Write your name here

Surname	Other names

Pearson Edexcel Award

Centre Number	Candidate Number

Statistical Methods

Level 2
Calculator allowed

Wednesday 14 May 2014 – Morning
Time: 1 hour 30 minutes

Paper Reference
AST20/01

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

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 ▶

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6/1/5/

P 4 3 6 2 9 A 0 1 2 4

PEARSON

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 The two-way table shows some information about the numbers of customers visiting a shop.

	Thursday	**Friday**	**Saturday**	**Total**
Morning	23		44	
Afternoon	20			70
Evening	35	30		102
Total			113	265

Complete the two-way table.

(Total for Question 1 is 3 marks)

2 Box A contains a red counter (R), a green counter (G) and an orange counter (O).

Box B contains a red counter (R), a yellow counter (Y) and a white counter (W).

Jeremy is going to take at random a counter from box A and a counter from box B.

(a) Complete the sample space diagram showing all possible outcomes.
One has been done for you.

		Box B		
		Red	**Yellow**	**White**
Box A	**Red**	(R, R)	.....	.....
	Green	.....	.....	.....
	Orange	.....	.....	.....

(2)

(b) Find the probability that

(i) both the counters are red,

.....

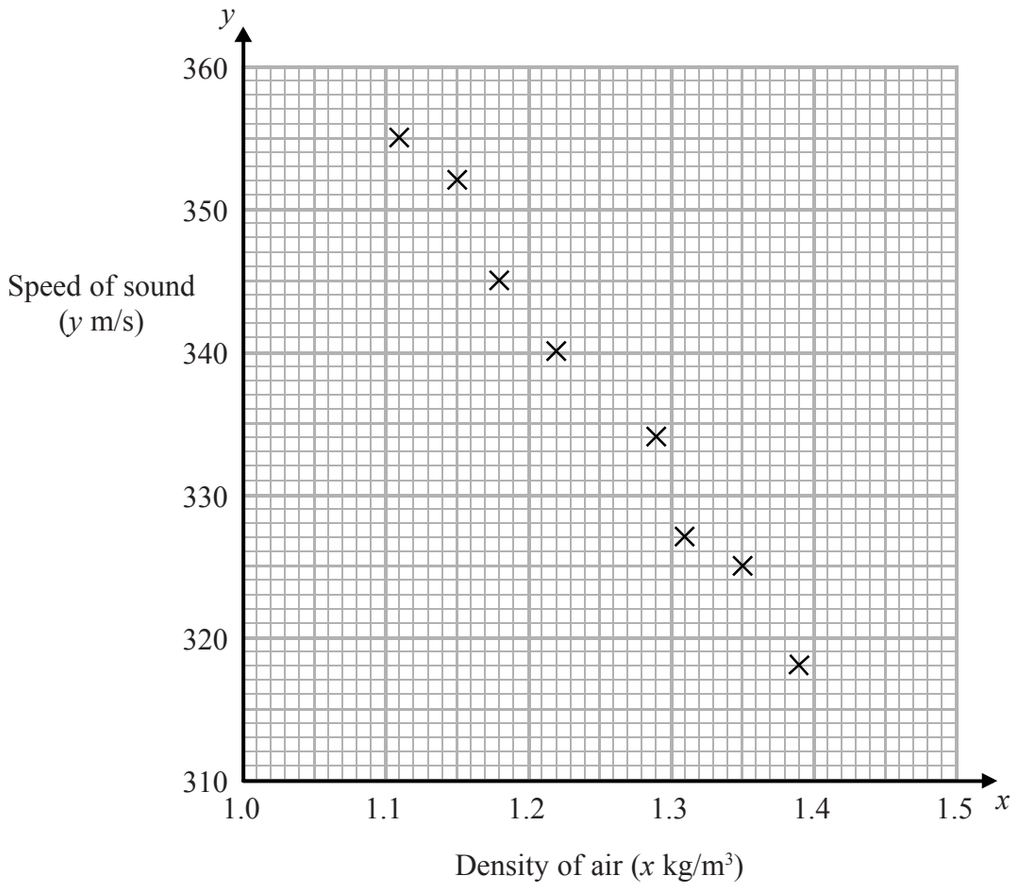
(ii) at least one of the counters is red.

