Write your name here

Surname		Other names

Pearson Edexcel Award

Centre Number

Candidate Number

Statistical Methods
Level 2
Calculator allowed

Monday 19 January 2015 – Morning	Paper Reference
Time: 1 hour 30 minutes	**AST20/01**

You must have:
Pen, HB pencil, eraser, calculator, ruler.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

**PEARSON**

Answer ALL questions.
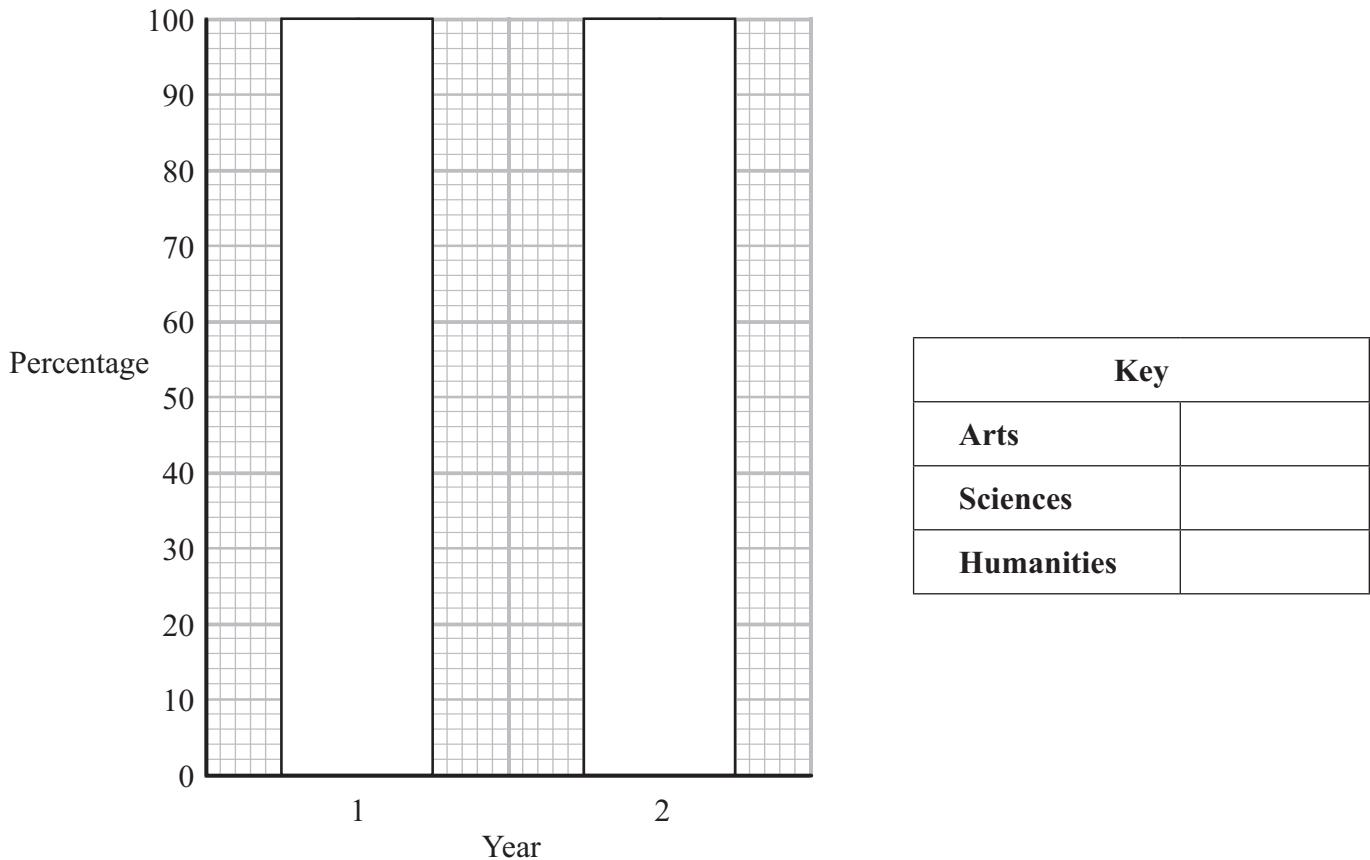
Write your answers in the spaces provided.

You must write down all stages in your working.

