THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

031/2A

PHYSICS 2A
ALTERNATIVE A PRACTICAL
(For both School and Private Candidates)

Time: 2:30 Hours **Wednesday, 13th October 2010 a.m.**

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **two (2)** questions including question **number 1.**
3. Whenever calculations are involved, show your work clearly.
4. Marks for each question are indicated at the end of the question.
5. Calculators and cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

$\pi = 3.14$

This paper consists of 5 printed pages.

1. The aim of this experiment is to find the mass of the unknown load labelled "W" and the spring constant K. Proceed as follows:

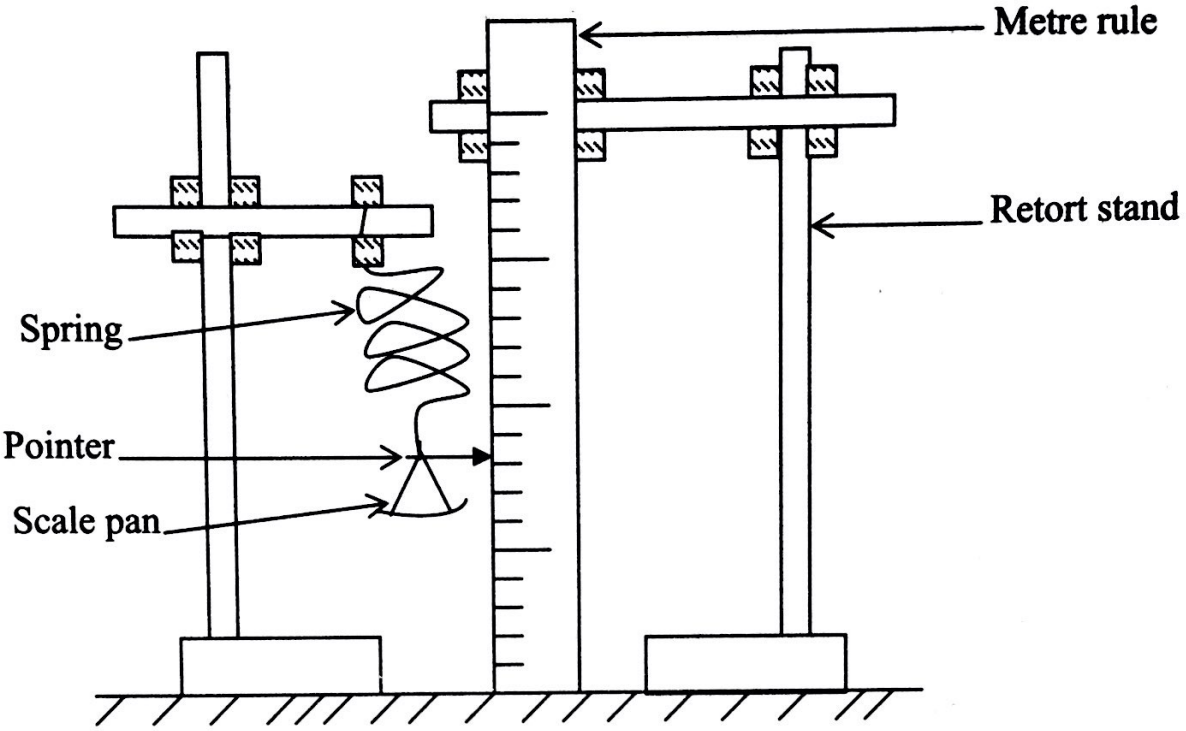


Figure 1

Set up the apparatus as shown in Figure 1. Put a mass of 50 g on the scale pan and recor the equilibrium position X_o of the pointer. Put on the scale pan the unknown weight marke W. Without removing W and the 50 g mass in the scale pan, add a load L of 50 g an record the new position of the pointer X. Calculate the extension $E = (X - X_o)$. Repeat thi process for L = 100 g, 150 g, 200 g and 250 g.

(a) Record your results as shown in Table 1.

Equilibrium position x_o .....

Table 1

Load (g)	x (cm)	$E = x - x_o$ (cm)
50		
100		
150		
200		
250		

(b) Plot the graph of load L against absolute value of extension E. The scale of th vertical axis should be chosen to range from 200 g to 300 g.

