

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DIPLOMA
IN TOURISM AND DIPLOMA IN ANIMAL HEALTH

MATH 0121: INTRODUCTORY MATHEMATICS

STREAMS: DTHM & DIP. ANHE

TIME: 2 HOURS

DAY/DATE:

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO.SHOW YOUR WORKINGS CLEARLY

QUESTION ONE

- a) Expand $(2x-3y)^4$ [4marks]
- b) Prove that $\sqrt{3}$ is not a rational number [5marks]
- c) Determine the domain and the range of the function $\sqrt{(x^2-4)}$ [4marks]
- d) Simplify $\frac{6-3i}{4-i}$ [4marks]
- e) Find the value of K such that the sequence is an AP [4marks]
 $K - 1, K + 3, 3K - 1$
- f) Distinguish between a simple and compound statement [3marks]
- g) Define the following properties of real numbers. State an example for each.
Distributive
Commutative
Associative [6marks]

QUESTION TWO

- a) In a 6- question marking test how many different answer sheets are possible if no answer sheet can be used twice and there are
6 answer sheets available
7 answer sheets are available
10 answer sheets are available [6marks]

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- b) How many terms of the sequence 1, 4, 7, 10... are needed to give a sum of 590 from the first term of the sequence [5marks]
- c) Find the quotient and the remainder when $x^3 - 4x^2 + x + 2$ is divided by $(x^2 - 3)$ [5marks]
- d) Prove analytically that $(A \cup B) \cup C = A \cup (B \cup C)$ [4marks]

QUESTION THREE

- a) A school committee of nine members is to be formed 8 parents and 6 teachers and the principal. In how many ways can the committee be formed in order to include
- i) The principal
- ii) The principal and 5 parents [10marks]
- b) Given $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
 $A = \{2, 3, 4\}$
 $B = \{4, 5, 6\}$
- Find i) A^c iv) $(A \cap B)^c$
ii) $B^c \cup A^c \cap B^c$
iii) $A \cap B$ [6marks]
- c) How many ways are there to select a first prize winner, second prize winner and a third prize winner from 50 different people who have entered a content [4marks]

QUESTION FOUR

- a) The second term of a GP is 2 and the fourth term is 8. Find the possible values of the common ratio and the corresponding first terms [6marks]
- b) Solve the following equation for $0^\circ \leq \theta \leq 360^\circ$ [6marks]
 $2 \sin^2 \theta = \sin \theta$
- c) Given that $f(x) = 2x - 1$ and $g(x) = x + 3$, find
- i) $f \circ g(3)$
- ii) $g \circ f(3)$
- iii) $g \circ g(x)$
- iv) $f \circ f(x)$ [8 marks]

QUESTION FIVE

- a) Construct a truth table for the following proposition to determine whether it is a fallacy, tautology or indeterminate
 $(P \rightarrow Q) \leftrightarrow [\sim Q \rightarrow (\sim P \wedge \sim Q)]$ [8marks]
- b) A family of 4 brothers and 3 sisters is to be arranged for a photograph in one row. In how many ways can they be seated if
- i) All the sisters seat together
 - ii) No two sisters seat together [4marks]
- c) Given $z_1 = 3 + 4i$, $z_2 = -2i + 2$, find
- i) $z_1 + z_2$
 - ii) $z_1 - z_2$
 - iii) $z_1 z_2$
 - iv) $z_1 \setminus z_2$ [8marks]
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