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*.

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.*
- Questions labelled with an **asterisk** (*****) are ones where the quality of your
  written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation
    and grammar, as well as the clarity of expression.*

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

Mean of a frequency distribution $= \dfrac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \dfrac{\sum fx}{\sum f}$, where x is the mid-interval value.

P 4 6 4 8 7 A 0 2 2 8

Answer ALL the questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 A college had an election for student president.

Each student could vote for one person, Edward or Linda or Rita.

The pictogram shows information about the votes each person got.

Key:

⊕

represents 4 votes
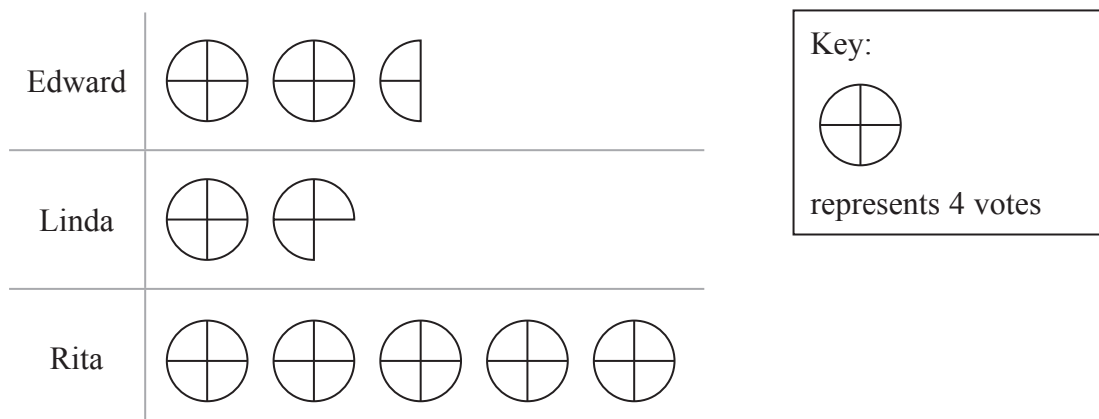
(a) Find the total number of votes Edward got.

....

(1)

(b) Work out the total number of votes.

....

(2)

To become student president, a person must get more than half the total number of votes.

(c) Does Rita become student president?
You must show your working.

....

....

(1)

(Total for Question 1 is 4 marks)

2 A bag contains only 4 red marbles and 1 blue marble.

One marble is to be taken at random from the bag.

Here is a list of words.

evens   impossible   unlikely   likely   certain

(a) Use one word from the list to complete each sentence below.

(i) The outcome that the marble is red is ....

(ii) The outcome that the marble is white is ....

(2)

A box contains only 3 green counters and 8 yellow counters.

One counter is to be taken at random from the box.

(b) (i) On the probability scale, mark with the letter Y the probability that the counter taken is yellow.

```
 |───────────────────────────|───────────────────────────|
 0                           1                            1
                             ─
                             2
```
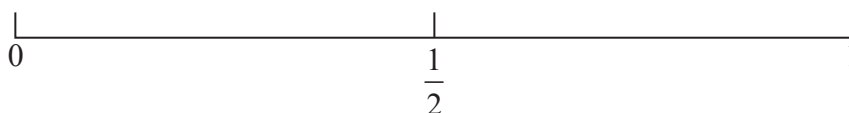
(ii) Write down the probability that the counter taken is yellow.

....

(2)

(Total for Question 2 is 4 marks)

3 The highest temperature each day in Manchester was recorded for the first fourteen days in May.

The frequency table shows information about these temperatures.

Highest Temperature (°C)	12	13	14	15	16	17
Frequency	1	3	4	2	3	1

(Data source: www.metoffice.gov.uk)

(a) Work out how many of these days had a highest temperature less than 15 °C.

....

(1)

(b) Write down the mode.

.... °C

(1)

Francis calculated the mean highest temperature for the first fourteen days in May.

He got an answer of 20.2 °C.

(c) Explain why his answer cannot be correct.

....

....

(1)

On the fifteenth day in May, the highest temperature was 18 °C.

(d) Discuss whether the mode for the first fourteen days in May is greater than, is equal to, or is less than the mode for the first fifteen days in May.

Give a reason for your answer.

....

....

