Name: _____

Higher Unit 3 topic test

Date:

Time: 50 minutes

Total marks available: 47

Total marks achieved: _____

Questions

Q1.

There are a total of 96 children in Years 4, 5 and 6
37 of these children cannot swim.

11 children in Year 4 cannot swim.
21 children in Year 5 can swim.

There are 30 children in Year 6
18 of these 30 children can swim.

   (i) Work out the number of children in Year 4 who can swim.

....

   (ii) Work out the total number of children in Year 5

....
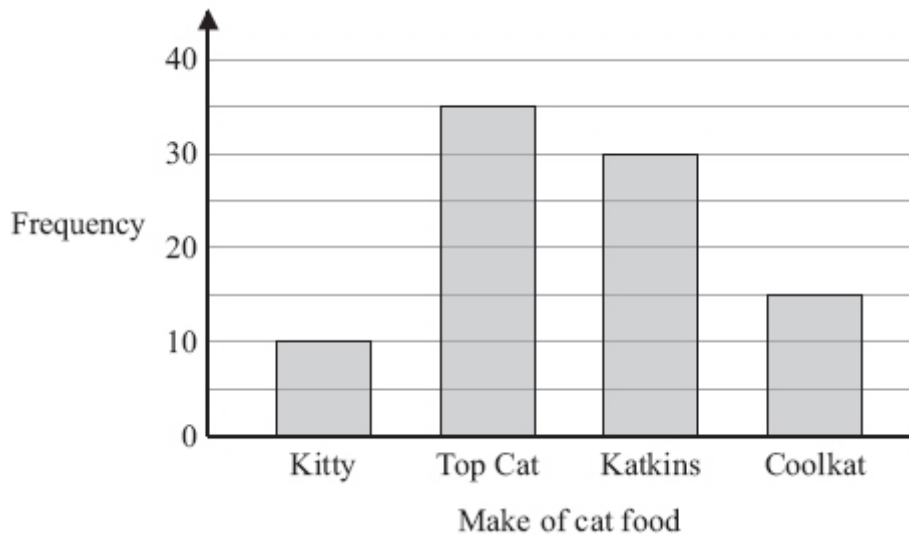
(Total for Question is 4 marks)

Q2.

A survey was carried out for a magazine.
90 cat owners were asked to write down the make of cat food their cats liked best.

The bar chart shows information about the results.

The information in the bar chart is going to be shown in a pie chart.

Use the information in the bar chart to complete the pie chart.
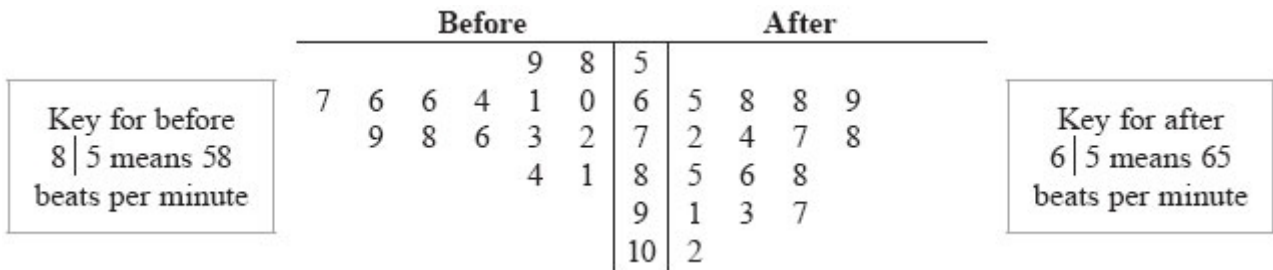

(Total for Question is 3 marks)

Q3.

* Zoe recorded the heart rates, in beats per minute, of each of 15 people.
Zoe then asked the 15 people to walk up some stairs.
She recorded their heart rates again.

She showed her results in a back-to-back stem and leaf diagram.

	Before				After			

```
                    Before                        After
                         9  8 │  5 │
        7   6   6   4   1  0 │  6 │ 5  8  8  9
            9   8   6   3  2 │  7 │ 2  4  7  8
                        4  1 │  8 │ 5  6  8
                             │  9 │ 1  3  7
                             │ 10 │ 2
```

Key for before
8 | 5 means 58
beats per minute

Key for after
6 | 5 means 65
beats per minute

Compare the heart rates of the people before they walked up the stairs
with their heart rates after they walked up the stairs.

(Total for Question is 6 marks)

Q4.

25 students in class A did a science exam.
30 students in class B did the same science exam.

The mean mark for the 25 students in class A is 67.8
The mean mark for all the 55 students is 72.0

Work out the mean mark for the students in class B.

....

(Total for Question is 3 marks)

Q5.

The table gives information about the temperature, T °C, at noon in a town for 50 days.