1 The table gives information about the percentages of the adults in each year group at a college studying different types of subjects.

		Type of subject studied		
		Arts	**Sciences**	**Humanities**
Year	**1**	20%	56%	24%
	2	14%	70%	16%

Use this information to complete the composite bar chart.

Key	
Arts	
Sciences	
Humanities	

(Total for Question 1 is 3 marks)

2 The results of a survey of 80 households are given in the table.

Number of people in household	Frequency
1	16
2	19
3	18
4	15
5	11
6	1

(a) Find the median number of people per household.

....

(2)

(b) Calculate the mean number of people per household.

....

(3)

(Total for Question 2 is 5 marks)

3 A car manufacturer is carrying out some experiments on car emissions.

Here is a list of statistical words used to describe data.

discrete   **continuous**   **categorical**

(a) Use a word from the list to complete correctly the following sentences.
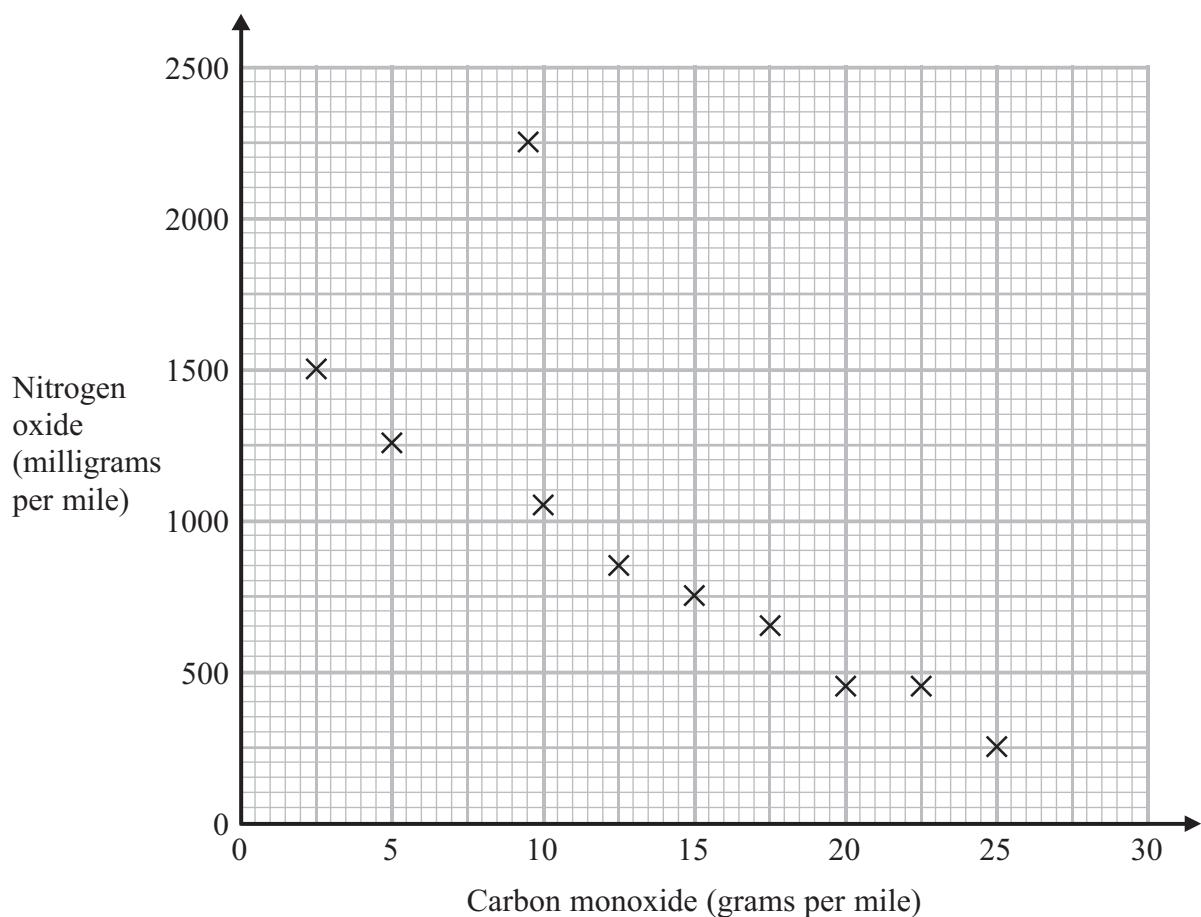
The number of experiments carried out each day

is an example of .... data.