.....

(3)

(Total for Question 2 is 5 marks)

3 A scientist recorded the density of air and the speed of sound in each of eight experiments.
The scatter graph gives information about her results.



(a) Describe the relationship between the density of air and the speed of sound in these experiments.

.....

(1)

The mean point of the data is (1.25, 337).

(b) On the grid,

(i) plot the mean point,

(ii) draw a line of best fit for the data.

(2)

In a 9th experiment, the density of air is 1.37 kg/m³.

(c) Find an estimate for the speed of sound.

..... m/s

(1)

(Total for Question 3 is 4 marks)

4 Kolka has a biased six-sided dice.

Kolka rolls the dice once.

The probability that the dice lands on 5 is $\frac{3}{10}$

(a) Work out the probability that the dice does **not** land on 5

.....

(2)

Kolka is now going to roll the dice 300 times.

(b) Work out an estimate for the number of times the dice will land on 5

.....

(2)

Benny also has a six-sided dice.
He wants to find out whether the dice is biased or not.

Benny rolls the dice 120 times.
In these 120 rolls, the dice lands on 5 a total of 12 times.

(c) Is Benny's dice biased?
Give a reason for your answer.

.....

.....

.....

(2)

(Total for Question 4 is 6 marks)

5 Sean recorded the temperature, in °C, of the water on the surface of a lake at 8 am on each of 30 days.

Here are his results.

14.2	15.1	12.9	15.2	16.6	13.8
13.0	15.7	13.4	15.5	15.8	15.9
14.1	15.3	15.7	14.2	15.5	14.9
14.6	14.7	16.1	13.5	16.2	15.5
13.8	15.8	14.9	16.1	15.3	14.7

(a) Is temperature an example of continuous data or of discrete data?
Give a reason for your answer.

.....

.....

(1)

(b) Summarise Sean's data in this grouped frequency table.

Temperature (w °C)	Tally	Frequency
$12 < w \leqslant 13$		
$13 < w \leqslant 14$		
$14 < w \leqslant 15$		
$15 < w \leqslant 16$		
$16 < w \leqslant 17$		

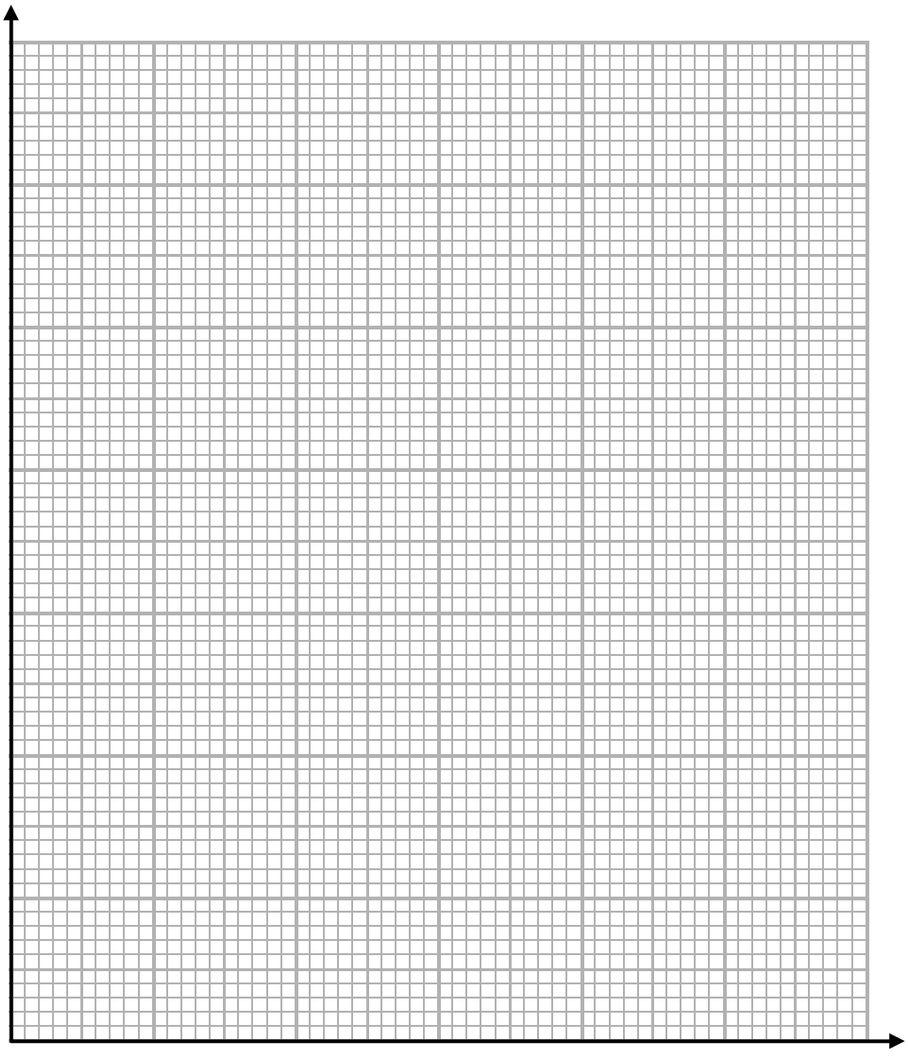
(2)