Temperature (T °C)	Frequency
$8 < T \leqslant 12$	6
$12 < T \leqslant 16$	8
$16 < T \leqslant 20$	13
$20 < T \leqslant 24$	21
$24 < T \leqslant 28$	2

(a) Write down the modal class interval.

....

(1)

(b) Calculate an estimate for the mean temperature.

.... ° C
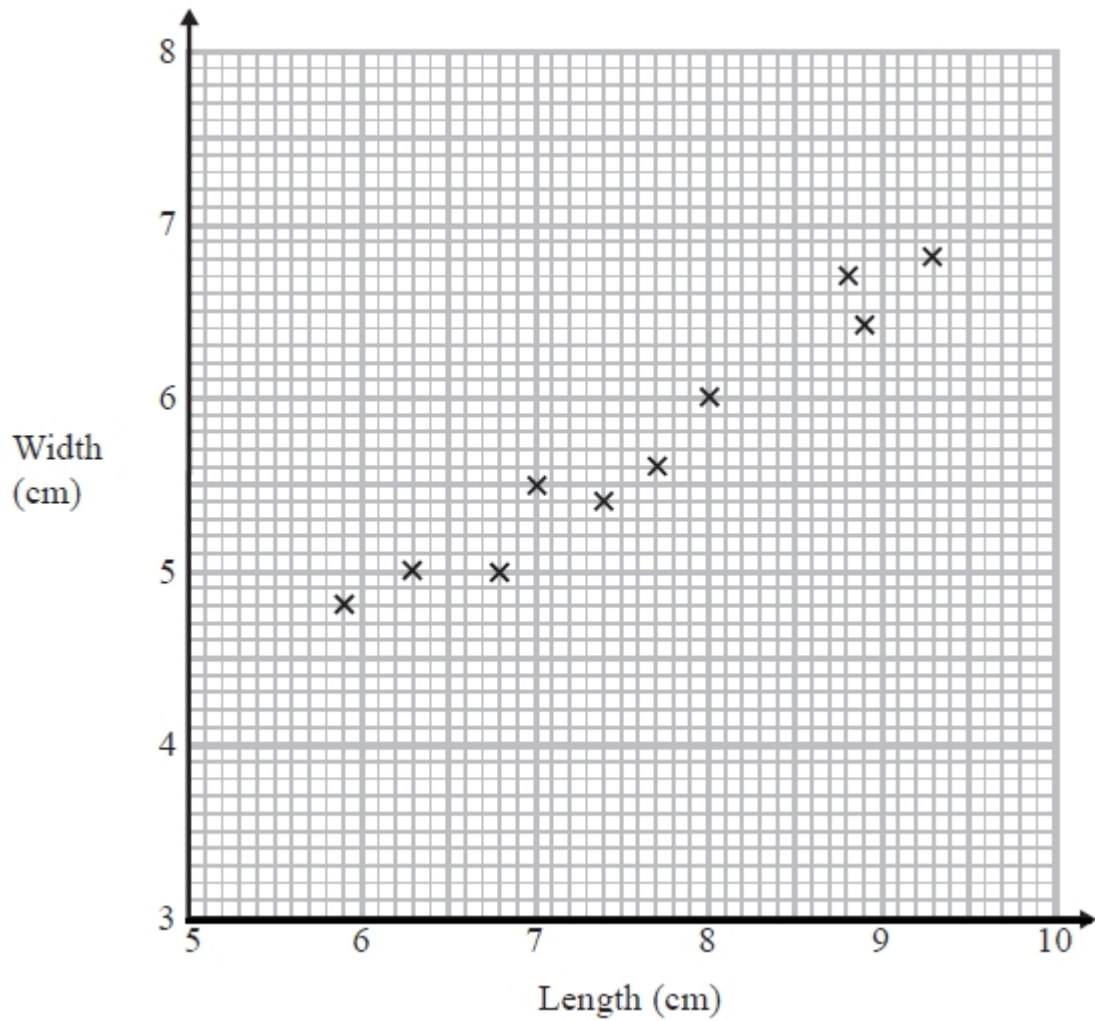
(4)

(c) Draw a frequency polygon for the information in the table.

