Topic 2 Part 3 *[189 marks]*

1a. *[1 mark]*

Markscheme

6 ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Whilst many knew what the mode was, there was some confusion by weaker candidates who interpreted the required value as the maximum value in the list, namely
7. Many candidates gave the correct value of the mean in part (b) but a surprising number seemed to have selected the incorrect value from their calculator display for the standard deviation. In mathematical studies, the smaller value of the standard deviation, σ_x, should be given. In part (d), ordered lists were often seen but it proved problematic for a significant number of candidates to find $Q_1$and
Q_3. Common mistakes such as
$Q_3 = \frac{6+6}{2} = 6.5$ and
$Q_1 = 3$ were seen on many scripts.

1b. *[2 marks]*

Markscheme

$\frac{5+3+6+\ldots+4}{13}$ ***(M1)***

Note: Award ***(M1)***for correctly substituted mean formula, division by 13 must be seen.

$= 4.85 \left(\frac{63}{13}\right)$
$(4.84615\ldots)$ ***(A1)*** ***(C2)***

[2 marks]

Examiners report

Whilst many knew what the mode was, there was some confusion by weaker candidates who interpreted the required value as the maximum value in the list, namely
7. Many candidates gave the correct value of the mean in part (b) but a surprising number seemed to have selected the incorrect value from their calculator display for the standard deviation. In mathematical studies, the smaller value of the standard deviation, σ_x, should be given. In part (d), ordered lists were often seen but it proved problematic for a significant number of candidates to find $Q_1$and
Q_3. Common mistakes such as
$Q_3 = \frac{6+6}{2} = 6.5$ and
$Q_1 = 3$ were seen on many scripts.

1c. *[1 mark]*

Markscheme

1.46
$(1.4595\ldots)$ ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Whilst many knew what the mode was, there was some confusion by weaker candidates who interpreted the required value as the maximum value in the list, namely
7. Many candidates gave the correct value of the mean in part (b) but a surprising number seemed to have selected the incorrect value from their calculator display for the standard deviation. In mathematical studies, the smaller value of the standard deviation, σ_x, should be given. In part (d), ordered lists were often seen but it proved problematic for a significant number of candidates to find $Q_1$and
Q_3. Common mistakes such as
$Q_3 = \frac{6+6}{2} = 6.5$ and
$Q_1 = 3$ were seen on many scripts.

1d. *[2 marks]*

Markscheme

$6 - 3.5$ ***(M1)***

$= 2.5$ ***(A1)*** ***(C2)***

Note: Award ***(M1)*** for their quartiles seen or a correct ordered list. Accept a correct ordered list from any previous part of the question.

[2 marks]

Examiners report

Whilst many knew what the mode was, there was some confusion by weaker candidates who interpreted the required value as the maximum value in the list, namely
7. Many candidates gave the correct value of the mean in part (b) but a surprising number seemed to have selected the incorrect value from their calculator display for the standard deviation. In mathematical studies, the smaller value of the standard deviation, σ_x, should be given. In part (d), ordered lists were often seen but it proved problematic for a significant number of candidates to find $Q_1$and
Q_3. Common mistakes such as
$Q_3 = \frac{6+6}{2} = 6.5$ and
$Q_1 = 3$ were seen on many scripts.

2a. *[2 marks]*

Markscheme

$\left(\frac{104.5+105.1+...}{6}\right)$ ***(M1)***

Note: Award ***(M1)*** for use of mean formula.

= 104.9 (cm) ***(A1)*** ***(C2)***

[2 marks]

Examiners report

Another well answered question with candidates showing a good understanding of standard form and many correct answers were seen in parts (a) and (b). Whilst the formula is given for percentage error, there were still a minority of candidates who divided by 105 rather than the required value of 104.9.

2b. *[2 marks]*

Markscheme

1.049×10^2 ***(A1)*****(ft)*****(A1)*****(ft)** ***(C2)***

Notes: Award ***(A1)*****(ft)** for 1.049, ***(A1)*****(ft)** for 10^2. Follow through from their part (a).

[2 marks]

Examiners report

Another well answered question with candidates showing a good understanding of standard form and many correct answers were seen in parts (a) and (b). Whilst the formula is given for percentage error, there were still a minority of candidates who divided by 105 rather than the required value of 104.9.

2c. *[2 marks]*

Markscheme

$\frac{105-104.9}{104.9} \times 100$ (%) ***(M1)***

Notes: Award ***(M1)*** for their correctly substituted % error formula.

% error = 0.0953 (%) (0.0953288...) ***(A1)*****(ft)** ***(C2)***

Notes: A 2sf answer of 0.095 following $\frac{105-104.9}{105} \times 100$ working is awarded no marks. Follow through from their part (a), provided it is not 105. Do not accept a negative answer. % sign not required.

[2 marks]

Examiners report

Another well answered question with candidates showing a good understanding of standard form and many correct answers were seen in parts (a) and (b). Whilst the formula is given for percentage error, there were still a minority of candidates who divided by 105 rather than the required value of 104.9.

3a. *[2 marks]*

Markscheme

200 (students) ***(M1)(A1)*** ***(C2)***

Note: Award ***(M1)*** for line drawn on the graph connecting 50 % with 200 or any indication (cross or dash) at the required point on the graph, ***(A1)*** for correct answer.

[2 marks]

Examiners report

Candidates who drew vertical or horizontal lines at correct positions on the graph were able to pick up the three method marks for this question and, for parts (a) and (b), a range of answers were accepted. The most common error on this question seemed to be in part (a) where the vertical line was drawn at 49% leading to a value outside the acceptable range of 190–200. Candidates are expected to read values off a continuous cumulative frequency curve at the given critical values (in this instance at 50%).

There was a mistake in the Spanish translation of question 5, which was discovered prior to marking. The principal examiner was informed and this unfortunate situation was addressed during the marking and awarding in order to ensure no candidate was disadvantaged.

3b. *[2 marks]*

Markscheme

500 – 350 ***(M1)***

Notes: Award ***(M1)*** for 350 seen or for a line on the graph from 57 % up to the curve showing number of students. An indication (cross or dash) at the required point on the graph is sufficient for method.

= 150 ***(A1)*** ***(C2)***

[2 marks]

Examiners report

Candidates who drew vertical or horizontal lines at correct positions on the graph were able to pick up the three method marks for this question and, for parts (a) and (b), a range of answers were accepted. In part (b), a common incorrect answer seen was 350 which was simply the number of candidates who were awarded less than a grade C rather than those with a grade C or higher. On a minority of scripts, an answer of 90 reflected the candidate's misinterpretation of the requirement of the question as 'grade C only'.

There was a mistake in the Spanish translation of question 5, which was discovered prior to marking. The principal examiner was informed and this unfortunate situation was addressed during the marking and awarding in order to ensure no candidate was disadvantaged.

3c. *[2 marks]*

Markscheme

60 (%) ***(M1)(A1)*** ***(C2)***

Notes: Award ***(M1)*** for 400 or a line on the graph at 400 seen, ***(A1)*** for correct answer. % sign not required. An indication (cross or dash) at the required point on the graph is sufficient for method.

[2 marks]

Examiners report

Candidates who drew vertical or horizontal lines at correct positions on the graph were able to pick up the three method marks for this question and, for parts (a) and (b), a range of answers were accepted. In part (c), a numerical answer of 60 was required, with 'grade C' on its own losing this last mark.