(c) From the graph, determine the unknown weight marked W, given that $L = KE + W$ where K is a constant.

d) What does the gradient of the graph represent?

e) State the sources of errors and precautions that should be taken in the experiment.
(25 marks)

The aim of this experiment is to determine the refractive index of water. Proceed as follows:

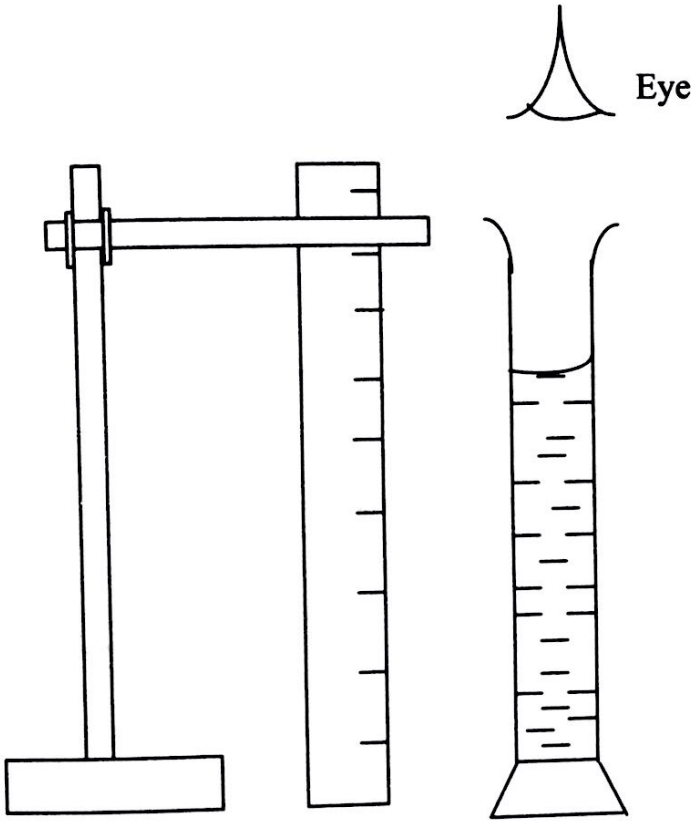


Figure 2

(a) Arrange your apparatus as in Figure 2. Put about $150cm^3$ of clear water in the measuring cylinder. Drop an office pin at the bottom so that it rests touching the wall of the cylinder.

(b) Look in the cylinder from Figure 2. Use another office pin as a search pin, move it up and down outside the cylinder, and locate the image position by no parallax method. Locate the image position on the ruler. Measure and record the depth (H_1) of the image. Measure and record the depth (H_2) of water. Repeat the experiment with $175cm^3$, $200cm^3$, $225cm^3$ and $250cm^3$ of water in the measuring cylinder.

(c) (i) Record in Table 2 your values for H_1 and H_2 corresponding to the volumes of water in the measuring cylinder.

Table 2

Volume of water V (cm)	H_1	H_2
150		
175		
200		
225		
250		

(ii) Plot the graph of H_2 versus H_1.
(iii) Determine the slope of the graph.
(iv) What is the physical meaning of the slope?
(v) State sources of error in this experiment. **(25 marks)**

3. The aim of this experiment is to determine the resistivity of an electrical conductor P.

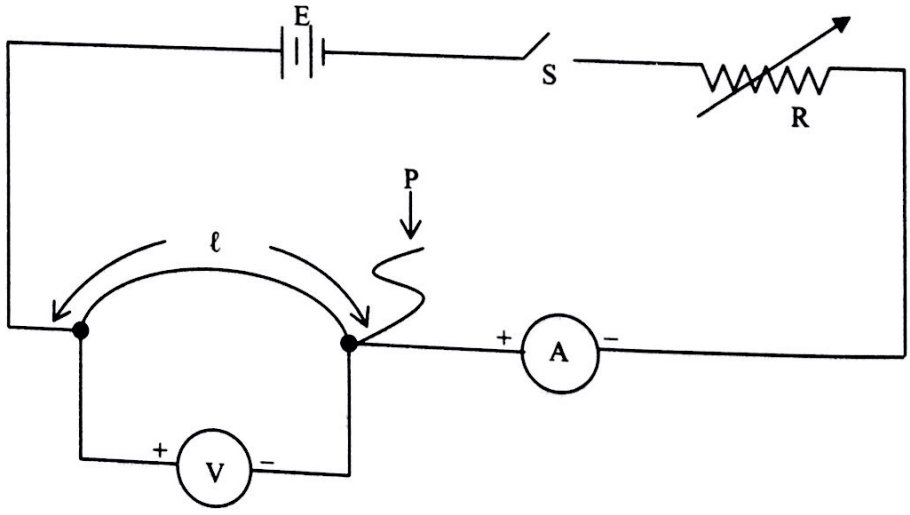


Figure 3

With P having a length ℓ = 50 cm, connect up the circuit as shown in Figure 3. Close the key S and adjust the rheostat R so that the current in P is 0.20 A. Record the current I and the potential difference V between its ends.

Repeat the procedure with current I = 0.30 A, 0.40 A, 0.50 A and 0.60 A.

(a) Record your results in Table 3.

Table 3

Current I (A)	P.d (volts)
0.20	
0.30	
0.40	
0.50	
0.60	

(b) Plot a graph of V against I and calculate the slope G.

(c) Deduce the resistivity of the conductor P given that; $\rho = \frac{G\pi d^2}{4\ell}$.

Where ρ = resistivity
d = diameter of P (measured using the micrometer screw gauge provided).

(25 marks)