(2)

(Total for Question 3 is 5 marks)

4 The table shows information about the mean amount of money each person in the UK spent on food and drink per week for the years 2009 to 2012

	2009	2010	2011	2012
Mean spending per week in pence (to the nearest penny)				
Category:				
Milk and cream	200	189	187	188
Cheese	75	79	80	81
Carcase meat	127	130	129	136
Non-carcase meat and meat products	423	441	449	471
Fish	117	117	120	124
Eggs	27	28	28	30
Fats and oils	47	50	53	55
Sugar	20	21	21	23
Potatoes (fresh and processed)	111	113	116	121
Fruit and vegetables excluding potatoes	419	441	442	460
Cereals	452	461	474	497
Other food and drink	144	144	148	159
Beverages	48	51	51	56
Soft drinks	85	89	93	96
Confectionery	93	96	101	102
Alcoholic drinks	289	307	308	330
Total spent on food and drink eaten at home	2675	2757	2799	2929
Total spent on food and drink eaten out	1133	1166	1193	1209
Total spent on all food and drink	**3808**	**3923**	**3993**	**4137**

(*Data source: Living Cost and Food Survey*)

(a) Write down the category with the highest mean amount of money spent each year.

....

(1)

P 4 6 4 8 7 A 0 6 2 8

In the table, the mean amount of money spent on cheese in 2012 was more than in 2009

(b) Work out how much more.
You must show your working.

.... pence

(2)

The mean amount of money spent on eggs was the same in both 2010 and 2011
This is also true for two other categories.

(c) Write down the names of these two categories.

.... and ....

(1)

In 2012, the total spent on food and drink eaten at home was 2929 pence.
In 2012, the total spent on food and drink eaten out was 1209 pence.

These two totals add to 4138 pence.

(d) Explain why the total spent on all food and drink given in the table, 4137 pence, is
different from 4138 pence.

....

....

(1)

In 2009, Sophie spent a total of 2750 pence per week on food and drink eaten at home.
In 2009, Sophie spent a total of 1100 pence per week on food and drink eaten out.

(e) Compare Sophie's spending to the information given in the table.

....

....

....

....

(2)

(Total for Question 4 is 7 marks)

5 The pie chart shows information about the favourite flavour of ice cream for each of 24 people.

Key:

◩ strawberry

▦ pistachio

▢ chocolate

▨ vanilla
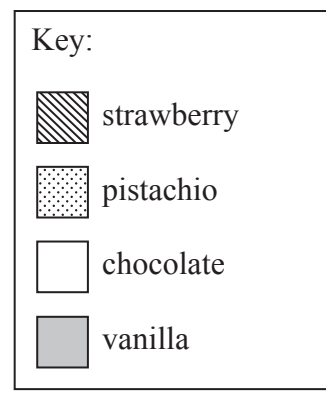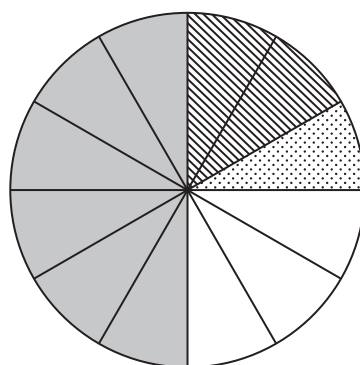
(a) Write down the most popular flavour of ice cream.

....

(1)

Strawberry is the favourite flavour of ice cream for 4 people.

(b) Show how this can be calculated from the pie chart.

(1)

(c) Using the information in the pie chart, complete the bar chart.
Label the axes.

....

....
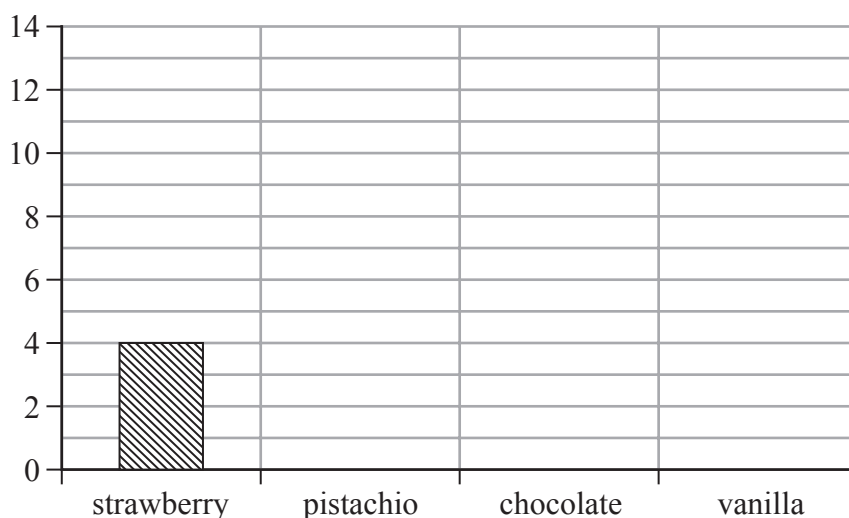
(4)

