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: 2½ Hours ***Tuesday morning 16/10/2007***

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **two (2)** questions including question **number 1.**
3. Calculations should be clearly presented.
4. Marks for each question are indicated at the end of each question.
5. Cellular phone are **not** allowed in the examination room
6. Electronic calculators are **not** allowed in the examination room.
7. Write your **Examination Number** on every paper of your answer booklet (s).
8. The following may be used.

   Acceleration due to gravity, $g = 9.8ms^{-2}$.

This paper consists of 5 printed pages.

1. The aim of this experiment is to determine the mass of a given object "B", and the constant of the spring provided.

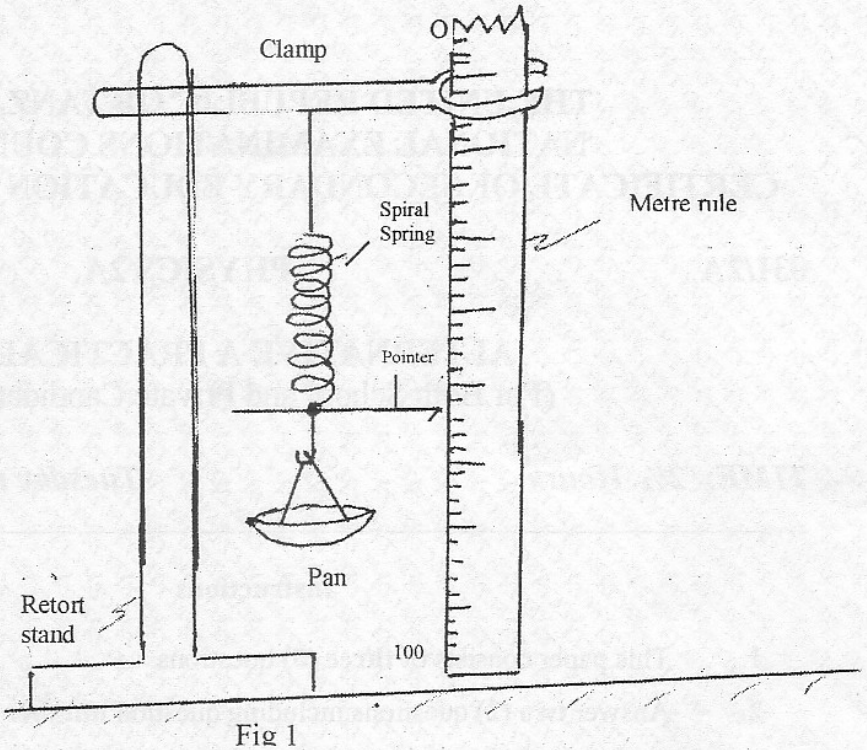


Fig 1

(i) Set up the apparatus as shown in fig.1 with zero mark of the metre-rule at the top of the rule and record the scale reading, by the pointer, S_o.

(ii) Place the object "B" and standard weight (mass) W equal to 20g in the pan and record the new pointer reading S_1. Calculate the extension, $e = S_1 - S_o$ in cm.

(iii) Repeat the procedure in (ii) above with W = 40g, 60g, 80g and 100 g.

(a) Record your results in tabular form as shown below:
Table of Results:

S_o =			
Mass (kg)	Force, F (N)	Pointer reading S_1 (cm)	Extension $= S_1 - S_o$ (cm)
0 0.02 0.04 0.06 0.08 0.10			

(b) Plot graph of Force F (vertical axis) against extension e (horizontal axis).

(c) Use your graph to evaluate

(i) mass of B

(ii) spring constant, K, given that force, extension, constant and weight of B are are related as follows:

$F = Ke - B$

(25 marks)

2. The aim of this experiment is to find the refractive index of a glass block. Proceed as following:

Place the given glass block in the middle of the drawing paper on the drawing board. Draw lines along the upper and lower edge of the glass block. Remove the glass block and extend the line you have drawn. Represent the ends of these lines segments as SS^1 and TT^1. Draw the normal NN^1 to the parallel lines SS^1 and TT^1 as shown in Fig. 2 (a).

