Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel Award

Centre Number | | | | | |

Candidate Number | | | | |

Monday 13 January 2020

Morning (Time: 1 hour 30 minutes) | Paper Reference **AST20/01**

Statistical Methods

Level 2
Calculator allowed

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 ▶

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P 6 3 0 5 1 A 0 1 2 0

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 A fruit farmer found the weights, in grams, of 30 pears grown in his orchard.

Here are his results.

111	114	116	129	114
124	111	112	133	134
116	129	122	118	129
113	126	121	124	113
117	129	127	115	128
123	121	128	119	127

(a) Complete the grouped frequency table for this information.
Use class intervals of equal width.
The first row has been done for you.

Weight (w grams)	Tally	Frequency
$110 < w \leqslant 115$	𝍸 |||	8

(3)

(b) Write down the modal class interval.

.....

(1)

(Total for Question 1 is 4 marks)

2 Selma has two boxes of crayons, box A and box B.

In box A, she has one red crayon (R), one yellow crayon (Y) and one white crayon (W).

In box B, she has one red crayon (R), one white crayon (W), one yellow crayon (Y) and one green crayon (G).

Selma is going to take at random a crayon from box A and a crayon from box B.

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

		Box B
Box A		

(3)

(b) Find the probability that both of the crayons will be

(i) red,

.....

(1)

(ii) the same colour,

.....

(2)

(iii) different colours.

.....

(2)

(Total for Question 2 is 8 marks)

3 Jaymini has a coin.
She spins the coin 20 times.
The coin lands Tails a total of 6 times.

Jaymini says that the coin is biased.

Jaymini may be **right**.

(a) Explain why.

.....

.....

(1)

Jaymini may be **wrong**.

(b) Explain why.

.....

.....

(1)

(Total for Question 3 is 2 marks)

4 The table gives information about the 900 employees working in a factory.

Type of employee	Number of employees
Office worker	130
Factory floor worker	740
Manager	30

The owner of the factory wants to survey his employees.

He decides to take a stratified sample of 50 employees stratified by type of employee.

Work out the number of factory floor workers he should have in his sample.

.....

(Total for Question 4 is 2 marks)

5 The people working in an office were asked to choose their favourite drink.
They could choose from tea, coffee or hot chocolate.

Here are the results.

Males

tea	coffee	coffee	tea
hot chocolate	tea	coffee	tea
coffee	tea	tea	coffee
tea	hot chocolate	hot chocolate	coffee
coffee	hot chocolate	hot chocolate	coffee

Females

coffee	coffee	hot chocolate	tea
tea	hot chocolate	tea	tea
coffee	coffee	hot chocolate	coffee
tea	hot chocolate	coffee	coffee
tea	coffee	coffee	coffee

The manager of the office canteen wants to investigate the choices of the males and the choices of the females.

Draw and complete a two-way table for this information.

(Total for Question 5 is 4 marks)

6 Kirsty wants to find out how many take away meals people eat.
She is going to use a questionnaire.

(a) Design a suitable question for Kirsty to use in her questionnaire.
You must include some response boxes.

(2)

Kirsty is going to give the questionnaire to a sample of the teachers at her school.

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

.....

(1)

Kirsty gives the questionnaire to 10 teachers at her school.

This may **not** be a good sample.

(c) Give **one** reason why.

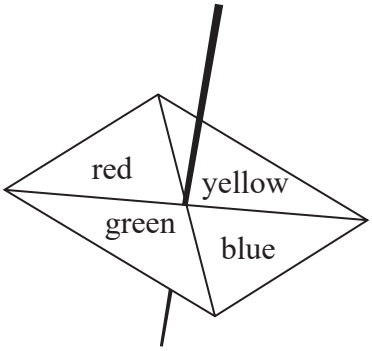
.....

.....

(1)

(Total for Question 6 is 4 marks)

7 Here is a 4-sided spinner.



Prasha spins the spinner 300 times.
The table shows the number of times the spinner lands on each of the colours.

Colour	red	yellow	green	blue
Frequency	74	56	90	80

Prasha continues to spin the spinner.