There was a mistake in the Spanish translation of question 5, which was discovered prior to marking. The principal examiner was informed and this unfortunate situation was addressed during the marking and awarding in order to ensure no candidate was disadvantaged.

4a. *[1 mark]*

Markscheme

$14 \leq x < 18$ ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Part (a) was generally well done but, in part (b), writing down the mid-interval value of a class proved difficult for some candidates and many incorrect answers of 7.5 were seen.

4b. *[1 mark]*

Markscheme

8 ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Part (a) was generally well done but, in part (b), writing down the mid-interval value of a class proved difficult for some candidates and many incorrect answers of 7.5 were seen.

4c. *[2 marks]*

Markscheme

$\frac{4\times30+8\times26+12\times29+16\times32+20\times18+24\times27+28\times14}{176}$ ***(M1)***

Notes: Award ***(M1)*** for an attempt to substitute their mid-interval values (consistent with their answer to part (b)) into the formula for the mean. Award ***(M1)*** where a table is constructed with their (consistent) mid-interval values listed along with the frequencies.

= 14.7 (cm) (14.7045…) ***(A1)*****(ft)** ***(C2)***

Notes: Follow through from their answer to part (b). If a final incorrect answer that is consistent with their (b) is given award ***(M1)(A1)*****(ft)** even if no working is seen.

[2 marks]

Examiners report

Popular, but erroneous answers, seen in part (c) were 15.5 and 16. These seemed to be as a result of adding their mid-class values together and dividing by 7 rather than the total of the frequencies.

4d. *[2 marks]*

Markscheme

18 + 27 + 14 ***(M1)***

Note: Award ***(M1)*** for adding 18, 27 and 14.

= 59 ***(A1)*** ***(C2)***

[2 marks]

Examiners report

There was much confusion over the meaning of the phrase *'at least'* in part (d) and, as a consequence, there were as many wrong answers of 117 (30 + 26 + 29 + 32) seen as there were correct answers.

5a. *[5 marks]*

Markscheme

(i)

$\frac{71+79+...}{12}$ ***(M1)***

$72.4\left(72.4166..., \frac{869}{12}\right)$ ***(A1)(G2)***

Note: Award ***(M1)*** for correct substitution into the mean formula.

(ii) 4.77 (4.76896…) ***(G1)***

(iii) 72.4 + 4.77 = 77.17 ***(M1)***

Note: Award ***(M1)*** for adding their mean to their standard deviation.

Two golfers ***(A1)*****(ft)*****(G2)***

Note: Follow through from their answers to parts (i) and (ii).

[5 marks]

Examiners report

The question was for the most part approached by almost all candidates and answered relatively well. The question in part (e) related to the use of the equation of the regression line for predicting, although regularly asked on exams, was still found to be a difficult one by some candidates. Some answers still suggested mathematical thinking and language unaccustomed to drawing conclusions and providing justifications.

5b. *[2 marks]*

Markscheme

0.990 (0.99014…) ***(G2)***

[2 marks]

Examiners report

The question was for the most part approached by almost all candidates and answered relatively well. The question in part (e) related to the use of the equation of the regression line for predicting, although regularly asked on exams, was still found to be a difficult one by some candidates. Some answers still suggested mathematical thinking and language unaccustomed to drawing conclusions and providing justifications.

5c. *[2 marks]*

Markscheme

$y = 1.01x + 0.816$ ($y = 1.01404...x + 0.81618...$) ***(G1)(G1)***

Notes: Award ***(G1)*** for $1.01x$ and ***(G1)*** for 0.816. If the answer is not an equation award a maximum of ***(G1)(G0)***.

OR

$y - 74.25 = 1.01(x - 72.4)$($y - 74.25 = 1.01404...(x - 72.4166...)$) ***(A1)(A1)***

Notes: Award ***(A1)*** for 1.01 correctly substituted in the equation, and ***(A1)*****(ft)** for correct substitution of (72.4, 74.25) in the equation. Follow through from their part (a)(i). If the final answer is not an equation award a maximum of ***(A1)(A0)***.

[2 marks]

Examiners report

The question was for the most part approached by almost all candidates and answered relatively well. The question in part (e) related to the use of the equation of the regression line for predicting, although regularly asked on exams, was still found to be a difficult one by some candidates. Some answers still suggested mathematical thinking and language unaccustomed to drawing conclusions and providing justifications.

5d. *[2 marks]*

Markscheme

$y = 1.01404... \times 70 + 0.81618...$ ***(M1)***

Note: Award ***(M1)*** for substitution of 70 into their regression line equation from part (c).

$y = 72$ (71.7989...) ***(A1)*****(ft)*****(G2)***

Note: Follow through from their part (c).

[2 marks]

Examiners report

The question was for the most part approached by almost all candidates and answered relatively well. The question in part (e) related to the use of the equation of the regression line for predicting, although regularly asked on exams, was still found to be a difficult one by some candidates. Some answers still suggested mathematical thinking and language unaccustomed to drawing conclusions and providing justifications.

5e. *[2 marks]*

Markscheme

No, equation cannot be (reliably) used as 89 is outside the data range. ***(A1)(R1)***

OR

Yes, but the result is not valid/not reliable as 89 is outside the data range/as we extrapolate ***(A1)(R1)***

Note: Do not award ***(A1)(R0)***.

[2 marks]

Examiners report

The question was for the most part approached by almost all candidates and answered relatively well. The question in part (e) related to the use of the equation of the regression line for predicting, although regularly asked on exams, was still found to be a difficult one by some candidates. Some answers still suggested mathematical thinking and language unaccustomed to drawing conclusions and providing justifications.

6a. *[1 mark]*

Markscheme

$x = 1$ ***(A1)*** ***(C1)***

[1 mark]

Examiners report

In part (a), the majority of candidates were able to identify the correct value for x. In part (b), many candidates seemed to think that the median was the same as the value of y. Consequently the value 5 proved to be a popular, but incorrect, answer. The majority of candidates wrote down the correct value of 7 and went on to give the required answer of 16 in part (c). A cautionary note here though: A common set of responses to this question was 1, 5 and 18. Without working this earned 1 mark, with working (in part (c)) this earned 4 marks.

6b. *[2 marks]*

Markscheme

$\frac{3+y}{2} = 5$ ***(M1)***

Note: Award ***(M1)*** for setting the correct equation or equivalent.

$y = 7$ ***(A1)*** ***(C2)***

[2 marks]

Examiners report

In part (a), the majority of candidates were able to identify the correct value for x. In part (b), many candidates seemed to think that the median was the same as the value of y. Consequently the value 5 proved to be a popular, but incorrect, answer. The majority of candidates wrote down the correct value of 7 and went on to give the required answer of 16 in part (c). A cautionary note here though: A common set of responses to this question was 1, 5 and 18. Without working this earned 1 mark, with working (in part (c)) this earned 4 marks.

6c. *[3 marks]*

Markscheme

$1 + 1 + 3 + 7 + 14 + z = 6 \times 7$ ***(M1)(M1)***

Note: Award ***(M1)*** for the sum of their 5 numbers and z, and ***(M1)*** for 6×7.

$z = 16$ ***(A1)*****(ft)** ***(C3)***

Note: Follow through from their x and y found in part (b) provided y is a positive integer less than 14.

