



SUPP. 2004/2005

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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

COURSE CODE: AEM 100

TITLE OF PAPER: MATHEMATICS

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

- INSTRUCTIONS:**
1. ANSWER ANY FOUR OUT OF THE SIX QUESTIONS.
 2. NO DOCUMENT IS AUTHORIZED.
 3. SHOW ALL YOUR WORKINGS.
 4. EQUIPMENT AUTHORIZED: CALCULATOR, COMPASS, RULER, ERASER
 5. 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 (overall: 25 marks; 1.a = 13 marks; 1.b = 12 marks)

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1.a

Four rural communities in the district of Shisweleni have their populations in the ratio 8 : 12 : 5 : 10. The government of Swaziland has allocated a grant of E58,475 for the purchase of water tanks. The allocation has been made in proportion to their populations. Calculate how much each community receives.

1.b

Two farmers sold their lambs at two different prices. If they had sold 112 of the dearer lambs and 60 of the cheaper ones they would have received E4500.6 but if they had sold 96 of the dearer lambs and 120 of the cheaper ones they would have received E5200.8. Find the price of the dearer lambs.

Question 2 (overall: 25 marks; 2.a = 10 marks; 2.b = 15 marks)

2.a

If $A(x - 1) + B(x + 1) = 3x + 5$ for all values of x , find the values of A and B .

2.b

A household head invests E2000 at 5% per annum simple interest in order to pay school fees, for his son. He pays the fees of E400 partly from the interest and partly from the capital invested. How much of the capital (initially invested) is left after 3 years.

2.c

A test on a metal filament lamp gave the following values of resistance (R ohms) at various voltage (V volts).

V:	62	75	89	100	120
R:	100	117	135	149	175

(2.c.1) These results are expected to agree with an equation of the type $R = mV + c$ where m and c are constants. Test this by drawing the graph.

(2.c.2) By selecting any two pairs of points of your choice, find suitable values for m and c and write the correct form of the equation $R = mV + c$.

Question 3 (overall: 25 marks; 3.a=10 marks; 3.b=10 marks; 3.c=5 marks)

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3.a

Solve the following system

$$3x - y + 2z = 7$$

$$x + 3y + z = 3$$

$$2x + y + z = 4$$

3.b

Find the limit of the function $f(x)$ when $x \rightarrow \infty$ *infinity*

$$f(x) = \frac{4x^2 + 1}{x^2 + 3x + 2}$$

3.c

Find the first derivative of the function $f(t) = (3 + x^2)^3(2x + 4)$

Question 4 (overall: 25 marks; 4.a=15 marks; 4.b = 10 marks)

4.a

Water needed to fill several tanks of different volumes can be represented by the function

$$f(v) = v^3 + 20v^2 + 20 \quad \text{where } v \text{ represents the volume of the tank}$$

Find the quantity of water when the gradient of $f(v)$ is 110 litres.

4.b

Evaluate the area between the graph of the function $f(x) = 200 - 2x^2$ and that of $f(x) = 25 + 2x + x^2$.

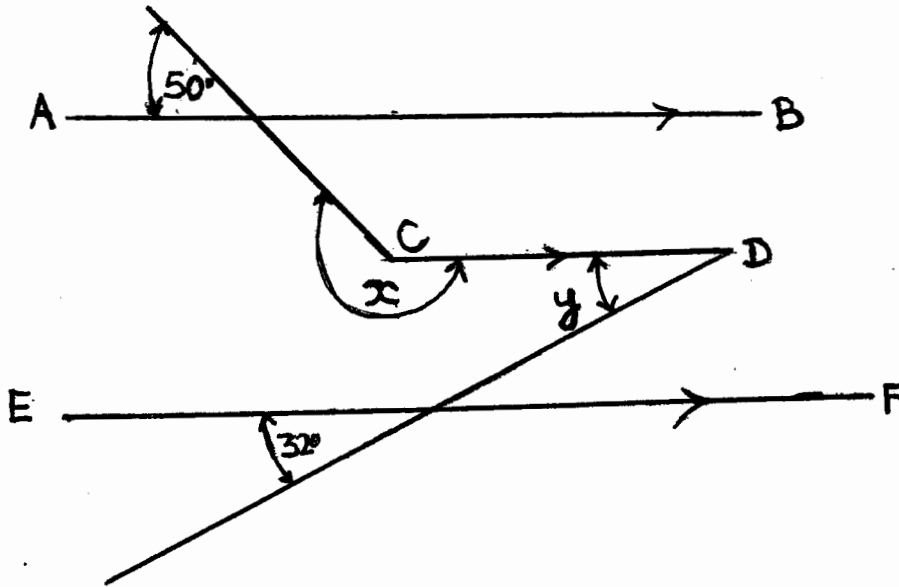
Question 5 (5.a = 12.5 marks; 5.b= 12.5 marks)

5.a

In an isosceles triangle, the two equal sides are each a in length. The third side is $a/2$ in length. Show that, if the altitude drawn from the intersection of the equal sides is h , then $16h^2 = 15a^2$.

5.b

In the figure below the lines AB, CD and EF are parallel. Find the values of x and y .



Question 6 (6.a=13 marks; 6.b= 12 marks)

6.a

A steel ingot is in the shape of a cylinder 1.5 m diameter and 3.5 m long. How many metres of square bar of 50 mm side can be rolled from it.

6.b

Water is being pumped through a pipe of 10cm diameter so that it discharges 1250 litres per minute. Calculate the speed of flow of the water in metres per second. The pipe is used to empty a swimming bath containing 800 cubic metres of water. How long does it take, in hours, to empty the bath?