

Surname											Other Names														
Centre Number							Candidate Number																		
Candidate Signature																									

For Examiner's Use

General Certificate of Secondary Education
June 2009

STATISTICS Foundation Tier

3311/F
F



Tuesday 16 June 2009 9.00 am to 11.00 am

For this paper you must have: - a calculator - mathematical instruments.	
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Time allowed: 2 hours

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book.

Information

- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer book.
- You are expected to use a calculator where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22	
TOTAL	
Examiner's Initials	



JUN093311F01

APW/Jun09/3311/F

3311/F

You may need to use the following formulae:

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

$$\text{Mean of a grouped frequency distribution} = \frac{\sum fx}{\sum f},$$

where x is the mid-interval value.



Turn over for the first question

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

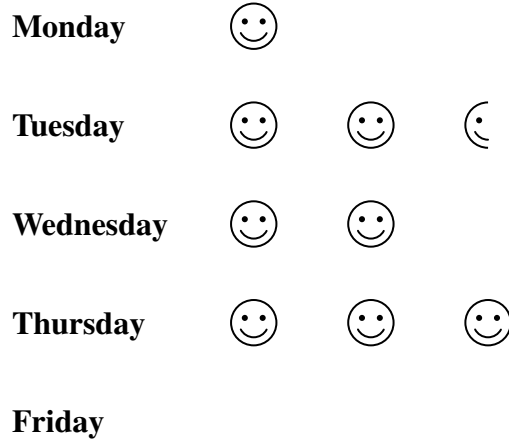
Turn over ►



Answer **all** questions in the spaces provided.

- 1 Each weekday, for one week, 20 passengers were asked whether they were happy with their local bus service.

The pictogram shows some of the results.



- 1 (a) On Wednesday 8 people said they were happy with the service.
Complete the key below.

 represents people

(1 mark)

- 1 (b) How many people were happy with the service on Tuesday?

Answer (2 marks)

- 1 (c) On Friday 13 people were happy with the service.

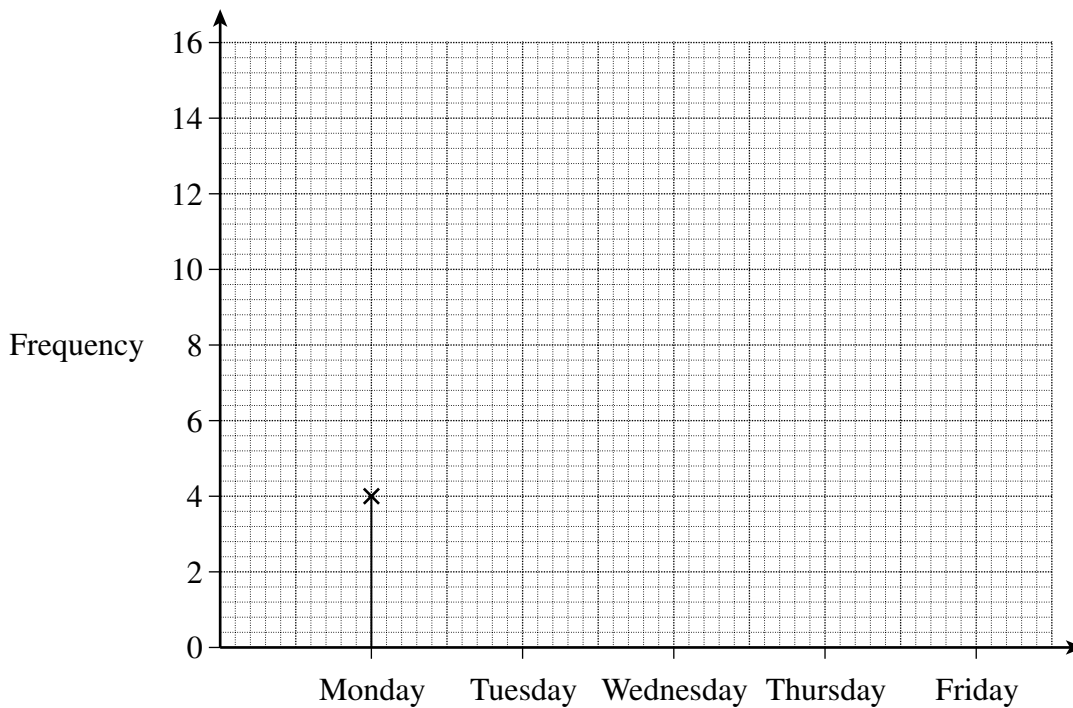
Use this information to complete the pictogram.