(c) Write down the modal class interval.

..... °C

(1)

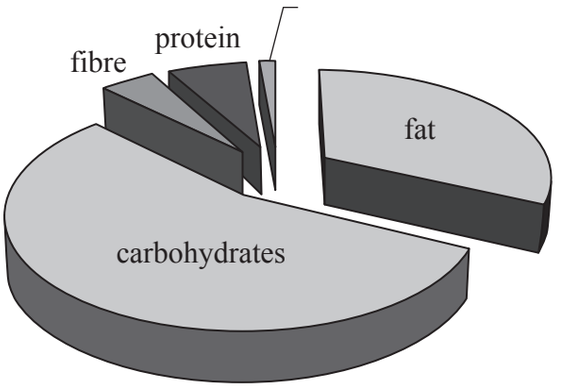
(d) On the grid, draw a histogram for the information in your grouped frequency table.



(3)

(Total for Question 5 is 7 marks)

6 The 3-D pie chart shows some information about the ingredients of a packet of crisps.



Write down **two** possible problems with this pie chart.

.....

.....

.....

.....

(Total for Question 6 is 2 marks)

7 Gary wants to find out how long it takes people to travel to work.
He is going to use a questionnaire.

(a) Design a suitable question that Gary could use on his questionnaire to find this information out.

(2)

Gary gives his questionnaire to a sample of people on a train.

(b) (i) Write down one advantage of taking a sample.

.....

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

.....

.....

.....

.....

(2)

(Total for Question 7 is 4 marks)

8 The grouped frequency table gives information about the times taken by 60 students to each do a calculation.

Time taken (t seconds)	Frequency
$30 < t \leqslant 40$	3
$40 < t \leqslant 50$	8
$50 < t \leqslant 60$	15
$60 < t \leqslant 70$	19
$70 < t \leqslant 80$	12
$80 < t \leqslant 90$	3

(a) Work out an estimate for the mean time.
Give your answer correct to 1 decimal place.

