OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

MATHEMATICS (MEI)

4766

Statistics 1

QUESTION PAPER

Candidates answer on the printed answer book.

OCR supplied materials:
- Printed answer book 4766
- MEI Examination Formulae and Tables (MF2)

Other materials required:
- Scientific or graphical calculator

Monday 24 January 2011
Morning

Duration: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

These instructions are the same on the printed answer book and the question paper.

- The question paper will be found in the centre of the printed answer book.
- Write your name, centre number and candidate number in the spaces provided on the printed answer book. Please write clearly and in capital letters.
- **Write your answer to each question in the space provided in the printed answer book.** Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.

INFORMATION FOR CANDIDATES

This information is the same on the printed answer book and the question paper.

- The number of marks is given in brackets **[ ]** at the end of each question or part question on the question paper.
- You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is being used.
- The total number of marks for this paper is **72**.
- The printed answer book consists of **12** pages. The question paper consists of **8** pages. Any blank pages are indicated.

INSTRUCTION TO EXAMS OFFICER / INVIGILATOR

- Do not send this question paper for marking; it should be retained in the centre or destroyed.

Section A (36 marks)

1 The stem and leaf diagram shows the weights, rounded to the nearest 10 grams, of 25 female iguanas.

8	3	9						
9	3	5	6	6	6	8	9	9
10	0	2	2	3	4	6	9	
11	2	4	7	8				
12	3	4	5					
13	2							

Key: 11 | 2 represents 1120 grams

(i) Find the mode and the median of the data. **[2]**

(ii) Identify the type of skewness of the distribution. **[1]**

2 The table shows all the possible products of the scores on two fair four-sided dice.

		Score on second die			
		1	2	3	4
Score on first die	1	1	2	3	4
	2	2	4	6	8
	3	3	6	9	12
	4	4	8	12	16

(i) Find the probability that the product of the two scores is less than 10. **[1]**

(ii) Show that the events 'the score on the first die is even' and 'the product of the scores on the two dice is less than 10' are not independent. **[3]**

3 There are 13 men and 10 women in a running club. A committee of 3 men and 3 women is to be selected.

(i) In how many different ways can the three men be selected? **[2]**

(ii) In how many different ways can the whole committee be selected? **[2]**

(iii) A random sample of 6 people is selected from the running club. Find the probability that this sample consists of 3 men and 3 women. **[2]**

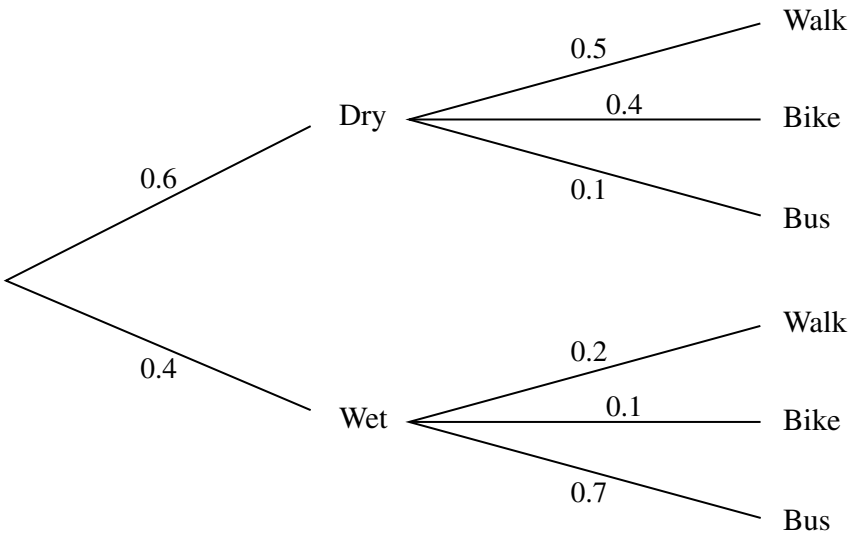
4 The probability distribution of the random variable X is given by the formula

$$P(X = r) = kr(r + 1) \quad \text{for } r = 1, 2, 3, 4, 5.$$

(i) Show that $k = \frac{1}{70}$. **[2]**

(ii) Find $E(X)$ and $Var(X)$. **[5]**

5 Andy can walk to work, travel by bike or travel by bus. The tree diagram shows the probabilities of any day being dry or wet and the corresponding probabilities for each of Andy's methods of travel.