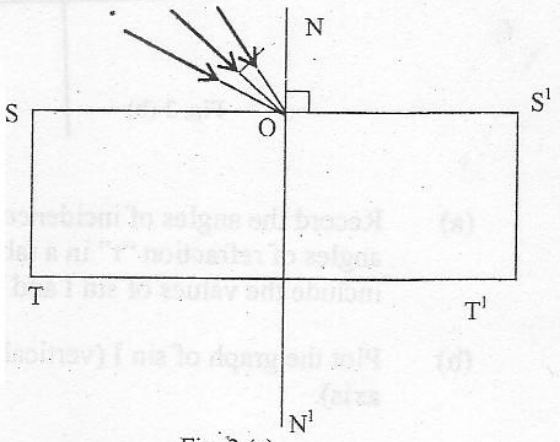


Fig. 2 (a)

Draw five evenly spaced lines from O to represent incident rays at different angles of incident (10°, 20°, 30°, 40° and 50° from the normal). Replace the glass block carefully between SS^1 and TT^1. Stick two pins P_1 and P_2 as shown in Fig 2 (b) as far apart as possible along one of the line drawn to represent an incident ray. Locate an emergent ray by looking through the block and stick pins P_3 and P_4 exactly in line with images I_1 and I_2 of pins P_1 and P_2. Draw the emergent ray and repeat the procedure for all the incident rays you have drawn. Finally draw in the corresponding refracted rays

NOTE: The drawing paper should be handed in together with other answer sheets.

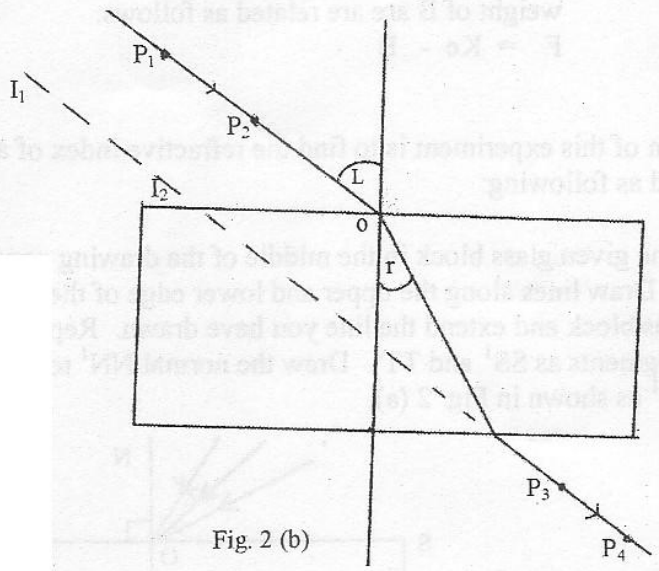


Fig. 2 (b)

(a) Record the angles of incidence I and the measured corresponding angles of refraction "r" in a table. Your table of results should include the values of sin I and sin r.

(b) Plot the graph of sin I (vertical – axis) against sin r (horizontal – axis).

(c) Determine the slope of the graph

(d) What is the refractive index of the glass block used?

(e) Mention any sources of errors in this experiment. **(25 marks)**

3. The aim of this experiment is to determine the potential fall along a uniform resistance wire carrying a steady current.

Proceed as follows:

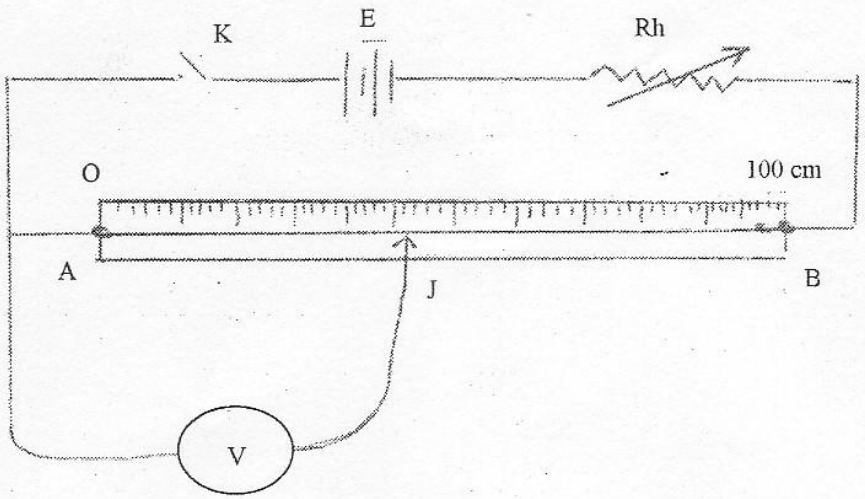


Fig. 3

Connect up the circuit as shown in fig .3. Adjust the rheostat so that when the sliding contact J is near B, and the key is closed the voltmeter V indicates an almost full scale deflection. Do not alter the rheostat again.
Close key K and make contact with J, so that AJ = 10 cm. Record the potential different V volts between A and J as registered on the voltmeter.
Repeat this procedure for AJ = 20 cm 30cm, 50cm, and 70cm.

(a) Tabulate your results for the values of AJ and V

(b) Plot a graph of V (vertical axis) against AJ (horizontal axis)

(c) Calculate the slope of the graph.

(d) What is your comment on the slope?

(e) State any precautions on the experiment.

(25 marks)