(2)
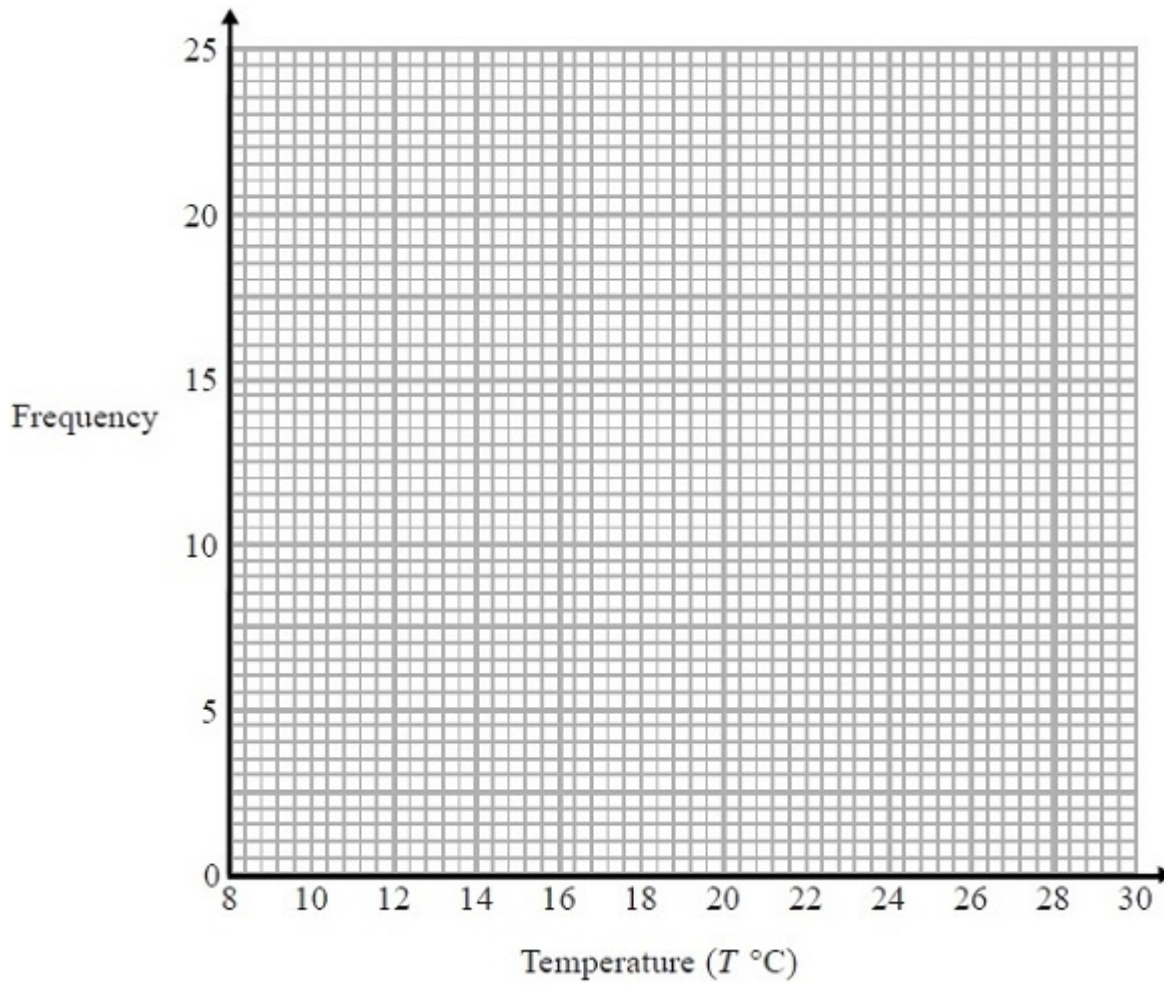
(Total for Question is 7 marks)

Q6.

The scatter graph shows some information about ten pine cones from the same tree.
It shows the length and the width of each pine cone.

(a) Describe the relationship between the length and the width of a pine cone.

....

....

(1)

Another pine cone from this tree has a length of 8.4 cm.

(b) Estimate the width of this pine cone.

....cm

(2)

(Total for question = 3 marks)

Q7.

Walkden Reds is a basketball team.

At the end of 11 games, their mean score was 33 points per game.
At the end of 10 games, their mean score was 2 points higher.

Jordan says,

"Walkden Reds must have scored 13 points in their 11th game."

Is Jordan right?
You must show how you get your answer.

....
(Total for question is 3 marks)

Q8.

Mr Brown gives his class a test.
The 10 girls in the class get a mean mark of 70%
The 15 boys in the class get a mean mark of 80%

Nick says that because the mean of 70 and 80 is 75 then the mean mark for the whole class in the test is 75%

Nick is not correct.
Is the correct mean mark less than or greater than 75%?
You must justify your answer.

....
....
....

(Total for question = 2 marks)

Q9.

The table shows some information about the foot lengths of 40 adults.

Foot length (f cm)	Number of adults
$16 \leqslant f < 18$	3
$18 \leqslant f < 20$	6
$20 \leqslant f < 22$	10
$22 \leqslant f < 24$	12
$24 \leqslant f < 26$	9

(a) Write down the modal class interval.

....
(1)

(b) Calculate an estimate for the mean foot length.

.... cm
(3)
(Total for question = 4 marks)

Q10.

The grouped frequency table gives information about the heights of 30 students.

Height (*h* cm)	Frequency
$130 < h \leqslant 140$	1
$140 < h \leqslant 150$	7
$150 < h \leqslant 160$	8
$160 < h \leqslant 170$	10
$170 < h \leqslant 180$	4

(a) Write down the modal class interval.