..... seconds

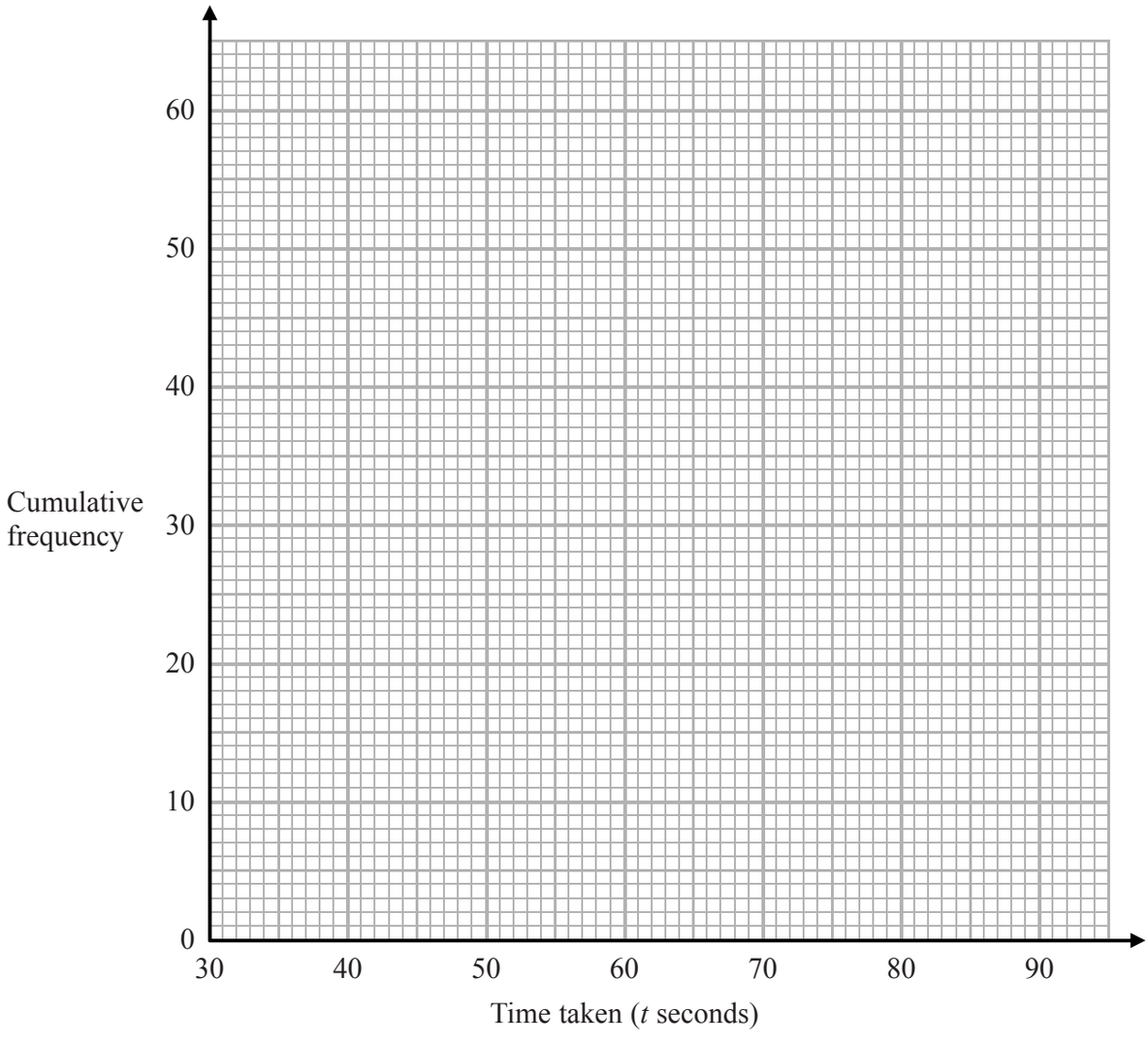
(4)

(b) Complete the cumulative frequency table for the students' times.

Time taken (t seconds)	Cumulative frequency
$30 < t \leqslant 40$	3
$30 < t \leqslant 50$	
$30 < t \leqslant 60$	
$30 < t \leqslant 70$	
$30 < t \leqslant 80$	
$30 < t \leqslant 90$	

(1)

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



(2)

(d) Using your cumulative frequency graph, find an estimate for the number of students who took more than 75 seconds to do the calculation.

.....

(2)

(Total for Question 8 is 9 marks)

9 The stem and leaf diagrams give information about the ages, in years, of the players in each of two hockey clubs, Fairfield United and Downton Green.

Fairfield United

1	8 8 9
2	0 1 3 5 7 7 7 9
3	2 8 9
4	3

Key:
1 | 8 represents 18 years

Downton Green

1	9
2	2 2 3 5 7 8
3	1 2 5 7 9
4	0 1 2

Key:
1 | 9 represents 19 years

(a) Complete this table.

	Fairfield United	**Downton Green**
Median	27	.....
Interquartile range	.....	16

(3)

(b) Compare the distributions of the ages of the players in each of these two clubs.

1 .....

.....

2 .....

.....

