

ADVANCED SUBSIDIARY GCE

MATHEMATICS

Probability & Statistics 1

4732

QUESTION PAPER

Candidates answer on the Printed Answer Book

OCR Supplied Materials:

- Printed Answer Book 4732
- List of Formulae (MF1)

Other Materials Required:

- Scientific or graphical calculator

Monday 15 June 2009
Afternoon

Duration: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

These instructions are the same on the Printed Answer Book and the Question Paper.

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the spaces provided on the Printed Answer Book.
- **The questions are on the inserted Question Paper.**
- **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 and make sure that 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 graphical calculator in this paper.
- Give non-exact numerical answers correct to 3 significant figures unless a different degree of accuracy is specified in the question or is clearly appropriate.

INFORMATION FOR CANDIDATES

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- The number of marks is given in brackets [] at the end of each question or part question on the Question Paper.
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **72**.
- The Printed Answer Book consists of **12** pages. The Question Paper consists of **4** pages. Any blank pages are indicated.

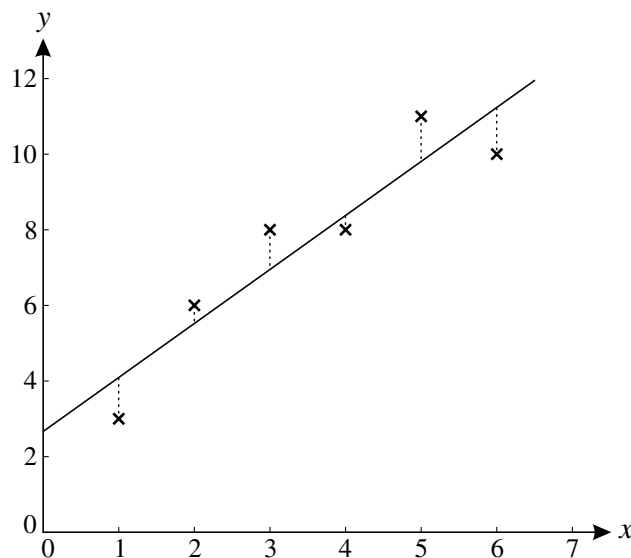
INSTRUCTION TO EXAMS OFFICER / INVIGILATOR

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

- 1 20% of packets of a certain kind of cereal contain a free gift. Jane buys one packet a week for 8 weeks. The number of free gifts that Jane receives is denoted by X . Assuming that Jane's 8 packets can be regarded as a random sample, find
- (i) $P(X = 3)$, [3]
- (ii) $P(X \geq 3)$, [2]
- (iii) $E(X)$. [2]
- 2 Two judges placed 7 dancers in rank order. Both judges placed dancers A and B in the first two places, but in opposite orders. The judges agreed about the ranks for all the other 5 dancers. Calculate the value of Spearman's rank correlation coefficient. [4]
- 3 In an agricultural experiment, the relationship between the amount of water supplied, x units, and the yield, y units, was investigated. Six values of x were chosen and for each value of x the corresponding value of y was measured. The results are shown in the table.

x	1	2	3	4	5	6
y	3	6	8	8	11	10

These results, together with the regression line of y on x , are plotted on the graph.



- (i) Give a reason why the regression line of x on y is not suitable in this context. [1]
- (ii) Explain the significance, for the regression line of y on x , of the distances shown by the vertical dotted lines in the diagram. [2]
- (iii) Calculate the value of the product moment correlation coefficient, r . [3]
- (iv) Comment on your value of r in relation to the diagram. [2]

- 4 30% of people own a Talk-2 phone. People are selected at random, one at a time, and asked whether they own a Talk-2 phone. The number of people questioned, up to and including the first person who owns a Talk-2 phone, is denoted by X . Find

(i) $P(X = 4)$, [3]

(ii) $P(X > 4)$, [2]

(iii) $P(X < 6)$. [3]

- 5 The diameters of 100 pebbles were measured. The measurements rounded to the nearest millimetre, x , are summarised in the table.

x	$10 \leq x \leq 19$	$20 \leq x \leq 24$	$25 \leq x \leq 29$	$30 \leq x \leq 49$
Number of stones	25	22	29	24

These data are to be presented on a statistical diagram.

(i) For a histogram, find the frequency density of the $10 \leq x \leq 19$ class. [2]

(ii) For a cumulative frequency graph, state the coordinates of the first two points that should be plotted. [2]

(iii) Why is it not possible to draw an exact box-and-whisker plot to illustrate the data? [1]

- 6 Last year Eleanor played 11 rounds of golf. Her scores were as follows:

79, 71, 80, 67, 67, 74, 66, 65, 71, 66, 64.

(i) Calculate the mean of these scores and show that the standard deviation is 5.31, correct to 3 significant figures. [4]

(ii) Find the median and interquartile range of the scores. [4]

This year, Eleanor also played 11 rounds of golf. The standard deviation of her scores was 4.23, correct to 3 significant figures, and the interquartile range was the same as last year.

(iii) Give a possible reason why the standard deviation of her scores was lower than last year although her interquartile range was unchanged. [1]

In golf, smaller scores mean a better standard of play than larger scores. Ken suggests that since the standard deviation was smaller this year, Eleanor's overall standard has improved.

(iv) Explain why Ken is wrong. [1]

(v) State what the smaller standard deviation does show about Eleanor's play. [1]

[Questions 7, 8 and 9 are printed overleaf.]

7 Three letters are selected at random from the 8 letters of the word COMPUTER, without regard to order.

(i) Find the number of possible selections of 3 letters. [2]

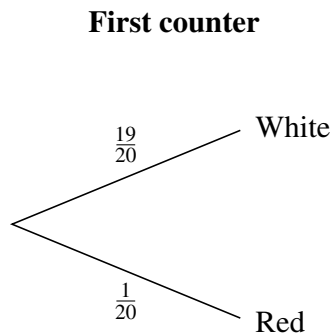
(ii) Find the probability that the letter P is included in the selection. [3]

Three letters are now selected at random, one at a time, from the 8 letters of the word COMPUTER, and are placed in order in a line.

(iii) Find the probability that the 3 letters form the word TOP. [3]

8 A game at a charity event uses a bag containing 19 white counters and 1 red counter. To play the game once a player takes counters at random from the bag, one at a time, without replacement. If the red counter is taken, the player wins a prize and the game ends. If not, the game ends when 3 white counters have been taken. Niko plays the game once.

(i) (a) Copy and complete the tree diagram showing the probabilities for Niko. [4]



(b) Find the probability that Niko will win a prize. [3]

(ii) The number of counters that Niko takes is denoted by X .

(a) Find $P(X = 3)$. [2]

(b) Find $E(X)$. [4]

9 Repeated independent trials of a certain experiment are carried out. On each trial the probability of success is 0.12.

(i) Find the smallest value of n such that the probability of at least one success in n trials is more than 0.95. [3]

(ii) Find the probability that the 3rd success occurs on the 7th trial. [5]

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Centre Number						Candidate Number				
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1 (i)	
1 (ii)	
1 (iii)	
2	

2 (continued)	
3 (i)	
3 (ii)	

4 (i)	
4 (ii)	
4 (iii)	

5 (i)	
5 (ii)	
5 (iii)	

6 (iii)	
6 (iv)	
6 (v)	
7 (i)	
7 (ii)	

7 (iii)	
8 (i) (a)	
8 (i) (b)	

8 (ii) (a)	
8 (ii) (b)	

9 (ii) (continued)	



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