....

(1)

This incorrect frequency polygon has been drawn for the information in the table.
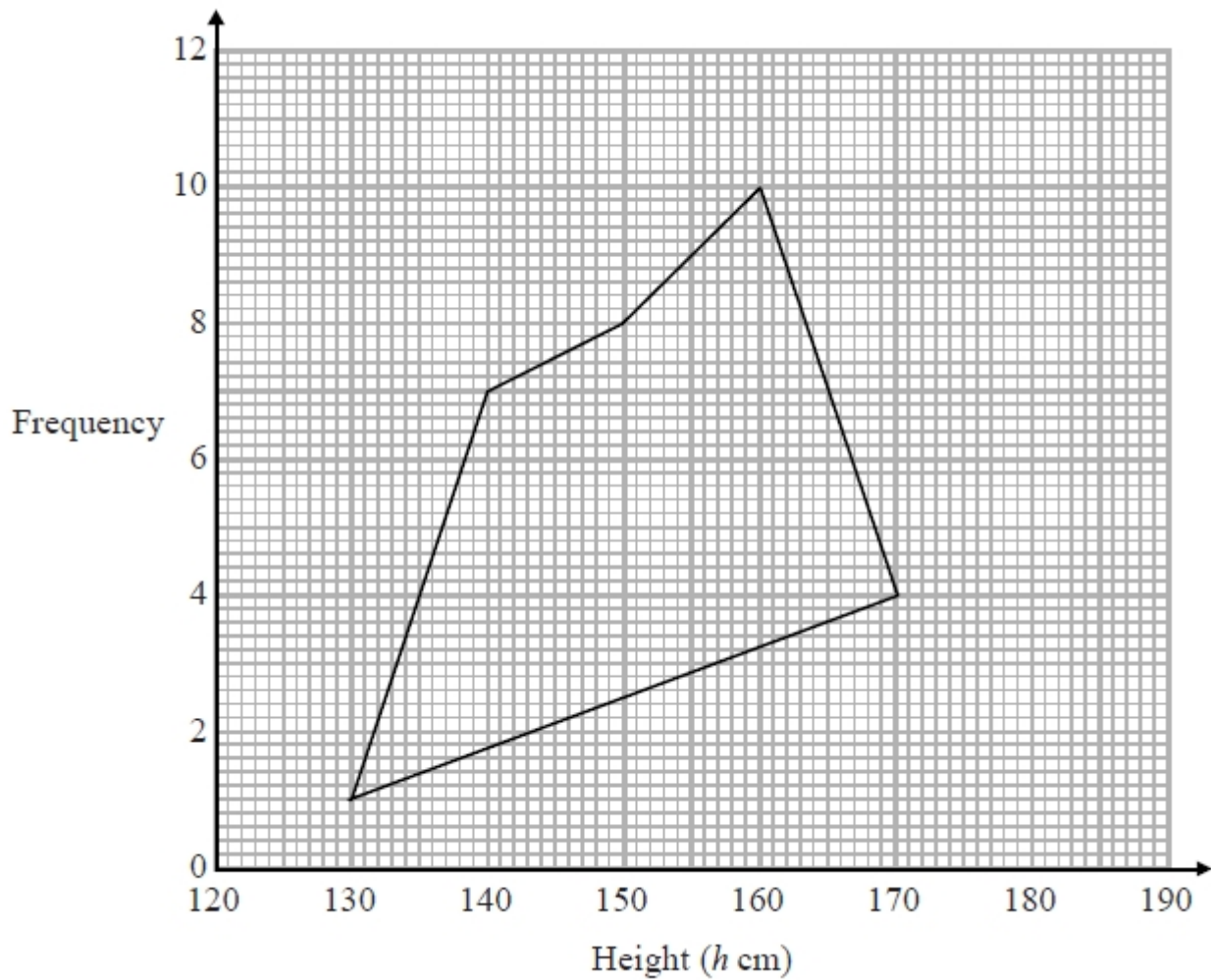
(b) Write down two things wrong with this incorrect frequency polygon.

1

....

2

....

(2)
(Total for question is 3 marks)

Q11.