(Total for Question 5 is 6 marks)

6 Malcolm asked each student in his class how many minutes of music they listen to each day.

He drew this box plot for the information.
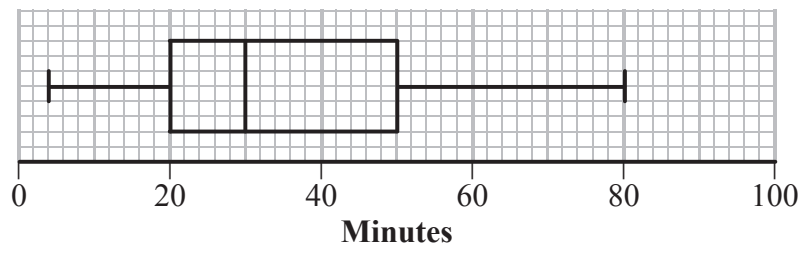
Minutes

(a) Write down the percentage of these students who listen to more than 30 minutes of music each day.

.... %

(1)

(b) Find the range.

.... minutes

(2)

(c) Describe the skew of the distribution.

....

(1)

Malcolm also asked each teacher in his school how many minutes of music they listen to each day.

He drew a box plot for the information.

Malcolm is going to compare the information in the two box plots.

(d) Write down the name of the average he should use.

....

(1)

(Total for Question 6 is 5 marks)

7 The graph shows some information about annual cinema admissions in the UK from 1997 to 2009

UK annual cinema admissions by age
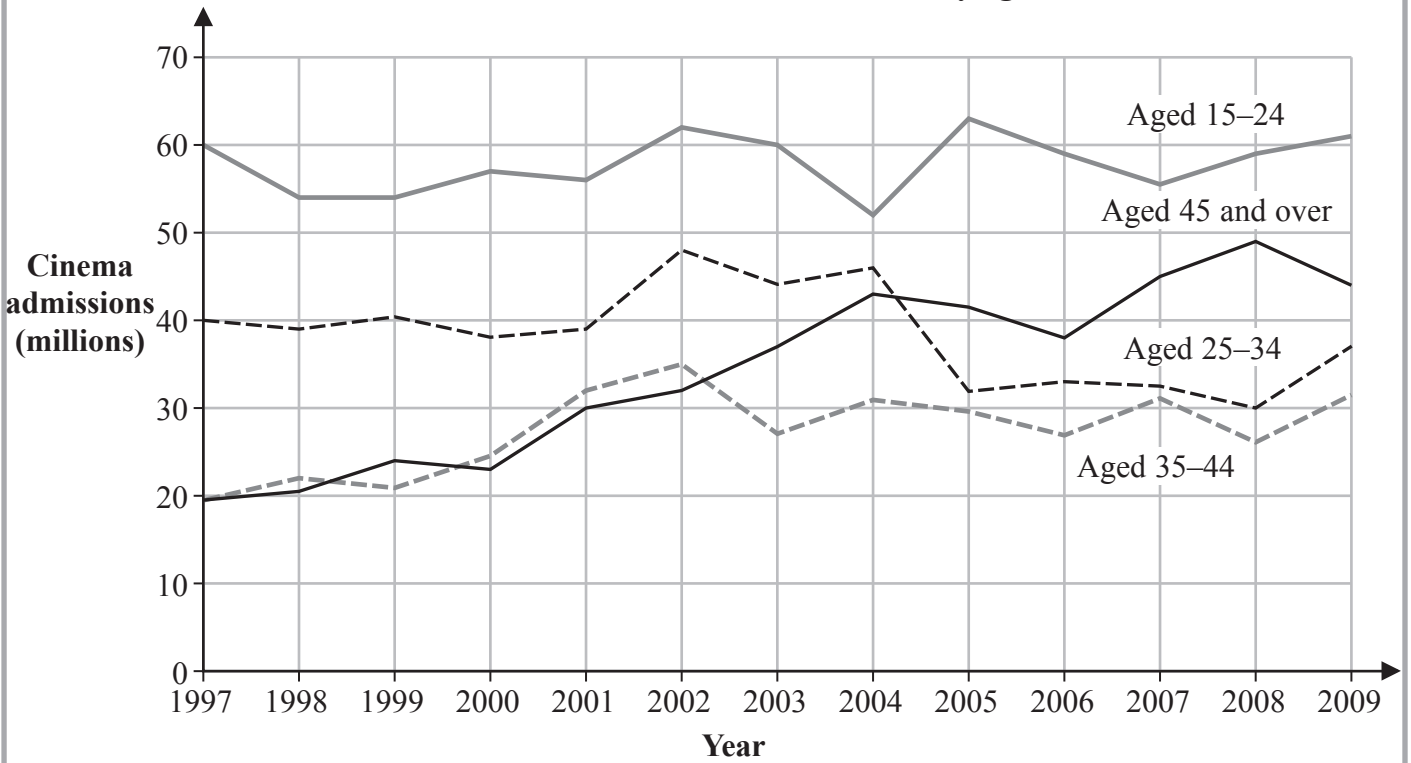
(*Data source: UK Film Council*)

