PANGANI GIRLS SCHOOL

NAME: …… Index number: ……

CLASS: …….. CLS NO……..

PRE MOCK EXAMINATION
MATHEMATICS DEPT
FORM FOUR - 2013
Paper 2
Time: 2 ½ hours

Instructions to candidates
1) Fill the spaces provided above.
2) The paper consists of two sections**:** ***section I*** and ***section II*.**
3) Answer **all** the questions in **section I** and any **five** in **section II**
4) Section I has **sixteen** questions and section two has **eight** questions
5) All answers and working must be written on the question paper in the spaces provided below each question.
6) ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
7) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

For examiner's use only.

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

SECTION 1 (Answer all questions).

1. Find the value of x that satisfy the equation (4mks)

Log (x + 5) = log 4 – log (x + 2)

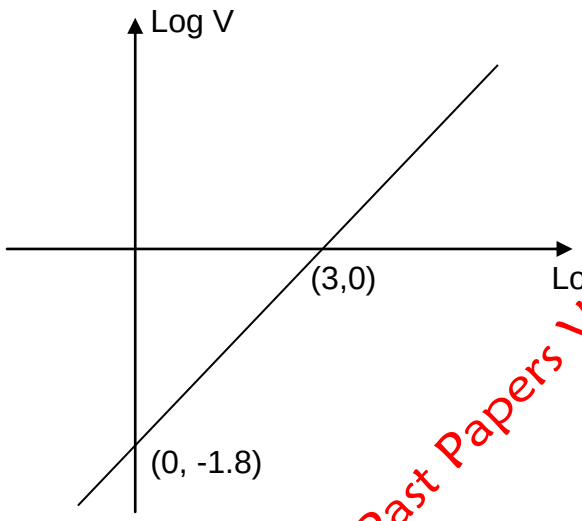
2. The expression $nx^2 + 12nx + 25$ is a perfect square. Find the value of n. (3mks)

3. Jane bought a new laptop on hire purchase. The cash value of the laptop was Ksh.48,000, he paid a deposit of Ksh.10,000 followed by 24 monthly installments of Ksh. 2,000. Calculate the monthly rate at which the compound interest was charged. (4mks)

4. An arithmetic series has a common difference as $-\frac{1}{4}$ and first term as 3.

Find the number of terms of the series which would give a sum zero.
(3mks)

5. The graph below is part of a straight line graph obtained from the initial equation $V = ap^n$. Use the graph to calculate the values of a and n. (3mks)



6. Bag 1 contains 3 red balls and 2 white balls while bag 2 contains 1 red ball and 3 white balls. A bag is chosen at random and a ball chosen from it and then it is placed in the other bag and a ball is chosen from that bag at random. Find the probability the two balls chosen have the same colour.
(4mks)

7. The surface area and volume of a sphere are given as $S = 4\pi r^2$ and

$V = \frac{4}{3}\ \pi r^3$ respectively. Express V in terms of S. (2mks)

8. Solve the following equation to 2. d.p. (3mks)

$5\ (2^{x+1}) = 7^x$

9. A shopkeeper mixes coffee worth sh.55 per kg with coffee worth sh.47 per kg. How many kilograms of each should he use to obtain 24kg of mixture worth sh.52 per kg. (3mks)

10. Expand and simplify

$(\quad)\quad(\quad)$

$$\left(x + \frac{1}{x}\right)^4 - \left(x - \frac{1}{x}\right)^4$$

and use it to get the exact value of $(10.1)^4 - (9.9)^4$ (4mks)

11. The points (2,2) and (-4 , -4) are the end points of the diameter of a circle. Find the equation of the circle in the form (3mks)

$$x^2 + y^2 + ax + by = c$$

12. A boy takes 10 hours to plough a flower garden. However, with the help of his sister, it takes them 6 hours only. How long would it take the sister working alone. (2mks)

13. A triangle whose area is $6.5cm^2$ is mapped onto a triangle whose area is $13cm^2$ by matrix. $\begin{pmatrix} x+4 & 6 \\ & \end{pmatrix}$ Find the value of ***x.*** (3mks)

14. The gradient of a curve is always equal to the square of its x – co-ordinates at any point (x, y). If the curve passes through (1,2). Find its equation. (3mks)

15. Solve the simultaneous equation. (3mks)

$\text{Log}_3 (2x + y) = 2$

$\text{Log}_2 (5x + 3y) = 2$

16. Find the equation of the normal to the curve $y = x^2 + 4x - 3$ at point (1,2) (3mks)

SECTION II (ANSWER ANY 5 QUESTIONS ONLY)