[3 marks]

Examiners report

In part (a), the majority of candidates were able to identify the correct value for x. In part (b), many candidates seemed to think that the median was the same as the value of y. Consequently the value 5 proved to be a popular, but incorrect, answer. The majority of candidates wrote down the correct value of 7 and went on to give the required answer of 16 in part (c). A cautionary note here though: A common set of responses to this question was 1, 5 and 18. Without working this earned 1 mark, with working (in part (c)) this earned 4 marks.

7a. *[2 marks]*

Markscheme

(i) 6 (mm) ***(A1)***

(ii) 20 (mm) ***(A1)*** ***(C2)***

[2 marks]

Examiners report

Parts (a) and (b) proved to be very well done with many correct answers seen. On a few scripts however, candidates who seemed unsure of the correct average, wrote down, average, mean or even medium.

7b. *[1 mark]*

Markscheme

Median *(A1)* *(C1)*

Note: Award *(A1)* for Q_2 or 50^{th} percentile.

[1 mark]

Examiners report

Parts (a) and (b) proved to be very well done with many correct answers seen. On a few scripts however, candidates who seemed unsure of the correct average, wrote down, average, mean or even medium.

7c. *[2 marks]*

Markscheme

14 – 9 *(A1)*

Note: Award *(A1)* for 9 and 14 seen.

5 (mm) *(A1)* *(C2)*

[2 marks]

Examiners report

Part (c) was generally well done with many candidates correctly identifying Q1 and Q3 and many correct answers of 5 were seen.

7d. *[1 mark]*

Markscheme

75 (%) *(A1)* *(C1)*

[1 mark]

Examiners report

75% proved to be an elusive answer on many scripts for part (d) as a significant number of candidates did not seem to understand the meaning of quartiles. Indeed, a popular, but erroneous answer seen was 57.1% which was arrived at from the calculation $\frac{14-6}{14} \times 100$.

8a. *[2 marks]*

Markscheme

Attempt to order set of numbers *(M1)*

64 *(A1)* *(C2)*

[2 marks]

Examiners report

This question proved to be relatively easy for most candidates. They could find the median, mean and also the pulse rate of the student who joined the group. Where mistakes were made, they were in not ordering the list of numbers. Part (c) presented the most challenge for weaker candidates.

8b. *[2 marks]*

Markscheme

$\frac{639}{10}$ ***(M1)***

Note: Award ***(M1)*** for their sum divided by 10.

63.9 ***(A1)*** ***(C2)***

[2 marks]

Examiners report

This question proved to be relatively easy for most candidates. They could find the median, mean and also the pulse rate of the student who joined the group. Where mistakes were made, they were in not ordering the list of numbers. Part (c) presented the most challenge for weaker candidates.

8c. *[2 marks]*

Markscheme

$\frac{(639+x)}{11} = 65$ or equivalent ***(M1)***

$x = 76$ ***(A1)*****(ft)** ***(C2)***

Notes: Award ***(M1)*** for setting up an equation (*their* part (b)
$\times 10 + x)/11 = 65$. Follow through from their sum seen in part (b). Accept correct alternative methods but not trial and error.

[2 marks]

Examiners report

This question proved to be relatively easy for most candidates. They could find the median, mean and also the pulse rate of the student who joined the group. Where mistakes were made, they were in not ordering the list of numbers. Part (c) presented the most challenge for weaker candidates.

9a. *[1 mark]*

Markscheme

continuous ***(A1)***

[1 mark]

Examiners report

(a) Many candidates thought that this was discrete data.

9b. *[1 mark]*

Markscheme

$20 < T \leq 30$ ***(A1)***

[1 mark]

Examiners report

(b) This part was very well done with the occasional candidate writing down the number rather than the group.

9c. *[1 mark]*

Markscheme

15 ***(A1)***

[1 mark]

Examiners report

(c) Fairly well done although 15.5 was seen quite often.

9d. *[3 marks]*

Markscheme

(i) 21.5 ***(G2)***

(ii) 9.21 (9.20597…) ***(G1)***

[3 marks]

Examiners report

(d) This was really badly done with most candidates only putting the midpoints into their GDC or only putting the frequencies into their GDC. Perhaps they did not know how to use their GDC correctly.

9e. *[2 marks]*

Markscheme

(i) $q = 194$ ***(A1)***

(ii) $r = 200$ ***(A1)***

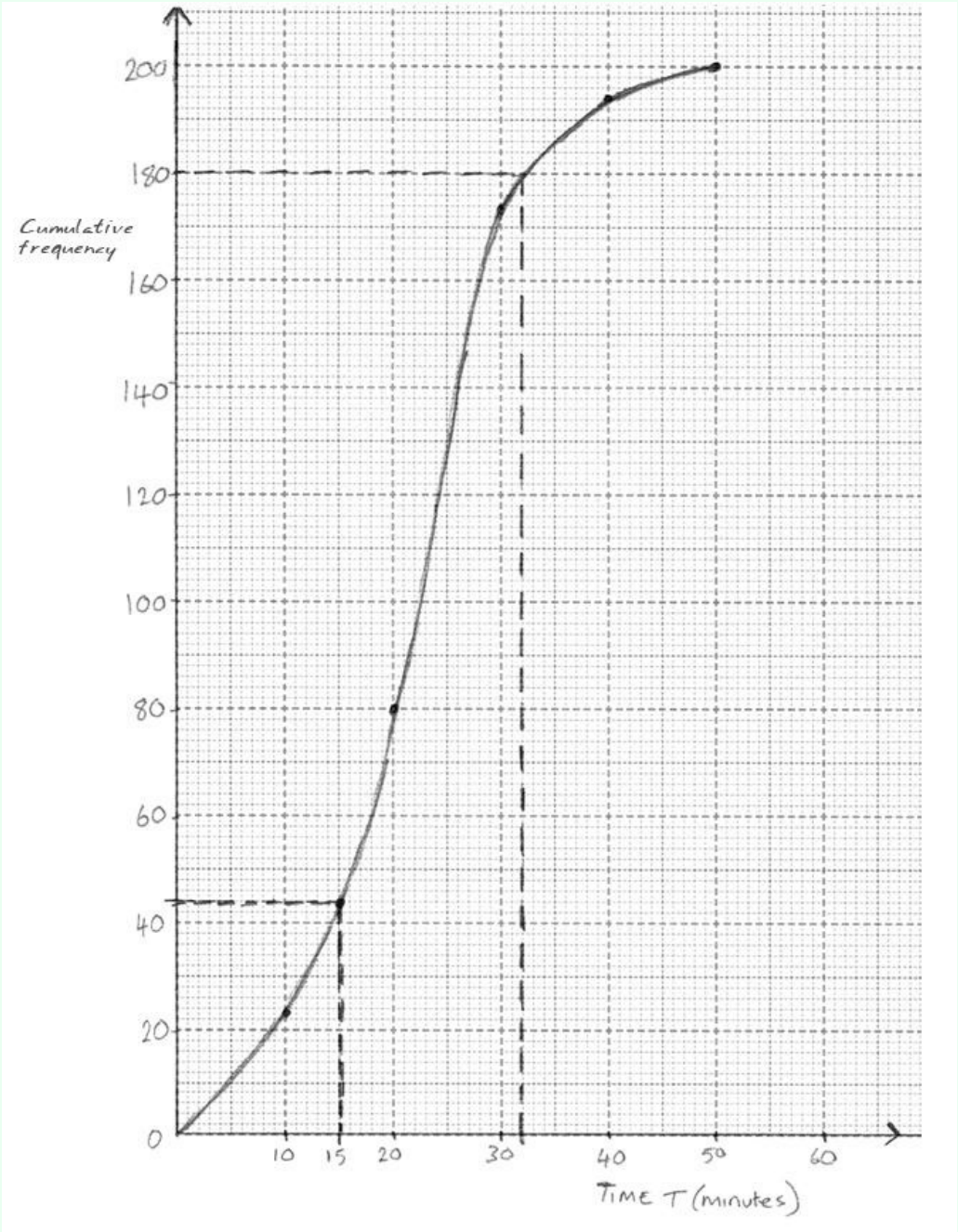
[2 marks]

Examiners report

(e) The values of q and r were mostly correct.