A car company records the number of miles cars of different engine sizes, in litres, travel using one gallon of fuel.
The scatter graph shows this information.
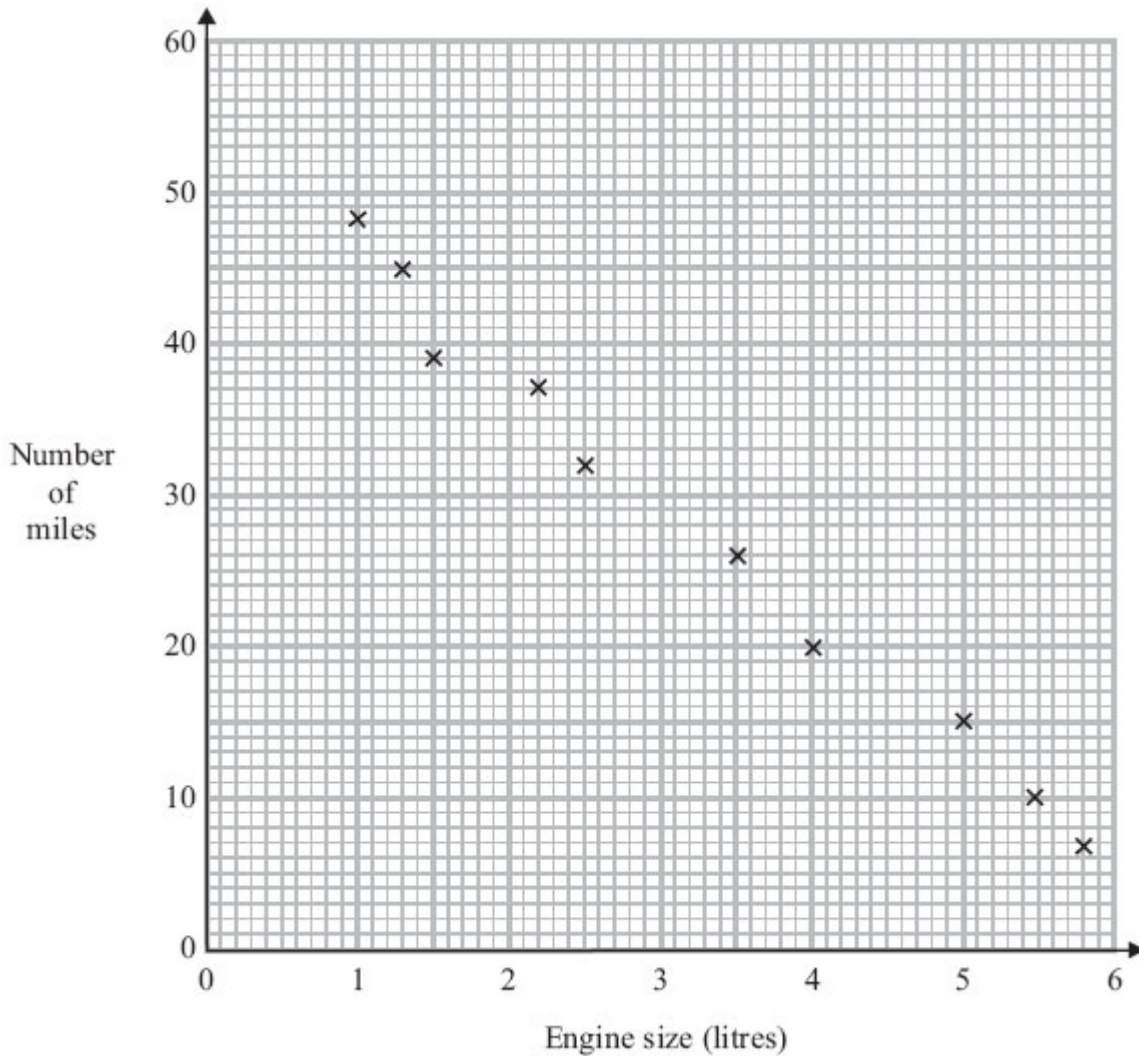
Another car has an engine size of 1.8 litres and travels 42 miles using one gallon of fuel.

(a) Plot this information on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

....

(1)

(c) Draw a line of best fit.

(1)

A car has an engine size of 2.8 litres.

(d) Find an estimate for the number of miles this car travels using one gallon of fuel.

....

(1)

(Total for Question is 4 marks)

Q12.

The scatter diagram shows information about 10 students.

