 or 24 stated or implied as target total of the four cards

M1

$1 + 5 + 7 + 9 + 11$ or 33

M1

Indicating 1, 5, 7 and 11 are the chosen four cards implies M2

9

A1**Alternative method 2**

$1, 5, 7, 9 \rightarrow (1 + 5 + 7 + 9) \div 4$

or $1, 5, 7, 11 \rightarrow (1 + 5 + 7 + 11) \div 4$

or $1, 5, 9, 11 \rightarrow (1 + 5 + 9 + 11) \div 4$

or $1, 7, 9, 11 \rightarrow (1 + 7 + 9 + 11) \div 4$

or $5, 7, 9, 11 \rightarrow (5 + 7 + 9 + 11) \div 4$

$1, 5, 7, 9 \rightarrow 22 \div 4$

or $1, 5, 7, 11 \rightarrow 24 \div 4$

or $1, 5, 9, 11 \rightarrow 26 \div 4$

or $1, 7, 9, 11 \rightarrow 28 \div 4$

or $5, 7, 9, 11 \rightarrow 32 \div 4$

M1

$1, 5, 7, 9 \rightarrow 5.5$

or $1, 5, 7, 11 \rightarrow 6$

or $1, 5, 9, 11 \rightarrow 6.5$

or $1, 7, 9, 11 \rightarrow 7$

or $5, 7, 9, 11 \rightarrow 8$

A1

9

with no error in the mean of 1, 5, 7, 11

A1**Additional Guidance**

Use the alternative scheme that awards the better mark

33 – 24

M1M1A0

$1 + 5 + 7 + 11 = 28$, $28 \div 4 = 6$, answer 9 (with no other work)

M1A0A0**[3]****Q15.**

4×31 or 124

M1

5×30 or 150

M1

their 150 – their 124

Dependent on M2

M1dep

26

A1**[4]**

Q16.

Alternative method 1

12×1.58 or 18.96 or 28×1.52 or 42.56

M1

$28 \times 1.52 - 12 \times 1.58$ or their $42.56 - \text{their } 18.96$ or 23.6
oe

M1dep

their $23.6 \div (28 - 12)$ or their $23.6 \div 16$
oe
Dep on M1 M1

M1dep

1.475 or 1.48

A1

Alternative method 2

$16x + 12 \times 1.58$ or $16x + 18.96$ or 28×1.52 or 42.56

M1

$(16x =)$ their $42.56 - \text{their } 18.96$ or $(16x =) 23.6$
oe

M1dep

Their $23.6 \div (28 - 12)$ or their $23.6 \div 16$
oe
Dep on M1 M1

M1dep

1.475 or 1.48

A1

Additional Guidance

$23.6 \div 16 = 1.475 = 1.5$

M1M1M1A1

$23.6 \div 16 = 1.5$

M1M1M1A0

$23.6 \div (28 - 12)$
 $23.6 \div 14$

M1M1M1A0

$23.6 \div 14$

M1M1M0A0

Beware use of 0.06 e.g. $1.58 - 1.52 = 0.06$

M0

[4]

Q17.

9.83×7 or 68.81

M1

their $68.81 - 9.75 - 9.79 - 9.80 - 9.88 - 9.94 - 9.98$
or 9.67
oe

M1dep

9.67 and Yes

A1

[3]

Q18.

$$1 + 2 + 3 + \dots + 10 (= 55) \text{ or } 8 \times 5 (= 40)$$

Allow one omission in addition

M1

their 55 – their 40

Successfully finds 8 numbers that add up to 40

M1 dep

15

A1

7 and 8 or 9 and 6 or 10 and 5

ft where possible to do so

A1 ft

[4]

Q19.

$$19 \times 82 \text{ or } 1558$$

M1

$$\frac{\text{their } 1558 + 93}{20} \text{ or } \frac{1651}{20}$$

oe

M1dep

82.55 or 82.6

A1

[3]

Q20.

$$2.5(0) \times 11 \text{ or } 27.5(0)$$

$$\text{or } 7.5(0) \times 7 \text{ or } 52.5(0)$$

$$\text{or } 12.5(0) \times 2 \text{ or } 25$$

M1

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

or 105

sum of fx

M1dep

their $105 \div 20$ 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]

Q21.

Alternative method 1 Total % for A after 6 tests – total % for B after 5 tests

$$60 \times 5 \text{ or } 300$$

$$\text{or } 52 \times 5 \text{ or } 260 \quad \text{oe}$$

M1

$$\frac{24}{50} \times 100 \text{ or } 0.48 \times 100$$

$$\text{or } 48 \quad \text{oe}$$

348 implies M1M1

M1

$$60 \times 5 + \frac{24}{50} \times 100 - 52 \times 5$$

or

$$300 + 48 - 260 \text{ or } 88$$

oe eg 348 – 260

dep on M1M1

M1dep

$$44$$

$$\text{allow } \frac{44}{50}$$

A1

Alternative method 2 Total score for A after 6 tests – total score for B after 5 tests

$$\frac{60}{100} \times 50 \text{ or } 30$$

oe

$$\text{allow } \frac{30}{50}$$

implied by 150 or 174

M1

$$\frac{52}{100} \times 50 \text{ or } 26$$

oe

$$\text{allow } \frac{26}{50}$$

implied by 130

M1

$$\frac{60}{100} \times 50 \times 5 + 24 - \frac{52}{100} \times 50 \times 5$$

or

$$150 + 24 - 130$$

oe eg 174 – 130

dep on M1M1

M1dep

$$44$$

$$\text{allow } \frac{44}{50}$$

A1

Alternative method 3 Total score for A after 6 tests – total score for B after 5 tests