(2 marks)



- 1 (d) On the graph below draw a vertical line diagram to show the data.

The line representing Monday has been drawn for you.



(3 marks)

- 1 (e) Give **one** advantage of the vertical line diagram compared to the pictogram.

.....

.....

(1 mark)

Turn over for the next question

Turn over ►



- 2 Some of the teachers at Faye's school arrive by car.

Faye counts the number of people in each of the first 11 cars to arrive one day.

Here are her results.

1 3 1 1 1 2 4 1 1 1 1

- 2 (a) Explain why the mode is equal to 1

.....

 (1 mark)

- 2 (b) Explain why the median is equal to 1

.....

 (2 marks)

- 2 (c) The mean number of people in each of these cars is 1.5454 ...

In this context, why might the mean be considered the least appropriate to use of the mean, mode and median?

.....

 (1 mark)

- 2 (d) Faye is interested in environmental issues.

She writes this research question.

'Do most teachers travel to school in a car on their own?'

- 2 (d) (i) Explain why these data might support a 'yes' answer to the question.

.....

 (1 mark)



- 2 (d) (ii) Explain why these data might **not** support a 'yes' answer to the question.

.....

.....

(1 mark)

- 2 (e) Faye finds a website on the Internet which states:

'95% of American teachers travel to work by car on their own.'

Explain why this secondary data may not be helpful for Faye's research question.

.....

.....

(1 mark)

- 3 (a) Give the value of the probability for an event that is

- 3 (a) (i) impossible

Answer.....

(1 mark)

- 3 (a) (ii) equally likely to happen or not

Answer.....

(1 mark)

- 3 (a) (iii) certain to happen.

Answer.....

(1 mark)

- 3 (b) Use suitable probability words to describe events which have a probability of

- 3 (b) (i) 0.95

Answer.....

(1 mark)

- 3 (b) (ii) 0.28

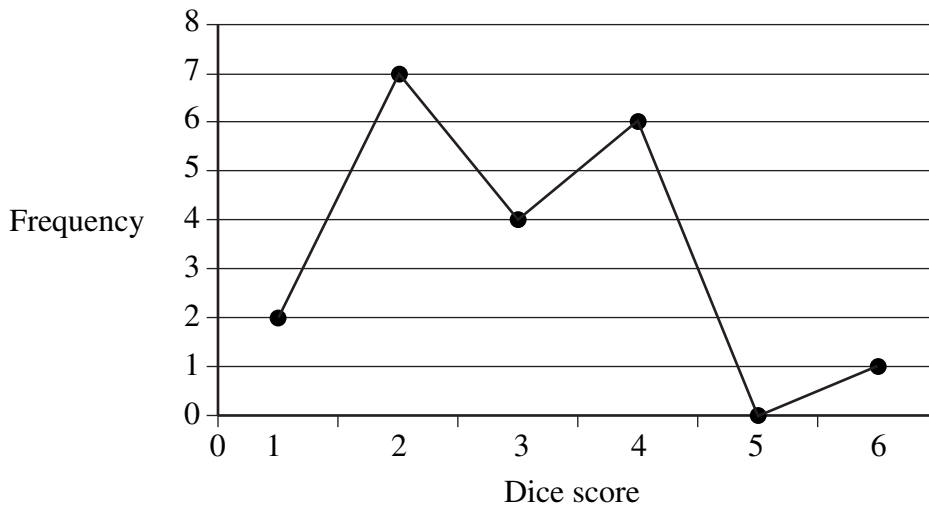
Answer.....

(1 mark)



- 4 A dice is rolled 20 times.
The score is recorded each time.

- 4 (a) Leonardo draws the following diagram to show the results.