Miles measured are examples of .... data.

(2)

The scatter graph gives information about the amounts of nitrogen oxide and carbon monoxide emitted by the exhausts of ten cars.

(b) Circle the point on the scatter graph that represents an outlier.

(1)

(c) Ignoring the outlier, what type of correlation does the scatter graph show?

....

(1)

(d) Ignoring the outlier, draw a line of best fit on the scatter graph.

(1)

An eleventh car emitted 7.5 grams per mile of carbon monoxide.

(e) Make a prediction for the amount of nitrogen oxide emitted.

.... milligrams per mile

(1)

(Total for Question 3 is 6 marks)
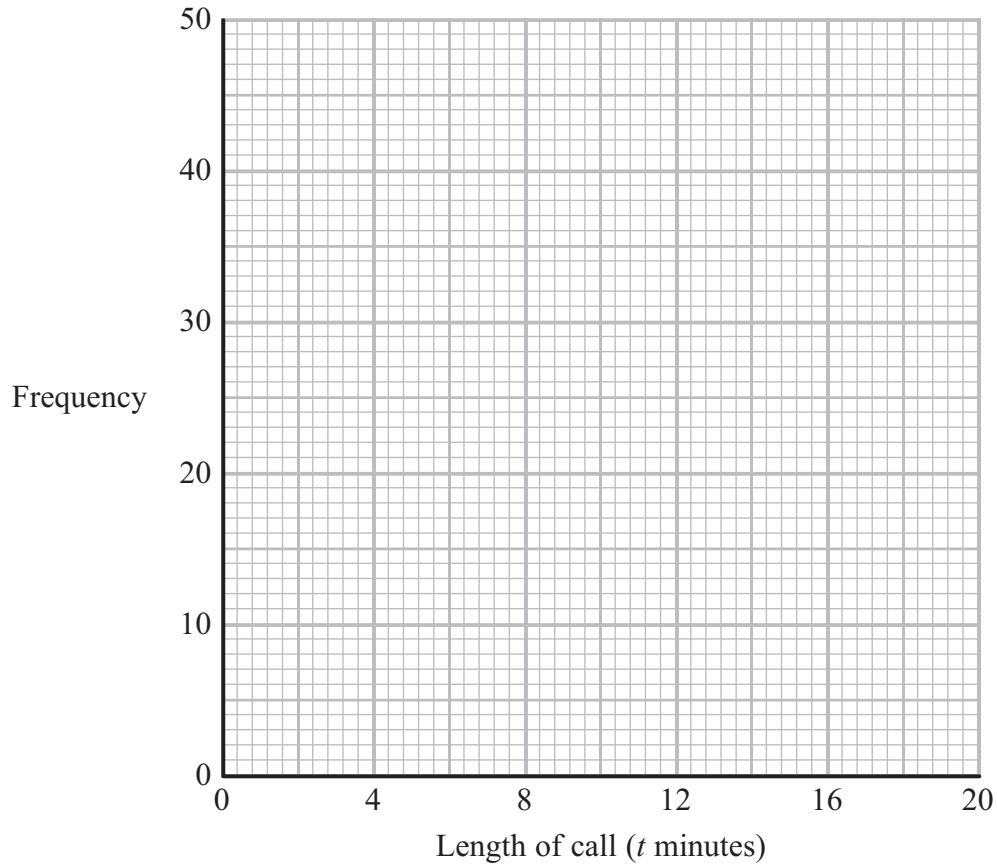
4 Albert and Bruna are call centre assistants.