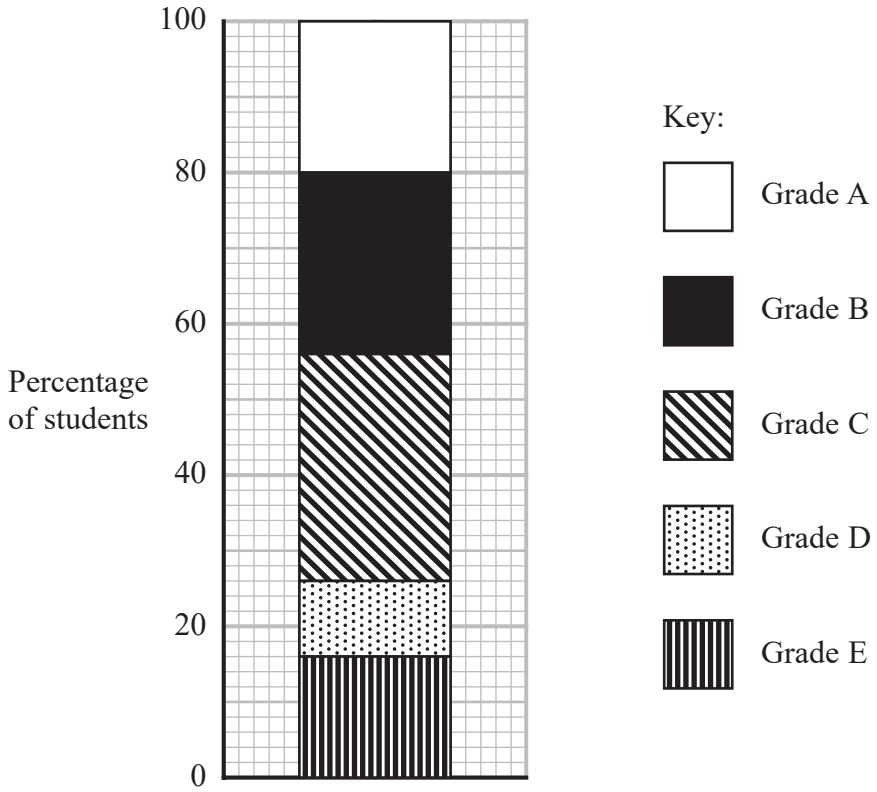
Using the information in the table, work out an estimate for the number of times the spinner will land on yellow when she has spun the spinner a total of 360 times.

.....

(Total for Question 7 is 2 marks)

8 Some students did a test.

The composite bar chart shows information about the percentages of the students who got grade A or grade B or grade C or grade D or grade E.