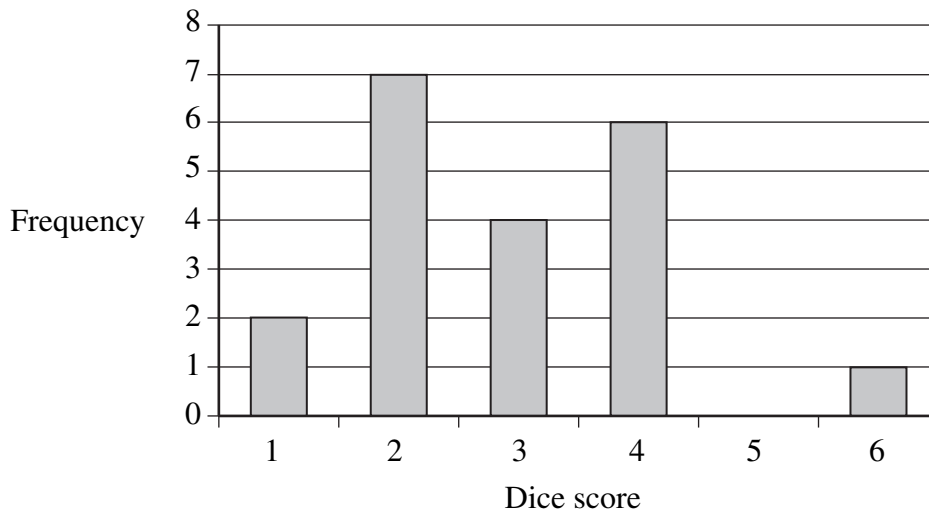


Is this diagram suitable for these data?
Explain your answer.

.....
.....

(2 marks)

- 4 (b) Vincent draws this diagram for the same data.



Is this diagram suitable for these data?
Explain your answer.

.....
.....

(2 marks)



- 4 (c) (i) What is the relative frequency of the score 2 for these data?

.....

Answer (1 mark)

- 4 (c) (ii) If this is a biased dice use these data to estimate the probability of a score of 2 on the next roll.

.....

Answer (1 mark)

- 4 (c) (iii) If this is a fair dice write down the probability of a score of 2 on the next roll.

.....

Answer (1 mark)

Turn over for the next question



- 5 The table shows the number of days on which it rained each week in Dryville during the 52 complete weeks of 2008.

Number of days on which it rained	Frequency	
0	21	
1	17	
2	8	
3	3	
4	2	
5	1	
6	0	
7	0	

- 5 (a) In how many weeks were there **exactly** 4 days on which it rained?

Answer (1 mark)

- 5 (b) In how many weeks were there **at least** 3 days on which it rained?

.....

Answer (1 mark)

- 5 (c) Use the table to show that there were 55 days on which it rained in Dryville.

.....

.....

.....

(2 marks)

- 5 (d) Use part (c) to calculate the mean number of days per week on which it rained in Dryville in 2008.

.....

.....

.....

Answer..... (2 marks)



- 6 (a)** Calculate the crude birth rate for Scotter in 2008.

.....

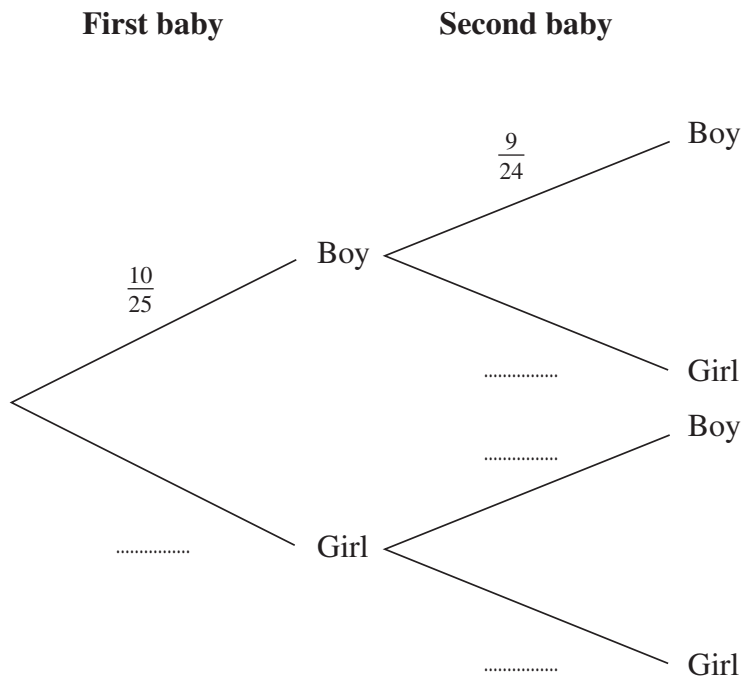
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6 (b) The crude death rate for Scotter in 2008 was 5
Has the population of Scotter gone up or down in 2008?
Give a reason for your answer.

6 (c) Of the 25 births, 10 were baby boys.
Two of these 25 babies are chosen at random.

Complete the tree diagram to show the probabilities for the gender of these two babies.