For each student, it shows the number of hours spent revising and the mark the student achieved in the Spanish test.
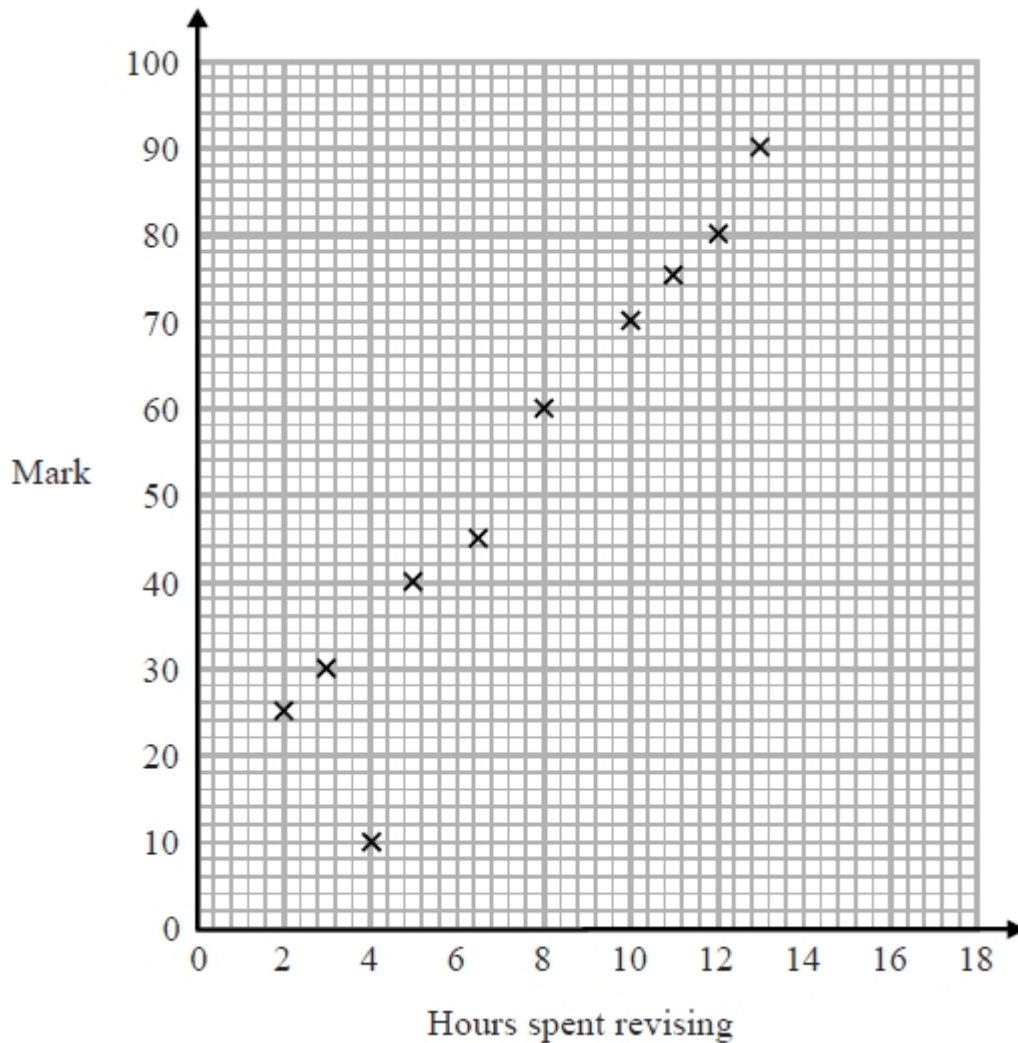
One of the points is an outlier.

(a) Write down the coordinates of the outlier.

....

(1)

For all the **other** points

(b) (i) draw the line of best fit,

    (ii) describe the correlation.

....

....

(2)

A different student studies for 9 hours.

(c) Estimate the mark gained by this student.

....

The Spanish test was marked out of 100

Lucia says,

"I can see from the graph that had I revised for 18 hours I would have got full marks."

(d) Comment on what Lucia says.

....

....

(1)
(Total for question is 5 marks)

Examiner's Report

Q1.

There was a lot of information to be processed in this question. Those candidates who used a suitable two- way table were much more successful than those who tried to reason it out. The most common successful approach was to set up a two way table with rows labelled 'Swim' and 'Not Swim' and with columns labelled 'Year 4' Year 5' and 'Year 6'. Candidates could then work through the given information and put it in the correct cells in the table to produce a table like one in the diagram.

	Y4	Y5	Y6	Tot
S		21	18	
NS	11			37
Tot			30	96

 The table was a huge aid in organising the data, so that the remaining cells could be filled in easily and the correct values picked out. Even so, some candidates managed to put at least one given value (usually the 18) in the wrong cell. A few candidates who did adopt this approach then put the wrong number down on the answer line so losing a mark.

Q2.

This question was attempted by almost all candidates with most scoring full marks and those that did not usually gained M1 for one correct angle. Candidates rarely forgot to label the pie chart and in most cases labelled the angles as well as the require type of cat food. Candidates often did not show their working for the angles which, especially in the cases where candidates did not have a protractor could have earned them M1. Weaker candidates failed to use a ruler which sometimes led to angles outside the tolerance.

Q3.

This question was worth 6 marks so it was somewhat surprising to see that some candidates limited themselves to a brief comment stating that heart rates were higher after people had walked up the stairs. Examiners were able to give this little credit without any supportive evidence. At the other extreme a significant number of candidates worked out the mode, median, mean, range and interquartile range for "before" and "after". Some then made an attempt to interpret their findings whilst others judged that they had completed the question once the calculations were done. What was required, of course, was the calculation and comparison of an appropriate average (i.e. the median or mean) for "before" and "after", the calculation and comparison of an appropriate measure of spread (i.e. the range or interquartile range) and then some interpretation in the context of the question. Most candidates were able to score marks for the calculations, but far fewer were able to deduce that the hearts rates had risen (due to the rise in the average considered) and that they were more varied after the 15 people had walked up the stairs (due to the rise in the measure of spread considered). Common errors included giving "60" as the median and "81" as the highest heart rate for the people before they walked up the stairs. This seems to have arisen because candidates took the leaf furthest to the right as having the highest value.