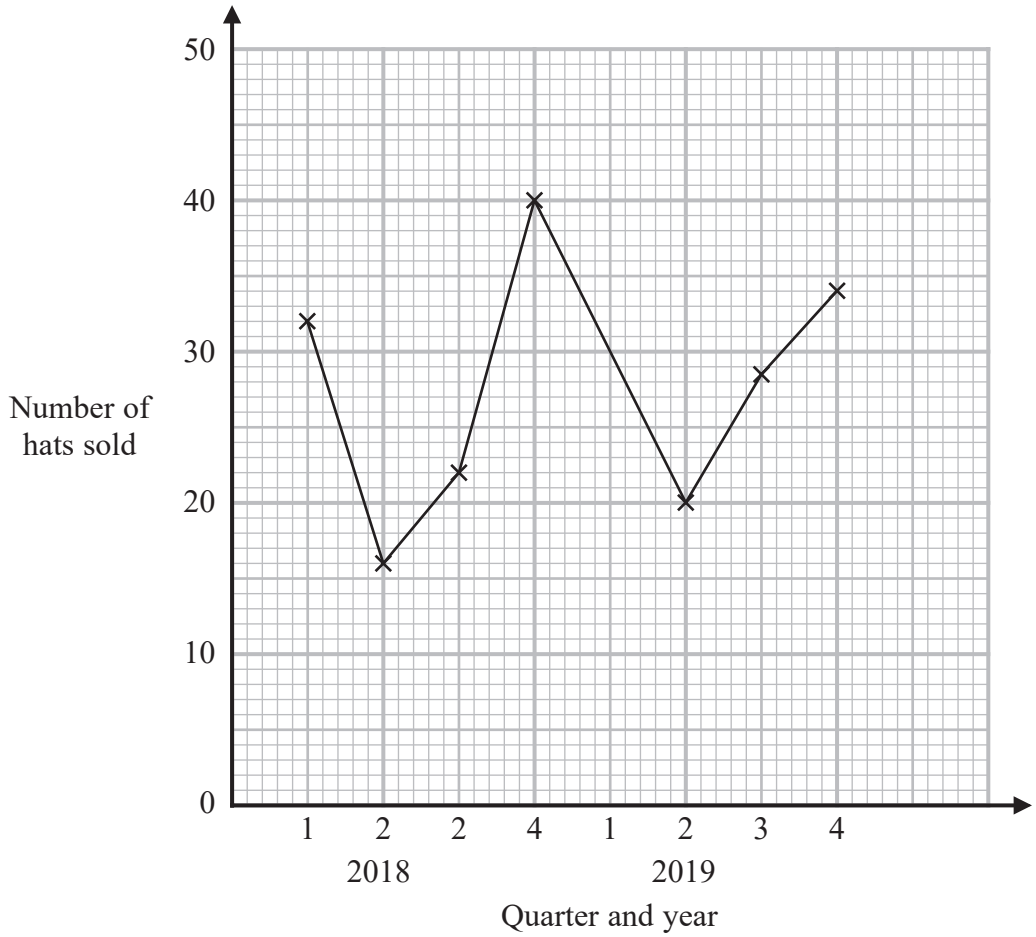


Use the information from the composite bar chart to complete the table.

Grade	A	B	C	D	E
Percentage of students					

(Total for Question 8 is 3 marks)

9 The time-series graph shows information about the number of hats sold in a shop each quarter in 2018 and 2019.



Write down two things that are wrong or could be misleading with the time-series graph.

1 .....

.....

2 .....

.....

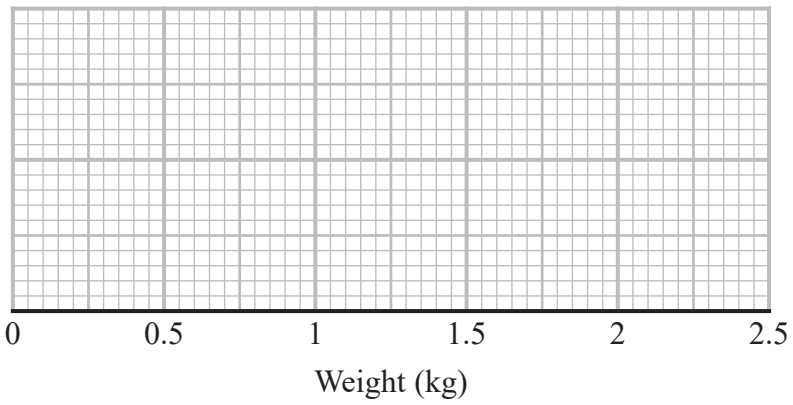
(Total for Question 9 is 2 marks)

10 A research assistant found the weights, in kg, of 15 rabbits.

Here are her results.

0.7	0.8	1.1	1.2	1.2
1.2	1.4	1.5	1.6	1.8
1.8	1.8	1.9	2.0	2.3

(a) On the grid, draw a box plot for these results.



(4)