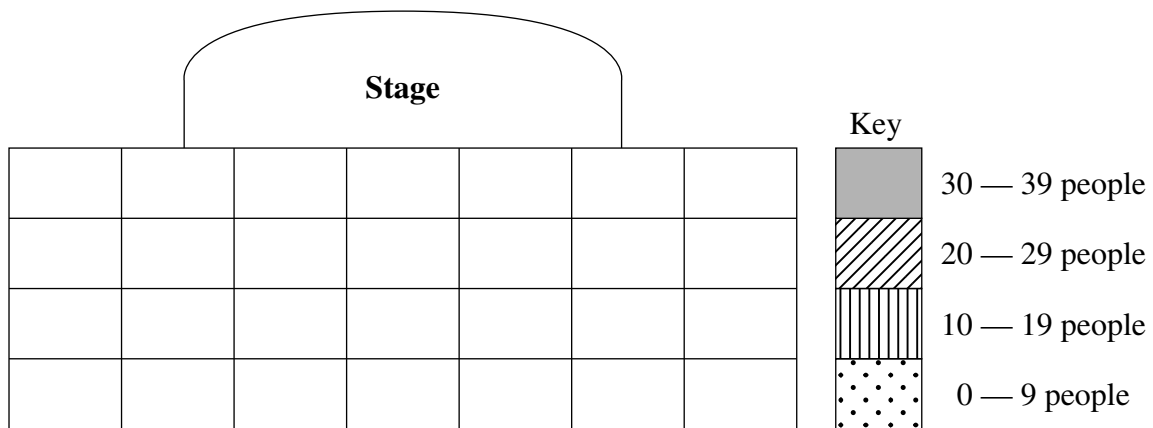


14

- 7 A band is playing at a small open-air concert in a field. The organisers monitor the number of people in different areas of the field. They split the field into rectangles and count the number of people in each rectangle. The diagram shows the number of people in each rectangle.

Stage						
12	23	36	38	33	20	8
10	18	34	39	32	19	5
5	11	34	37	32	11	3
3	4	16	19	12	10	2

- 7 (a) Use the Key to produce a choropleth (shading) map on the blank copy of the field below.



(3 marks)

- 7 (b) Each person at the concert has a numbered ticket. One ticket is to be chosen at random to meet the members of the band backstage.

Write a T in the rectangle which is most likely to contain the person with the chosen ticket.

(1 mark)

