

REPUBLIQUE DU CAMEROUN

Paix-Travail-Patrie

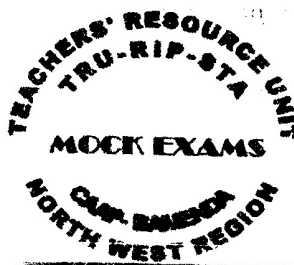
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Peace-Work-Fatherland

MINISTRY OF SECONDARY
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MARCH 2024

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with MTA	SUBJECT CODE NUMBER 0770	PAPER NUMBER 3
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION	SUBJECT TITLE PURE MATHEMATICS WITH STAISTICS	
ADVANCED LEVEL		

Time Allowed: **THREE hours**
INSTRUCTIONS TO CANDIDATES

Mobile phones are **NOT ALLOWED** in the **PURE MATHEMATICS WITH STAISTICS** examination room.

Full marks may be obtained for answers to ALL questions.
Mathematical formula Booklets published by the GCE Board are allowed.
In calculations, you are advised to show all the steps in your working, giving the answer at each stage.
Calculators are allowed.
Start each question on a fresh page.

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SCAN TO VISIT THE WEBSITE

1. Two events A and B are such that:

(ii) $P(A) = 5/12$, $P(B) = 1/2$, $P(A \text{ or } B \text{ but not } A \text{ and } B) = 2/3$.

Find:

- a) $P(A \cap B)$
b) $P(A/B)$
c) $P(A^1 \cap B^1)$

- (iii) Two boxes A and B contain green and yellow balls. Box A contains 8 green balls and 6 yellow balls. Box B contains 3 green balls and 4 yellow balls. A fair die is thrown and if it shows a 1 or a 2, a ball is selected at random from box A , otherwise a ball is selected from Box B .

- a) Draw a tree diagram to illustrate these events.

Hence or otherwise,

- b) Find the probability that a green ball is selected.

(3, 2, 3, 3, 2 marks)

2. A grouped frequency distribution of the ages of 75 employees in a factory is shown on the table below.

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number of employees	6	11	16	14	12	8	5	4

Estimate to two decimal places

- a) The mean age of the employees.
b) The standard deviation.
By drawing a cumulative frequency curve for the distribution,
c) Obtain the quartile deviation of the ages.
d) Determine the percentage of employees who are over 27 years

(3, 4, 2, 2, 2 marks)

3. (i) A television repairer in Bamenda uses a particular spare part at a rate of 4 per week. Assuming that the need for the spare part occurs at random, find to three decimal places the probability that:

- a) Exactly six are used in a particular week
b) at least 3 are used in two weeks
c) Exactly 6 are used in each of 3 consecutive weeks.

(3, 3, 3 marks)

- (ii) Given that $X \sim \text{Geo}(0.25)$,

- a) Find the mean of X .
b) Show that the standard deviation of X is $2\sqrt{3}$

(2, 2 marks)

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4. The continuous random variable X has probability density function f given by

$$f(x) = \begin{cases} \frac{1}{18}(x+3), & -a \leq x \leq a \\ 0, & \text{otherwise} \end{cases}$$

Find:

- a) The value of a
b) The mean of X
c) The variance of X

Show that the median, m satisfies the equation $m^2 + 6m - 9 = 0$

(3, 3, 4, 3 marks)

5. (i) It is found that the 95% confidence interval for the mean weight of a random sample of 64 cartons from a certain store is (1.77kg, 1.79kg)



Find the values of $\bar{X}$, the mean weight of the sample of 64 cartons and σ , the standard deviation of the weight of all the cartons in the store. (5 marks)

(ii) A statistics test was given to a group of 30 boys and another group of 35 girls in a school. The marks obtained were summarized as follows:

Boys: $n = 30$, $\bar{x} = 40$, $\sum(x - \bar{x})^2 = 1196$

Girls: $n = 35$, $\bar{x} = 47$, $\sum(x - \bar{x})^2 = 1520$.

Assuming a common population variance and considering that the distribution of test marks is normal,

- Use the two samples to find an unbiased estimate of the common population variance.
- Test at 5% level of significance whether there is a difference in the ability of the boys and girls in this test.

(3, 5 marks)

6. (i) A random variable R takes integer values r with probability $P(r)$ where

$$p(r) = \begin{cases} kr^2, & r = 1, 2, 3 \\ k(7-r)^2, & r = 4, 5, 6 \\ 0 & \text{otherwise} \end{cases}$$

Find:

- The value of the constant k .
- The mean of the probability distribution.
- The variance of the probability distribution.

(ii) Another random variable Y is such that $Y \equiv 14R - 2$. Find (d) the mean and variance of Y . (2, 3, 4, 4 marks)

7. (i) The heights of beans plants from a certain farm are normally distributed with mean 30cm and standard deviation 5cm. Calculate to 3 significant figures, the probability that a beans plant selected at random from the farm will have a height

- Less than 28.5cm.
- Between 26cm and 33cm.

(2, 3 marks)

(ii) The lifetime in thousands of hours, of light bulbs follow an exponential distribution with probability density function

$$f(t) = \frac{1}{2} e^{-\frac{t}{2}}, t > 0$$

- Find the mean lifetime of light bulbs.

A bulb is selected at random. Find the probability that it lasts for

- more than 2500 hours
- less than 1800 hours

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(2, 3, 3 marks)

8. For 8 consecutive months, a factory manager recorded the number of items produced by the factory and the total cost of their production as shown in the table below

Number of items x (1000)	18	11	15	22	16	13	19	10
Cost of production y (1000)	17	14	13	24	11	15	18	12

- Obtain the regression equation of cost of production on number of items produced.
- Given that the factory produced 35 items, calculate the cost of production.
- Calculate the product moment correlation coefficient r between the number of items produced and the cost of production.
- The manager is thinking of changing the cost of production but does not know if he should increase it or reduce it. Based on your value of r above, what advice would you give the manager of the factory?

(7, 2, 3, 1 marks)