A day is selected at random. Find the probability that

(i) the weather is wet and Andy travels by bus, **[2]**

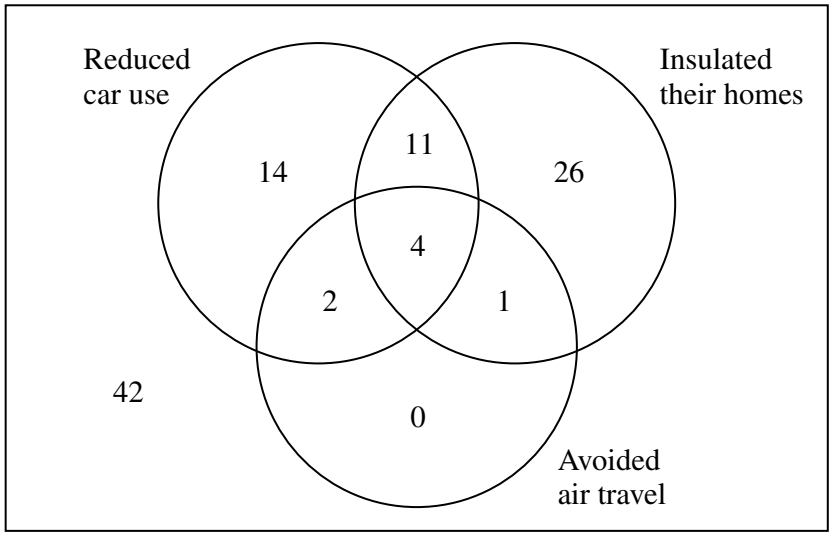
(ii) Andy walks or travels by bike, **[3]**

(iii) the weather is dry given that Andy walks or travels by bike. **[3]**

6 A survey is being carried out into the carbon footprint of individual citizens. As part of the survey, 100 citizens are asked whether they have attempted to reduce their carbon footprint by any of the following methods.

- Reducing car use
- Insulating their homes
- Avoiding air travel

The numbers of citizens who have used each of these methods are shown in the Venn diagram.



One of the citizens is selected at random.

(i) Find the probability that this citizen

(*A*) has avoided air travel, **[1]**

(*B*) has used at least two of the three methods. **[2]**

(ii) Given that the citizen has avoided air travel, find the probability that this citizen has reduced car use. **[2]**

Three of the citizens are selected at random.

(iii) Find the probability that none of them have avoided air travel. **[3]**

Section B (36 marks)

7 The incomes of a sample of 918 households on an island are given in the table below.

Income (x thousand pounds)	$0 \leqslant x \leqslant 20$	$20 < x \leqslant 40$	$40 < x \leqslant 60$	$60 < x \leqslant 100$	$100 < x \leqslant 200$
Frequency	238	365	142	128	45

(i) Draw a histogram to illustrate the data. **[5]**

(ii) Calculate an estimate of the mean income. **[3]**

(iii) Calculate an estimate of the standard deviation of the incomes. **[4]**

(iv) Use your answers to parts **(ii)** and **(iii)** to show there are almost certainly some outliers in the sample. Explain whether or not it would be appropriate to exclude the outliers from the calculation of the mean and the standard deviation. **[4]**

(v) The incomes were converted into another currency using the formula $y = 1.15x$. Calculate estimates of the mean and variance of the incomes in the new currency. **[3]**

8 Mark is playing solitaire on his computer. The probability that he wins a game is 0.2, independently of all other games that he plays.

(i) Find the expected number of wins in 12 games. **[2]**

(ii) Find the probability that

(*A*) he wins exactly 2 out of the next 12 games that he plays, **[3]**

(*B*) he wins at least 2 out of the next 12 games that he plays. **[3]**

(iii) Mark's friend Ali also plays solitaire. Ali claims that he is better at winning games than Mark. In a random sample of 20 games played by Ali, he wins 7 of them. Write down suitable hypotheses for a test at the 5% level to investigate whether Ali is correct. Give a reason for your choice of alternative hypothesis. Carry out the test. **[9]**

BLANK PAGE

BLANK PAGE

OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

MATHEMATICS (MEI)

4766

Statistics 1

PRINTED ANSWER BOOK

Candidates answer on this printed answer book.

OCR supplied materials:
- Question paper 4766 (inserted)
- MEI Examination Formulae and Tables (MF2)

Other materials required:
- Scientific or graphical calculator

Monday 24 January 2011
Morning

Duration: 1 hour 30 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

These instructions are the same on the printed answer book and the question paper.

- The question paper will be found in the centre of the printed answer book.
- Write your name, centre number and candidate number in the spaces provided on the printed answer book. Please write clearly and in capital letters.
- **Write your answer to each question in the space provided in the printed answer book.** Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.

INFORMATION FOR CANDIDATES

This information is the same on the printed answer book and the question paper.