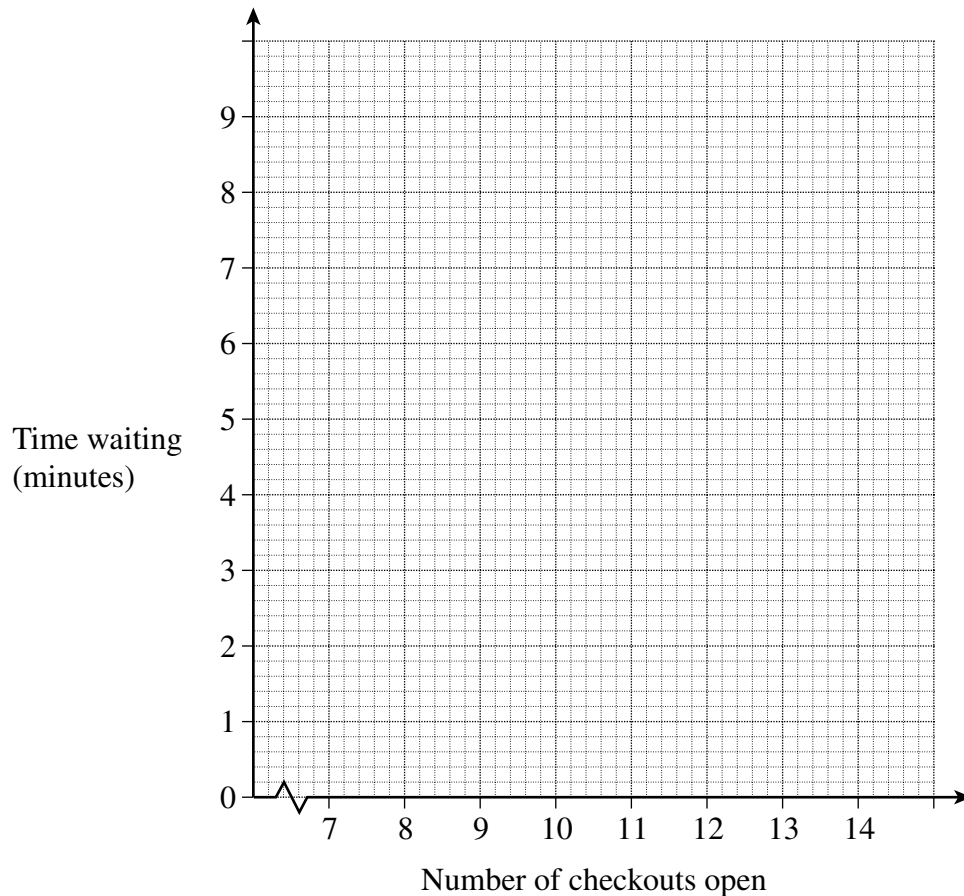


- 8 Over a period of time Anya keeps a record of the number of checkouts open and the length of time she has to wait to be served at her local supermarket.

The data for her last eight visits are in the table.

Number of checkouts open	9	13	9	13	12	11	7	14
Time waiting (minutes)	7	3	5	6	5	6	9	3

- 8 (a) Plot these data as a scatter diagram using $\times$ for each point.



(2 marks)

- 8 (b) Describe the strength **and** type of correlation shown in the diagram.

.....

Answer..... (2 marks)

- 8 (c) For these data, the mean number of checkouts open is 11 and the mean length of time waiting to be served is 5.5 minutes.

Plot the double mean point on the diagram using the $\bullet$ symbol.

Use this point to draw a line of best fit for the data.

(2 marks)

- 8 (d) Estimate how long Anya has to wait to be served when there are 10 checkouts open.

Answer minutes (1 mark)

11

Turn over ►



- 9 Boris is investigating if the distance from a polling station affects whether people usually vote in his town.

He plans to ask a random sample of people some questions.

- 9 (a) Define the population for this survey.

.....

 (2 marks)

- 9 (b) Boris is undecided about whether to interview people or send a postal questionnaire.
 Which method should Boris choose?
 Give **two** reasons for your answer.

Method

Reason 1

.....

Reason 2

.....
 (2 marks)

- 9 (c) Boris decides to do a pilot survey first.
 One question he uses is

Question: What is the distance from your house to the nearest polling station?
 Response: miles

- 9 (c) (i) Give **one** criticism of the question.

.....

 (1 mark)

- 9 (c) (ii) Give **one** criticism of the response section.

.....

 (1 mark)



- 9 (d) The 10 numerical responses he receives from his pilot survey are

1 3 0.5 2 0.5 4 1 1 24 3

- 9 (d) (i) Boris uses these data to estimate the population mean distance to the nearest polling station.

Work out his estimate.

.....

.....

.....

Answer miles (2 marks)

- 9 (d) (ii) Boris realises he could have made a better estimate of the mean using the data. Explain how.

.....

.....

(1 mark)

- 9 (e) Boris now carries out his full survey to estimate the population mean distance to the nearest polling station.

Explain why this should provide a better estimate than his pilot survey did.

.....

.....

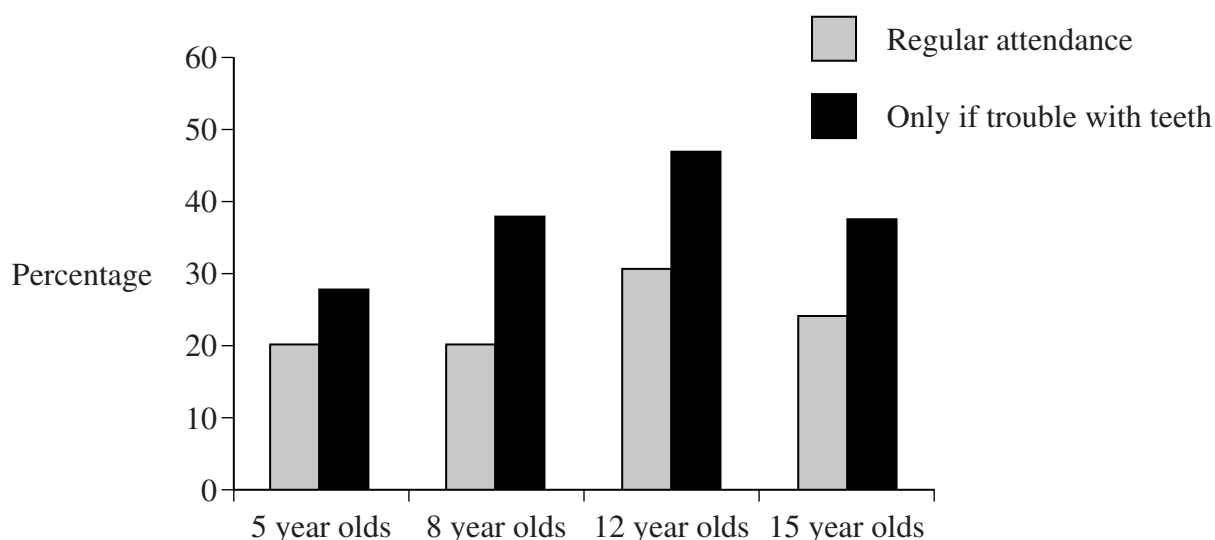
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(1 mark)