Information about the lengths of the telephone calls received by Albert one day is shown in the table.
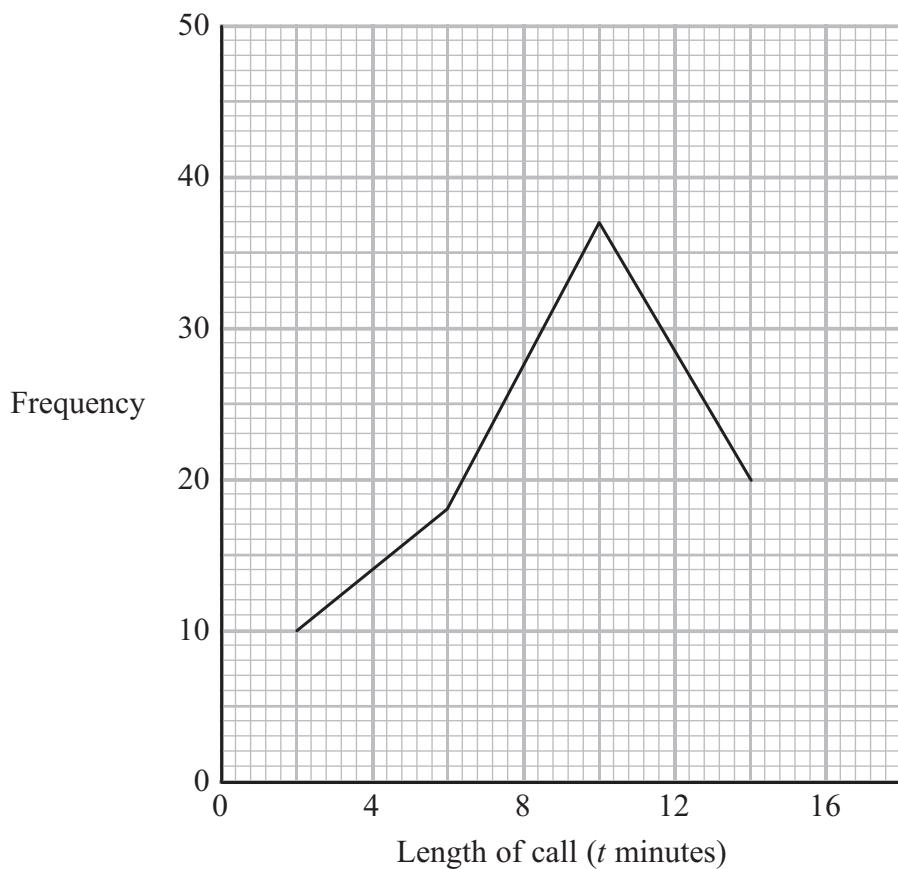
Length of call (*t* minutes)	Frequency
$0 < t \leqslant 4$	20
$4 < t \leqslant 8$	45
$8 < t \leqslant 12$	16
$12 < t \leqslant 16$	12
$16 < t \leqslant 20$	6

(a) Draw a frequency polygon for this information.

(2)

Length of call (*t* minutes)

The frequency polygon below gives information about the lengths of the telephone calls received by Bruna during the same day.

(b) Write down two comparisons between the lengths of the telephone calls received by Albert and by Bruna that day.

1 ....

....

2 ....

....

(2)

(Total for Question 4 is 4 marks)

5 A spinner can land on Yellow or Blue or Green or Red or Black.

The spinner is biased.

The table shows the probabilities that the spinner will land on Yellow or on Blue or on Green or on Red.

Colour	Yellow	Blue	Green	Red	Black
Probability	0.2	0.25	0.15	0.10	

(a) Work out the probability that the spinner will land on Yellow or on Green.

....
(2)

(b) Work out the probability that the spinner will land on Black.

....
(2)

Jas is going to spin the spinner 250 times.

(c) Work out an estimate for the number of times the spinner will land on Blue.

....
(2)

Another spinner can land on 1 or on 2 or on 3 or on 4 or on 5

The spinner is spun 80 times.

The table gives information about the number of times the spinner landed on each number.