9f. *[4 marks]*

Markscheme



(A1)(A2)*(ft)*(A1)

Notes: Award ***(A1)*** for scale and axis labels, ***(A2)*(ft)** for 5 correct points, ***(A1)*(ft)** for 4 or 3 correct points, ***(A0)*** for less than 3 correct points, ***(A1)*** for smooth curve through their points, starting at (0, 0). Follow through from their answers to parts (e)(i) and (e)(ii).

[4 marks]

Examiners report

(f) Most candidates plotted the points correctly. Some had problems plotting the 23 and 173. A few candidates used the midpoints instead of the end points and some drew bar charts.

9g. *[6 marks]*

Markscheme

(i) 22.5 ± 2 ***(A1)***

(ii) 32 ± 2 ***(M1)(A1)*****(ft)*****(G2)***

Note: Award ***(M1)*** for lines drawn on graph or some indication of method, follow through from their graph if working is shown.

(iii) 44 ± 2 ***(A1)*****(ft)**

Note: Follow through from their graph if working is shown.

200 – 44 = 156 ***(M1)(A1)*****(ft)*****(G2)***

Note: Award ***(M1)*** for subtraction from 200, follow through from their graph if working is shown.

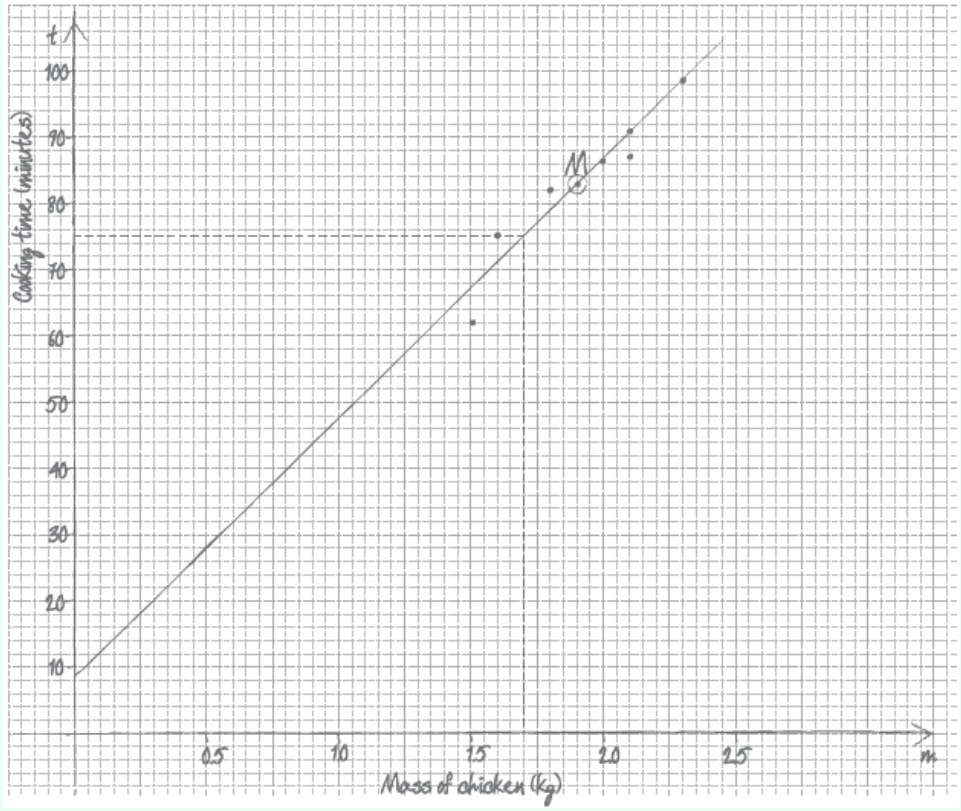
[6 marks]

Examiners report

(g) There was a lot of follow through marks gained here by those candidates who drew lines or put marks on their graphs in the correct places.

10a. *[4 marks]*

Markscheme



(A1) *for correct scales and labels (mass or m on the horizontals axis, time or t on the vertical axis)*

(A3) *for 7 or 8 correctly placed data points*

(A2) *for 5 or 6 correctly placed data points*

(A1) *for 3 or 4 correctly placed data points,* ***(A0)*** *otherwise.* ***(A4)***

Note: If axes reversed award at most ***(A0)(A3)*****(ft)**. If graph paper not used, award at most ***(A1)(A0)***.

Examiners report

[N/A]

10b. *[2 marks]*

Markscheme

(i) 1.91 (kg) (1.9125 kg) ***(G1)***

(ii) 83 (minutes) ***(G1)***

Examiners report

[N/A]

10c. *[1 mark]*

Markscheme

Their mean point labelled. ***(A1)*****(ft)**

Note: Follow through from part (b). Accept any clear indication of the mean point. For example: circle around point, (m, t), M , etc.

Examiners report

[N/A]

10d. *[2 marks]*

Markscheme

Line of best fit drawn on scatter diagram. ***(A1)*****(ft)*****(A1)*****(ft)**

Notes:Award ***(A1)*****(ft)** for straight line through their mean point, ***(A1)*****(ft)** for line of best fit with intercept 9(±2) . The second ***(A1)*****(ft)** can be awarded even if the line does not reach the t-axis but, if extended, the t-intercept is correct.

Examiners report

[N/A]

10e. *[2 marks]*

Markscheme

75 ***(M1)******(A1)*****(ft)*****(G2)***

Notes: Accept 74.77 from the regression line equation. Award ***(M1)*** for indication of the use of their graph to get an estimate **OR** for correct substitution of 1.7 in the correct regression line equation $t = 38.5m + 9.32$.

Examiners report

[N/A]

10f. *[2 marks]*

Markscheme

0.960 (0.959614...) ***(G2)***

Note: Award ***(G0)(G1)*****(ft)** for 0.95, 0.959

Examiners report

[N/A]

10g. *[2 marks]*

Markscheme

Strong and positive ***(A1)*****(ft)*****(A1)*****(ft)**

Note: Follow through from their correlation coefficient in part (f).

Examiners report

[N/A]

10h. *[2 marks]*

Markscheme

(i) Cooking time is much larger (or smaller) than the other eight ***(A1)***

(ii) The gradient of the new line of best fit will be larger (or smaller) ***(A1)***

Note: Some acceptable explanations may include but are not limited to:

The line of best fit may be further away from the plotted points
It may be steeper than the previous line (as the mean would change)
The t-intercept of the new line is smaller (larger)

Do not accept vague explanations, like:

The new line would vary
It would not go through all points
It would not fit the patterns
The line may be slightly tilted

Examiners report

[N/A]

11a. *[3 marks]*

Markscheme

%	0–20	20–40	40–60	60–80	80–100
F	14	26	58	16	6

(A1)(A1)(A1) ***(C3)***

[3 marks]

Examiners report

This question was poorly answered by many of the candidates. A number of students could not identify the specified frequencies from the graph in part a). Most could not give the midinterval value although surprisingly many of these candidates then went on and used the correct mid-interval value in the mean formula. A number did not understand the meaning of 'an estimate of the mean' and just wrote down a number read from the diagram.

