



SUPP. 2005/2006

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**UNIVERSITY OF SWAZILAND**

**SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMME:** DIP. IN AGRICULTURAL EDUCATION I  
DIP. IN AGRICULTURE I  
DIP. IN HOME ECONOMICS I  
DIP. IN HOME ECONOMICS EDUCATION I  
REM. IN AGRICULTURE I  
REM. IN HOME ECONOMICS EDUCATION I

**COURSE CODE:** AEM 100

**TITLE OF PAPER:** MATHEMATICS

**TIME ALLOWED:** TWO HOURS AND THIRTY MINUTES (2H30MIN)

- INSTRUCTIONS:**
1. QUESTION 1 IS COMPULSORY.
  2. ANSWER ANY THREE OTHER QUESTIONS.
  3. NO DOCUMENT IS AUTHORIZED.
  4. SHOW ALL YOUR WORKINGS.
  5. EQUIPMENT AUTHORIZED: CALCULATOR, COMPASS, RULER, ERASER
  6. USE, IF NEEDED, THE GRAPH PAPER WILL BE PROVIDED.

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY  
THE CHIEF INVIGILATOR**

**QUESTION 1**

**SECTION A: MULTIPLE CHOICE:** For each item, circle the one letter of the choice that best completes/answers that item. In this section, consider all numbers exact.

(2 marks each) [20 marks total]

1. Expressed in grams, 2.4 Mg is: a.  $2.4 \times 10^{-6}$  b.  $2.4 \times 10^{-3}$  c.  $2.4 \times 10^3$  d.  $2.4 \times 10^6$
2. If the volume of a cone is  $1875\pi \text{ cm}^3$  and its height is 25 cm, its radius in cm is:  
a. 8.66... b. 15 c. 30 d. 17.32... e. 75 f. 225
3. Expressed in hectares,  $2.4 \times 10^3 \text{ m}^2$  is: a.  $2.4 \times 10^7$  b.  $2.4 \times 10^4$  c. 2.4 d.  $2.4 \times 10^{-1}$
4. If a liquid has a relative density of 3.5, the mass of  $100 \text{ cm}^3$  of the liquid would be:  
a. 35 g b. 35 kg c. 350 g d. 350 kg e. 3.5 g f. 3.5 kg
5. If a cylinder has a height of 50 cm and a surface area of  $200 \text{ cm}^2$ , a similar cylinder with a height of 100 cm would have a surface area in  $\text{cm}^2$  of: a. 50 b. 100 c. 400 d. 800 e. 1000
6. An angle measuring 4 radians, measures: a.  $1.273\dots^\circ$  b.  $229.183\dots^\circ$  c.  $0.022\dots^\circ$  d.  $0.0698\dots^\circ$
7. The angle with the same value (including sign) of the cosine as  $200^\circ$  is:  
a.  $20^\circ$  b.  $70^\circ$  c.  $110^\circ$  d.  $160^\circ$  e.  $250^\circ$  f.  $290^\circ$  g.  $340^\circ$
8. The scale of a map is 1 : 5 000. An area of  $100 \text{ cm}^2$  on the map represents:  
a.  $2\,500 \text{ km}^2$  b.  $250 \text{ km}^2$  c.  $25 \text{ km}^2$  d.  $2.5 \text{ km}^2$  e.  $0.25 \text{ km}^2$  f.  $0.025 \text{ km}^2$
9. If 5 men working 8 hours per day can fence a given field in 6 days, then how many days will it take 8 men if they work 5 hours per day? a. 4 b. 4.5 c. 5 d. 6 e. 7 f. 8 g. 9
10. A rectangular field is 20m longer than it is wide. If the perimeter is 600m, the width is:  
a. 50m b. 100m c. 140m d. 200m e. 250m f. 300m

**SECTION B:** Answer all questions in the space provided. Show all of your work!

1. A meal for 100 persons needs the following ingredients (assume prices are exact):

Ingredient	Number 1	Number 2	Number 3
Amount needed (kg)	53.00	10.00	35.00
Cost per kg	E1.83	E7.59	E1.45

What is the total cost per person of the ingredients?

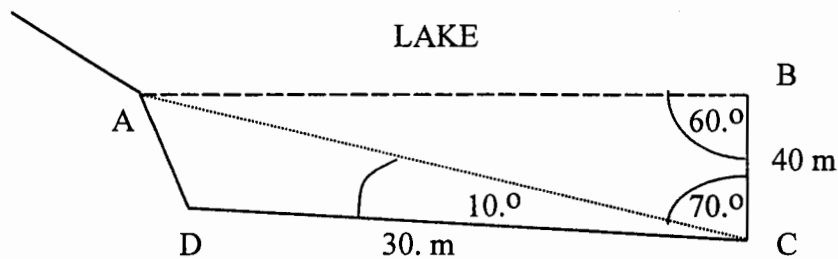
[10 marks]

2. Given that the basal fertilizer dressing for cabbages is 1100 kg/ha of 2:3:4 (24), how much phosphorus is applied to 3.60ha? [5 marks]

3. If alfalfa hay is 18.4% protein and soya bean meal is 50.0% protein, in what proportions would we mix these in order to get a feed with 18% protein for young pigs? [5 marks]

**QUESTION 2**

Assume the following diagram (not drawn to scale) is a small inlet off of a large lake.



If you wished to build a dam from A to B and drain the land for crop production:

- How long would the dam be? [10 marks]
- How much land area would you gain? [10 marks]

**QUESTION 3**

- a. Assuming all numbers to be exact, if there are 2 fungal cells at the start and the number doubles every 4 hours, how many fungal cells are there in 2 days. [10 marks]
- b. The Gross Domestic Product (an economic indicator) of Swaziland in 1986 was E463,306 and the annual growth rate was 8.8%. If that growth rate had continued, what would the Gross Domestic Product have been in 1996? [10 marks]

**QUESTION 4**

- a. Assuming all numbers to be exact, if Total Revenue (TR) in Emalangeni as a function of the number of units sold (X) is:  $TR = 200 + 25X - 0.5X^2$   
What are the maximum and minimum values of TR in the interval  $0 \leq X \leq 30$ ? [10 marks]
- b. The instantaneous acceleration of an object is constant at  $30.4m/s^2$ . The instantaneous velocity at 15.0s is 514m/s. Find the equation for instantaneous velocity at any point in time. [10 marks]

**QUESTION 5**

- a. Use matrices to determine the proportions in which to mix maize (10.% protein) and peanut meal (52% protein) to get a feed which is 16% protein. [10 marks]
- b. Marginal profit in US dollars is given by the equation:  $MP= 860-12X$ , where X is the number of a product sold. If X changes from 20 to 30, what is the change in total profit? Assume all numbers are exact. [10 marks]

**QUESTION 6**

Use the data in the table below as indicated. (Consider all numbers in this table to be exact.)

Tonnes of Vegetables Produced in the Land of Faithful

	<u>Year</u>		
<u>Type</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>
Carrots	40	50	100
Potatoes	70	90	60
Total	110	140	150

Source: Hypothetical

- a. Present the data in a multiple bar graph. [10 marks]

b. For potatoes, calculate the statistics listed on the left below. Use the definition formula for variance. Do your work to the right of the blanks, and record your final answers in the blanks. [10 marks]

Mean: \_\_\_\_\_

Range: \_\_\_\_\_

Variance: \_\_\_\_\_

Standard

Deviation: \_\_\_\_\_

Coefficient of

Variation: \_\_\_\_\_