Number	1	2	3	4	5
Frequency	10	8	14	26	22

The spinner may be biased.
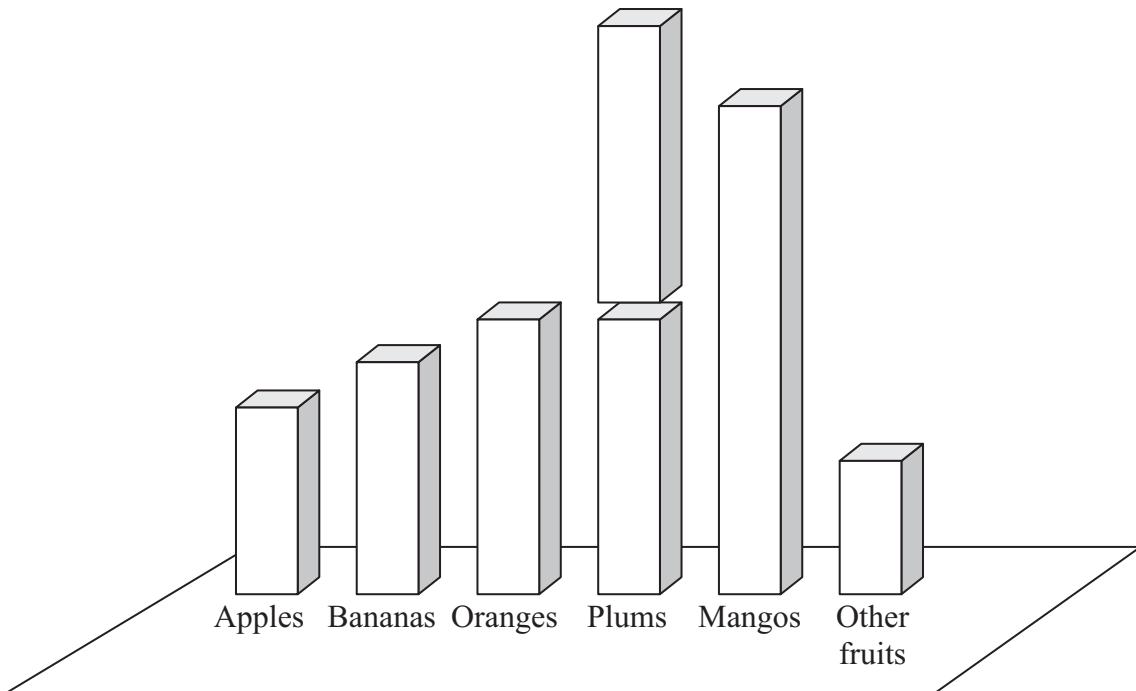
(d) Explain why.

....

....

...
(1)

(Total for Question 5 is 7 marks)

6 A grocer drew a bar chart about the different types of fruit sold in one month.

Describe three features of the bar chart that could be wrong or misleading.

1...

....

2...

....

3...

....

(Total for Question 6 is 3 marks)