Q4.

There were relatively few good answers to this question. The most frequently seen incorrect method was 72 − 67.8 = 4.2 followed by 4.2 + 72 = 76.2. Candidates need to practice mean in a variety of situations rather than just rote learning of calculation of a mean from a total divided by frequency. It is important to know that there are three elements in mean calculations and reversing to find totals is essential. Those who gained partial marks usually found either 3960 or 1695 but then couldn't see how to complete the method, sometimes dividing by 55 instead of by 30.

Q5.

Part (a) was well answered, the most common error being in stating 4 or 21 as the answer, rather than the class interval.

Part (b) was a good discriminator with many getting the correct answer. Some used the lower or upper end of the class interval. Weaker candidates used the class interval width, 50÷5 (=10) or 90÷5 (=18). It was disappointing to see addition or multiplication errors in some work.

In part (c) many good attempts were spoiled by careless error. This could be a failure to use the scale to plot the points correctly, failure to plot at the midpoint, drawing free hand or curves, or joining first to last point. Some only drew the bar chart hey were perhaps hoping to use to draw the polygon.

Q6.

Both parts were answered well. There were only a few in part (a) who gave incomplete references to correlation rather than a description of a relationship.

A mark was sometimes lost in part (b) where poor lines of best fit were drawn, or the scaling was misused.

Q7.
No Examiner's Report available for this question

Q8.
No Examiner's Report available for this question

Q9.
No Examiner's Report available for this question

Q10.
No Examiner's Report available for this question

Q11.

Candidates were able to plot the point successfully, as you would expect on this paper. They were also able to name the type of correlation, some giving strength as well, this was not necessary but was accepted. Only a few candidates gave positive as an incorrect answer. The line of best fit was well drawn by the majority, it most commonly started at the upper limit on the left at (1,48) which was just in tolerance. The most common incorrect answers appeared where the line was drawn just above this point. The reading from the graph was usually accurately given.

Q12.
No Examiner's Report available for this question

Mark Scheme

Q1.

Question	Working	Answer	Mark	Notes
(i)	<table><tr><td></td><td>Y4</td><td>Y5</td><td>Y6</td><td>Tot</td></tr><tr><td>S</td><td></td><td>21</td><td>18</td><td></td></tr><tr><td>NS</td><td>11</td><td></td><td></td><td>37</td></tr><tr><td>Tot</td><td></td><td></td><td>30</td><td>96</td></tr></table> OR 96 – 37 = 59 children can swim 18 + 21 = 39 children in Y5 or Y6 can swim 59 – 39	20	4	M1 for including 4 of the 6 pieces of information given in a clearly labeled two-way table A1 for 20 or 20 out of 96 or 20/96 OR M1 for a correct method that leads to the number of children in year 4 that can swim eg 96 – 37 (= 59) children can swim 18 + 21 = (39) children in Y5 or Y6 can swim '59' – '39' A1 for 20 or 20 out of 96 or 20/96 M1 for one correct calculation leading to a 'new', piece of information in a clearly labeled two-way table A1 for 35 or 35 out of 96 or $^{35}/_{96}$ OR M1 for a correct method that leads to the total number of children in year 5 eg '20' + 11 (= 31) children in Y4 30 + '31' (=61) children in Y4 or Y6 96 – '61' children in Y5 A1 for 35 or 35 out of 96 or $^{35}/_{96}$ SC If M1 not earned then award B1 if ans(ii) = 55 – ans (i)
(ii)	<table><tr><td></td><td>Y4</td><td>Y5</td><td>Y6</td><td>Tot</td></tr><tr><td>S</td><td>20</td><td>21</td><td>18</td><td>59</td></tr><tr><td>NS</td><td>11</td><td>14</td><td>12</td><td>37</td></tr><tr><td>Tot</td><td>31</td><td>35</td><td>30</td><td>96</td></tr></table> OR 20 + 11 = 31children in Y4 30 + 31 = 61 children in Y4 or Y6 96 – 61	35		

Q2.

Question		Working	Answer	Mark	Notes
		Top Cat = 35 × 4 = 140° Katkins = 30 × 4 = 120° Coolkat = 15 × 4 = 60°	Pie chart	3	M1 for 360 ÷ 90 or 4 seen or one angle (TC or Ka or Co) correct in pie chart ± 2° ignore labels, or one correct angle calculated A1 for any two angles (TC or Ka or Co) correct in pie chart. ± 2° ignore labels A1 for fully correct and labelled pie chart. All angles ±2°

Q3.

