

S47S/1
SUB- MATHS
JUNE 2013
 $2\frac{2}{3}$ hours

GREENHILL ACADEMY SECONDARY, KIBULI
UGANDA ADVANCED CERTIFICATE OF EDUCATION
Internal Mock Examinations 2016
SUBSIDIARY MATHEMATICS

2 HOURS 40 MINUTES

INSTRUCTIONS TO CANDIDATES:

This Paper consists of eight questions in section A and 6 questions in section B.

Answer **all questions** in section A and only four from section B.

Graph papers are provided

Silent programmable Calculators and tables with a list of formulae may be used in this Paper

SECTION A: (40 MARKS)*Attempt all questions in this section.*

1. Given the mean, median and standard deviation of the following values (05 marks)

2. Solve the equations;

$$\begin{aligned}x + 2y &= 7 \\x^2 - 4x + y^2 &= 1\end{aligned}$$

(05 marks)

3. If $\tilde{a} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$, $\tilde{b} = \begin{pmatrix} 11 \\ 3 \end{pmatrix}$ and $\tilde{c} = \begin{pmatrix} 10 \\ 9 \end{pmatrix}$

Find

i. $\frac{1}{2}(\tilde{a} - \tilde{c})$

ii. $|\tilde{a} + \tilde{b} + \tilde{c}|$

(05 marks)

4.

- a. Determine the number of different arrangements of the letters in the word ARRANGE
b. How many different committees consisting of two boys and three girls can be formed from a group of five boys and eight girls?

(05 marks)

5. Express in the form $a + b\sqrt{6}$, the expression

$$\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

6. Solve the simultaneous equations by the use of matrix method

$$\begin{aligned}x - y &= 5 \\3x + 2y &= 5\end{aligned}$$

(05 marks)

7. The events A and B are independent. If $P(A) = 0.3$ and $P(B) = 0.5$, find

a. $P(A \cup B)$

(03 marks)

b. $P(A \cap B')$

(02 marks)

8. The discrete random variable X has the probability function shown in the table below.

x	1	2	3	4	5
P(X=x)	0.2	0.3	0.3	0.1	0.1

Calculate the;

- a. Expectation of X

(02 marks)

- b. Variance of X

(03 marks)

SECTION B: (60 marks)*Attempt only four questions in this section.*

9.

- a. Factorise the expression $4x^3 - 8x^2 - x + 2$. (03 marks)
- b. If the expression $x^3 + px^2 + qx + r$ gives the same remainder when divided by $x+1$ or $x - 2$,
- Show that $p + q = -3$ (04 marks)
 - If the remainder is 4 when divided by $x - 1$, find the value of r (03 marks)
 - Given that the remainder is -60 when the expression is divided by $x + 3$, Calculate the values of p and q . (05 marks)

10. A spot check of the speeds of vehicles on a motorway are shown in the grouped frequency distribution table below.

Speed (m.p.h)	56-58	59-61	62-64	65-67	68-70	71-73	74-76
Number of Vehicles	5	12	28	58	44	18	10

- a. Calculate the
- Mean speed
 - Standard deviation
 - Median speed (09 marks)
- b. Plot an ogive for the above data. Use it to estimate the semi-interquartile range for the speeds of vehicles. (06 marks)

11.

- a. The table shows the retail prices of three commodities together with the corresponding quantities consumed for the period 2000 – 2002

	Weights	Prices in the years		
Year		2000	2001	2002
salt	1	390	380	410
Sugar	5	610	620	600
tea	2	500	550	480

Using 2000 as the base year, calculate the

- weighted price index for 2001
 - Weighted aggregate price index for 2002 (06 marks)
- b. The table shows the average monthly production of a certain commodity in thousands of tones

Year	2000	2001	2002	2003	2004	2005	2006
Production	48	36	43	45	38	36	31

On the same coordinate axes represent the average monthly production and the three-year moving averages for the data. (09 marks)

12.

a. If $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 4 & -1 \end{pmatrix}$, find

i. $(A + B)^2$

ii. $A^2 + B^2$

iii. What is the relationship between matrix $(A + B)^2$ and Matrix $A^2 + B^2$

b. Given that $D = 1201$ and I is a 22 identity matrix obtain the values of p and q such that

$$D^2 = pD + qI$$

13. The following gives the test results for 10 children.

Child	A	B	C	D	E	F	G	H	I	J
Maths (X)	1	8	15	18	23	28	33	39	45	45
English (Y)	3	14	8	20	19	17	36	26	14	29

a. Draw a scatter diagram to represent the data and explain the shape of your graph

(04 marks)

b. Draw a line of best fit through the points of the scatter diagram. Use your result to estimate the marks in math for a student who got 30 in English.

(03 marks)

c. Calculate the Spearman's correlation coefficient (ρ) and hence comment on the performance.

(08 marks)

14.

a. Five forces act as shown in figure 1 and are in equilibrium

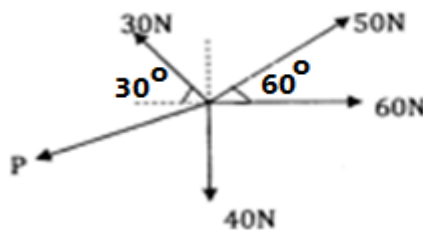


Figure 1

Find the magnitude and direction of force p

b. Figure 2 shows two particles A and B each of mass 0.5kg, joined by a light inelastic string which passes over a smooth fixed pulley at C.

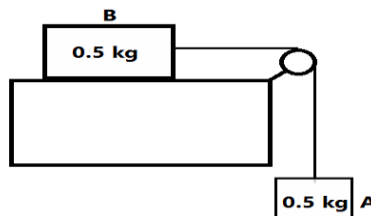


Figure 2

The system is held at rest with **A** hanging freely while **B** is on a rough horizontal surface. If the co-efficient of friction between B and the surface is 0.4, find the;

i. The magnitude of the acceleration of each particle.

(05 marks)

ii. The tension in the string when the system is released.

(02 marks)

END