



**UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER**

**PROGRAMME: DIP AGRIC I & DIP AGRIC ED. I  
DIP HOME ECON. I & DIP HOME ECON. ED. I  
REM HOME ECON. & REM HOME ECON. ED  
REM AGRIC & REM AGRIC. ED.**

**COURSE CODE: LUM 100**

**TITLE OF PAPER: PHYSICS**

**TIME ALLOWED: TWO (2) HOURS**

**SPECIAL MATERIAL REQUIRED: NONE**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO  
OTHER QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

**SECTION I**  
**COMPULSORY**

**QUESTION 1**

- a) What are the dimensions of
- i) Velocity
  - ii) Pressure
  - iii) Energy
- [6 marks]**
- b) The equation for work is expressed as the product of force and the distance moved in the direction of the force, i.e.  $W = F.L \cos \theta$  where  $\theta$  is the angle between the force and motion.  
Using dimensional analysis, check whether the given equation is correct.
- [6 marks]**
- c) Your animals, which are grazing 2 km,  $30^\circ$  north of east away from the crawl, are attacked by a lion. The lion runs after the bull for 1.5 km,  $60^\circ$  north of east before catching it. Find out how far and which direction you will have to go to attack the lion, if it dragged the bull for 500 m,  $30^\circ$  south of east.
- [8 marks]**
- d) Fig 1 shows a hydraulic jack which is to be used to lift a load. Given that  $A_2$  is  $2.5A_1$ , what is the force required to be applied at  $A_1$  in order to lift 20 bags of cement. One bag of cement weighs 50kg.

**[20 marks]**

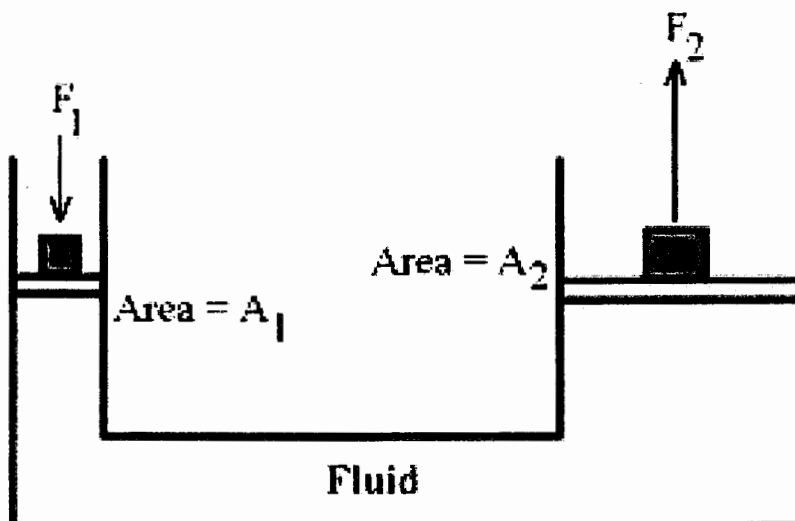


Fig. 1: Hydraulic Jack

## SECTION II

CHOOSE ANY TWO QUESTIONS FROM THIS SECTION.

## QUESTION 2

- a) State the principle of conservation of energy and explain how this principle is applied when a ball is thrown vertically upwards.

[10 marks]

- b) The wheelbarrow in figure 2 is used to carry harvested potatoes from the field to a roadside stall. Calculate the vertical force required at the handles A to lift the wheelbarrow if it rolls at C and its weight and contents of 1000 N act at B.

[10 marks]

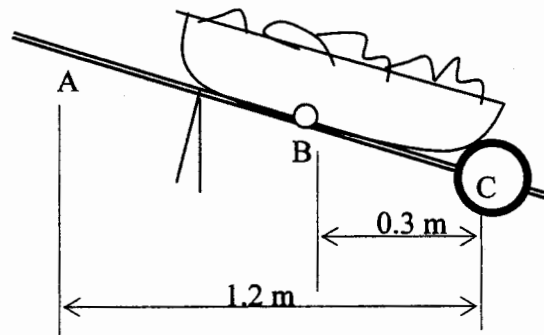


Figure 2 wheelbarrow being used to carry potatoes

- c) What will be the amount of work done to move the wheelbarrow and potatoes if a horizontal force of 650 N is used to push the wheelbarrow? The roadside stall is 150 m away from the field.

[10 marks]

## QUESTION 3

- a) State equations of linear motion.

[8 marks]

- b) State any four useful functions of friction

[8 marks]

- c) A bird is eating maize at 2.7 m high from the ground and 20 m away from a child who is guarding the field against any animals. If the child can only conveniently throw at an angle of  $60^\circ$  to the horizontal from his height of 1.7 m, calculate the velocity with which to throw the stone to hit the bird's position.

[14 marks]

## QUESTION 4

- a) With the aid of a diagram, describe a simple experiment you would carry out to demonstrate that light travels in a straight line  
[5 marks]
- b) State the general mirror formula and define all the terms involved  
[2 marks]
- c) An object 1 cm tall is placed 30cm in front of a convex mirror which has a radius of curvature of 40cm so that it is perpendicular to, and has one end resting on the axis of the mirror. Find the size and position of the image formed by the mirror  
[8 marks]
- d) With the aid of sketches, discuss the differences between a circuit in which the resistances are connected in parallel and that in which they are connected in series  
[5 marks]
- e) Fig 3 shows a 12V battery of internal resistance  $0.6\Omega$  connected to three resistors A, B, and C. Find the current in each resistor  
[10 marks]

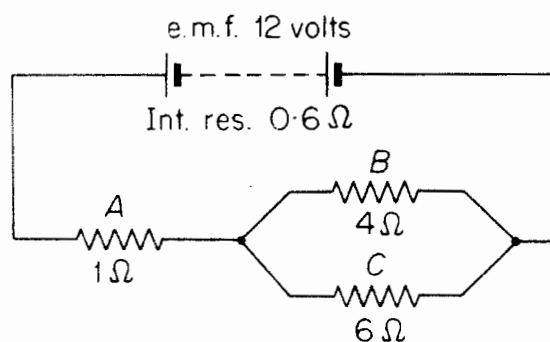


Fig 3: Electric circuit