



GCSE Foundation/Higher 23

Handling Data



Mark scheme



117 minutes



105 marks

Interpreting and discussing results

M1. (a) Stem 4, 5, 6, (7) and suitable key

B1

Leaves

6 8 9

1 2 3 3 5 7 9

0 1 4 5

2

B1 one error

Unordered is one error

B2

Stem, leaves and aligned correctly to show distribution

Strand (ii)

Logical organised working

Q1

(b) 55

ft their stem-and-leaf

B1 ft

(c) $0.05 \times \text{their } 55 (= 2.75)$

oe their 55 must be < 59

M1

their 55 + their 2.75 (= 57.75)

or

59 – their 2.75 (= 56.25)

M1 dep

Yes and 57.75

or Yes and 56.25

ft their 55 only

A1 ft

Alternative method 1

59 – their 55 (= 4)

their 55 must be < 59

M1

$\frac{\text{their } 4}{\text{their } 55} \times 100 (= 7.(...))$

oe

M1 dep

Yes and 7.(...)

ft their 55 only

A1 ft

Alternative method 2

$0.05 \times \text{their } 55 (= 2.75)$

or

59 – their 55 (= 4)

oe their 55 must be < 59

M1

$0.05 \times \text{their } 55 (= 2.75)$
 and
 $59 - \text{their } 55 (= 4)$
oe their 55 must be < 59

M1 dep

Yes and 2.75 and 4
ft their 55 only

A1 ft

Alternative method 3

$\frac{59}{\text{their } 55} (\times 100)$ or $1.07(\dots)$ or $107(\dots)$
oe their 55 must be < 59

M1

$\text{their } 1.07(\dots) - 1$ or $\text{their } 107(\dots) - 100$
May be implied by correct final answer

M1 dep

Yes and $7(\dots)$
ft their 55 only

A1 ft

Alternative method 4

1.05 seen

M1

$\text{their } 55 \times 1.05$ or $59 \div 1.05$
oe their 55 must be < 59

M1 dep

Yes and 57.75
 or Yes and $56(\dots)$
ft their 55 only

A1 ft

[8]

M2. (a) Attempts to calculate fx

(at least one attempt)

or 424 seen

$8 \times 10 (= 80)$
 $10 \times 18 (= 180)$
 $12 \times 7 (= 84)$
 $15 \times 4 (= 60)$
 $20 \times 1 (= 20)$

M1

their $424 \div$ their 40

10.6

M1 dep

10.60

Strand (i)

Correct notation required

Do not accept 10.6

SC2 404.5

Q1

(b) Mode = 10 as it is the value occurring most often

oe

B1

Median is the 20th (or 20.5th) unless contradicts with conclusion

oe

SC1 both definitions only without 'Yes' or '£10'

B1

(c) One similarity

eg same range, same mode, same values for data, same frequency for

£15

oe

B1

One difference

Different mean, different median, Shelley 50 visits/fees, Paul 40

oe

Calculations/working not required

B1

[7]

M3. (a) $\frac{19}{147} \times 100$
oe

M1

12.92(...) or 12.93

Accept 13 with M1 working seen

A1

12.9

ft any value > 1 dp correctly rounded to 1 dp or their calculation given

to 1 dp

SC1 13 (answer only)

B1 ft

- (b) (i) Stem (0), 1, 2, 3 and 4
and
suitable key
Accept 4, 3, 2, 1, (0)

B1

Leaves

1 2 3 4 6 7 8 8

0 1 6 7 9

1 2 3 8

5

1

B1 4 rows correct

B1 complete but unordered leaves

B2

Stem, leaves and aligned correctly

Strand (ii)

Logical, organised order of working

Q1

- (ii) 8

B1

- (iii) 0

Accept 'none' or 'zero'

B1

- (c) Ticks the 19 late trains only

B1

States mode should now be 7

oe eg one minute less

SC1 wrong or no box ticked and states new mode is 7

B1 dep

[11]

- M4.** (a) $2 \times 0.4 (+) 3 \times 0.6 (+) 7 \times 0.8 (+) 4 \times 1.0 (+) 3 \times 1.2 (+) 1 \times 1.4 (= 17.2)$
or $0.8(+)$ $1.8(+)$ $5.6(+)$ $4(+)$ $3.6(+)$ $1.4 (= 17.2)$
Attempt at fx - at least one product seen