17. Use the taxation rates in the table below to answer the questions that follows.

Taxable income in K£ p.a.	Rate %

1 – 4500	10
4501 – 7500	15
7501 – 10500	20
10501 -13500	25
13501 – 16500	30
Over 16500	35

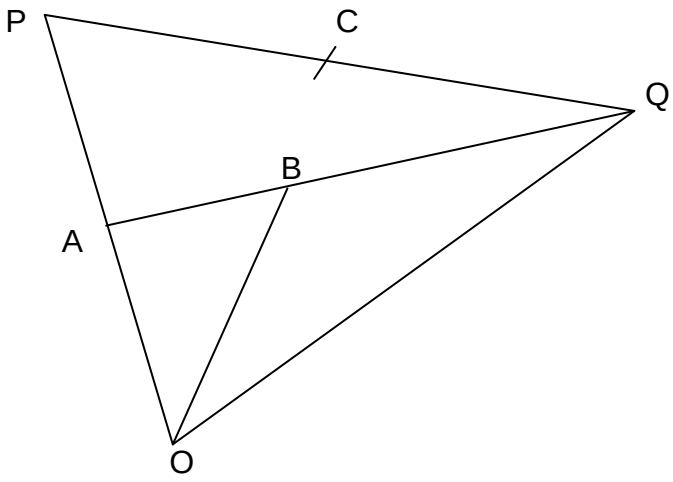
Liz is a manager of a certain company who is entitled to a monthly personal relief of sh.3,000 and tax (PAYE) is sh.9,000 per month and a co operative shares of sh 1200 per month is contributed.
Calculate:

a. Liz's total deductions per month from her earnings. (2mks)

b. Total GrossTax per month .. (1mk)

c. Liz's monthly basic salary if her monthly allowances amounted to Sh.12,000. (7mks)

18. The figure below shows triangle OPQ such that OP = **p**, QP = **q**, OA: AP = 2 : 1 and QB : BA = 1 : 1



i. Find b, the position vector of B in terms of **p** and **q**. (3mks)

ii.a. Given that C divides QP in the ratio K: 1 – K, where K is a constant, express OC in terms of **p**, **q** and K. (2mks)

b. Hence, if points O, B and C lie in the straight line. Find the value of K. Therefore, state the ratio QC : CP (5mks)

19. The first term of a G.P is 4 if the common ratio is 2, find the greatest number of terms that will give a sum less than 40. (4mks)

b. The 2^{nd} 4^{th} and 7^{th} terms of an A.P. are the first 3 consecutive terms of a G.P. if the common difference of the AP is 2.

Find (a) the common ratio

(b) the sum of the first eight terms of the G.P.

(6mks)

20. The table below gives the ages of 56 HIV/AIDS victims as recorded in a certain VCT centre.

Age	5-9	10-14	15-19	20-24	25-29	30-34

No. of victims	7	10	16	14	6	3

Estimate :

a. The mean age using an assumed mean of 17.5 years. (3mks)

b. The median age (3mks)

c. The standard deviation (3mks)

d. The percentage of victims whose ages are below 25 years. (1mks)

21. A shear parallel to x-axis (x-axis invariant) maps point (1,2) onto points (7,2) T is the transformation equivalent to the shear followed by a reflection in the line y = x . Find the matrix which defines T. (5mks)

b. A transformation P maps point (1,3) and (-2, -3) onto point (2,4) and (-3,-11) respectively. Find the matrix of the transformation. (5mks)

22. A body moves in a straight line with acceleration $(5 - 12t)\ m/s^2$ t seconds after the start. Given that the body started with a velocity of 3m/s.

a. Find velocity and displacement in terms of t. (6mks)

b. How far was the body from its starting point after 2 seconds and its velocity then? (4mks)

24. The relationship between two quantities **x** and **y** are suspected to be of form $y = ab^x + 2.1$ where a and b are constants. The table below shows corresponding values of x and y.

X	1.4	2.3	3.2	4.0	5.0	6.1
Y	9.5	12.1	16.2	19.5	30.2	42.5

By drawing a suitable straight line graph estimate the values of a and b.
(6mks)

b. Hence, determine the value of a and b
(4mk)

23. A solution whose volume is 80 litres is made up of 40% water and 60% alcohol. When x litres of water are added, the percentage of alcohol drops to 40%.

a. Find the value of x. (4mks)

b. Thirty litres of water is added to the new solutions. Calculate the percentage of alcohol in the resulting solution. (2mks)

c. If 5 litres of the solution in (b) above is added to 2 litres of the original solutions. Calculate in the simplest form, the ratio of water to that of alcohol in the resulting solution. (4mks)