Question	Working	Answer	Mark	Notes
	Median (before) = 67 Median (after) = 78 Mean (before) = 69.6 Mean (after) = 80.8(6...) Range (before) = 84 – 58 = 26 Range (after) = 102 – 65 = 37 IQR (before) = 78 – 61 = 17 IQR (after) = 91– 69 = 22	Comparison of 1. medians / means 2. range / IQR	6	B2 for median (before) = 67 and median (after) = 78 (B1 for one correct median) OR B2 for mean (before) = 69.6 and mean (after) = 80.9 /80.8(6..) (B1 for one correct mean) B2 for range (before) = 26 and range (after) = 37 OR B2 for IQR (before) = 17 and IQR (after) = 22 (B1 for one correct range/IQR) OR B2 for fully correct diagram/chart to compare, e.g. box plots, cumulative frequency diagrams, etc (B1 for diagram/chart with one error in presentation) C1 for median (after) > median (before) oe or ft their medians OR for mean (after) > mean (before) oe or ft their means OR C1 for range (after) > range (before) oe or ft their ranges OR for IQR (after) > IQR (before) oe or ft their IQRs C1 for comments, in context, relating to an average and to the spread of the data (dep on B3). QWC: Decisions should be justified and calculations attributable SC If no marks scored, B1 for a correct comparison (eg Heart rates are faster after walking up the stairs)

Q4.

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
		75.5	3	M1 for 25 × 67.8 (= 1695) or 55 × 72.0 (= 3960) M1 (dep) for ("3960" − "1695") ÷ 30 A1 cao

Q5.

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
(a)		$20 < T \le 24$	1	B1 for $20 < T \le 24$
(b)	6×10 + 8×14 + 13×18 + 21×22 + 2×26 = 920 920 ÷ 50	18.4	4	M1 for finding fx with x consistent within intervals (including the end points) allow 1 error; implied by 820, 1020 M1 (dep) for use of all correct mid-interval values eg 920 M1 (dep on 1st M1) for $\sum fx \div \sum f$ A1 for 18.4 oe
(c)		correct frequency polygon	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments) or all points plotted accurately and joined with last joined to first to make a polygon or all points at the correct heights and consistently within or at the ends of the intervals and joined (can include joining last to first to make a polygon) NB: ignore parts of graph drawn to the left of the 1ˢᵗ point or the right of the last point

Q6.

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
(a)		Relationship	1	B1 for description of relationship eg "As the length of the pine cone increases the width increases" oe (accept positive correlation)
(b)		6.1 to 6.4	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a vertical line from 8.4 or a point at (8.4, y) where y is from 6.1 to 6.4 A1 for given answer in the range 6.1 to 6.4

Q7.

Paper 1MA1: 1H				
Question	Working	Answer		Notes
		'Yes' with correct	P1	begins process of working with mean eg 35×10 (=350) or 33×11 (=363) or 10×(35−33) (=20) or 11×(35−33) (=22)
		working	P1	(dep) finding the difference eg "363"−"350", or 33 − "20" or 35 − "22"
			C1	'Yes' with 13 from correct working

Q8.

Question	Working	Answer		Notes
		more than	C1	Makes reference to different numbers of girls and boys
			C1	Completes reasoning eg there are more (boys) with 80% than (girls) with 70% or correct mean (700+1200)÷25 = 76

Q9.

Paper 1MA1: 2H			
Question	Working	Answer	Notes
(a)		$22 \leq f < 24$	B1
(b)		21.9	M1 $x \times f$ using midpoints
			M1 (dep on previous mark) "$x \times f$" ÷ 40
			A1 accept 22 if working seen

Q10.

Paper 1MA1: 2H			
Question	Working	Answer	Notes
(a)		$160 < h \leq 170$	B1 for identifying the correct class interval
(b)		1. Points should be plotted at mid-interval values 2. The polygon should not be closed	C1 C1 for a correct error identified for a correct error identified

Q11.

		Working	Answer	Mark	Notes
	(a)		Point plotted	1	B1 for point plotted
	(b)		Negative	1	B1 for Negative (correlation)
	(c)		Correct line	1	B1 for a straight line that lies between (1, 40) to (1, 48) and (5.5, 6) to (5.5, 14)
	(d)		30 – 34	1	B1 30-34 or ft lobf (dep on single str line segment with a negative gradient)

Q12.

Paper 1MA1: 3H			
Question	Working	Answer	Notes
(a)		(4,10)	B1 cao
(b)(i)		Line drawn	B1 Straight line drawn passing between (2,20) and (2,30) AND (13,86) and (13,94)
(b)(ii)		Positive	C1 positive
(c)		Value between 60 and 70	C1 a correct value given
(d)		Statement	C1 for referring to the danger of extrapolation outside the given range or for a given point Eg line of best fit may not continue or full marks are hard to achieve no matter how much revision is done