(a) Write down the age group which had the least number of cinema admissions in 2003

....

(1)

(b) Write down the number of cinema admissions for people aged 25–34 in 2008

.... million

(1)

(c) Describe the trend in annual cinema admissions for people aged 45 and over between 1997 and 2009

....

(1)

Jonathan says that the graph does not show all the cinema admissions from 1997 to 2009

(d) Explain why Jonathan is correct.

....

....

(1)

(Total for Question 7 is 4 marks)

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P46487A01128

8 The multiple bar chart shows the percentage of females in each age group in Great Britain with a driving licence for the years 1975, 1995 and 2012
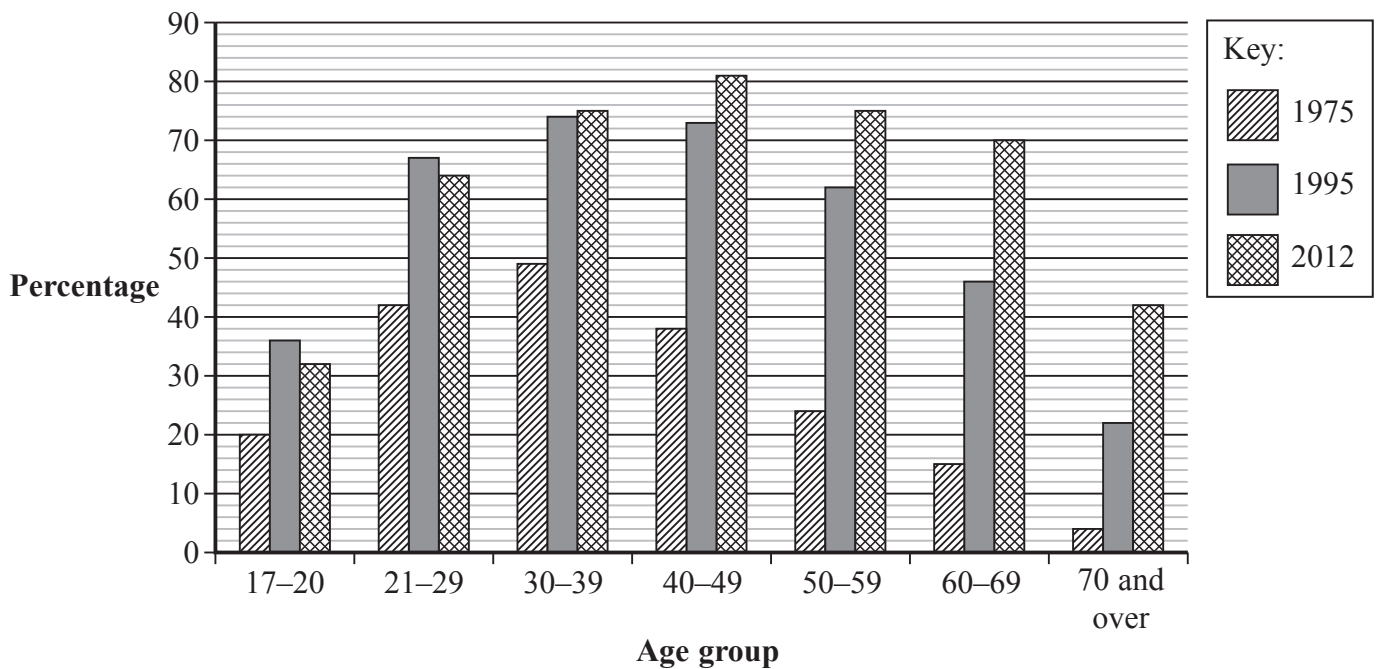
(*Data source: National Travel Survey*)

(a) Write down the age group with the highest percentage of females with a driving licence in 1975

....

