



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTUARIAL
SCIENCES
UNIVERSITY EXAMINATION FOR CERTIFICATE IN COMMUNITY HEALTH
SPECIAL RESITS DECEMBER 2022
MAIN CAMPUS

COURSE CODE: SMA 1111

COURSE TITLE: MATHEMATICS I

EXAM VENUE:

STREAM: HEALTH SCIENCE

DATE:

EXAM SESSION:

TIME: 2.00 HOURS

Instructions:

- 1. Answer question one (compulsory) and any other two questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (30 marks)

a) Simplify: $\frac{2}{3-\sqrt{5}}$ by rationalizing the denominator (4marks)

(b) Use remainder theorem to solve the equation $2x^3 - x^2 - 7x + 6 = 0$ at $x = 1$ (3marks)

c) Solve the equation:

$3^x * 9^{2y} = 27$ and $2^x * 4^{-y} = 1/8$ by finding the value x and y (5 marks)

d) Find the real solutions, if any of the equation $\frac{3x}{x-2} + \frac{1}{x} = 4$ using the quadratic formula (5marks)

e) Let; $A = \{3, 4, 5, 6, 7\}$

$B = \{3, 4, \dots, 9\}$

$C = \{1, 2, 3, 4\}$

Find $(A \cap C)^c / (A \cup B)^c$ (5marks)

f) Solve: $\log(x - 1) + \log(x + 8) = 2\log(x + 1)$ (5marks)

g) Use binomial theorem to determine the expansion of $(1 + x)^4$ (5marks)

QUESTION TWO (20 marks)

a) Given two functions $f(x) = x + 1$ and $g(x) = 4x$. Evaluate

i) $(f \circ g)(x)$ (3 marks)

ii) $(g \circ f)(x)$ (3marks)

b) Find the inverse of $f(x) = 2x + 3$ (3marks)

c) Find the area of a triangle given that side $AB = 3$, $BC = 2$ and angle $B = 50^\circ$ (4marks)

d) Convert the following into

i) 230° into radians (2marks)

ii) $\frac{\pi^c}{6}$ into degrees (2marks)

e) Solve: $\log x = 2$ (3 marks)

QUESTION THREE (20 marks)

- a) Define the following terms as used in set theory
- i) Empty set (2marks)
 - ii) Singleton set (2marks)
- b) Find the power set of $S = \{1,3\}$ (3marks)
- c) Let $U = \{1,2,3, \dots, 8,9\}$ be the universal set and $A = \{1,2,3,4\}$, $B = \{2,4,6,8\}$ and $C = \{3,4,5,6\}$.
Find
- i) A^c (2marks)
 - ii) $(A \cap C)^c$ (2marks)
 - iii) $(A \cup B)^c$ (2marks)
 - iv) $B \setminus C$ (2marks)
- d) Draw the Venn diagram and shade the region corresponding to
- i) $A \cap B \cap C$ (3marks)
 - ii) A^c (2marks)

QUESTION FOUR (20 marks)

- a) The following distribution gives the finishing times in minutes for male runners in a marathon:

Time	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Runners	6	5	7	10	5	4	3

Use the data to compute

- i) mode (1mark)
- ii) mean (3marks)

- iii) median (3marks)
- iv) standard deviation from the above data (3marks)
- b) Calculate the mean of following ungrouped data:
20, 18, 15, 15, 14, 12, 11, 9, 7, 6, 4, 1 (4marks)
- c) Solve $\sin\theta = \frac{1}{2}$ for $0^\circ < \theta < 360^\circ$ (6marks)

QUESTION FIVE (20 marks)

- a) Below is an arithmetic progression.
 $60 + 57 + \dots + 18$
- (i) How many terms are there in the progression? (3 marks)
- (ii) What is the sum of the terms in the progression? (3 marks)
- b) A progression has a second term of 48 and a fourth term of 27. Find the first term of the progression in each of the following cases:
- (i) the progression is arithmetic (3 marks)
- (ii) the progression is geometric with a positive common ratio. (3 marks)
- c) The fifth term of a geometric progression is 24 and the ninth term is 384.
All the terms are positive.
- (i) Find the common ratio. (3 marks)
- (ii) Find the first term. (2 marks)
- (iii) Find the sum of the first ten terms. (3 marks)