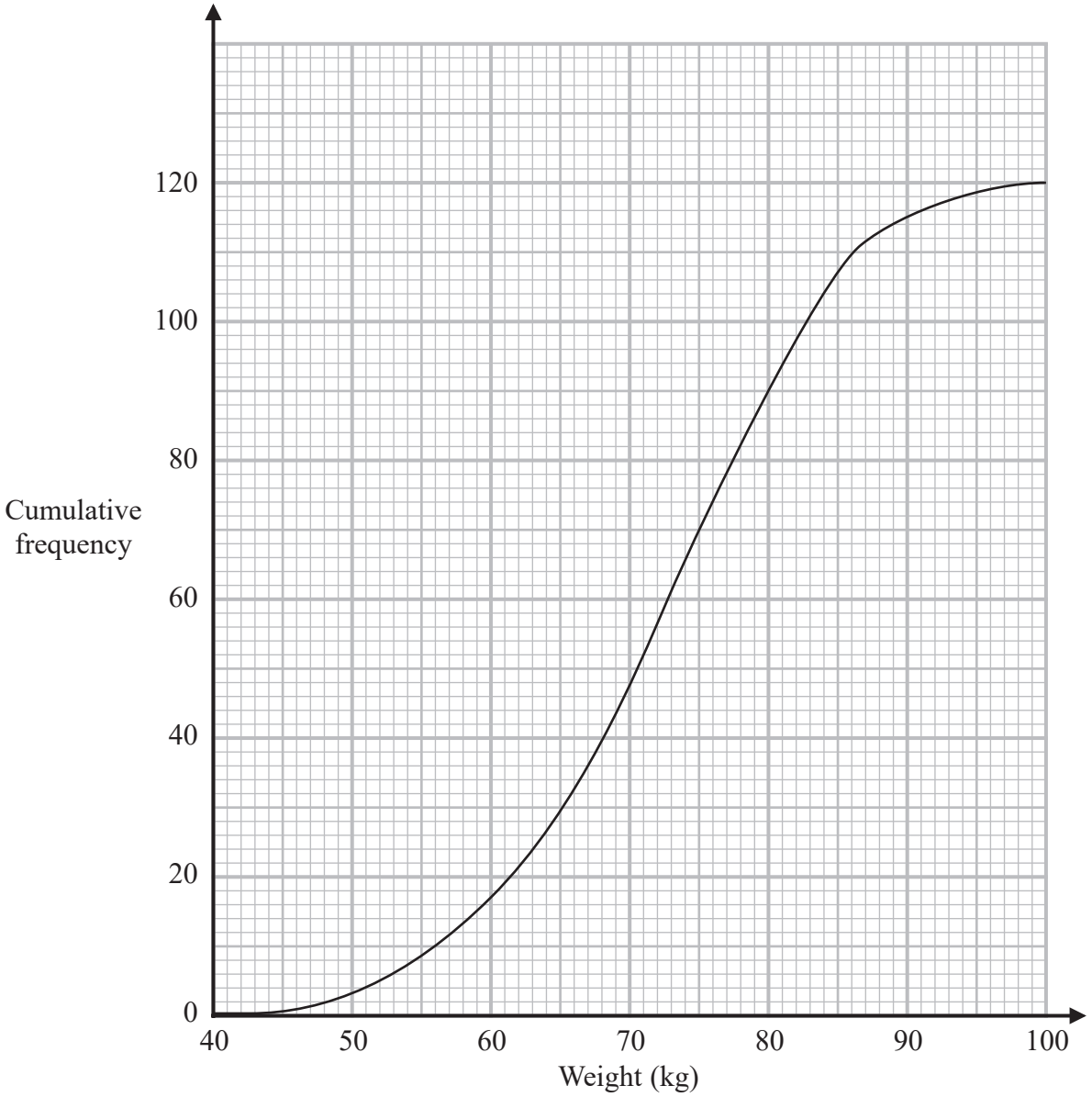
(b) Describe the skew of the distribution of the weights of these rabbits.

.....

(1)

(Total for Question 10 is 5 marks)

11 Here is a cumulative frequency curve for the weights, in kg, of 120 ostriches.



Use the cumulative frequency curve to find an estimate for

(i) the median weight,

..... kg

(1)

(ii) the interquartile range.

..... kg

(2)

(Total for Question 11 is 3 marks)

12 On one day, a receptionist recorded how many minutes each patient had to wait before they were seen by their doctor.

Here are the results.

2	10	13	7	9	4	21	6	17
4	11	12	23	5	8	30	8	18
19	18	9	16	12	25	15	22	15

(a) Draw an ordered stem and leaf diagram for this information.
You must include a key.

0	
1	
2	
3	

(3)

(b) Find the median.

..... minutes

(1)

(c) Work out the interquartile range.

..... minutes

(2)

(Total for Question 12 is 6 marks)

