S475/1
SUBSID.MATHEMATICS
Paper 1
Jul. / Aug. 2016
$2^2/_3$ hours

''Together for Mathematics''

SECONDARY MATHEMATICS TEACHERS' ASSOCIATION

SMATA JOINT MOCK EXAMINATIONS 2016
Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1

2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** the ***eight*** questions in Section **A** and only **four** questions in Section **B**.

Any additional question(s) will **not** be marked.

Each question in section **A** carries **5** marks while each question in section **B** carries **15** marks.

All working **must** be shown clearly.

Begin each answer on **a fresh** sheet of paper.

Graph paper is provided.

Where necessary, take acceleration due to gravity, **g = 9.8 ms^{-2}**
Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

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SECTION A: (40 MARKS)

*Answer **all** the questions in this section.*

1. The 4^{th} term of an arithmetic progression (A.P) is 77 and the 8^{th} term is 53.

   Find (i) the first term and the common difference of the A.P.

   (ii) the sum of the first ten terms. *(05 marks)*

2. The table below shows the marks obtained by a student in a series of tests of Fine Art and Mathematics.

Fine Art *(x)*	70	50	65	76	65	76
Mathematics *(y)*	52	35	48	50	58	71

   Calculate the **spearman's rank correlation coefficient** and **comment** on the results. *(05 marks)*

3. Given that $f(x) = x^3 - 16x + 24$.

   (i) Find , $f\left(\frac{-1}{2}\right)$

   (ii) Show that $(x - 2)$ is a factor of $f(x)$. *(05 marks)*

4. The table below shows the prices of peas and Beef per kg in 2006 and 2014.

	Year	
Item	**2006**	**2014**
Peas (kg)	2,500	4,000
Beef (kg)	6,000	8,000

   Using 2006 as the base year, find;

   (a) Price relatives of peas and beef.

   (b) Simple aggregate price index. *(05 marks)*

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5. A certain curve has an equation which satisfies $\frac{dy}{dx}$ = k (x + 5), k is a constant. Given that the gradient of the curve at point (0, 3) is 10.

   (i) Find the value of k.

   (ii) Find its particular equation. *(05 marks)*

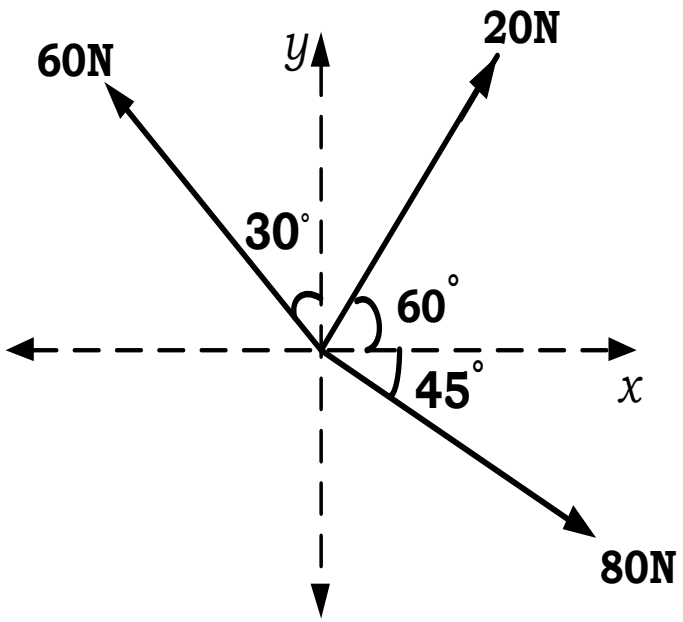
6. Solve the equation $2\,\text{Cosec}^2\theta - \cot\theta = 8$ for $0^o \leq \theta \leq 180^o$. *(05 marks)*

7. Two events A and B are **independent** such that P(A) = **0.2** and P(B) = **0.7**
   Find (i) P(A∩B)

   (ii) $P(A \cup B)'$

   (iii) P(A/B) *(05 marks)*

8. Find the magnitude and direction of the resultant of the forces shown in the figure below. *(05 marks)*



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SECTION B: (60 MARKS)

*Answer only **four** questions from this section.*

9. The duration of parking a car (***in minutes***) in a certain car parking lot in Kampala on a particular day was recorded as below.

Time (min)	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No. of cars	1	2	5	4	8	13	10	4	3	2

(a) Plot a histogram to show the above data. Use your graph to estimate the modal parking time.

(b) Calculate the mean and standard deviation using a working mean of 57 minutes. *(15 marks)*

10. (a) Given that matrices P = $\begin{pmatrix} 1 & 0 \\ 2 & 2 \end{pmatrix}$ and Q = $\begin{pmatrix} 4 & 2 \\ -1 & 5 \end{pmatrix}$.

Find (i) R such that R = 3P + 2Q. State the order of matrix R.

(ii) PQ

(iii) $(P.Q)^{-1}$

(b) Solve the simultaneous equations below by matrix method.

$3x - 2 = 4y$

$5x + y - 7 = 0$ *(15 marks)*

11. Given the curve $y = x(x^2 - x - 1)$.

(a) Find the turning points of the curve. *(09 marks)*

(b) Distinguish between the nature of the turning points. Hence, sketch the curve. *(06 marks)*

12. The mean life of a certain type of alkaline cells is 600 days and standard deviation 60 days. Their duration is normally distributed. Find the probability that a cell picked at random will last;

(a) (i) for more than 690 days.

(ii) for less than 540 days.

(iii) between 630 and 690 days.

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(b) If there are 400 alkaline cells, calculate how many will need replacement after 720 days. *(15 marks)*

13. The table below shows the annual production of Rice in **tonnes** by a certain Rice Growers Union (**RGU**) for the period 2004 - 2014.

Year	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Annual Prodn (tonnes)	186	136	162	168	145	142	120	144	156	154	125

(a) Construct a 5 year-moving average.

(b) Graph the moving averages together with the original data.

(c) Comment on the trend of productions of rice over the 11 year period.

14. (a) A tool box of mass **10kg** was pushed up a smooth incline of $\mathbf{30^0}$ to the horizontal from rest. It attained the speed of $\mathbf{40\ ms^{-1}}$ after **10** seconds. Find the work done by the force. *(08 marks)*

(b) A mass of **20kg** resting on a **rough** horizontal table is connected by a light string passing over a smooth pulley at the edge of the table, to a mass of **16kg** hanging freely. The coefficient of friction between the mass and the table is **0.5**. If the system is released from rest, find the;

(i) acceleration of the system.

(ii) tension in the string. *(07 marks)*

END

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