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

031/2A

PHYSICS 2A
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

Time: 2:30 Hours **Thursday, 15th November 2018 a.m.**

Instructions

1. This paper consists of **two (2)** questions.
2. Answer **all** the questions.
3. Where calculations are involved show your work clearly.
4. Each question carries 25 marks.
5. Calculators, cellular phones and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. Use $\pi = 3.14$.





1. You are provided with iron metal ball, inextensible string of 2 m, stopwatch, retort stand, clamp and cork pads. Set up the apparatus as shown in the Figure 1.

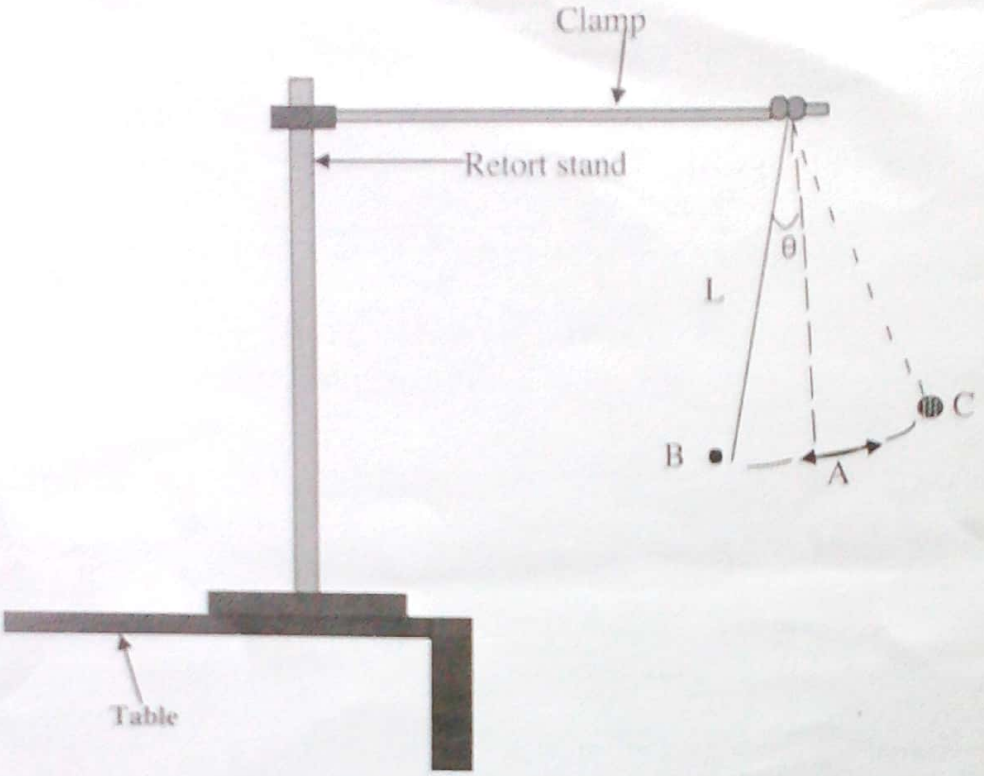


Figure 1

Proceed as follows:-

(a) Tie a piece of thread to an iron metal ball to form a pendulum.
(b) Suspend the pendulum from two clamped pieces of wood.
(c) Adjust the length L of the pendulum to 140 cm.
(d) Displace and set the ball to start oscillating through a small angle.
(e) Record the time t, taken for 10 complete oscillations by using a stop watch.
(f) Repeat this experiment for values of L equal to 120 cm, 100 cm, 80 cm, 60 cm and 40 cm, and record your data as shown in the Table 1.

Table 1

Length L (cm)	140	120	100	80	60	40
Time t for 10 oscillations (s)						
Period time T (s)						
T^2 (s^2)						

Questions

(i) Complete the table with data from the experiment.

(ii) Plot the graph of T^2 against L.

(iii) Find the slope.