(2)

(Total for Question 9 is 5 marks)

10 Silvia recorded the weights, in kg, of 65 turkeys.
The table gives information about her results.

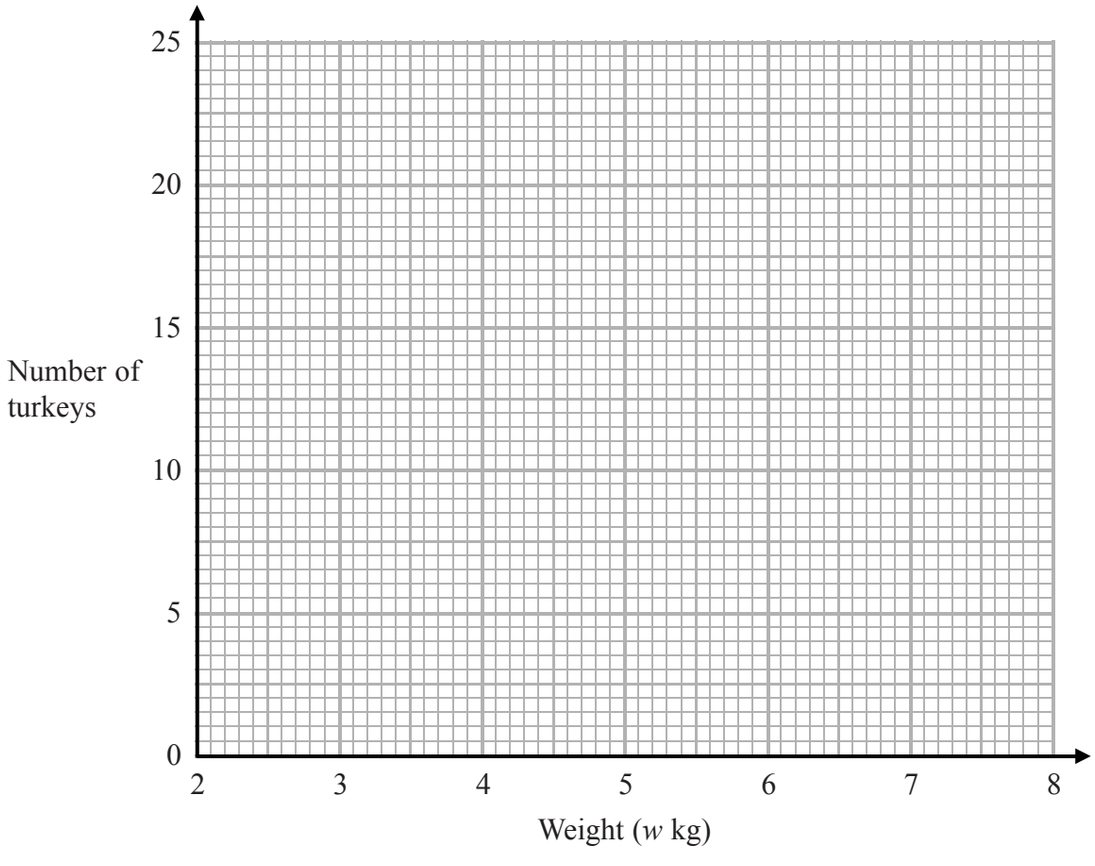
Weight (w kg)	Number of turkeys
$2.5 < w \leqslant 3.5$	5
$3.5 < w \leqslant 4.5$	9
$4.5 < w \leqslant 5.5$	14
$5.5 < w \leqslant 6.5$	21
$6.5 < w \leqslant 7.5$	16

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

..... kg

(1)

(b) On the grid, draw a frequency polygon for the information in the table.



(2)

(c) Describe the skew of the distribution of the weights of these turkeys.