M1

their $17.2 \div$ their $(2 + 3 + 7 + 4 + 3 + 1)$ or their $17.2 \div 20$
Condone one error or omission in frequencies

M1 dep

0.86

Ignore further working
 SC2 [15.8, 15.9] or 0.76 or 0.96
 SC1 [2.8, 2.9]

A1

- (b) Mention of collecting data about heights of ball bounce on concrete
eg do an experiment dropping (same) balls (from same height) onto concrete and collect data

B1

Mention of summary statistics, a suitable graph or other calculation for comparison
eg calculate the average heights of the bounces for concrete or plot a frequency polygon of heights on concrete

B1

Mention of interpreting results or link to given hypothesis
eg compare the averages or compare the graphs

B1

[3]

M5. (a) 34

B1

- (b) (5.10+) 2 hours 1 minute
Accept sight of 2 hours 1 minute or 2.01

M1

7.11

A1

- (c) 4 correct plots
B1 ft 2 or 3 correct plots ft their part a

B2 ft

- (d) Draws a suitable line of best fit

M1

(5.10+) their read off value at 5.10

M1 dep

Correct answer for their 5.10 + read off value
Must have M2
 SC1 M0 but answer [5.40, 5.45]

A1 ft

[8]

M6.	(a) $\frac{2}{13}$	B1	[5]
	(b) 5.4 minutes oe $60 \div 5 (= 12)$	M1	
	5 (minutes) 24 (seconds) SC1 <i>any other non-integer time correctly converted to minutes and seconds</i> SC1 <i>5 min 4 secs or 5 min 40 secs</i> or <i>in range 5 min 12 secs</i> to <i>5 min 36 secs</i>	A1	
	(c) There is some (weak or moderate) support for the hypothesis oe <i>Do not allow strong support</i> oe	B1	
	(d) At least 5 points with all in a strong positive correlation	B1	
M7.	Σ boys scores $12 + 18 + 12 + 19 + 9 + 20 + 11 + 9 + 18 + 12$ $= 140$	M1	[5]
	(Mean =) 14	A1	
	Boys range = 11	B1	
	Conclusion using data comparing mean and range with all information clearly and coherently organised Strand (iii) eg, <i>girls are better as mean higher and range about same</i> <i>There is no difference as means and ranges about the same</i> Q1 <i>partial conclusion or lack of clarity</i>	Q2	

M8.	(a) $\Sigma xf (3 \times 0 + 4 \times 4 + 5 \times 4 + 6 \times 9 + 7 \times 8 + 8 \times 5)$	M1
	186	A1
	6.2	
	<i>ft their total \div 30 if M1 awarded</i>	A1 ft
	(b) (i) Reference to cumulative totals for French (1, 5, 13, 21, 30) <i>eg, 'I added the frequencies'</i>	M1
	5	B1
	(ii) 5 Spanish level 5 and 6 17 French level 5 and 6 <i>Lots of zeros in top right hand of table</i> <i>The numbers above zero are on or below the leading/main diagonal</i>	B1
		[6]
M9.	(a) (i) 2	B1
	(ii) Lists numbers in order <i>Allow one error or omission</i>	M1
	4	A1
	(iii) $9 + 7 + 6 + 2 + 4 + 2 + 3 (= 33)$ <i>Allow one error or omission</i>	M1
	Their 33×2	M1dep
	66	A1

(b) $4.5 \times 8 (= 36)$

M1

Their 36 – their 33

M1 dep

3

Accept unsupported 3 but beware completely incorrect method.