(1)

Yuen makes three claims about the information in the multiple bar chart.

(b) For each claim, tick the box to show whether the claim is true or false.
Use the information in the multiple bar chart to justify each answer.

Claim 1 33% of females in the 17–20 age group had a driving licence in 1995

True ☐ False ☐

....

....

....

Claim 2   In 2012, more than half of all females aged 21 to 69 had a driving licence.

True ☐   False ☐

....

....

....

Claim 3   For all age groups, the percentage of females with a driving licence is higher in 2012 than in 1995

True ☐   False ☐

....

....

....

(3)

(Total for Question 8 is 4 marks)

9 Percy is the conductor of a large choir.

He is going to use a survey to find out the type of music that people in the choir want to sing at the next concert.

(a) State the population for his survey.

....

....

(1)

Percy is going to use a sample instead of taking a census.

It is cheaper to use a sample than to take a census.

(b) Give one other advantage of using a sample.

....

....

(1)

Percy wants to make sure that people from all age groups in the choir are fairly represented in the sample.

He is going to use stratified sampling.

Here is a list of words.

reliability   accuracy   bias   time   cost

(c) Use one word from the list to best complete the statement.

Stratified sampling will help to minimise ....

(1)

The table shows some data that Percy could find out about the people in the choir.

(d) Complete the Type of data column in the table.
    Use only the words **quantitative** or **qualitative**.

	Type of data
Number of people	
Type of music	
Age of people in years	

(2)

Percy plans to use a questionnaire to collect the information.

*(e) Discuss whether he should use open or closed questions on the questionnaire.

....

....

....

....

(1)

Percy plans to ask the following question on his questionnaire.

Do you agree that we should sing classical music at the next concert?

☐   ☐

Yes   No

This is **not** a good question.

(f) Write down one thing that is wrong with this question.

....

....

(1)

(Total for Question 9 is 7 marks)

10 The diagram shows information for eleven different countries about the mean annual weight of tea and of coffee used per person to make drinks.
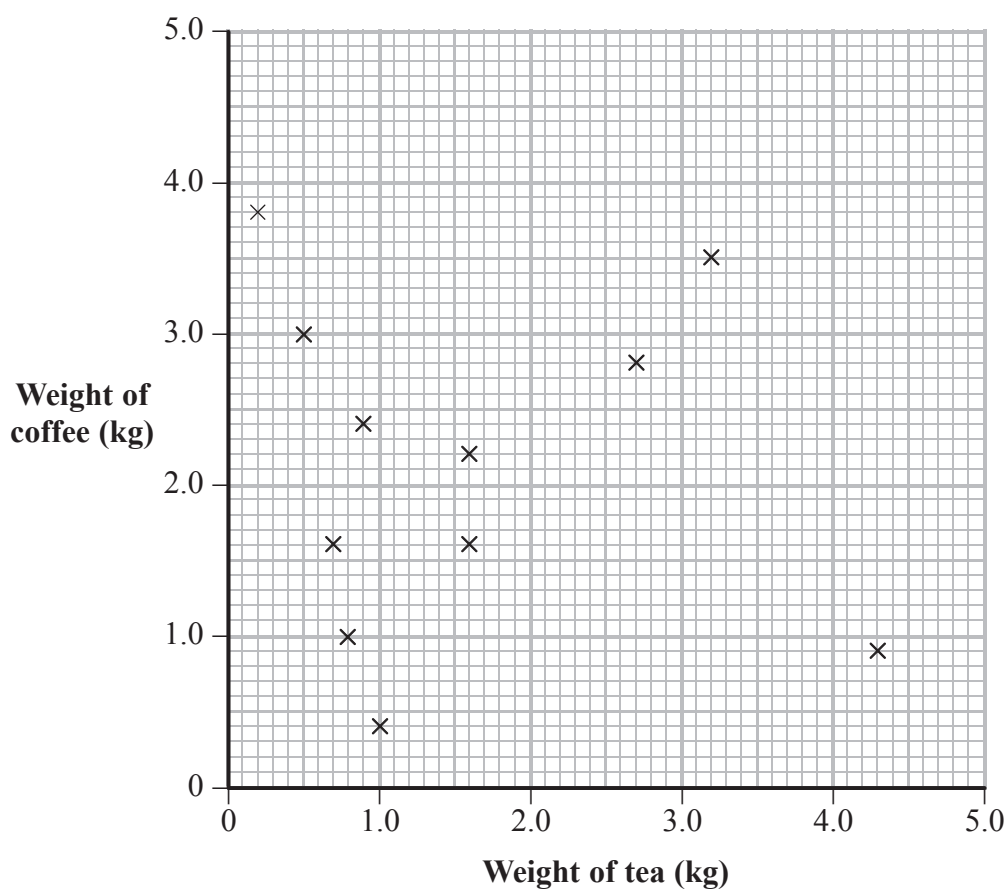
(*Data source: World Factbook*)