- The number of marks is given in brackets **[ ]** at the end of each question or part question on the question paper.
- You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is being used.
- The total number of marks for this paper is **72**.
- The printed answer book consists of **12** pages. The question paper consists of **8** pages. Any blank pages are indicated.

Section A (36 marks)

1 (i)	
1 (ii)	
2 (i)	
2 (ii)	

3 (i)	
3 (ii)	
3 (iii)	

4 (i)	
4 (ii)	

5 (i)

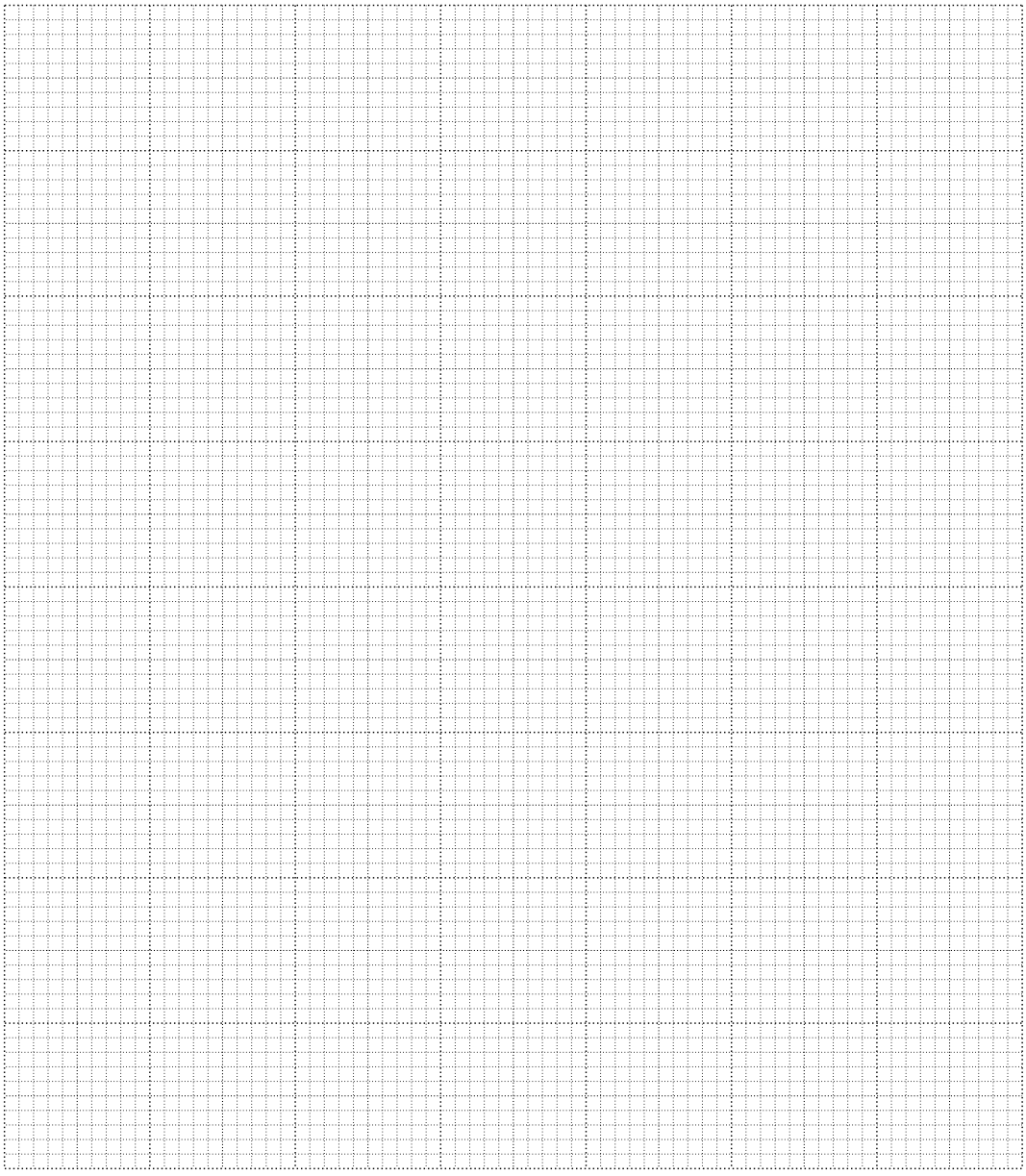
5 (ii)

5 (iii)

6(i) (*A*)	
6(i) (*B*)	
6 (ii)	
6 (iii)	

Section B (36 marks)

7 (i)



7 (ii)

7 (iii)

7 (iv)

7 (v)

8 (i)

8 (ii) (*A*)

8 (ii) (*B*)

8 (iii)

8 (iii)	(continued)