11b. *[1 mark]*

Markscheme

50 ***(A1)*** ***(C1)***

[1 mark]

Examiners report

This question was poorly answered by many of the candidates. A number of students could not identify the specified frequencies from the graph in part a). Most could not give the midinterval value although surprisingly many of these candidates then went on and used the correct mid-interval value in the mean formula. A number did not understand the meaning of 'an estimate of the mean' and just wrote down a number read from the diagram.

11c. *[2 marks]*

Markscheme

$\text{Mean} = \frac{10\times14+.....+90\times6}{120}$ ***(M1)***

Note: Award ***(M1)*** for correct substitution of their values from (a) in mean formula.

$= 45\frac{2}{3}(45.7)$ ***(A1)*****(ft)** ***(C2)***

[2 marks]

Examiners report

This question was poorly answered by many of the candidates. A number of students could not identify the specified frequencies from the graph in part a). Most could not give the midinterval value although surprisingly many of these candidates then went on and used the correct mid-interval value in the mean formula. A number did not understand the meaning of 'an estimate of the mean' and just wrote down a number read from the diagram.

12a. *[1 mark]*

Markscheme

Median = 25 mins ***(A1)*** ***(C1)***

[1 mark]

Examiners report

This question was well answered with many candidates gaining full marks. Some received a unit penalty in part (a) for omitting the minutes.

12b. *[2 marks]*

Markscheme

32 – 16 ***(A1)***
= 16 ***(A1)*****(ft)** ***(C2)***

Notes: Award ***(A1)*** for identifying correct quartiles, ***(A1)*****(ft)** for correct answer to subtraction of their quartiles.

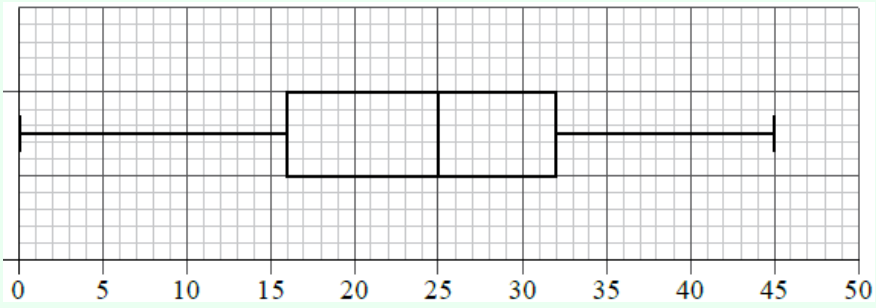
[2 marks]

Examiners report

This question was well answered with many candidates gaining full marks.

12c. *[3 marks]*

Markscheme



median shown ***(A1)*****(ft)**
box with ends at their quartiles ***(A1)*****(ft)**
end points at 0 and 45 joined to box with straight lines ***(A1)*** ***(C3)***

Note: Award ***(A1)*****(ft)*****(A1)*****(ft)*****(A0)*** if lines go right through the box.

[3 marks]

Examiners report

This question was well answered with many candidates gaining full marks. Most of the candidates knew how to draw the box and whisker plot. A mark was deducted if the whiskers were drawn all the way through the box.

13a. *[1 mark]*

Markscheme

30 ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Many students had difficulty with reading the box and whisker plot and interpreting this question. Some candidates had difficulty with finding the range in part (a)(iii). Many wrote down the end points for the required range of data instead of writing the difference between the largest and smallest values. A number of candidates had problems estimating the number of students who achieved a mark greater than 32. Many students used the number 40 instead of the total number of student 56 for the estimation in part b).

13b. *[1 mark]*

Markscheme

32 ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Many students had difficulty with reading the box and whisker plot and interpreting this question. Some candidates had difficulty with finding the range in part (a)(iii). Many wrote down the end points for the required range of data instead of writing the difference between the largest and smallest values. A number of candidates had problems estimating the number of students who achieved a mark greater than 32. Many students used the number 40 instead of the total number of student 56 for the estimation in part b).

13c. *[2 marks]*

Markscheme

$38 - 10 = 28$ ***(A1)(A1)*** ***(C2)***

Note: Award ***(A1)*** for 10 and 38 seen, ***(A1)*** for correct answer only.

[2 marks]

Examiners report

Many students had difficulty with reading the box and whisker plot and interpreting this question. Some candidates had difficulty with finding the range in part (a)(iii). Many wrote down the end points for the required range of data instead of writing the difference between the largest and smallest values. A number of candidates had problems estimating the number of students who achieved a mark greater than 32. Many students used the number 40 instead of the total number of student 56 for the estimation in part b).

13d. *[2 marks]*

Markscheme

$0.25 \times 56 = 14$ ***(M1)(A1)*** ***(C2)***

Note: Award ***(M1)*** for multiplying 0.25 by 56.

[2 marks]

Examiners report

Many students had difficulty with reading the box and whisker plot and interpreting this question. Some candidates had difficulty with finding the range in part (a)(iii). Many wrote down the end points for the required range of data instead of writing the difference between the largest and smallest values. A number of candidates had problems estimating the number of students who achieved a mark greater than 32. Many students used the number 40 instead of the total number of student 56 for the estimation in part b).

14a. *[1 mark]*

Markscheme

55 ***(A1)*** ***(C1)***

[1 mark]

Examiners report

This question was not well answered. Many candidates could not find the mid interval value, and used their graphic display calculator incorrectly to find the mean and standard deviation.

14b. *[2 marks]*

Markscheme

$62.\overline{5}$ (62.6) ***(A2)*(ft)** ***(C2)***

[2 marks]

Examiners report

This question was not well answered. Many candidates could not find the mid interval value, and used their graphic display calculator incorrectly to find the mean and standard deviation.

14c. *[1 mark]*

Markscheme

8.86 ***(A1)*** ***(C1)***

Note: Follow through from their answer to part (a).

[1 mark]

Examiners report

This question was not well answered. Many candidates could not find the mid interval value, and used their graphic display calculator incorrectly to find the mean and standard deviation.

14d. *[2 marks]*

Markscheme

$62.6 - 3 \times 8.86 = 36.0$ ***(M1)(A1)*(ft)** ***(C2)***

Note: Accept 36.

Follow through from their values in part (b) **only if working is seen**.

[2 marks]

Examiners report

This question was not well answered. Many candidates could not find the mid interval value, and used their graphic display calculator incorrectly to find the mean and standard deviation. The candidates who showed working and correct method in part c) were awarded the final two marks. If working was not shown then these marks could not be awarded.

15a. *[1 mark]*

Markscheme

65 ***(A1)***

[1 mark]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

15b. *[3 marks]*

Markscheme

(i)
54 (km h^{-1}) ***(G2)***

Note: If the answer to part (b)(i) is consistent with the answer to part (a) then award ***(G2)*****(ft)** even if no working seen.

(ii)
19.2 (
19.2093...) ***(G1)***

Note: Accept
19, do not accept
20.

