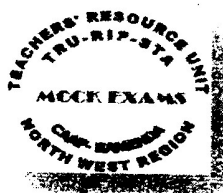


REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie

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MARCH 2023

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

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

Mobile phones are **NOT ALLOWED** in the examination room.

Full marks may be obtained for answers to ALL questions.

Mathematical formulae 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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TURN OVER

SCAN TO VISIT THE WEBSITE

1. (i) Two events A and B are such that $P(B) = \frac{1}{3}$, $P(A \cup B) = \frac{11}{27}$ and $P(A/B) = \frac{5}{9}$,

find

- (a) $P(A \cap B)$
(b) $P(A)$

- (ii) A shop stocks electrical bulbs from two companies K and D . Of the stock, 60% of the bulbs are from company K and 40% are from company D . It is known that 30% of the bulbs from company K and 40% of the bulbs from company D last long. (2, 3)marks

Find the probability that a bulb

- (a) chosen at random from the stock will last long.
(b) chosen at random from the stock will either last long or it is from company K .
(c) that lasts long, chosen at random from the stock, will be from company K .

2. A random variable X has cumulative probability distribution function (3, 3, 2)marks

$$F(x) = \frac{2x}{12} \text{ for } x = 1, 2, 3, 4, 5, 6.$$

find

- (a) the mean of X .
(b) the variance of X .
(c) $P(x > 2)$

- (ii) A student is given a bundle of keys to open a lock. The probability that a key selected at random will open the lock is 17%. Given that different attempts at opening the lock are independent, (2, 3, 2)marks

Find:

- (a) the probability that the first key to open the lock will be in his third attempt.
(b) the smallest integer n for which there will be a 95% chance of opening the lock on or before the n^{th} attempt.

3. The time taken by an air craft to fly over a city was measured by female students in upper sixth of a certain school in the town. The results obtained were summarized in the table below (3, 3)marks

Time t (secs)	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Number of students f	2	2	8	8	16	13	9	10

Find, to two decimal places,

- (a) the mean of the distribution.
(b) the standard deviation of the distribution
(c) the median of the distribution.

The 22 boys in the class measured the time independent of the girls and obtained a mean time of 20 seconds and a standard deviation of 8 seconds

- (d) Find, to two decimal places, the mean time and the variance of the time estimates made by the whole class.

(3, 3, 2, 5)marks

4. During Christmas, a balloon manufacturing company packages balloons in packets whose weights are normally distributed with mean 1kg and standard deviation 0.004kg. A packet of weight between 0.994kg and 1.006kg is sold for 600FCFA. A packet of weight less than 0.99kg is sold for 300FCFA while a packet of weight greater than 1.006kg is sold for 700FCFA. Find the probability that a packet of balloons chosen at random from the company's production line has weight

- (a) less than 0.99kg.
(b) between 0.994kg and 1.006kg.
(c) greater than 1.006kg

The company produces 10,000 packets. Given that the cost of production is 400 FCFA per packet,

- (d) find the company's expected profit from the sales of all the packets of balloons produced.

(3, 3, 3, 4)marks

- The probability distribution function of a continuous random variable Y is given by

$$f(y) = \begin{cases} \frac{4}{81} y(k - y^2), & 0 \leq y \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

Find

- the value of the integer k .
- the mean of Y
- the variance of Y
- the mode of Y .

6. (i) According to the results obtained from a random sample of the heights of 110 men from a certain community, the 95% confidence interval for the mean height of the men in that community is seen to be approximately (176.30cm, 179.20cm). (3, 3, 4, 3)marks

Given that $\bar{x}$ is the sample mean and σ is the standard deviation of the normal population from which the sample has been drawn, find, to two decimal places, the values of $\bar{x}$ and σ .

- (ii) A sociologist was studying the drinking habits of adults. A random sample of 300 adult alcohol consumers from village inhabitants and an independent random sample of 400 from city inhabitants were asked what their monthly expenditure on alcohol was. The results are summarised in the following table. 5marks

	Sample size	Mean	Population standard deviation
Village inhabitants	300	6400Fr	6690Fr
City inhabitants	400	7420Fr	8130Fr

- Using a 5% significance level, test whether or not the two groups differ in the mean amount spent on alcohol.
- Explain briefly the importance of the central limit theorem in your solution.

(7, 1)marks

7. (i) Given that $X \sim \text{Bin}(25, 0.2)$, find
- $P(X = 3)$
 - $P(X \geq 2)$

- (ii) A telephone company launches the sale of SIM cards on a market day in a certain village and realises that the average number sold per hour is 2. (2, 3)marks

Calculate, to 5 decimal places, the probability that the company sells

- 3 SIM cards in one hour.
- more than 3 SIM cards in 1 hour.
- 4 SIM cards in 45 minutes.

8. The marks obtained by a group of 12 students in the test (x) and end of course examination (y) were summarized in the table below (2, 3, 3)marks

Test (x)	14	29	55	79	11	23	47	69	61	36	18	74
Exam (y)	96	93	35	50	73	86	31	54	81	42	65	38

Calculate to 3 decimal places,

- the Pearson's product-moment correlation coefficient for the score.
- the regression line of the examination marks on the test mark.
- the examination marks of a student who scored 40 in the test.
- the spearman's coefficient of rank correlation.

(6, 2, 2, 3)marks

