S475/1
SUB – MATHEMATICS
Paper 1
June/July, 2016
$2\frac{2}{3}$ hours

MOCK EXAMINATIONS 2016
Uganda Advanced Certificate of Education
SUB – MATHEMATICS
Paper 1
2 hours 40 minutes

INSTRUCTIONS

- *Answer all the eight questions in section A and only four questions in section B.*
- *Any additional question(s) answered will not be marked*
- *All working must be shown clearly*
- *Begin each answer on a fresh page*
- *Graph paper is provided*
- *Avoid mixing the two sections A and B*
- *Non – programmable scientific calculators may be used.*

SECTION A (40 MARKS)
Answer all the questions in this section

1. Given that $a = \log_x xy^2$ *and* $b = \log_x x^3y^{-2}$, find the value of $a + b$ (05 marks)

2. The table below shows the heights of trees in meters in a certain forest. Calculate the standard deviation

Height in meters	15 –	20 –	25 –	30 –	35 –	40 – 45
Number of trees	2	14	29	43	33	9

3. The table below shows the price of items and their corresponding weights in the years 2000 and 2004.

ITEM	**PRICE (Ushs)**	**PRICE**	**Weight**
	2000	2004	
Food	55,000	60,000	4
Housing	48,000	52,000	2
Transport	16,000	20,000	1

Using 2000 as the base year, calculate the weighted price index for the items in 2004.

4. A box contains 4 black pens (B) and 5 red pens (R). Two pens are picked at random, one after the other without replacement. Find the probability that both pens are of the same.

5. Events A and B are independent.
   (a) Show that events A and B^1 are also independent.
   (b) If $P(A) = \frac{1}{5}$ and $P(B^1) = \frac{2}{3}, find\ P(A \cup B')$.

6. The roots of the quadratic equation $x^2 - px + q = 0$ are $\propto$ and β. Form an equation in terms of P and q whose roots are $\frac{1}{2\propto}$ abd $\frac{1}{2\beta}$.

7. Solve the equation $2^x 2^{1-x} - 3 = 0$.

8. Given that $\frac{3-2\sqrt{3}}{3+2\sqrt{3}} - \frac{3+2\sqrt{3}}{3-2\sqrt{3}} = a + b\sqrt{3}$, find rational values of a and b.

SECTION B

9. Eight candidates seeking admission to senior one sat for English and math tests. The scores were as shown in the table below.

English (x)	55	54	35	62	87	56	71	50
Maths (y)	57	60	47	65	83	53	74	63

   (a) (i) Draw a scatter diagram for the data
   (ii) Draw a line of best fit on your scatter diagram.
   (iii) Use the line of best fit to find the value of y when $x = 70$. (08 marks)

   (b) Calculate Spearman's rank correlation coefficient. Comment on your result (07 marks)

10. The table below shows the number of boxes of pens sold by a certain wholesale shop from the year 2009 to 2012.

Year	**Quarter**			
	1st	2nd	3rd	4th
2009	192	280	320	260
2010	300	360	380	270
2011	342	420	430	320
2012	424	480	510	412

   (a) Calculate the four – point moving averages for the data (06 marks)
   (b) (i) On the same axes, plot the original data and the four – point moving averages. (05 marks)

(ii) Comment on the trend of the number of boxes of pens sold over the four – year period. (01 mark)

(iii) Use your graph to estimate the number of boxes to be sold in the first quarter of 2013.

11. Differentiate the following with respect to X.

(a) $Y = (3x^2 - 5x)^{-2/3}$

(b) $Y = (1 + X^2)^2(1 - x^2)$

(c) $Y = 3x^4 - 8x^3 - 6x^2 + 24x + 3$

(d) $Y = \frac{x^2+}{(x+2)^2}$

12. (a) Simply $\frac{x^2(x^2+1)-\frac{1}{2}-(x^2+1)^{\frac{1}{2}}}{x^2}$

(b) Without using tables or calculators, find the values of

(i) $\frac{12^{3/2} \times 16^{1/8}}{27^{\frac{1}{6}} \times 18^{\frac{1}{2}}}$

(ii) $\log 75 + 2log2 - log3$

(c) Show that $2x^2 + x^2 - 13x + 6$ is divided by $x - 2$, and hence find the other factors of the expression.

END