7 The table gives information about the time taken, in minutes, for 120 adults to each complete a cryptogram.

Time taken (t minutes)	Frequency
$0 < t \leqslant 10$	10
$10 < t \leqslant 20$	14
$20 < t \leqslant 30$	28
$30 < t \leqslant 40$	34
$40 < t \leqslant 50$	24
$50 < t \leqslant 60$	10
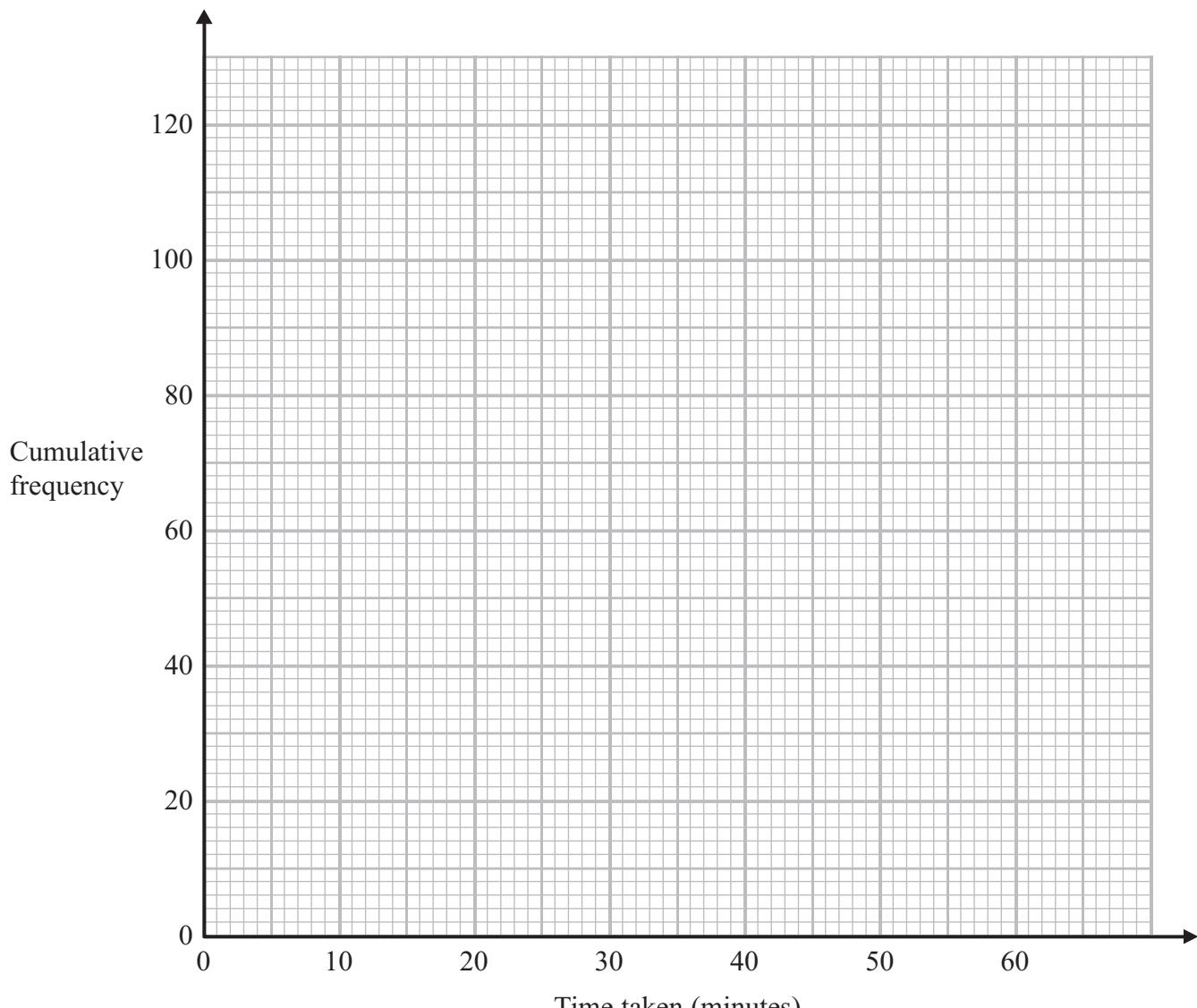
(a) Complete the cumulative frequency table.

Time taken (t minutes)	Frequency
$0 < t \leqslant 10$	10
$0 < t \leqslant 20$	
$0 < t \leqslant 30$	
$0 < t \leqslant 40$	
$0 < t \leqslant 50$	
$0 < t \leqslant 60$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.

Time taken (minutes)

(2)

(c) Use your cumulative frequency graph to find an estimate for

   (i) the median,

   .... minutes

   (ii) the interquartile range.

   .... minutes

   (3)

(Total for Question 7 is 6 marks)

P 4 5 8 0 5 A 0 1 1 2 4

8 The table gives information about the lengths, in minutes, of 30 television films.

Length (*t* minutes)	Frequency
$70 < t \leqslant 90$	6
$90 < t \leqslant 110$	10
$110 < t \leqslant 130$	11
$130 < t \leqslant 150$	3

(a) Write down the modal class interval.

....

(1)

(b) Find the class interval which contains the median.

....

(1)

(c) Calculate an estimate for the mean length of these 30 films.

.... minutes

(4)

(Total for Question 8 is 6 marks)

9 A consultant is hired by a fishing company to survey the opinions of its workers on a proposed savings scheme.

The consultant is going to take a sample of the workers of the fishing company.

(a) Write down one disadvantage of taking a sample.

....

(1)

The consultant is going to use a questionnaire to find out how much money each worker would be prepared to contribute to the savings scheme.

(b) Design a suitable question for the consultant to use in the questionnaire.
You must include some response boxes.

(2)

The consultant decides to give the questionnaire only to the office workers in the fishing company.

(c) Write down one reason why this may **not** be a good sample.

....

....