(a) Write down the name given to this type of diagram.

....

(1)

Two of the eleven countries are the United Kingdom and the Republic of Ireland.

(b) Use the information in the diagram to complete the table.

Country	Weight of tea (kg)	Weight of coffee (kg)
United Kingdom	2.7	....
Republic of Ireland	....	0.9

(2)

P 4 6 4 8 7 A 0 1 6 2 8

For one of the eleven countries, the annual weight of tea is equal to the annual weight of coffee.

(c) On the diagram, circle the point that shows the data for this country.

(1)

Andy wants to make predictions by drawing a line of best fit on the diagram.

*(d) Discuss whether or not this is a sensible thing to do.

....

....

....

(2)

(Total for Question 10 is 6 marks)

11 Here are 10 cards.

| 1 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 |

Devika picks at random one of these cards.

(a) (i) Find the probability that this card has a 2 or a 4 on it.

....

(ii) Find the probability that this card does **not** have a 3 on it.

....

(2)

Getting an even number and getting an odd number are mutually exclusive events.

(b) Explain what is meant by the term mutually exclusive.

....

....

(1)

Sam picks at random one of the 10 cards.
He looks at the number on the card and then replaces the card.
Sam again picks at random one of the cards and looks at the number on the card.

(c) Find the probability that both of the numbers are odd numbers.

....

(2)

(Total for Question 11 is 5 marks)

12 John wants to know which pets are more popular, dogs or cats.

(a) Write down a question that John could use on a questionnaire to investigate this.

(1)

Many types of animal can be pets.
Valerie thinks that the gender of a person may affect their choice of pet.
She plans to investigate this with a face-to-face survey.

(b) Design a data collection sheet for Valerie to use.

(2)

(c) Valerie will not be able to use a scatter diagram to show her results.

Explain why not.

....

....

....

(1)

(Total for Question 12 is 4 marks)

13 The table gives information about the heights of 43 presidents of the United States.

Height (h cm)	Frequency
$160 < h \leqslant 170$	3
$170 < h \leqslant 180$	16
$180 < h \leqslant 190$	22
$190 < h \leqslant 200$	2

(*Data source: www.presidenstory.com*)

(a) Write down the modal class interval.

....

(1)

(b) The information in the table can **not** be used to calculate the exact value of the mean height.
Explain why not.

....

....

(1)

(c) Calculate an estimate for the mean height.
Give your answer correct to 1 decimal place.

.... cm

(3)

The heights of the same 43 presidents have been grouped differently in the table below.

Height (*h* cm)	Frequency
$160 < h \leqslant 165$	1
$165 < h \leqslant 170$	2
$170 < h \leqslant 175$	8
$175 < h \leqslant 180$	8
$180 < h \leqslant 185$	13
$185 < h \leqslant 190$	9
$190 < h \leqslant 195$	2
$195 < h \leqslant 200$	0

Using the information from this table, an estimate for the mean height is 180.1 cm.

*(d) Which of the two estimates is the better estimate of the mean height?
Give a reason for your answer.

....

....

....

(2)

(Total for Question 13 is 7 marks)

14 The table shows the number of students in each year in the mathematics department of a university.

Year	first year	second year	third year	**Total**
Number of students	90	78	72	240

Amanda wants to find out what the students think about the mathematics department.