[3 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

15c. *[1 mark]*

Markscheme

76 ***(A1)***

[1 mark]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

15d. *[2 marks]*

Markscheme

$a = 76$,
$b = 98$ ***(A1)*****(ft)**

Note: Follow through from their answer to part (c) for
a and
$b =$ their
$a + 22$.

$c = 118$ ***(A1)***

[2 marks]

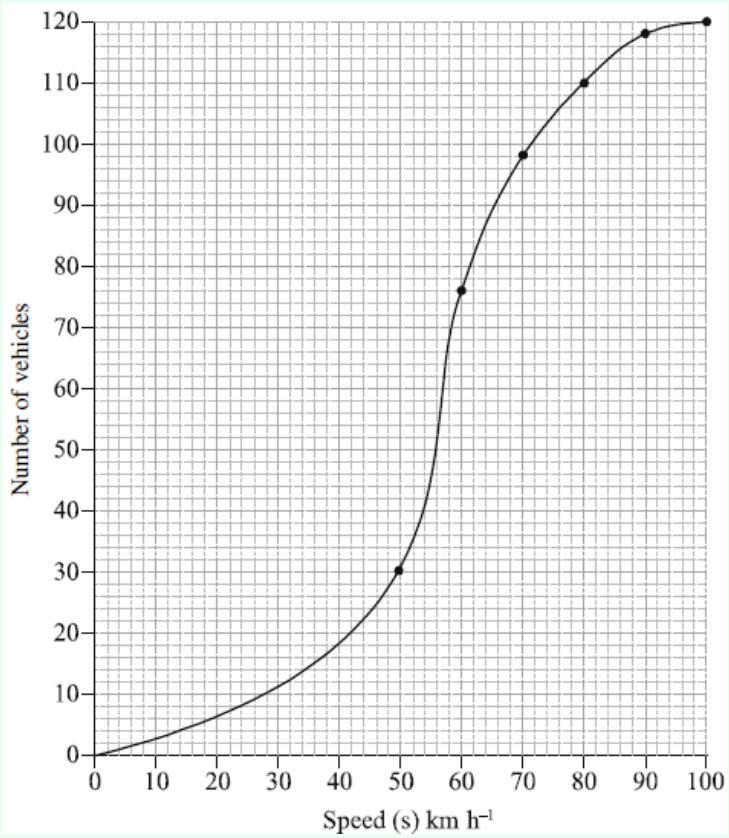
Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

15e. *[4 marks]*

Markscheme



(A1)(A1)*(ft)*(A1)*(ft)*(A1)

Notes: Award ***(A1)*** for axes labelled and correct scales. If the axes are reversed do not award this mark but follow through. Award ***(A2)*(ft)** for **their** 6 points correct, ***(A1)*(ft)** for at least 3 of these points correct. Award ***(A1)*** for smooth curve drawn through all points **including** (
0,
0). If either the
x or the
y axis has a break in it to zero, do not award this final mark.

[4 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

15f. *[4 marks]*

Markscheme

(i)
57
(km h^{-1})
(± 2) ***(M1)(A1)*****(ft)*****(G2)***

Note: Award ***(M1)*** for clear indication of median on their graph. Follow through from their graph. If their answer is consistent with their incorrect graph but there is no working present on graph then no marks are awarded.

(ii)
90 vehicles
(± 2) ***(M1)(A1)*****(ft)*****(G2)***

Note: Award ***(M1)*** for clear indication of method on their graph. Follow through from their graph. If their answer is consistent with their incorrect graph but there is no working present on graph then no marks are awarded.

[4 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

15g. *[3 marks]*

Markscheme

$50 + 19.2 = 69.2$ ***(A1)*****(ft)**

24
(± 2) drivers will be fined ***(M1)(A1)*****(ft)*****(G2)***

Notes: Follow through from their graph and from their part (b)(ii). Award ***(M1)*** for indication of method on their graph. If their answer is consistent with their incorrect graph but there is no working present on graph then no marks are awarded.

[3 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The different class widths seemed to cause more problems to the teachers commenting on the G2 forms than to the students. However, 1(b) was a discriminator at the grade 4 level. Most candidates were successful in drawing the cumulative frequency curve or attempting to do so. There were a small number who clearly had never had any experience with this type of graph. A common error was the incorrect plotting of points at the interval midpoints. Weaker candidates plotted bar charts.

A small number of candidates did not use the graph paper provided, preferring instead to use lined paper. This is to be strongly discouraged since no judgment will be made about the scale used or the accuracy of the plotted points. Similarly, the graph will not be used to benefit students whose answers lie outside accepted tolerances but who have shown working. Drawing an accurate graph requires the use of graph paper.

16a. *[2 marks]*

Markscheme

$q = 25 - (4 + 3 + 8 + 4 + 1)$ ***(M1)***

Note: Award ***(M1)*** for subtraction from 25 of all values from the table.

$= 5$ ***(A1)*** ***(C2)***

[2 marks]

Examiners report

Part b was not well answered by the majority of candidates, indicating that the use of the GDC is not a natural tool for answering this type of question. Many students ignored the frequencies when finding the mean, median, and standard deviation.

16b. *[4 marks]*

Markscheme

(i)

2.2 ***(A2)*****(ft)** ***(C2)***

Note: Award ***(M1)*** for use of mean formula with correct substitution. Follow through from part (a), irrespective of whether working is shown.

(ii)

2 ***(A1)*** ***(C1)***

(iii)

1.39 ***(A1)*****(ft)** ***(C1)***

Note: Follow through from part (a), irrespective of whether working is shown. Award ***(A1)*** for 1.38.

[4 marks]

Examiners report

Part b was not well answered by the majority of candidates, indicating that the use of the GDC is not a natural tool for answering this type of question. Many students ignored the frequencies when finding the mean, median, and standard deviation.

17a. *[1 mark]*

Markscheme

61 kg ***(A1)*** ***(C1)***

[1 mark]

Examiners report

Question 14 parts a and b were well done.

17b. *[2 marks]*

Markscheme

$66 - 52$ ***(A1)***

$= 14$ ***(A1)*****(ft)** ***(C2)***

Note: Award ***(A1)*** for identifying quartiles, ***(A1)*****(ft)** for correct subtraction of their quartiles.

[2 marks]

Examiners report

Question 14 parts a and b were well done.

17c. *[1 mark]*

Markscheme

20 ***(A1)*** ***(C1)***

[1 marks]

Examiners report

Parts c and d were omitted or incorrectly answered more frequently than any other question on the exam paper.

17d. *[2 marks]*

Markscheme

$\frac{49.5 \times 20 + 56.5 \times 20}{40}$ ***(M1)***

Note: Award ***(M1)*** for multiplication of midpoints by frequencies.

