



EASTERN REGION TEACHERS' ASSOCIATION (ERETA)

JOINT MOCK EXAMINATIONS 2019

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1

2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer all questions eight (8) in section A and only four (4) questions in section B.
- Each question in A carries 5 marks while each question in B carries 15 marks.
- All working must be shown clearly.
- Where necessary take acceleration due to gravity to be $g = 9.8\text{ms}^{-2}$.
- Graph papers and a mathematical table may be provided.

SECTION A (40MKS)

1. Solve the equation; $3(3^{2x}) + 2(3^x) - 1 = 0$ (05mks)
2. Find the area under the curve $y = x(4 - x)$. (05mks)
3. Determine the equation of the curve with gradient function;
 $3x^2 - 3x + 1$ at the point $(1, 0)$. (05mks)
4. Find $\frac{dy}{dx}$, when $y = (x^2 - 3)(x + 1)^2$ (05mks)
5. A match is played 5 times and the probability that a team wins is 0.75. Find the probability that a team wins after playing;
(i). atleast 3 times. (03mks)
(ii). exactly 2 times. (02mks)
6. In an Arithmetical progression, the thirteenth term is 27 and the seventh term is 3 times the second term.
Find the; (i). common difference. (03mks)
(ii). sum of the 1st ten terms. (02mks)
7. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{15}{17}$, where A is obtuse and B is acute, find without tables, the value of $\sin(A + B)$. (05mks)
8. A particle of 2kg mass rests on a rough horizontal plane where the coefficient of friction is M. A fore of 1N acts on the particle. If the system is in equilibrium. Find the value of M when the force acts:
(i). horizontally (02mks)
(ii). upwards at an angle of 30° to the horizontal. (03mks)

SECTION B (60MKS)

9. (a). A random variable x is given a probability distribution as;
 $p(x=0) = 0.1, p(x=1) = p(x = 2) = 0.3, p(x = 3) = k$ and $p(x = 4) = 0.2$
Find the; (i). value of the constant k.
(ii). the expectation of x
(iii). the variance of x

- (b). The marks of students are normally distributed with mean 30 marks and standard deviation 5 marks. If a student is randomly selected find the probability that a student score the marks;
- between 34 and 40 marks
 - less than 35
 - more than 38

10. The heights of students in cm, were recorded as shown below:

29	56	54	61	62	38	70	72	71	65
25	39	40	48	69	24	47	75	40	41
60	64	44	53	64	70	68	64	44	20
18	24	34	39	40	52	50	30	64	49
34	60	50	55	64	30	15	20	10	15

- Form a frequency distribution table with classes 10 – 19, 20 – 29 etc.
 - Use the table to calculate the;
 - mean and standard deviation
 - Draw a cumulative frequency curve and use it to estimate the;
 - semi-interquartile range
 - the 80th – 70th percentile
11. Two food tasters x and y sampled six types of cakes: A, B, C, D, E, F and recorded them as follows:

Cakes	A	B	C	D	E	F
x	20	60	40	35	35	40
y	10	55	40	20	30	60

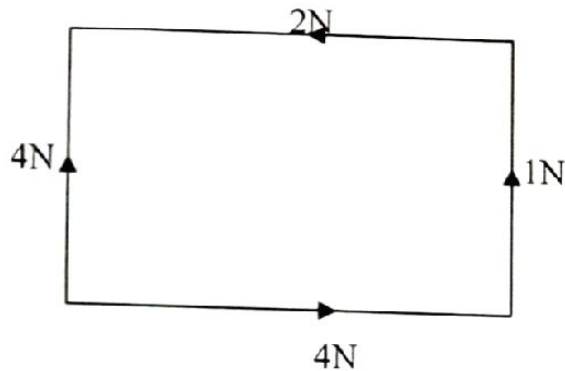
- Draw a scatter diagram to represent the data.
 - Draw a line of best fit in the diagram
 - Calculate the rank correlation coefficient between x and y and comment on your result.
 - Use the line of best fit to find y when x = 45.
12. The table below shows the annual production of copper in millions of kilograms in a certain country for the period 1960 – 1970.

Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Annual production in millions of kg	196	146	172	178	155	152	130	154	166	164	135

- Construct a 5 year moving average
- Graph the moving average together with the original data

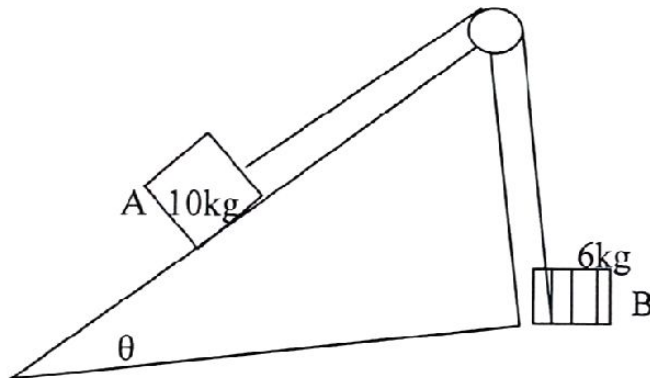
- (c). Comment on the trend of production over year period
- (d). Use your graph to estimate the production in 1971.

13. (a). The diagram below shows a system of forces acting on a metallic rectangular frame of mass 2kg.



- Find: (i). the magnitude and direction of the resultant force.
 (ii). the acceleration of the frame

- (b). The particles A and B of masses 10kg and 6kg respectively are connected by a light inextensible string passing over a smooth fixed pulley.



If the system is released from rest when B is on the ground, particle A moves through a distance of 30cm before reaching the base of the smooth plane inclined at an angle of $\sin^{-1}(4/5)$ to the horizontal.

- Find: (i). the acceleration of the particle
 (ii). speed with which A reaches the base of the plane.

14. Newton's law of cooling states that the temperature of a body in a room reduces at a rate proportional to the difference between the body's temperature and the temperature of the room. A body with temperature 90°C is placed in a room with temperature 18°C and is then cooling at a rate of 3°C per minute. Find how long it takes for the body's temperature to drop to 60°C . What will be the temperature 24 minutes from the time the body was put in the room?

END