(1)
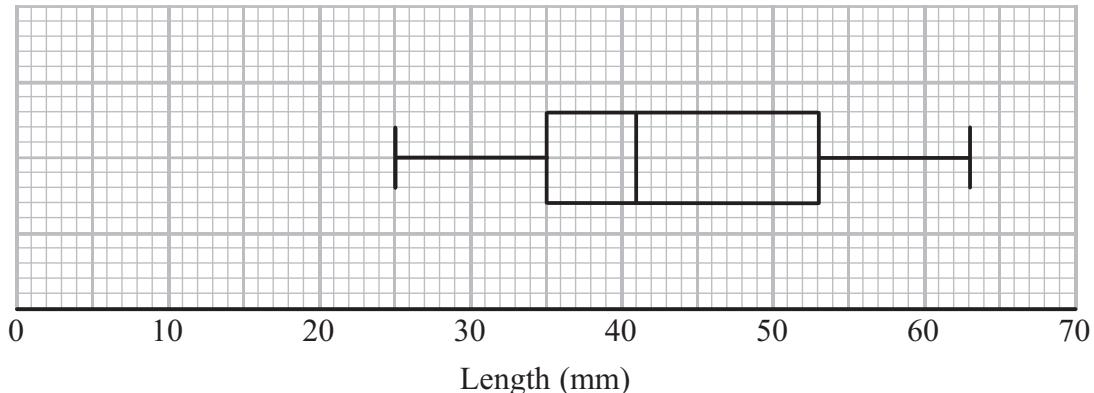
(Total for Question 9 is 4 marks)

10 Ravi recorded the lengths, in mm, of some slugs in his garden.

The box plot below was drawn using this information.

Length (mm)

(a) Describe the skew of the distribution of the lengths of these slugs.

....

(1)

Kay also recorded the lengths, in mm, of some slugs in her garden.

| 27 | 36 | 38 | 41 | 43 | 45 | 49 | 50 |
| 52 | 52 | 54 | 55 | 58 | 59 | 60 |
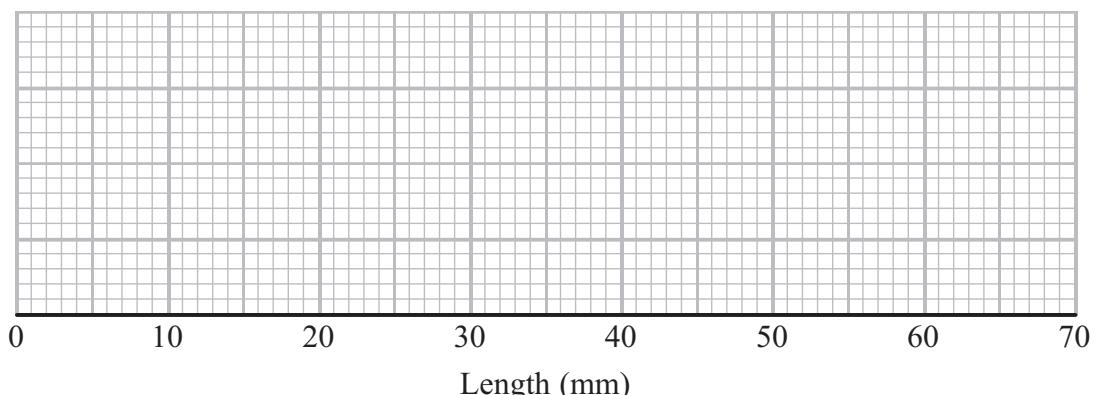
(b) Find for Kay's results

   (i) the median,

.... mm

  (ii) the lower quartile,

.... mm

 (iii) the upper quartile.

.... mm

(3)

(c) On the grid, draw a box plot for Kay's results.

Length (mm)

(2)

(d) Compare the two distributions of slug lengths.
Write down two comparisons.

1...

....

2...

....

(2)

(Total for Question 10 is 8 marks)

11 The following table shows the share price, in pence, of Mathcom in 2012 and in 2013.

Year	2012	2013
Share Price (in pence)	1196	1263

(a) Taking 2012 as the base year, work out the index number for the share price of Mathcom in 2013.
Give your answer correct to 1 decimal place.

....

(2)

Using 2012 as the base year, the index number for the share price of Statcom in 2013 is 109.3

(b) Interpret and compare the index numbers for Mathcom and Statcom in 2013.

....

....

....

(2)

(Total for Question 11 is 4 marks)

12 The table shows information about the number of games consoles sold each month by a shop.

The table also shows 3-point moving averages for this information.

Month	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number of games consoles	64	84	53	91	108	92	154
3-point moving average		67	76	84	97	x	

(a) Using the information given in the table, work out the last 3-point moving average, x.

....

(2)

(b) Describe what the moving averages show about the trend in the number of games consoles sold in the shop over these months.