(iv) From the relation $T = 2\pi\sqrt{\frac{L}{g}}$, find g.

(v) Give the physical meaning of g.

(vi) Mention two sources of errors and any precaution taken in this experiment.

(vii) Mention two effects of g. **(25 marks)**

2. You are provided with rectangular glass block, soft drawing board, drawing pins, optical pins, white sheet of paper and drawing equipments. Proceed as follows:

(a) Fix the white sheet of paper on the drawing board using drawing pins.

(b) Put the glass block with one of its largest surface top most on top of the plane paper.

(c) Trace the outline of the glass block on the paper by using a pencil. Remove the glass block and draw a normal extending to opposite sides as shown in the Figure 2.

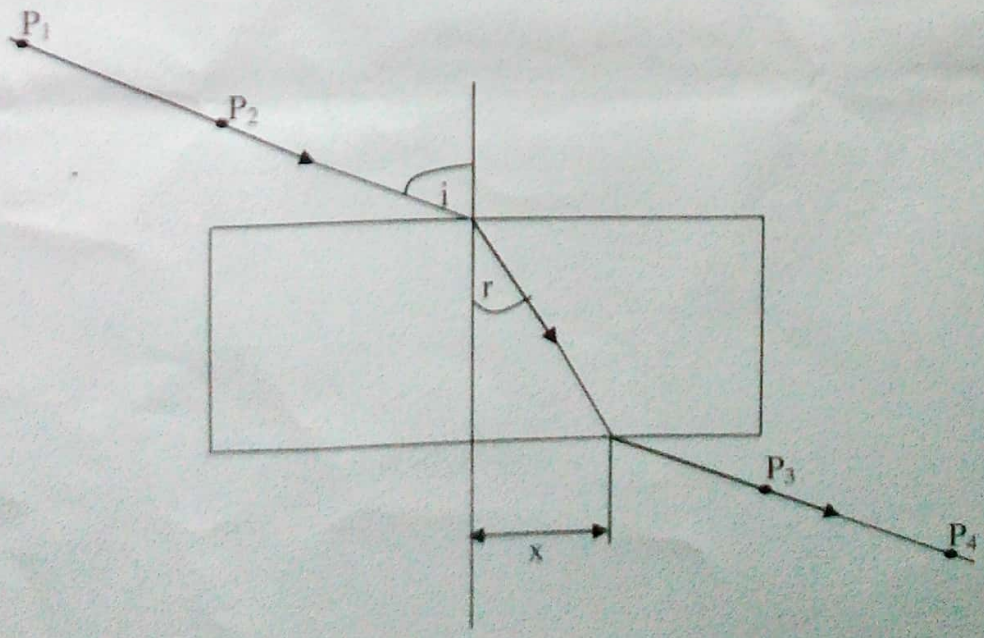


Figure 2

(d) Draw a line making an angle of incidence $i = 30^0$. Stick two pins; P_1 and P_2 in a reasonable distance apart on the drawn line.

(e) Replace the glass block on the outline and stick two more pins, P_3 and P_4 at positions which will make all the pins, P_1, P_2, P_3 and P_4 appear to be in a straight line, as seen when observed through the glass block from the opposite side.

(f) Remove the glass block and draw the completed path of the ray through the block. Measure and record the angle of refraction r and the distance x.

(g) Repeat the procedures in part (a) to (f) for angles $i = 40^0$, 50^0, 60^0 and 70^0 and record your data as shown in the Table 2.

(h) Measure and record the dimensions of the glass block as follows:

Block length =.....Width =.....Thickness =.....

Table 2

i	r	Tan r	x (cm)
30^0			
40^0			
50^0			
60^0			
70^0			

(i) Using the data in the table,

(i) plot the graph of x against tan r.

(ii) determine the gradient of the graph.

(j) Explain what the value of the gradient means.

(k) State sources of errors in this experiment.

(l) Mention any two precautions to be taken in doing the experiment.

(25 marks)