$= 53$ kg ***(A1)*** ***(C2)***

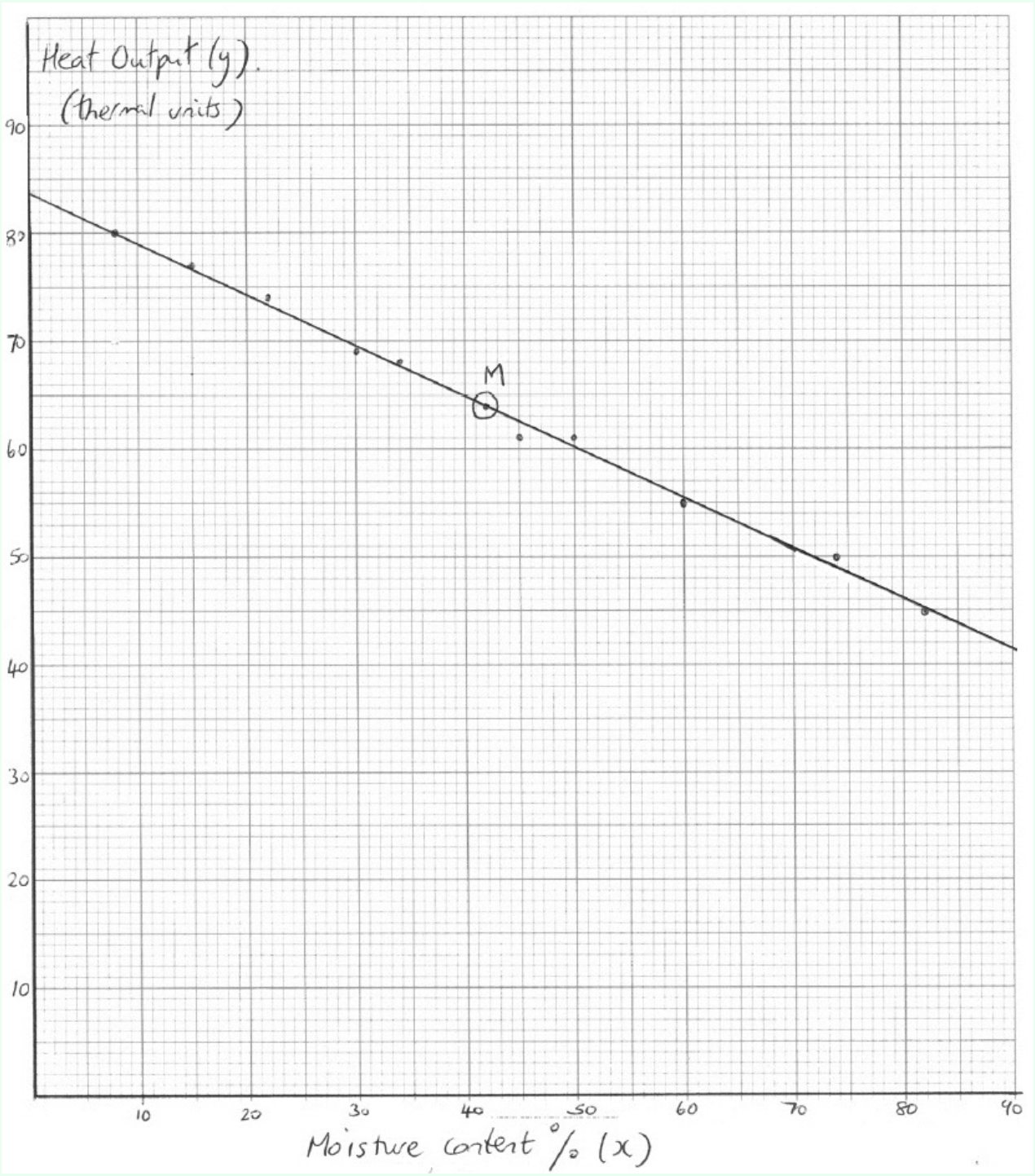
[2 marks]

Examiners report

Parts c and d were omitted or incorrectly answered more frequently than any other question on the exam paper.

18a. *[4 marks]*

Markscheme



(A1) for correct scales and labels
(A3) for all ten points plotted correctly
(A2) for eight or nine points plotted correctly
(A1) for six or seven points plotted correctly ***(A4)***

Note: Award at most ***(A0)(A3)*** if axes reversed.

[4 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

18b. *[2 marks]*

Markscheme

(i)
$\bar{x} = 42$ ***(A1)***

(ii)
$\bar{y} = 64$ ***(A1)***

[2 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

18c. *[2 marks]*

Markscheme

$(\bar{x}, \bar{y})$ plotted on graph and labelled, M ***(A1)*****(ft)*****(A1)***

Note: Award ***(A1)*****(ft)** for position, ***(A1)*** for label.

[2 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

18d. *[2 marks]*

Markscheme

-0.998 ***(G2)***

Note: Award ***(G1)*** for correct sign, ***(G1)*** for correct absolute value.

[1 mark]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

18e. *[2 marks]*

Markscheme

line on graph ***(A1)*****(ft)*****(A1)***

Notes: Award ***(A1)*****(ft)** for line through their M, **(A1)** for approximately correct intercept (allow between
83 and
85). It is not necessary that the line is seen to intersect the
y-axis. The line must be straight for any mark to be awarded.

[2 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

18f. *[2 marks]*

Markscheme

$y = -0.470(25) + 83.7$ ***(M1)***

Note: Award ***(M1)*** for substitution into formula or some indication of method on their graph.
$y = -0.470(0.25) + 83.7$ is incorrect.

$= 72.0$ (accept
71.95 and
72) ***(A1)*****(ft)*****(G2)***

Note: Follow through from graph only if they show working on their graph. Accept
72 ± 0.5 .

[2 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

18g. *[2 marks]*

Markscheme

Yes since
25% lies within the data set and
r is close to
-1 ***(R1)(A1)***

Note: Accept Yes, since
r is close to
-1

Note: Do not award ***(R0)(A1)***.

[2 marks]

Examiners report

The great majority of candidates found this question to be a good start to the paper. The common errors were (1) incorrect scales being used; SI units are standard in this course and candidates are expected to know the difference between centimetres and millimetres (2) the lack of
r on the GDC (3) not knowing that the regression line
y on
x passes through the mean point and (4) not realising that the value of
r determines the validity of using the regression line
y on
x .

19a. *[2 marks]*

Markscheme

$\frac{0\times16+1\times22+2\times19...}{80}$ ***(M1)***

Note: Award ***(M1)*** for substituting correct values into mean formula.

1.75 ***(A1)*** ***(C2)***

[2 marks]

Examiners report

In parts (a) and (b),
2.5 was a common incorrect error for both parts as some candidates were confused as to the concept of both the mean and the median from tabular data and simply looked at the mean and median of the *Number of goals*, ignoring the weighting of the number of matches. Candidates faired a little better with part (c) and many correct answers (many as follow through answers) were seen in this part of the question.

19b. *[2 marks]*

Markscheme

An attempt to enumerate the number of goals scored. ***(M1)***

2 ***(A1)*** ***(C2)***

[2 marks]

Examiners report

In parts (a) and (b),
2.5 was a common incorrect error for both parts as some candidates were confused as to the concept of both the mean and the median from tabular data and simply looked at the mean and median of the *Number of goals*, ignoring the weighting of the number of matches. Candidates faired a little better with part (c) and many correct answers (many as follow through answers) were seen in this part of the question.

19c. *[2 marks]*

Markscheme

$\frac{2-1.75}{1.75} \times 100$ ***(M1)***
14.3% ***(A1)*****(ft)** ***(C2)***

Notes: Award ***(M1)*** for correctly substituted
% error formula.
% sign not required. Follow through from their answer to part (a). If
100 is missing and answer incorrect award ***(M0)(A0)***. If
100 is missing and answer incorrectly rounded award ***(M1)(A1)*****(ft)*****(AP)***.

