



**ADVANCED SUBSIDIARY GCE**  
**MATHEMATICS**  
Probability & Statistics 1

**4732**

Candidates answer on the Answer Booklet

**OCR Supplied Materials:**

- 8 page Answer Booklet
- List of Formulae (MF1)

**Other Materials Required:**

None

**Monday 15 June 2009**  
**Afternoon**

**Duration:** 1 hour 30 minutes



**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the spaces provided on the Answer Booklet.
- 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.
- 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.
- You are permitted to use a graphical calculator in this paper.

**INFORMATION FOR CANDIDATES**

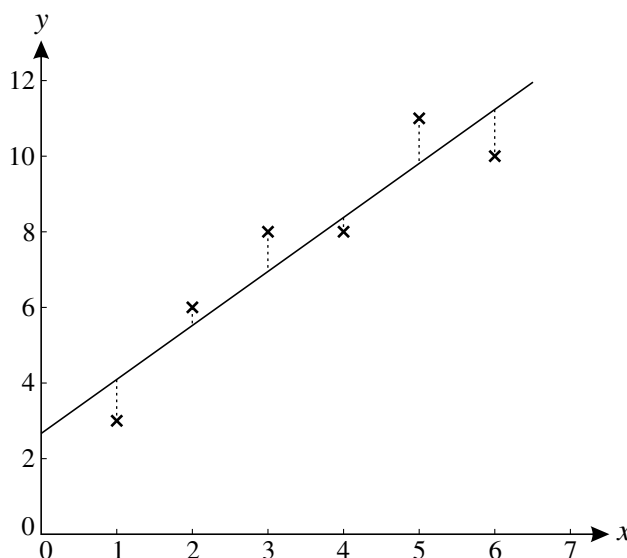
- The number of marks is given in brackets [ ] at the end of each question or part question.
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **72**.
- This document consists of **4** pages. Any blank pages are indicated.

2

- 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]

## 3

- 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.]

## 4

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]

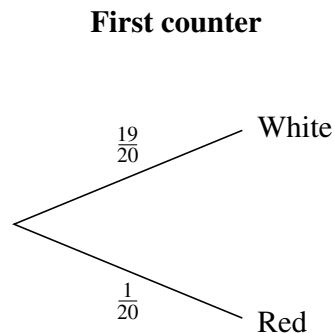
(ii) Find the probability that the letter P is included in the selection. [3]

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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