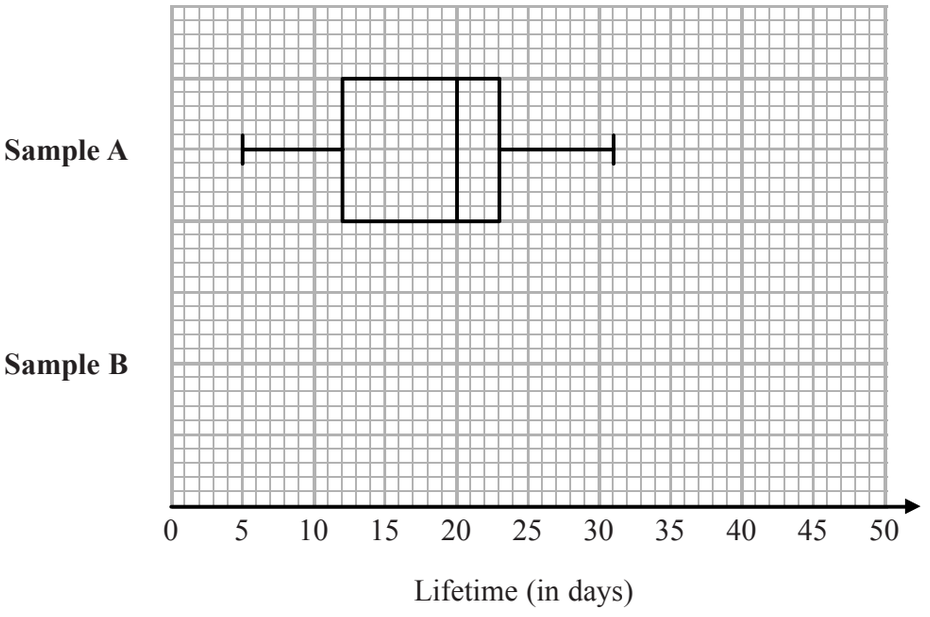
.....

(1)

(Total for Question 10 is 4 marks)

11 Karl had two samples of flies, sample A and sample B.

The box plot gives information about the lifetimes, in days, of the flies in sample A.



(a) Write down the median lifetime of the flies in sample A.

..... days

(1)

(b) Work out the interquartile range of the lifetimes of the flies in sample A.

..... days

(2)

The table gives information about the lifetimes, in days, of the flies in sample B.

	Number of days
Lowest value	3
Lower quartile	9
Median	17
Upper quartile	21
Highest value	33

(c) On the grid, draw a box plot for the information in the table about sample B.

(2)

(d) Compare the skews of the two distributions.

.....

.....

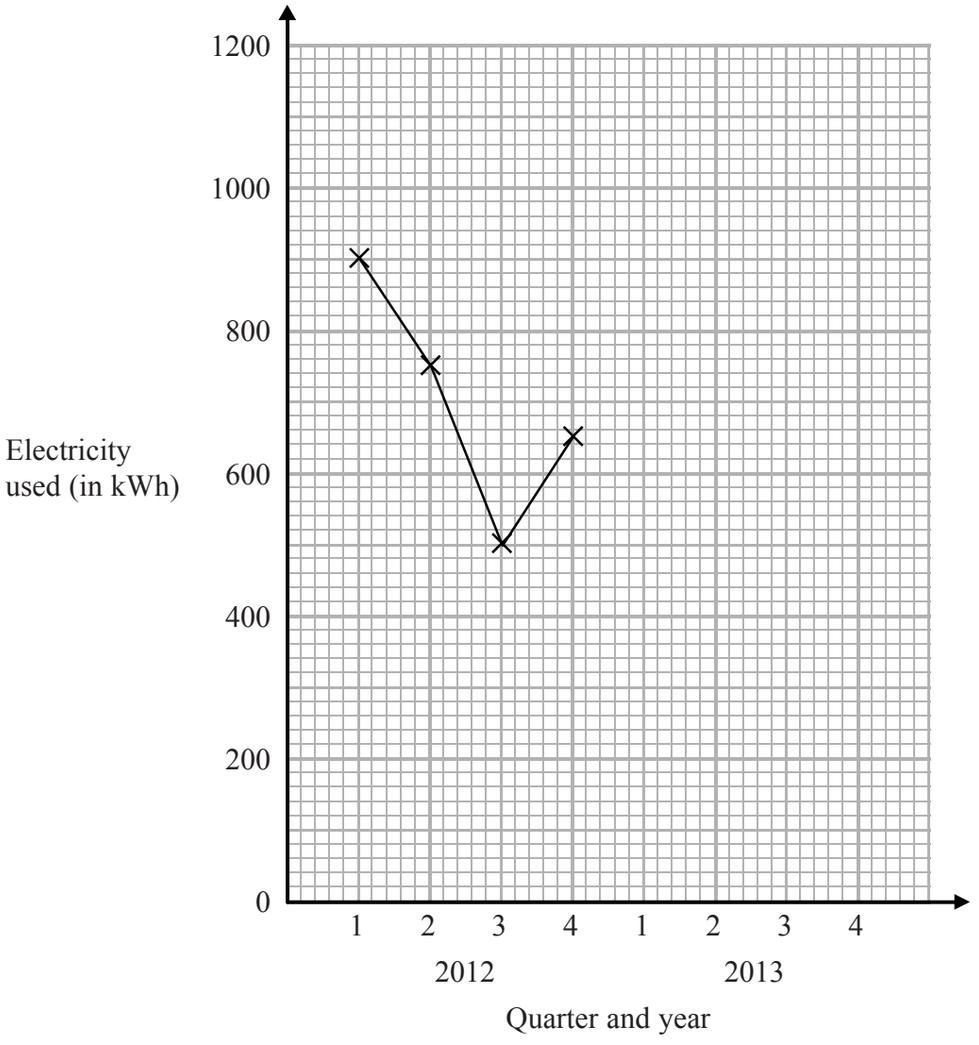
(1)