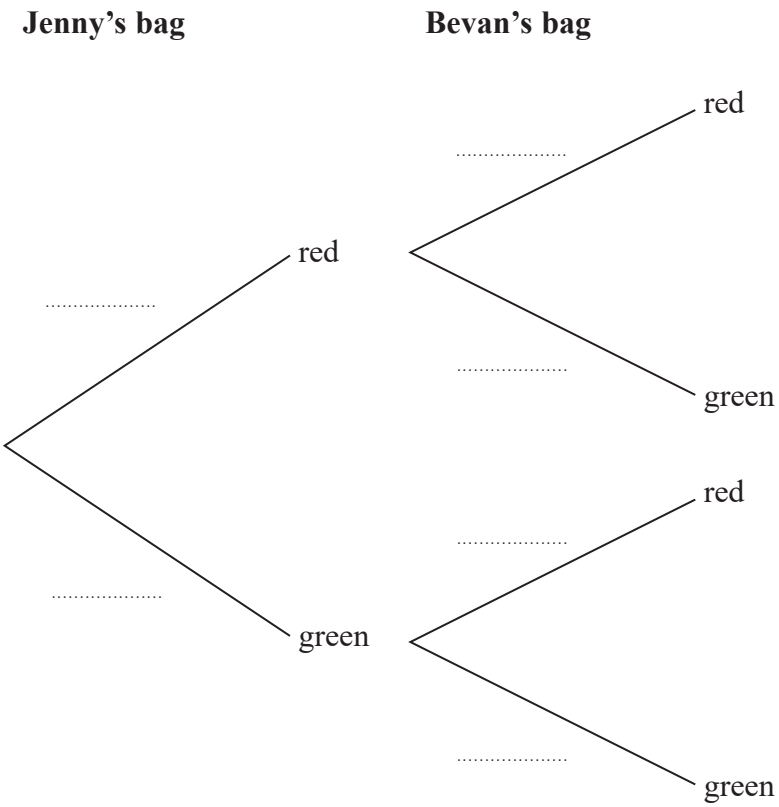
13 Jenny and Bevan each have a bag of jelly babies.

In Jenny's bag, there are only 4 red jelly babies and 6 green jelly babies.

In Bevan's bag, there are only 3 red jelly babies and 4 green jelly babies.

Jenny takes at random a jelly baby from her bag and Bevan takes at random a jelly baby from his bag.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that

(i) both jelly babies are red,

.....

(2)

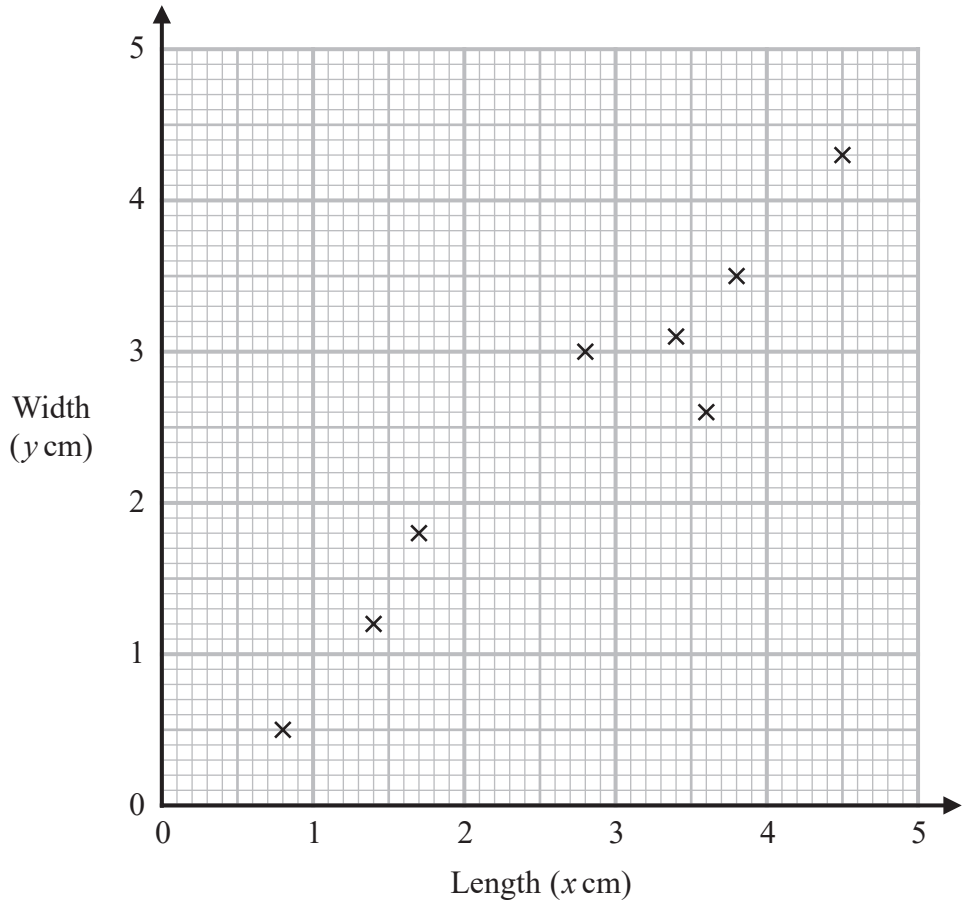
(ii) at least one jelly baby is green.