Turn over for the next question



- 10 The diagram shows the percentages of children who visit the dentist at various ages, either regularly or only when they have trouble with teeth.



Source: www.statistics.gov.uk

- 10 (a) What is the name of this type of diagram?

Answer (1 mark)

- 10 (b) Using the information given, at what age do less than 50% of all children visit the dentist?

Answer (1 mark)

- 10 (c) Consider the statement, 'more 15 year olds have **regular attendance** than 5 year olds'.

Is this statement True, False or Not possible to tell?

Give a reason for your answer.

Answer

Reason

(2 marks)

- 11 (a) Sammi collects some data that are discrete.
What is meant if data are described as 'discrete'?

.....

.....

(1 mark)



- 11 (b) Which of these types of measurements are continuous data?

Circle your answers.

frequencies lengths weights shoe sizes (1 mark)

- 11 (c) The table shows the time taken (to the nearest minute) by Sammi's class to finish a short piece of homework.

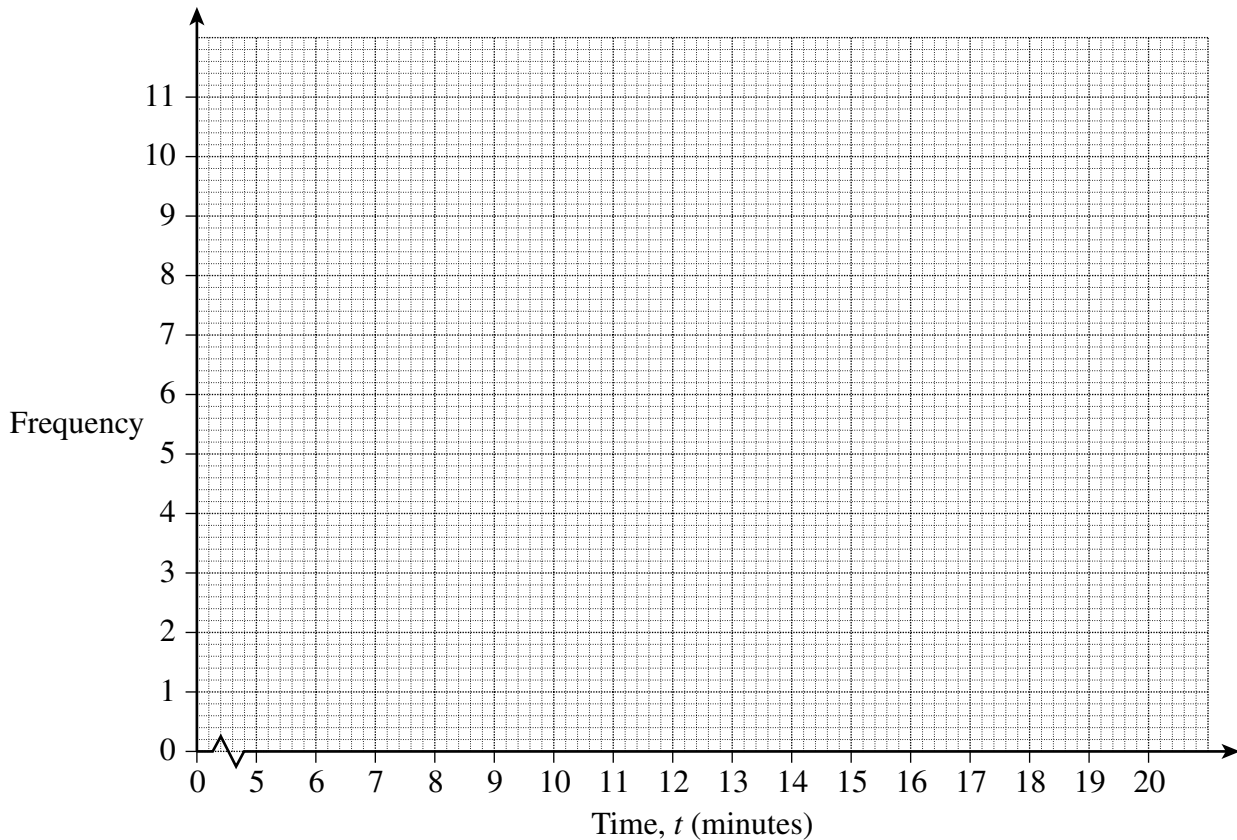
Time, t (minutes)	Frequency
6 – 8	2
9 – 11	6
12 – 14	11
15 – 17	9
18 – 20	1