50×5 or 250

oe

implied by 150 or 130 or 174

M1

$$\frac{60}{100} \times 50 \times 5 \text{ or } 150$$

and

$$\frac{52}{100} \times 50 \times 5 \text{ or } 130$$

oe

allow $\frac{150}{250}$ and $\frac{130}{250}$

M1dep

$$\frac{60}{100} \times 50 \times 5 + 24 - \frac{52}{100} \times 50 \times 5$$

or

$$150 + 24 - 130$$

oe eg $174 - 130$

M1dep

44

allow $\frac{44}{50}$

A1

Alternative method 4 Difference in scores after 5 tests + 6th score for A

$60 - 52$ or 8

oe

M1

$$\frac{60 - 52}{100} \times 50 \text{ or } 4$$

oe eg $\frac{60}{100} \times 50 - \frac{52}{100} \times 50$

or $30 - 26$

allow $\frac{4}{50}$

M1dep

$$\frac{60 - 52}{100} \times 50 \times 5 + 24$$

or

$$4 \times 5 + 24$$

or

$$20 + 24$$

oe

M1dep

44

allow $\frac{44}{50}$

A1

Additional Guidance

To award the 3rd M a calculation or a value (not an equation) must be seen
 Select the scheme that favours the student for the first 2 M marks even if not subsequently used

Alt 1 Do not award 1st M for 300 if incorrect method seen eg $6 \times 50 = 300$
 does not score the 1st M

Alt 1 Do not award 2nd M for 48 if incorrect method seen eg $100 - 52 = 48$
 does not score the 2nd M

Alt 2 Do not award 2nd M for 26 if incorrect method seen eg $50 - 24 = 26$
 does not score the 2nd M

[4]**Q22.**

$(200 + 160 + 104 + 100) \div 4$
 or $564 \div 4$ or 141

M1

their $141 \div 3 \times 8$
 or 47×8
 or $1128 \div 3$
 or 376

oe
accept $141 \times 2.66(\dots)$ or 141×2.67

M1dep

their 376×5 or 1880

M1dep

427

A1**Additional Guidance**

$(270 + 400 + 483 + 300 + 427) \div 5$ embedded answer

M1M1M1A0

$(1453 + x) \div 5 = 376$ and $1453 + x = 1880$

M1M1M1

$(1453 + x) \div 5 = 376$

M1M1M0

$200 + 160 + 104 + 100 \div 4$ scores M0 unless recovered

[4]**Q23.**

$(8 + 9 + 9 + 6 + 9 + 10) \div 6$
 or $51 \div 6$

or 8.5 *oe*
implied by 34

M1

$162 \div 360 \times 100$
 or 45 *oe*

M1

$4 \times$ their 8.5 + their 45
 or $34 + 45$ *oe*
dep on M2

M1dep

79

SC2 53.5 or 57.5

A1

Additional Guidance

Check table and pie chart for working

34 + 45%

M1M1M1**[4]****Q24.**

- (a) 1×5 and 2×6 and 3×8
and 4×2 and 5×4
or
5 and 12 and 24 and 8 and 20
or
69 *allow one error*

M1

$$(5 + 12 + 24 + 8 + 20) \div 25$$

or

$$69 \div 25$$

or

$$\text{their } 69 \div 25$$

without working their 69 must be the correct sum of their products

M1dep

$$2.76 \quad \text{oe}$$

A1**Additional Guidance**

Five products or values must be seen for first M1

Ignore attempt to round after 2.76 seen

M1M1A1

$$69 \div 5$$

M1M0

$$5 + 12 + 24 + 8 + 20 \div 25 \text{ unless recovered}$$

M1M0Correct products seen with $25 \div 5$ or $25 \div 15$ or $15 \div 5$ **M0**

- (b) $5 + 6 + 8$ or $25 - (4 + 2)$ or 19

$$\text{or } 1 - \frac{4+2}{25}$$

oe

M1

$$\frac{19}{25}$$

$$\text{or } 0.76 \text{ or } 76\%$$

oe

A1**Additional Guidance**

Ignore attempts to simplify or convert a correct fraction

Ignore probability words

19 out of 25 or 19 in 25 alone on the answer line with a correct answer in working

M1A1

19 out of 25 or 19 in 25 together with a correct answer on the answer line

M1A1

19 : 25 with a correct answer together on the answer line

M1A0**[5]**

Q25.

30×1.6 or 48

or

20×2.05 or 41

oe

$$\frac{30 \times 1.6 + 20 \times 2.05}{30 + 20} \text{ or } \frac{89}{50}$$

oe

M1

M1dep

1.78

allow 1.8 with M2 seen

A1

Additional Guidance

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

Answer only 1.8

M0M0A0

[3]

Q26.

(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]

Q27.

- (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

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

oe full correct method
eg (their 27 + their 112 + their 110 + their 252 + 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

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

$$= 195.5 \div 17 = 11.5$$

M0A0

- (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]**