.....

(2)

(Total for Question 13 is 6 marks)

14 The scatter graph gives information about the lengths, x cm, and the widths, y cm, of 8 leaves from a tree.



(a) Describe the relationship between the length and the width of these leaves.

.....

.....

(1)

(b) Work out the mean point of the data.
You may use $\Sigma x = 22$ and $\Sigma y = 20$

(..... , ...)

(2)

(c) On the grid

(i) plot the mean point,

(1)

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

(1)

Another leaf from the tree has a length of 4 cm.

(d) Find an estimate for the width of this leaf.

..... cm

(1)

(Total for Question 14 is 6 marks)

15 The table gives the number of visitors, in thousands, to a town each quarter of 2018 and 2019.

Year	**2018**				**2019**			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Number of visitors (000s)	14	24	9	8	12	22	9	7

(a) Calculate the 4-point moving averages for the information in the table.
The first three have been done for you.

13.75, 13.25, 12.75, ..., ...

(2)

(b) Describe what the moving averages show about the trend in the number of visitors to this town over this period.

.....

(1)

(Total for Question 15 is 3 marks)

16 Nav delivers parcels.

Here are the weights, w kg, of the 8 parcels he delivered on Wednesday.

2.7 2.7 3.4 3.2 1.5 2.4 1.8 1.5

(a) Work out the mean of the weights of the parcels that Nav delivered on Wednesday.

..... kg

(2)

(b) Work out the standard deviation of the weights of the parcels Nav delivered on Wednesday.
You may use $\Sigma w^2 = 49.88$
Give your answer correct to 3 decimal places.

..... kg

(2)

The following table gives the mean and the standard deviation of the weights of the parcels that Nav delivered on Thursday.

Mean (kg)	Standard deviation (kg) (correct to 3 decimal places)
2.275	0.435

(c) Compare the means and the standard deviations of the weights of the parcels that Nav delivered on Wednesday and Thursday.

Mean .....

.....

Standard deviation .....

.....

(2)

Here are the weights, in kg, of the parcels that Nav delivered on Friday.

1.6 3.4 2.8 2.7 2.4 1.2 2.8 16.5 0.8 1.3

One of these weights is an outlier.

(d) Write down this weight.

..... kg

(1)

(Total for Question 16 is 7 marks)

17 A farmer found the weight of each of 48 piglets.

The table gives information about the weights.

Weight (w kg)	Frequency
$20 < w \leqslant 25$	12
$25 < w \leqslant 30$	14
$30 < w \leqslant 35$	15
$35 < w \leqslant 40$	4
$40 < w \leqslant 45$	3

(a) Complete the following sentence.

The weight of a piglet is an example of ..... data.

(1)

(b) Find the class interval that contains the median weight.

.....

(1)

(c) Work out an estimate for the mean weight of the piglets.
Give your answer correct to one decimal place.

..... kg

(4)

(Total for Question 17 is 6 marks)

18 Michael goes to meetings in London.
He travels to London by train.

In 2016 the cost of his train ticket was £20.80

In 2018 the cost of his train ticket was £23.70

(a) Using 2016 as the base year, work out the index number for the cost of Michael's train ticket in 2018.
Give your answer correct to one decimal place.

.....

(2)

Kate also goes to meetings in London.
She also travels to London by train.

Using 2016 as the base year, the index number for the cost of Kate's train ticket in 2018 is 108.5

(b) Interpret the index numbers for the costs of Michael's and of Kate's train tickets in 2018 and compare these two index numbers.

.....

.....

.....

(2)

(Total for Question 18 is 4 marks)

19 Dawn recorded the heights, in cm, of 10 women and 15 men.

The mean height of the 10 women is 163 cm.

The mean height of the 15 men is 177 cm.

Work out the mean height of all 25 people.

..... cm

(Total for Question 19 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS