

Write your name here					
Surname			Other names		
Centre Number			Candidate Number		
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Edexcel GCSE					
Mathematics B					
Unit 1: Statistics and Probability (Calculator)					
Higher Tier					
Friday 2 March 2012 – Afternoon				Paper Reference	
Time: 1 hour 15 minutes				5MB1H/01	
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.					Total Marks
					<input style="width: 50px; height: 30px;" type="text"/>

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 60.
- 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 with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

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.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Marta asked some students how many cans of drink they each drank yesterday.

The table shows her results.

Number of cans x	Frequency f	fx
0	6	0
1	9	9
2	7	14
3	3	9
4	2	8
5	1	5

Work out the total number of cans these students drank yesterday.

$$\begin{aligned}\Sigma fx &= 0 \times 6 + 1 \times 9 + 2 \times 7 + 3 \times 3 + 4 \times 2 + 5 \times 1 \\ &= 0 + 9 + 14 + 9 + 8 + 5 \\ &= 45\end{aligned}$$

45

.....
(Total for Question 1 is 2 marks)

- *2. Mrs Collins is organising a school trip.
120 students are going on the trip.

The ratio of the number of staff to the number of students must be 1 : 15

Mrs Collins books three coaches for the trip.
Each coach has 42 seats.

Are there enough seats for all the students and staff?
You must show all your working.

$$\frac{120 \text{ students}}{15 \text{ students/teacher}} = 8 \text{ teachers required}$$

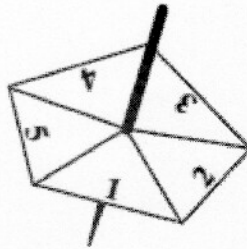
$$120 \text{ students} + 8 \text{ staff} = 128 \text{ people}$$

needing 128 seats.

$$3 \times 42 = 126 \text{ seats, } \underline{\text{not enough}}$$

(Total for Question 2 is 4 marks)

3. Here is a five-sided spinner.



The table shows the probabilities that the spinner will land on 1 or 2 or 3 or 4 or 5

Number	1	2	3	4	5
Probability	0.15	0.20	0.10	0.25	0.30

Pete spins the spinner once.

(a) Work out the probability that the spinner will land on a number greater than 2

$$\begin{aligned}P(>2) &= P(3) + P(4) + P(5) \\ &= 0.1 + 0.25 + 0.3 \\ &= 0.65\end{aligned}$$

0.65

(2)

Elinor is going to spin the spinner 200 times.

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

$$0.3 \times 200 = 60$$

60

(2)

(Total for Question 3 is 4 marks)

- *4. Debra and Mark are planning to go on a cruise.
They can travel with one of two companies, Caribbean Calypso or Royal European.

The table shows the cost per person to travel with each company.

		Type of cabin			
		Inside	Outside	Balcony	Suite
Cost per person	Caribbean Calypso	£1136	£1319	£1529	£2329
	Royal European	£1043	£1263	£1484	£2147

Caribbean Calypso has a discount of 10% if you book online.
Royal European has a discount of 5% if you book online.

Debra and Mark are going to book a suite for their cruise.
They are going to book online.

Debra and Mark want to pay the lowest possible cost.
Which company should they choose?
You must show all your working.

Caribbean Calypso:

$$£2329/\text{person} \times 2 \text{ people} \times 0.9 = £4192.2$$

10% discount

Royal European:

$$£2147/\text{person} \times 2 \text{ people} \times 0.95 = £4079.3$$

5% discount

They should choose Royal European.

(Total for Question 4 is 5 marks)

5. Here are the heights, in cm, of 20 sunflower plants.

73 84 78 96 98 84 101 93 71 104
 81 92 95 103 100 96 87 91 88 96

(a) Draw an ordered stem and leaf diagram for these heights.

Unordered:

7	3 8 1
8	4 4 1 7 8
9	6 8 3 2 5 6 1 6
10	1 4 3 0

Ordered:

7	1 3 8
8	1 4 4 7 8
9	1 2 3 5 6 6 6 8
10	0 1 3 4

cumulative frequency

(3)

(8)

(16)

Key: 7/1 means 71 cm height

(3)

(b) Find the median height.

$n = 20$, for median
 use the means of the 10th & 11th values

$$\text{Median} = \frac{92 + 93}{2} = 92.5$$

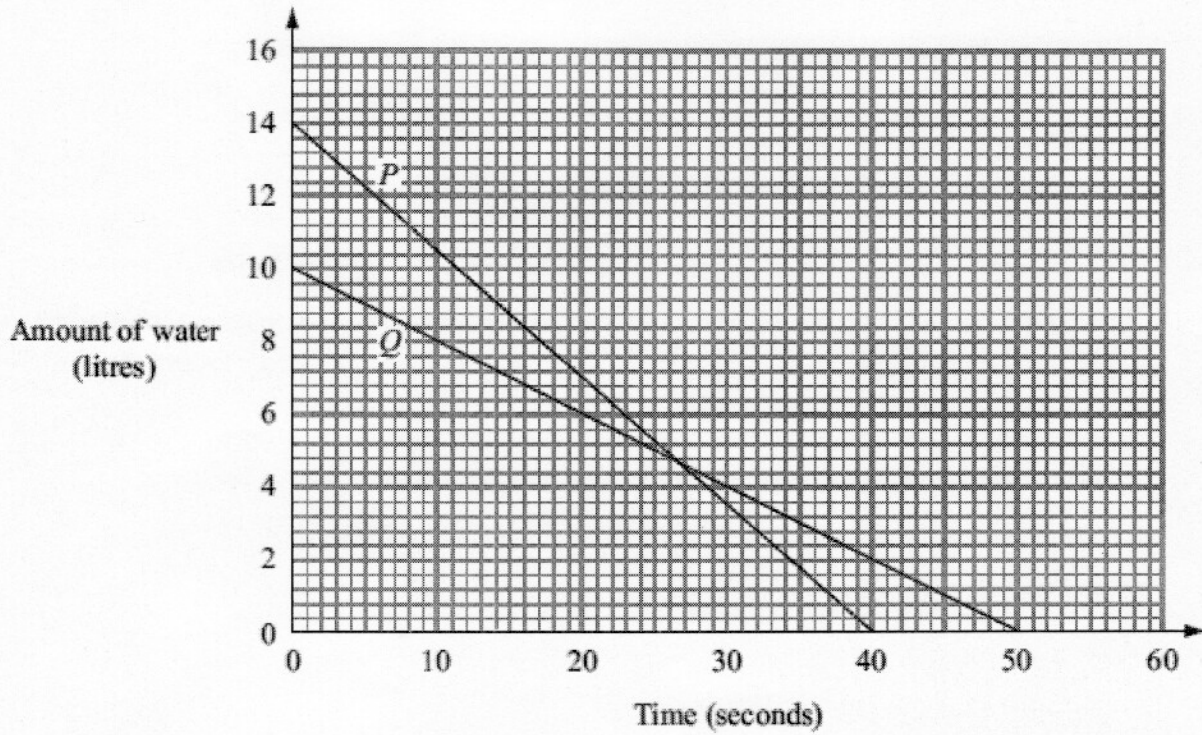
..... 92.5 cm

(1)

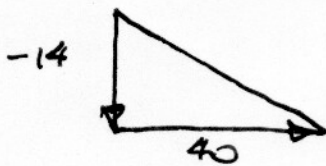
(Total for Question 5 is 4 marks)

6. Water is leaking out of two containers.
The water started to leak out of the containers at the same time.

The straight line P shows information about the amount of water, in litres, in container P .
The straight line Q shows information about the amount of water, in litres, in container Q .



- (a) Work out the gradient of line P .



$$\frac{-14}{40} = \frac{-7}{20} = -0.35$$

-0.35 litres/second
(2)

One container will become empty first.

(b) (i) Which container?

You must explain your answer.

The graph shows that P contains 0 litres after 40 seconds, Q after 50 seconds \therefore P is empty first

(ii) How much water is then left in the other container?

..... 2 litres
(2)

(Total for Question 6 is 4 marks)

7. Each year group in a school raised money for charity.

The incomplete table and pie chart show some information about this.

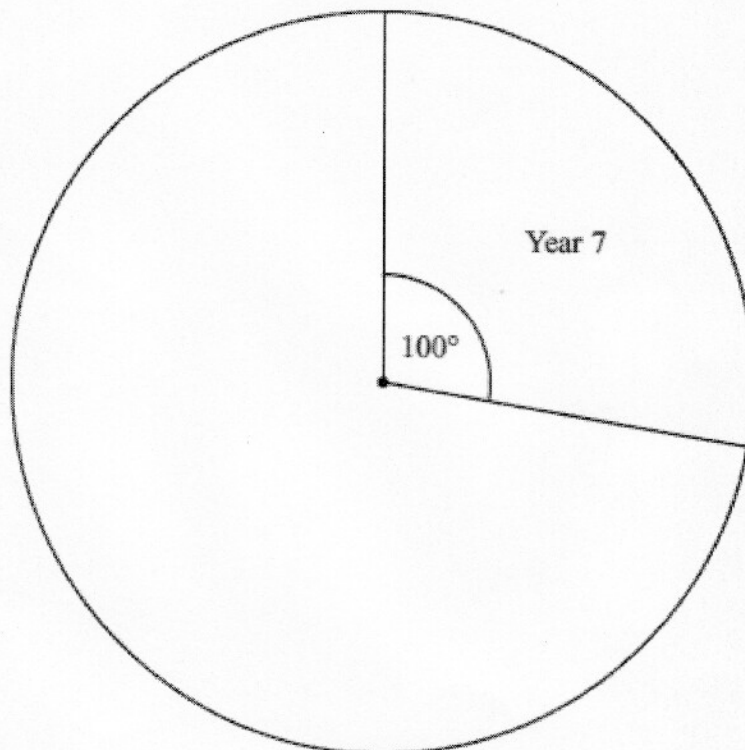
Complete the table.

Year Group	Amount raised
7	£ 250
8	£225
9	£137.50
10	£125
11	£162.50
	£900

$$= 2.5 \times 100^\circ$$

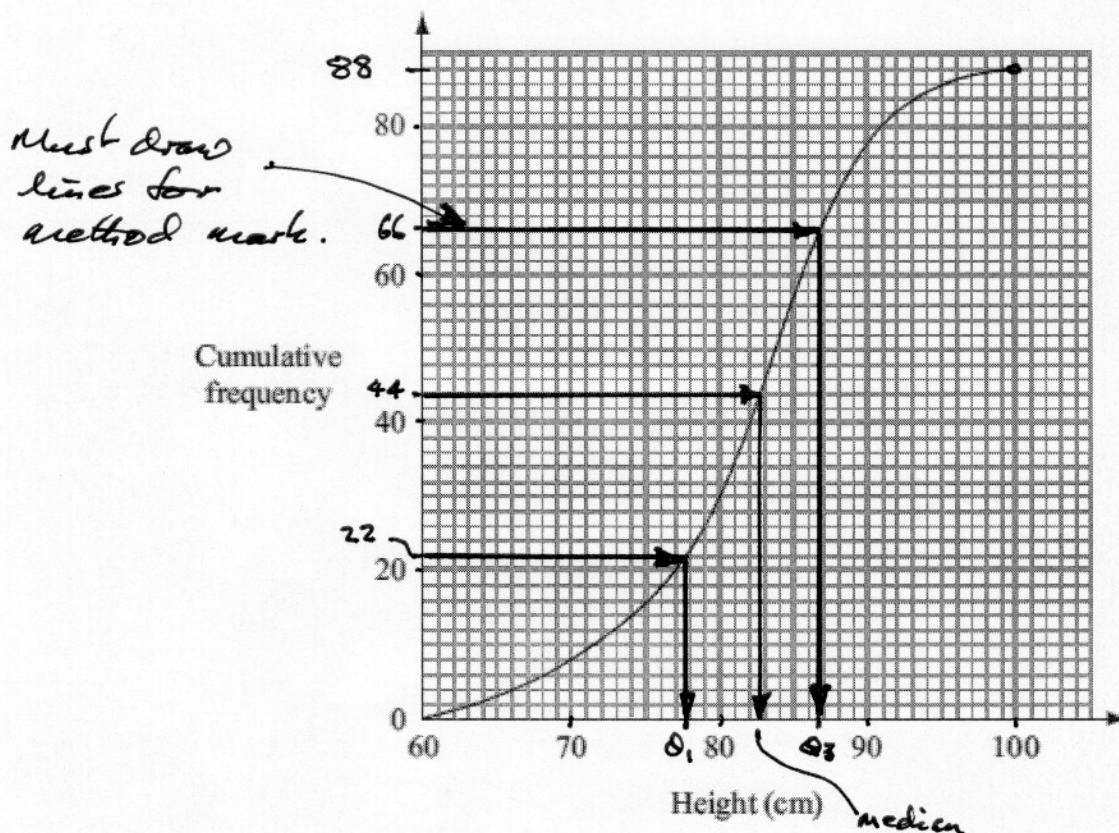
$$900 - (250 + 225 + 125 + 162.5) = 137.5$$

$$\frac{£900}{360^\circ} = £2.50 / \text{degree}$$



(Total for Question 7 is 3 marks)

8. The cumulative frequency graph shows information about the heights of some hollyhock plants.



- (a) Find an estimate for the median height.

88 plants
 $88/2 = 44$
 c.f. = 44, height = 82.7

..... 82.7 cm
 [82 to 83 allowable] (1)

- (b) Work out an estimate for the interquartile range.

First quartile $88/4 = 22$, $Q_1 = 77.6$
 Third quartile $\frac{3 \times 88}{4} = 66$, $Q_3 = 86.8$
 $IQR = Q_3 - Q_1 = 9.2$

..... 9.2 cm
 [8 to 10 allowable] (2)

- (c) Find an estimate for the number of hollyhock plants taller than 90 cm.

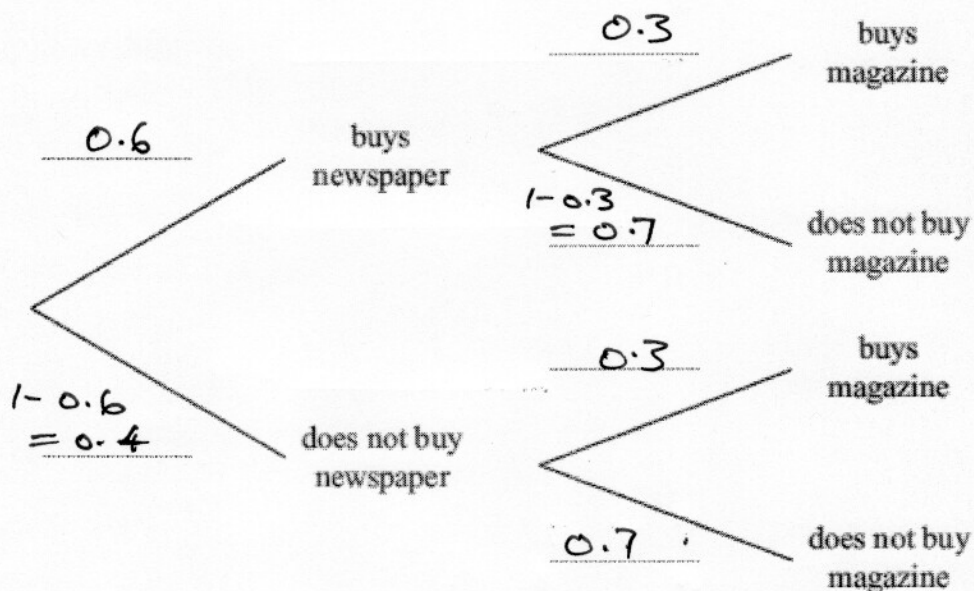
78 plants are ≤ 90 cm height
 $88 - 78 = 10$ plants

..... 10
 [10 or 11 allowable] (2)

(Total for Question 8 is 5 marks)

9. In a newsagent's shop, the probability that any customer buys a newspaper is 0.6
 In the same shop, the probability that any customer buys a magazine is 0.3

(a) Complete the probability tree diagram.



(2)

- (b) Work out the probability that a customer will buy either a newspaper or a magazine but not both.

$$\begin{aligned}
 &P(\text{newspaper AND no magazine}) + P(\text{no newspaper AND magazine}) \\
 &= 0.6 \times 0.7 + 0.4 \times 0.3 \\
 &= 0.42 + 0.12 \\
 &= 0.54
 \end{aligned}$$

..... 0.54

(3)

(Total for Question 9 is 5 marks)

10. Daniela works in a shop.

Daniela served 50 customers in the morning.
She served 75 customers in the afternoon.

The mean time to serve 50 customers in the morning was 48.7 seconds.
The mean time to serve all 125 customers was 50.2 seconds.

(a) Work out the mean time to serve the 75 customers in the afternoon.

Let afternoon mean time = "x".

$$\frac{50 \times 48.7 + 75x}{125} = 50.2 \text{ sec}$$

Total time
number of customers

$$\therefore 2435 + 75x = 50.2 \times 125 = 6275$$

$$75x = 6275 - 2435 = 3840$$

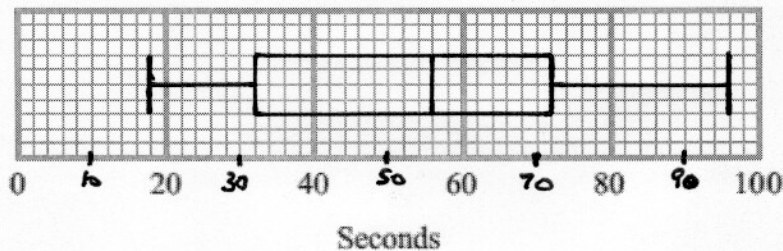
$$x = \frac{3840}{75} = 51.2 \text{ sec}$$

..... 51.2 seconds
(3)

For the 75 customers served in the afternoon

- the least time was 18 seconds
- the greatest time was 96 seconds
- the median time was 56 seconds
- the lower quartile was 32 seconds
- the upper quartile was 72 seconds

(b) On the grid, draw a box plot for this information.



(3)

(Total for Question 10 is 6 marks)

11. Raul is the manager of a restaurant.

He wants to find out how often local people eat in a restaurant.

Raul is going to carry out a survey using a questionnaire.

(a) Design a suitable question for Raul to use on his questionnaire.

How many times do you eat in a restaurant each month?

0 1 2 3 or more

(2)

(b) The two-way table shows information about the ages of the customers in Raul's restaurant one evening.

	Age (years)				Total
	0-16	17-30	31-60	over 60	
Male	8	10	17	20	55
Female	7	9	22	34	72
Total	15	19	39	54	127

Raul carries out his survey using only these customers.

He uses a sample of 50 of these customers stratified by gender and by age.

Calculate the number of males aged 17-30 in his sample.

$\frac{10}{127}$ of his customers are male and 17-30.

He needs $\frac{10}{127} \times 50 = 3.937 \approx 4$ of them in his sample.

4

(2)

Raul's survey is biased.

(c) Give **two** possible reasons why.

1 ... Since he is ^{only} asking restaurant customers, his sample does not include people who never go to a restaurant.

2 ... Customers on this particular evening may not be typical of other days and times

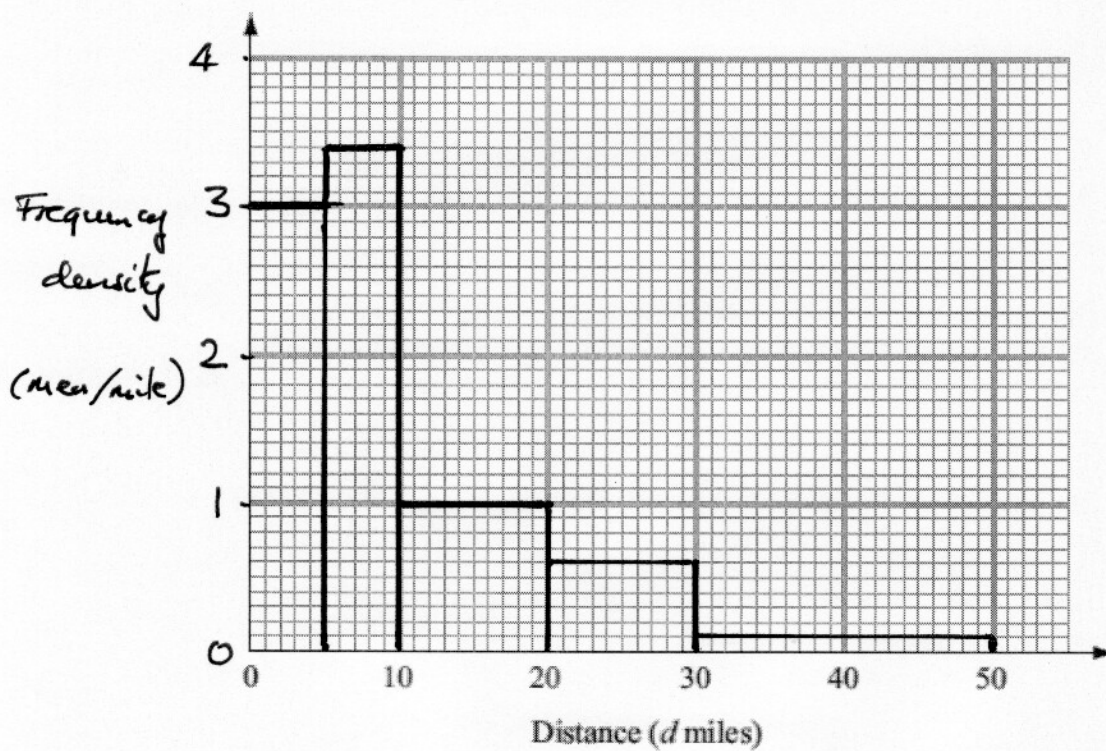
(2)

(Total for Question 11 is 6 marks)

12. The table gives some information about the distances, in miles, that some men travelled to work.

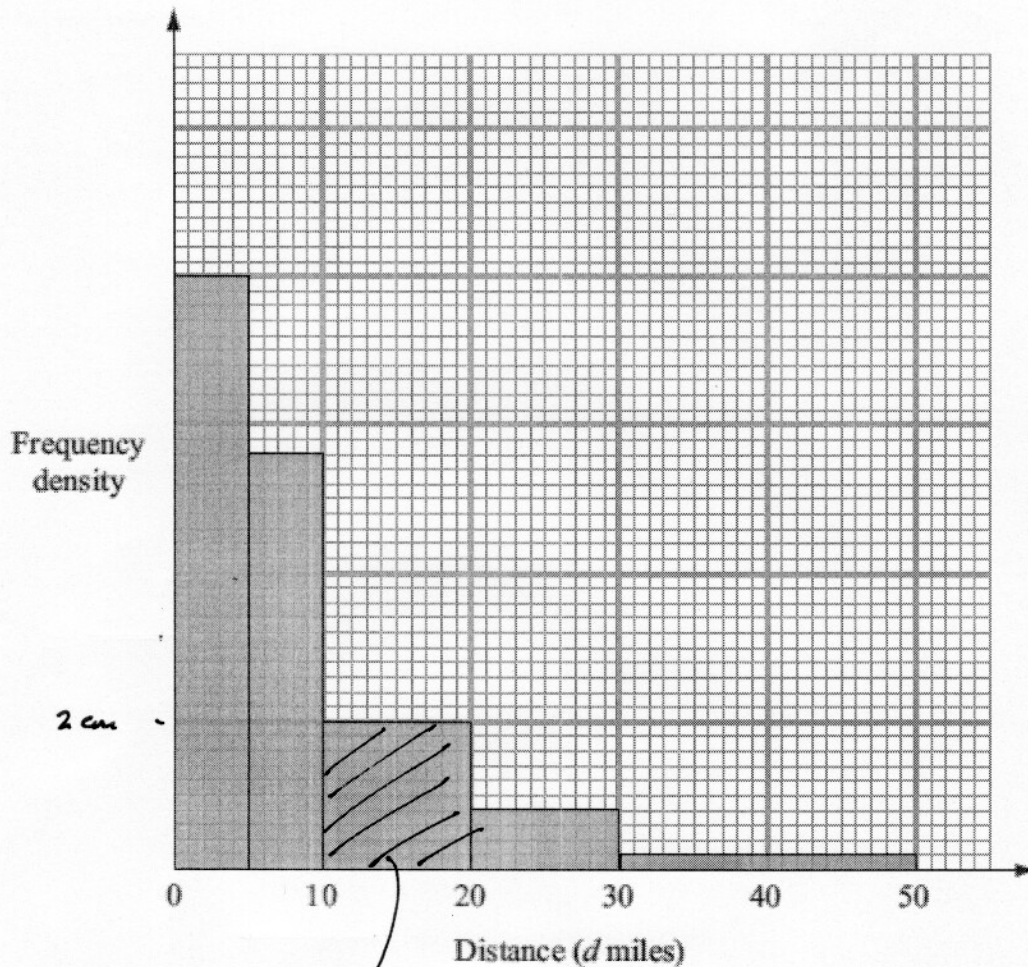
Class width	Distance (d miles)	Frequency	Freq. Density
5	$0 < d \leq 5$	15	$15/5 = 3$
5	$5 < d \leq 10$	17	$17/5 = 3.4$
10	$10 < d \leq 20$	10	$10/10 = 1$
10	$20 < d \leq 30$	6	$6/10 = 0.6$
20	$30 < d \leq 50$	2	$2/20 = 0.1$

(a) Draw a histogram for the information in the table.



(3)

The histogram below shows information about the distances, in miles, that some women travelled to work.



x women travelled between 10 and 20 miles to work.

- (b) Find an expression, in terms of x , for the total number of women represented by the histogram.

$$2 \text{ cm} \times 2 \text{ cm} = 4 \text{ cm}^2 \text{ represents } x \text{ women}$$

$$\begin{aligned} \text{Total area} &= 8 \times 1 + 5.6 \times 1 + 2 \times 2 + 0.8 \times 2 + 0.2 \times 4 \\ &= 20 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total number of women} &= \frac{20}{4} \times x \\ &= 5x \end{aligned}$$

(2)

(Total for Question 12 is 5 marks)

13. Isobel plays a game against Eric.

Isobel is twice as likely as Eric to win the game.
The probability that the game is drawn is 0.1

(a) Work out the probability that Eric wins the game.

$$P(\text{Eric wins}) = x$$

$$P(\text{Isobel wins}) = 2x$$

$$x + 2x + 0.1 = 1$$

$$3x = 0.9, \quad x = 0.3$$

$$\frac{0.3}{\dots\dots\dots} \quad (2)$$

Isobel and Eric play the game three times.

(b) Work out the probability that all three games are drawn.

$$0.1 \times 0.1 \times 0.1 = 0.001$$

$$\frac{0.001}{\dots\dots\dots} \quad (2)$$

(c) Work out the probability that Eric wins at least one of the three games.

$$P(\text{Eric does not win}) = 1 - 0.3 = 0.7 \text{ in each game}$$

$$P(\text{Eric does not win any game}) = 0.7 \times 0.7 \times 0.7 \\ = 0.343$$

$$\therefore P(\text{Eric wins at least 1 game}) = 1 - 0.343 \\ = 0.657$$

0.657

(3)

(Total for Question 13 is 7 marks)

TOTAL FOR PAPER IS 60 MARKS

END