- 11 (c) (i) What are the class limits for the first class interval?

Lower limit minutes

Upper limit minutes (2 marks)

- 11 (c) (ii) On the grid below draw an appropriate frequency diagram to represent the data.



(3 marks)

Turn over ►



12 Over a long period of time a theme park has discovered that

32% of its visitors are Adults (A) aged 20 and over

30% of its visitors are Teenagers (T) aged 13-19

38% of its visitors are Children (C) under 13

12 (a) (i) What is the probability that the next visitor is a Teenager?

.....

Answer (1 mark)

12 (a) (ii) Work out the probability that the next two visitors are both Teenagers.

.....

.....

Answer (2 marks)

12 (a) (iii) What assumption did you make in order to answer part (ii)?

.....

..... (1 mark)

12 (b) The theme park wants to run a simulation of its visitors using two-digit random numbers from 00 to 99.

Suggest a suitable allocation of these numbers.

Adults (A) Numbers to

Teenagers (T) Numbers to

Children (C) Numbers to

(2 marks)

12 (c) Use the two-digit random numbers below to simulate the next 10 visitors to the park in terms of whether they are Adults (A), Teenagers (T) or Children (C).

Number	79	02	32	55	09	76	44	00	82	32
Adult (A)										
Teenager (T)										
Child (C)										

(2 marks)



- 12 (d)** One day in the summer holidays the theme park offers free admission to Children under 13.

The theme park analysed the first 100 visitors that day according to age and gender. It was noted that

- the proportion of Children under 13 was one and a half times bigger than usual
- 27 of these Children under 13 were male
- there were 8 Teenagers
- half of the Teenagers were male
- there were 15 male Adults.

Complete this two-way table showing the type and gender of these 100 visitors.

	Male	Female	
Children under 13			
Teenagers			
Adults			
			Total 100

(4 marks)

- 12 (e)** One of these 100 visitors is chosen at random to receive a free annual pass to the park.

Find the probability that the visitor is

- 12 (e) (i)** a Child under 13

Answer (1 mark)

- 12 (e) (ii)** a female Teenager

Answer (1 mark)

- 12 (e) (iii)** a male Teenager or a male Adult.

.....
.....

