

P425/1 UGANDA ADVANCED CERTIFICATE OF EDUCATION

COMPETENCE BASED ASSESSMENT

S.5 MATHEMATICS P425/1

TIME: THREE HOURS

INSTRUCTIONS

- Attempt all items

Item one

Mr Kato is livestock farmer in Uganda. He bought a rectangle piece of land and he is in the process of obtaining a land title. A computer system is used to determine the dimensions of the land, and the length is represented by expression $\log_2 y - \log_7 8 = 2$ metres three of his friends about their recent purchase.

John bought 4 poles, 2 iron sheets and 10 kgs of nails for ugx 93,000

Mark bought 2 poles, 3 iron sheets and 5kgs of nails at ugx 76,500

Paul bought 3poles, 1 iron sheet and 8kgs of nails for ugx 64,000

Mr Kato plans to buy 10poles, 5 iron sheets and 20 kgs of nails

In addition Mr Kato rears and wants to improve his income through saving. Each year he sells 3 cows at ugx 1,100,000 each. He save 15% of his earnings at the beginning of ever year in a bank that offers 13.5% simple interest per annum. He plans to buy a lorry costing ugx 7,000,000

Task

As a mathematic student

- Determine the dimension of the land
- Hence, determine how much Mr Kato will spend on constructing the kraal.
- Estimate how long it will take Mr Kato raise enough money to buy a long.

Item two

The national water and sewage corporation (N W S) is designing a water distribution system for requirements and infrastructure constraints. A consultant engineer working on the project wants to determine the optimal flow rates for each community.

The water distribution is modelled by the following equations

a) $\sqrt{(3-x)} - \sqrt{(7+x)} = \sqrt{(16+2x)}$ Total water supply

b) $2(9^y) + 3^{(y-1)} + 4 = 2(3^{(y+1)})$ pressure balancing equation

c) $3p^3 + 3Z^3 = 2,565$ flow optimization equation

$P+Z = 15$

Where x, p, y and Z represent the flow rate in litre per minute in communities A, B and C respectively

The polynomial equation $(x) = ax^3 + 4bx^2 + cx - 8$ models the operational efficiency of the pumping system.

Task

a) Help the engineer determine the values of different variables involved for each flow in the community.

b) Determine the possible values of a, b, and c for which (x-1) and (x-2) are factors of the polynomial and leaves 6 as remainder when it is divided by (x-3)

Item three

There has been a terrorism threat in the DRC in the recent months. To curb this problem the USA government has deployed two teams of soldiers. The infantry and the air force. The infantry has been divided into two groups one group is situated at an each coordinate give simultaneously as $\log_2 x + 2\log_4 y = 4$, $\log_{10}(x+y) = 1$ the second group is situated at coordinate given by $\log_{25} 4x^2 - \log_5(3-x^2) = \log_{10} 10$ and $\log_4(6-y) = \log_2 y$. At exactly 8:00pm, the Air force noticed the terrorist's area at a distance

$$-7 \left(\frac{(\sqrt{5}-2)^2 - (\sqrt{5}+2)^2}{8\sqrt{5}} \right)$$

Kilometre away from the main town, Gama the Air force is planning to attack them if they confirm terrorists are more than 5km away from the main town but have not yet confirmed.

Task

a) Calculate the coordinates for the location of each of the groups.

b) How far the two groups apart

c) Based on the calculations, show whether or not it is safe the Air force to attack the terrorists given the stated condition.