....

(1)

(Total for Question 12 is 3 marks)

13 Asha has a set of 3 cards and 4 discs.

The cards are numbered 1, 2 and 3
The discs are numbered 2, 3, 4 and 5

Asha plays a game with the cards and the discs.
She chooses at random one of the cards and she chooses at random one of the discs.
She then adds together the number on the card and the number on the disc to get her score.

(a) Complete the sample space diagram to show all the possible scores.

		Disc			
		2	**3**	**4**	**5**
	1	3	4		
Card	**2**	4			
	3				

(2)

(b) Find the probability that the score is

(i) less than 4

....

(ii) an even number.

....

(3)

(Total for Question 13 is 5 marks)
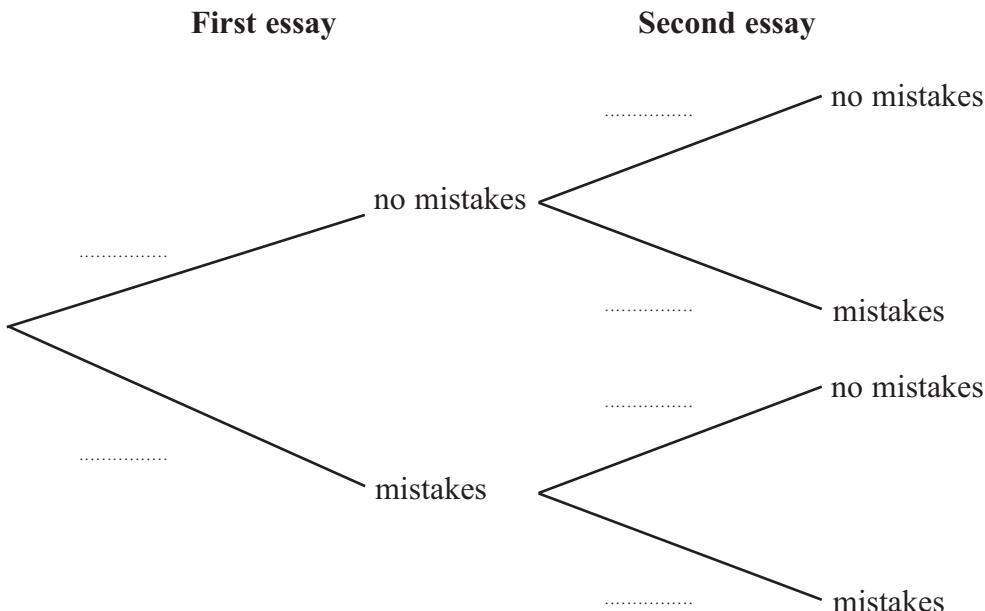
14 When James types two essays,

   the probability that he makes no mistakes in the first essay is 0.85
   the probability that he makes no mistakes in the second essay is 0.90

(a) Complete the probability tree diagram.

First essay   **Second essay**

```
                                    .............  no mistakes
                      no mistakes  <
        .............              .............  mistakes
       <
        .............              .............  no mistakes
                      mistakes     <
                                    .............  mistakes
```

(2)

(b) Work out the probability that James makes no mistakes in the first essay and no mistakes in the second essay.

....

(2)

(c) Work out the probability that James makes mistakes in only one of the essays.

....

(3)

(Total for Question 14 is 7 marks)

15 A martial arts centre has 400 members.

Each member practises only one of Kung Fu, Karate, Judo and Jujitsu.
The table gives information about the number of members who practise each martial art.

Martial Art	Frequency
Kung Fu	83
Karate	124
Judo	81
Jujitsu	112

Pavan takes a sample of 60 of these members stratified by martial art practised.

Find the number of members in his sample who practise Judo.

....

(Total for Question 15 is 2 marks)

16 There is a total of 30 boys and girls in a drama club.

The mean age of the 12 girls is 16.7 years.
The mean age of the 18 boys is 17.2 years.

Calculate the mean age of all 30 boys and girls.

....years

(Total for Question 16 is 4 marks)

17 The number of errors, x, on each of 25 pages of a magazine were recorded.

Here are the summarised results.

$$\sum x = 195 \qquad \sum x^2 = 6840$$

Calculate the standard deviation of the number of errors.
Give your answer to 3 significant figures.

....

(Total for Question 17 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

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