Accept embedded answers in correct method

A1

[9]

- M10.** (a) (i) Sight of midpoint eg, 35
Could be their midpoint eg, 35.5

B1

One correct product
 eg, $10 \times$ their midpoint (= 350) if correct
Others are $12 \times$ their 45 (= 540)
 $6 \times$ their 55 (= 330)
 $2 \times$ their 65 (= 130)

M1

$$\frac{\text{Their } 1350}{30}$$

Must be 30 and midpoints consistent

M1dep

45

A1

(ii) $\frac{22}{\text{Their } 30}$

B1 Numerator } Must be a proper fraction
B1 Denominator }

oe Fraction

SC1 Correct value as decimal or % (0.73 or better)

B2

- (b) (i) Correct plots at midpoints
B1 One error
Treat not joined or curve as one error
Ignore lines drawn beyond 1st and last plot

B2

	(ii) Slower as peak for members is earlier <i>oe must reference peak, highest point or mode</i>	B1
	More varied as graph for non-members is 'wider' <i>oe mentions additional group</i>	B1
(c)	Circles 39 minutes <i>Any indication</i>	B1
	12 people finished under 40 minutes <i>SC1 For 42 circled and explains 10 under 40 minutes oe</i>	B1
		[12]
M11.	(a) Attempts to calculate fx with at least one of 24, 45, 64 correct <i>0, 6, 24, 45, 64</i>	M1
	Finds Their Σfx and divides by Their 50 <i>$\Sigma fx = 139$ Their 50 is either correct or working shown</i>	M1 dep
	2.78 <i>Accept 2.8, with working</i>	A1
(b)	Valid explanation <i>16 is less than half of the times $34 \leq 3$ stops oe Only 16 out of 50 (and it should be 25)</i>	B1
(c)	5	B1
		[5]

M12. Allow embedded solutions, but if contradicted M marks only

$$4 \times 142 + 5 \times 146 + 8 \times 150 + 7 \times 154 + 5 \times 158 + 1 \times 162$$

$\sum fx$ where x is midpoint or end point or
Values ± 0.5

For at least 2 multiplications and additions seen

M1

Their $4528 \div 30$

M1 dep

150.9(3 ...)

151 with working

A1

[3]

M13. (a) $5 + 4$

or 9

M1

$$\frac{9}{30}$$

oe

A1

(b) (2.5, 1), (7.5, 2), (12.5, 7), (17.5, 9), (22.5, 7), (27.5, 4)
joined within 1 small square, straight lines attempted

B1 One error or not joined or joined with curve

SC1 for consistent plots at lcb or ucb

B2

(c) Correct comparison of average and spread, or
Correct comparison of average or spread and one other valid observation

eg Students average time larger oe
Allow eg in general, on average, overall
Spread of student times larger oe
Allow eg larger range, more varied ...

Other valid observations

eg More students watch from 15 to 25 h
Same number (7) watch from 10 to 15 h

B1 one correct comparison of average/spread
or one valid observation

B2

[6]

- M14.** Attempt to add at least 12 correct values from Stem and Leaf
*Values used **must** indicate that the candidates understands the stem and leaf notation.*

M1

270

A1

(Mean =) 'their 270' \div 30

Must divide by 30

M1 dep

9

No follow through

A1

[4]

- M15.** Stays the same

Shows ability to find median as middle value

This can be shown for 20 pieces or 21 pieces of data

M1

Identifying median as 19 from 20 pieces of data

19 quoted or implied as median M1 A1

A1

Identifying 19 as the median from 21 pieces of data

A1

[3]

- M16.** (a) Line crossing between 20 and 40 and within 1 cm of (70,200)
Must be ruled, at least 10 cm long

B1

- (b) As one goes up so does the other

Positive correlation oe

Or hotter it gets the more ice creams sold oe

B1

[2]

M17. (a) A Negative

B1

B Zero

Accept: None or No

B1

(b) (i) Suitable line

From $x = 20$ to $x = 70$

(20, 10 – 24) to (70, 50 – 64) inclusive

B1

(ii) About “60”

ft line if correct $\pm \frac{1}{2}$ square

56 - 66 inclusive if no line

B1 ft

[4]

M18. (a) All 8 points plotted correctly

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

Only 6 or 7 points correct

Ignore extra points

B1

B2

(b) Suitable straight line of best fit drawn

Must reach $x = 5$ and $x = 11$ and pass between (5, 5.5 to 6.5) and

(11, 3.5 to 4.2) Dotted line OK

B1

(c) The older the person the quicker they can do the test

Accept negative correlation

B1

[4]

