

**KABARAK**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2008/2009 ACADEMIC YEAR**

**FOR THE CERTIFICATE OF PRE- UNIVERSITY**

**MATHEMATICS**

**COURSE CODE: BMATH 002**

**COURSE TITLE: BASIC ALGEBRA**

**STREAM:**

**DAY:**

**TIME: 9.00 – 11.00 A.M.**

**DATE: /08/2009**

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**INSTRUCTIONS:**

Attempt questions **ONE** and any other **TWO** questions

**PLEASE TURN OVER**

**QUESTION ONE (30 MARKS)**

- (a) Given a quadratic equation  $x^2 + 5x + 6 = 0$ , by use of completing square method deduce the quadratic formula hence solve  $x^2 + 5x + 6 = 0$  (5 marks)
- (b) In how many ways can 6 people be seated at a round table. (3 marks)
- (c) Solve the following simultaneous equations by the matrix method;  
$$\begin{matrix} -2 & = & 1 \\ 4 & + & 2 & = & 10 \end{matrix}$$
 (4 marks)
- (d) In a geometrical progression the sum of the second and third terms is 6 and sum of the third and fourth terms is  $-12$ . Find the first term and common ratio. (5 marks)
- (e) (i) In how many distinct ways can the letters of the word RELATION be arranged? (2 marks)  
(ii) Evaluate;  $2^x + 2^{x+2} = 10$  (2 marks)
- (f) Use the Binomial theorem to expand  $(1 - 2)^n$  up to the term involving  $x^2$ . (4 marks)
- (g) Calculate the sum of the series;  $1 - \dots - 4 - \dots - 49$  (5 marks)

**QUESTION TWO (20 MARKS)**

- (a) Solve the following equations  
(i)  $x^2 - 20x + 64 = 0$  (3 marks)  
(ii)  $2^x + x = 3$  (3 marks)  
(iii)  $4^x + 15^x = 4$  (3 marks)
- (b) Solve the following equations  
(i)  $4^x - 2^x = 8$  (3 marks)  
(ii)  $27^x = 81^x$  (5 marks)  
(iii)  $(x + 3)^x + (x + 2)^x = \log 6$  (3 marks)

**QUESTION THREE (20 MARKS)**

- (a) Given that  $A = \begin{pmatrix} 1 & 3 \\ 2 & 6 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 1 \\ 2 & 2 \end{pmatrix}$   
Find  
(i)  $A + B$  (2 marks)  
(ii)  $A - 2B$  (2 marks)

(iii)  $A \times B$  (2marks)

(iv)  $A^{-1}$  (3marks)

(b) Given that  $\begin{pmatrix} 2 & 3 \\ -1 & 0 \end{pmatrix}$  and  $\begin{pmatrix} 4 & 5 \\ 1 & -1 \end{pmatrix}$  Find given  $=$  . (4marks)

(c) The 3<sup>rd</sup>, 5<sup>th</sup> and 8<sup>th</sup> terms of an A.P are the consecutive terms of a G.P. Given that the first term of the A.P is 8 determine the common difference d and the common ratio r. (5marks)

(d) How many distinct arrangements are there of the letters in the word MISSISSIPPI (2 marks)

**QUESTION FOUR (20 MARKS)**

(a) Derive the formula of A.P and hence find the sum of the following A.P  
 $2 + 2 + \dots +$  up to 14 terms. (8 marks)

(b) Derive the formula of the sum to infinity and hence find the sum of  $\{ \dots \} = 0.7 \dots$  (7 marks)

(c) A ball is dropped from a certain height and the first bounce takes  $\frac{2}{3}$  of the previous bounce. Find;

(i) Total time for the first 4 bounces (2 marks)

(ii) Total time until bouncing stops (3 marks)

**QUESTION FIVE (20 MARKS)**

(a) (i) Find the value of  $x$  for which  $5x - 3^2$  has no inverse. (3 marks)

(ii) In how many ways can a committee of 4 be chosen from 5 boys and 4 girls if the committee must have at least one girl? (6 marks)

(b) A group of students are on a tour. The total fare is Ksh. 120 and this is shared equally among the students. If two more students join the tour, each will pay shs. 2 less. Find the original number of students in the group. (6 marks)

(c) Given  $\begin{pmatrix} 1 & 2 \\ -3 & 0 \end{pmatrix}$ ,  $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$  =  $[2 \ 6]$

Find  $C( \quad )$  (5 marks)