



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

DECEMBER SESSION EXAMINATION FOR BACHELOR OF EDUCATION

ALGEBRA

DATE:

TIME:

INSTRUCTIONS

Answer Question one and any other **two** questions

QUESTION ONE(COMPULSORY)

- a) Show that the derived power law of indices if given by $x^0 = 1$ (3 marks)
- b) How many combinations are there of 5 different things taken 4 at a time? (3 marks)
- c) Simplify $\log_5 11.5 + \log_5 2$ (3 marks)
- d) Evaluate without using a calculator

$$3^{3\frac{1}{3}} \div 3^{-\frac{1}{3}} \quad (3 \text{ marks})$$

- e) Simplify the equations below

i. $\frac{1}{2-\sqrt{3}}$ (3 marks)

- ii. $\frac{2X^2-6X+2}{X-3}$ (4 marks)
- e) Solve for x in $(x-2)^2-12=0$ (4 marks)
- f) From the word square
- i. How many permutations do you have? (2 marks)
- ii. In how many is **a** the second letter? (3 marks)
- iii. In how many of them are **u** and **a** next to each other? (4 marks)

QUESTION TWO (20 MARKS)

- a) Show that the negative power law is given by $x^{-n} = \frac{1}{x^n}$ (3 marks)
- b) How many 5 digits odd number can be made from 0, 1,2,3,4 without repetition? (3 marks)
- c) Evaluate without using table or calculators $(0.027)^{\frac{2}{3}}$ (3 marks)
- d) The first term of an arithmetic sequence is equal to 6 and the common difference is equal to 3.
- i. Find the formula of the n^{th} term (3 marks)
- ii. Find the 50^{th} term (3 marks)
- e) Find the 9^{th} term of the sequence
1, $\sqrt{2}$, 2,

(5 marks)

QUESTION THREE

- a) Find the a_6 for an arithmetic sequence where $a_1 = 3x + 1$ and $d = 2x + 6$ (6 marks)
- b) A display of cans on a grocery shelf consist of 20 cans on the bottom, 18 cans in the next row and so in an arithmetic sequence until the top row has 4 cans. How many cans in total are in the display? (6 marks)
- c) Solve the following simultaneous equations (5 marks)

$$2x + y = 7$$

$$3x - y = 8$$

- d) How many six different six digit numbers can be written using all the following six digits
4, 4, 5,5,5,7? (3 marks)

QUESTION FOUR

- a) Find the n^{th} term and the first three terms of the arithmetic sequence having $a_4=93$ and $a_8=65$ (5 marks)
- b) Evaluate S_{10} for 250, 100, 40, 16,... (4 marks)
- c) How many different 5 letter words can be formed from the word APPLE? (3 marks)
- d) Solve the simultaneous equations below (5 marks)

$$y - 2x = 1$$

$$2y - 3x = 5$$

- e) Solve $\log_{10} 25 \times \log_{10} 100$ (3 marks)

QUESTION FIVE

- a) Find the number of combinations that are there of 6 distinct things taken 4 at a time (3 marks)
- b) Solve the following without using a calculator
$$\frac{\sqrt{16} \div 2^2}{(2^1 \times 4^{-2})^3}$$
 (5 marks)
- c) Out of 40 students, 17 have ridden an airplane, 28 have ridden a boat, 10 have ridden a train, 12 have ridden both airplane and boat, 4 have ridden an airplane only, 3 have ridden a train only. The number of students who have not ridden any mode of the 3 transportations is the same as the students who have ridden all three transportations. How many have not ridden any mode of the 3 transportation? How many have ridden a boat? (12 marks)