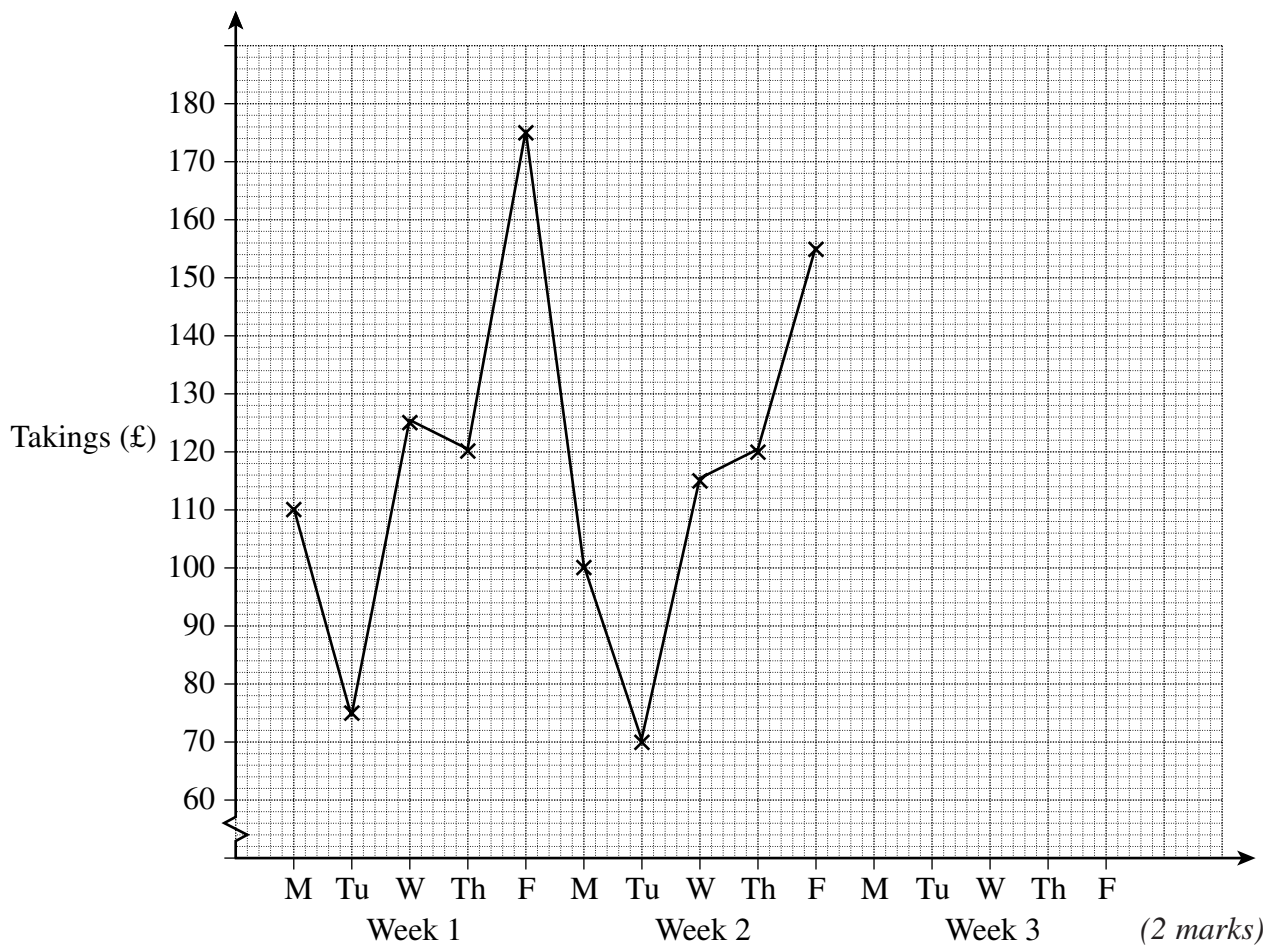
Answer..... (2 marks)



13 The table shows the takings (£) for lunches at a work's café over a period of three weeks.

Week	Day	Takings (£)
1	Monday (M)	110
	Tuesday (Tu)	75
	Wednesday (W)	125
	Thursday (Th)	120
	Friday (F)	175
2	Monday (M)	100
	Tuesday (Tu)	70
	Wednesday (W)	115
	Thursday (Th)	120
	Friday (F)	155
3	Monday (M)	95
	Tuesday (Tu)	60
	Wednesday (W)	115
	Thursday (Th)	105
	Friday (F)	150

13 (a) Complete the time series graph below by plotting the points for week 3



- 13 (b)** The takings are lowest on Tuesdays.

Give a possible reason for this.

.....

.....

(1 mark)

- 13 (c)** Describe two **other** patterns in the data.

Pattern 1

.....

Pattern 2

.....

(2 marks)

Turn over for the next question



- 14** The table shows the number of years of life expectancy for people living in the countries of the United Kingdom for 2003 – 2005.

Life expectancy, 2003 – 2005

	At birth		At age 65 years	
	Males	Females	Males	Females
England	76.9	81.2	16.8	19.6
Wales	76.3	80.7	16.4	19.2
Scotland	74.2	79.3	15.5	18.4
Northern Ireland	76.0	80.8	16.4	19.3

Source: www.statistics.gov.uk

- 14 (a)** Which of these countries had the highest life expectancy?

Answer (1 mark)

- 14 (b) (i)** According to the table to what age is a 65-year-old Scottish female expected to live?

.....

Answer..... (2 marks)

- 14 (b) (ii)** Why is the answer to part (b) (i) different to the value 79.3 years shown in the left-hand table?

.....

.....

(1 mark)

- 14 (c)** The average life expectancy at birth for males in the United Kingdom is 76.6

The average of the four figures for males at birth for England, Wales, Scotland and Northern Ireland is 75.85

Explain why these two values are different.

.....

.....

(1 mark)

END OF QUESTIONS



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