(Total for Question 11 is 6 marks)

12 The table gives information about the amount of electricity used by a company each quarter in 2012 and in 2013.

Year	**2012**				**2013**			
Quarter	1	2	3	4	1	2	3	4
Amount of electricity used (in kWh)	900	750	500	650	1000	850	600	750

Some of this information is shown on the time-series graph.



(a) Using the information in the table, complete the time-series graph.

(2)

(b) Calculate the 4-point moving averages for the information in the table.

....

(3)

(c) Describe what the moving averages show about the trend in the amount of electricity used during this period.

.....

(1)

In 2012, the total amount of electricity used was 2800 kWh.
In 2013, the total amount of electricity used was 3200 kWh.

(d) (i) Using 2012 as the base year, work out the index number for the total amount of electricity used in 2013.

Give your answer correct to 1 decimal place.

.....

(ii) Interpret your index number.

.....

(3)

(Total for Question 12 is 9 marks)

13 The table gives some information about the 670 stamps in Jody's stamp collection.
It shows the continents where the stamps were issued and the number of stamps from each of these continents.

Continent	Asia	Europe	America
Number of stamps	48	357	265

Jody is going to take a sample of 50 of these stamps stratified by continent.

Work out the number of stamps from each continent in Jody's sample.

Asia ..... stamps

Europe ..... stamps

America ..... stamps

(Total for Question 13 is 3 marks)

14 Here are the weights, in grams, of some mushrooms.

30 43 39 42 35 80 44 40 39 37

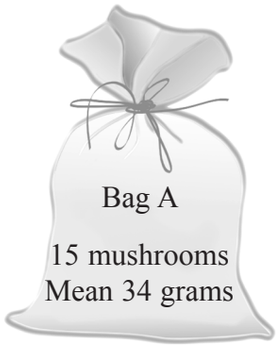
One of these mushrooms may be an outlier.

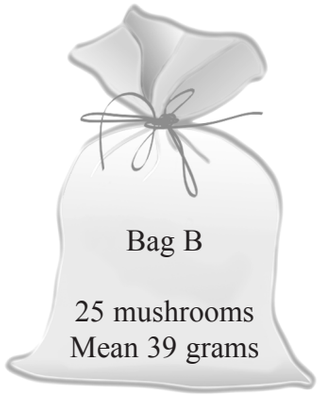
(a) Write down the weight of this mushroom.

..... grams

(1)

Here are two bags of mushrooms, bag A and bag B.





Bag A contains 15 mushrooms.
These mushrooms have a mean weight of 34 grams.

Bag B contains 25 mushrooms.
These mushrooms have a mean weight of 39 grams.

(b) Work out the mean weight of the 40 mushrooms.

..... grams

(3)

(Total for Question 14 is 4 marks)

15 The probability that it will rain on Saturday is 0.65
The probability that it will rain on Sunday is 0.7

(a) Draw a probability tree diagram for this information.

(3)

(b) (i) Work out the probability that it will rain on Saturday and on Sunday.

.....

(ii) Work out the probability that it will rain on Saturday and **not** rain on Sunday.

.....

(3)

(Total for Question 15 is 6 marks)

16 $n = 15$

$\sum y = 72$

$\sum y^2 = 396$

Calculate the standard deviation.
Give your answer correct to 1 decimal place.

.....

(Total for Question 16 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

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