[2 marks]

Examiners report

In parts (a) and (b),
2.5 was a common incorrect error for both parts as some candidates were confused as to the concept of both the mean and the median from tabular data and simply looked at the mean and median of the *Number of goals*, ignoring the weighting of the number of matches. Candidates faired a little better with part (c) and many correct answers (many as follow through answers) were seen in this part of the question.

20a. *[1 mark]*

Markscheme

H_0 : Choice of language is independent of gender. ***(A1)***

Notes: Do not accept “not related” or “not correlated”.

[1 mark]

Examiners report

Part A: Chi-square test

This question part was answered well by most candidates. The null hypothesis and degrees of freedom were mostly correct. Some candidates offered a conclusion supported by good justifications, but others still showed lack of the necessary knowledge to do that. Some responses to part d) incurred an accuracy penalty for not adhering to the required accuracy level.

20b. *[1 mark]*

Markscheme

2 ***(A1)***

[1 mark]

Examiners report

Part A: Chi-square test

This question part was answered well by most candidates. The null hypothesis and degrees of freedom were mostly correct. Some candidates offered a conclusion supported by good justifications, but others still showed lack of the necessary knowledge to do that. Some responses to part d) incurred an accuracy penalty for not adhering to the required accuracy level.

20c. *[2 marks]*

Markscheme

$\frac{50\times 69}{150} = 23$ ***(M1)(A1)(G2)***

Notes: Award ***(M1)*** for correct substituted formula, ***(A1)*** for 23.

[2 marks]

Examiners report

Part A: Chi-square test

This question part was answered well by most candidates. The null hypothesis and degrees of freedom were mostly correct. Some candidates offered a conclusion supported by good justifications, but others still showed lack of the necessary knowledge to do that. Some responses to part d) incurred an accuracy penalty for not adhering to the required accuracy level.

20d. *[2 marks]*

Markscheme

$\chi^2 = 4.77$ ***(G2)***

Notes: If answer is incorrect, award ***(M1)*** for correct substitution in the correct formula (all terms).

[2 marks]

Examiners report

Part A: Chi-square test

This question part was answered well by most candidates. The null hypothesis and degrees of freedom were mostly correct. Some candidates offered a conclusion supported by good justifications, but others still showed lack of the necessary knowledge to do that. Some responses to part d) incurred an accuracy penalty for not adhering to the required accuracy level.

20e. *[2 marks]*

Markscheme

Accept
H_0 since

$\chi^2_{calc} < \chi^2_{crit}(5.99)$ **or**
p-value
$(0.0923) > 0.05$ ***(R1)(A1)*****(ft)**

Notes: Do not award ***(R0)(A1)***. Follow through from their (d) and (b).

Examiners report

Part A: Chi-square test

This question part was answered well by most candidates. The null hypothesis and degrees of freedom were mostly correct. Some candidates offered a conclusion supported by good justifications, but others still showed lack of the necessary knowledge to do that. Some responses to part d) incurred an accuracy penalty for not adhering to the required accuracy level.

20f. *[4 marks]*

Markscheme

Award ***(A1)*** for correct scale and labels.

Award ***(A3)*** for all seven points plotted correctly, ***(A2)*** for 5 or 6 points plotted correctly, ***(A1)*** for 3 or 4 points plotted correctly.

(A4)

[4 marks]

Examiners report

Part B: Scatter plot and Regression line

Many candidates reversed the axes in a), but the points were mostly plotted well. The values of the coefficients of the equation of the regression line
$y = ax + b$ were often given not to the required 3 significant figure accuracy, and incurred a penalty. The regression line was often drawn not passing through point M and the y-intercept. The responses to the last part of the question were particularly weak, and many candidates were not able to offer a satisfactory reason to support their conclusion.

20g. *[2 marks]*

Markscheme

(i)
$\bar{S} = 49.9,$ ***(G1)***

(ii)
$\bar{F} = 47.3$ ***(G1)***

[2 marks]

Examiners report

Part B: Scatter plot and Regression line

Many candidates reversed the axes in a), but the points were mostly plotted well. The values of the coefficients of the equation of the regression line
$y = ax + b$ were often given not to the required 3 significant figure accuracy, and incurred a penalty. The regression line was often drawn not passing through point M and the y-intercept. The responses to the last part of the question were particularly weak, and many candidates were not able to offer a satisfactory reason to support their conclusion.

20h. *[1 mark]*

Markscheme

M$(49.9, 47.3)$ plotted on scatter diagram **(*A1*)(ft)**

Notes: Follow through from (a) and (b).

[1 mark]

Examiners report

Part B: Scatter plot and Regression line

Many candidates reversed the axes in a), but the points were mostly plotted well. The values of the coefficients of the equation of the regression line
$y = ax + b$ were often given not to the required 3 significant figure accuracy, and incurred a penalty. The regression line was often drawn not passing through point M and the y-intercept. The responses to the last part of the question were particularly weak, and many candidates were not able to offer a satisfactory reason to support their conclusion.

20i. *[2 marks]*

Markscheme

$F = -0.619S + 78.2$ ***(G1)(G1)***

Notes: Award ***(G1)*** for
$-0.619S$, ***(G1)*** for
78.2. If the answer is not in the form of an equation, award ***(G1)(G0)***. Accept
$y = -0.619x + 78.2$.

OR

(F - 47.3 = - 0.619(S - 49.9)) ***(G1)(G1)***

Note: Award ***(G1)*** for
-0.619, ***(G1)*** for the coordinates of their midpoint used. Follow through from their values in (b).

[2 marks]

Examiners report

Part B: Scatter plot and Regression line

Many candidates reversed the axes in a), but the points were mostly plotted well. The values of the coefficients of the equation of the regression line
$y = ax + b$ were often given not to the required 3 significant figure accuracy, and incurred a penalty. The regression line was often drawn not passing through point M and the y-intercept. The responses to the last part of the question were particularly weak, and many candidates were not able to offer a satisfactory reason to support their conclusion.

20j. *[2 marks]*

Markscheme

line drawn on scatter diagram ***(A1)*****(ft)*****(A1)*****(ft)**

Notes: The drawn line **must** be straight for any marks to be awarded. Award ***(A1)*****(ft)** passing through their M plotted in (c). Award ***(A1)*****(ft)** for correct
y-intercept. Follow through from their
y-intercept found in (d).

[2 marks]

Examiners report

Part B: Scatter plot and Regression line

Many candidates reversed the axes in a), but the points were mostly plotted well. The values of the coefficients of the equation of the regression line
$y = ax + b$ were often given not to the required 3 significant figure accuracy, and incurred a penalty. The regression line was often drawn not passing through point M and the y-intercept. The responses to the last part of the question were particularly weak, and many candidates were not able to offer a satisfactory reason to support their conclusion.

20k. *[2 marks]*

Markscheme

$F = -0.619 \times 44 + 78.2$ ***(M1)***

$= 51.0$ (allow
51 or
50.9) ***(A1)*****(ft)*****(G2)*****(ft)**

Note: Follow through from their equation.

OR

(M1) any indication of an acceptable graphical method. ***(M1)***

(A1)**(ft)** from their regression line. ***(A1)*****(ft)*****(G2)*****(ft)**

[2 marks]

Examiners report

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20l. *[2 marks]*

Markscheme

not reliable ***(A1)***

Monique's score in Science is outside the range of scores used to create the regression line. ***(R1)***

Note: Do not award ***(A1)(R0)***.

[2 marks]

Examiners report

Part B: Scatter plot and Regression line

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