She decides to take a sample of 40 of these students, stratified by year.

(a) Show that there should be 15 first year students in the sample.

(1)

Amanda uses a computer to generate the following list of random numbers.

47	12	53	53	26	06	03	89
27	04	44	49	11	24	33	14

(b) Explain how she can use these numbers to select the 15 first year students in the sample.

....

....

....

....

....

....

(3)

Amanda chooses the sample of 15 first year students.

7 of these students said they were happy with the mathematics department.

(c) Work out an estimate for the total number of first year students who are happy with the mathematics department.

....

(2)

(Total for Question 14 is 6 marks)

15 A headteacher recorded the number of student absences each day for the first three weeks of a school term.

Week	Day	Absences	5-point moving average
1	Monday	10	
	Tuesday	9	
	Wednesday	8	9.8
	Thursday	6	10.6
	Friday	16	11.2
2	Monday	14	12
	Tuesday	12	12.8
	Wednesday	12	13.8
	Thursday	10	14.8
	Friday	21	15.2
3	Monday	19	15.4
	Tuesday	14	15.8
	Wednesday	13	....
	Thursday	12	
	Friday	24	

The table shows this information.
It also shows some of the 5-point moving averages for this information.

(a) Complete the table to show the missing 5-point moving average.
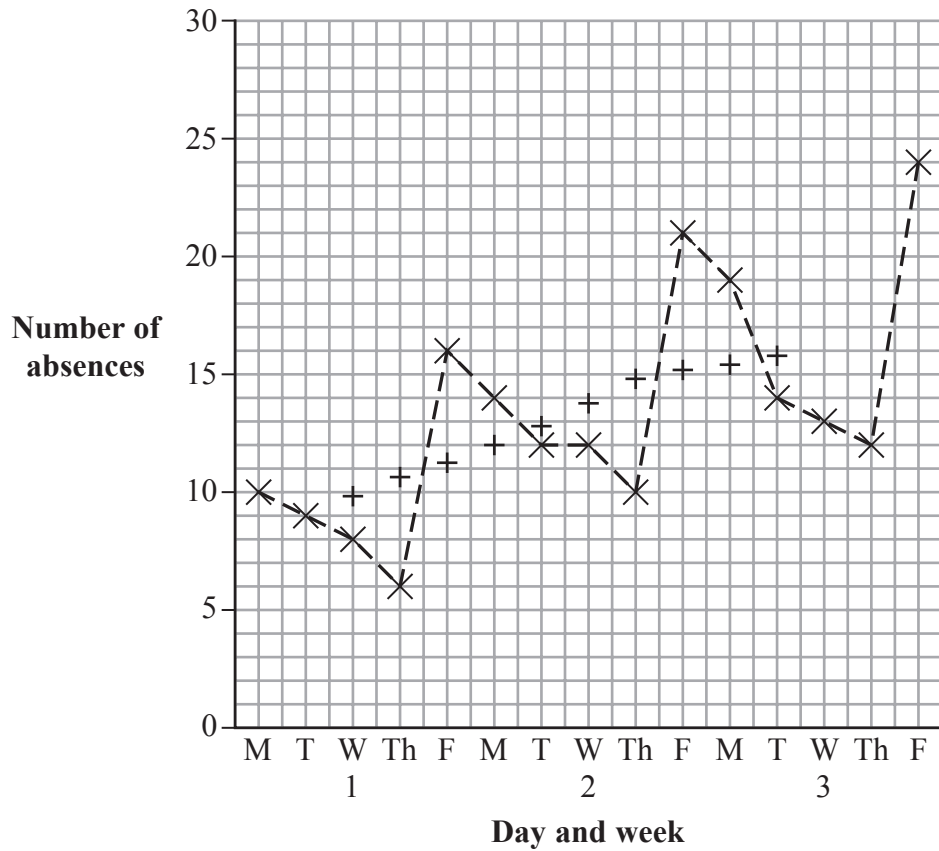You must show your working.

(2)

The data from the table is plotted on a time series graph on the next page.

(b) On the time series graph, plot the moving average from part (a).

(1)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) Draw a trend line on the time series graph.

(1)

The headteacher is worried about the number of absences on Fridays.

*(d) Use the time series graph to comment on whether the headteacher is right to be worried.

....

....

....

....

....

....

....

(2)

(Total for Question 15 is 6 marks)

TOTAL FOR PAPER IS 80 MARKS

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