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

031/2B

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

Time: 2:30 Hours   **Tuesday, 23rd October 2012 a.m.**

Instructions

1.   This paper consists of **two (2)** questions. Answer **all** questions.

2.   Where calculations are involved show your work clearly.

3.   Marks for questions are indicated at the end of each question.

4.   Calculators and cellular phones are **not** allowed in the examination room.

5.   Write your **Examination Number** on every page of your answer booklet(s).

6.   Use $\pi = 3.14$.

1. You are provided with a Pendulum bob, Stop watch/clock, Thread, Tape measure, Retort stand and clamp. Proceed as follows:

    (a)   Set the apparatus as shown in Figure 1.
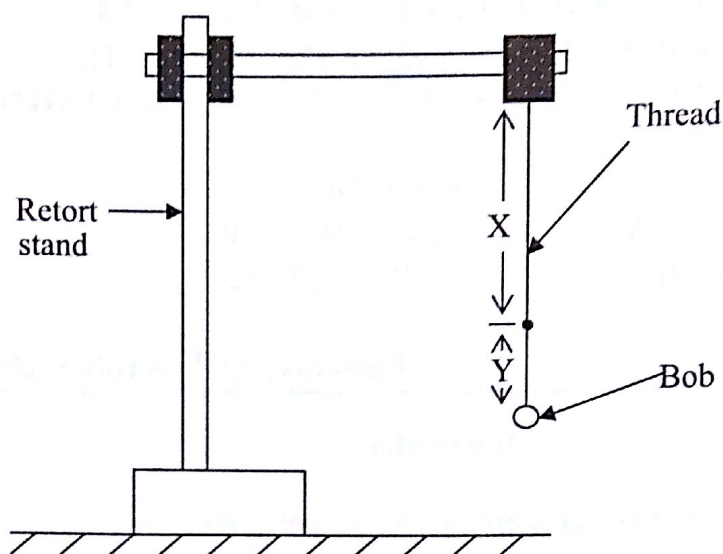

Figure 1

Note: Y is a distance from a knot to the bob which is equal to 10cm.

    (b)   Measure X = 60cm, then set the bob into oscillations by displacing it to a small angle and releasing it. Record the time (t) taken for 20 complete oscillations.
    (c)   Repeat (b) above for the length of X = 50cm, 40cm, 30cm, and 20cm.
    (d)   Record your results in a suitable table including periodic time T and T^2.
    (e)   Plot a graph of T^2 against X.
    (f)   Calculate the slope (S) of your graph.
    (g)   Read and record the T^2-intercept

    (h)   (i)   Compute the value of $\dfrac{4\pi^2}{S}$

          (ii)   Comment on the value obtained in (h) (i).

    (i)   (i)   Calculate the value of Z where $S = \dfrac{T^2}{Z}$.

          (ii)   How is Y related to Z?
    (j)   State any two (2) sources of error.
    (k)   Suggest the aim of this experiment.

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

    (a)   Place a glass block on a white sheet of paper with its largest face upper most and trace its figure ABCD. Remove the block; mark the centre of the face AB as O.
    (b)   Draw a line at O making an angle of 30º to the normal 'N' which is representing the incident ray.
    (c)   Erect two pins P_1 and P_2 on the 30º line. Return the glass block on the rectangle ABCD.

(d)   View P_1 and P_2 through face CD of the block and erect sighting pins Q_1 and Q_2 in line with the images P_1 and P_2 respectively. Remove the block and draw a line to the rectangle joining points Q_1 and Q_2 to represent an emergent ray. Finally draw a line joining point O and the point of contact E of line Q_1Q_2 with CD to represent refracted ray.

(e)   Measure the angle of refraction, r, between the normal at O and OE.

(f)   Draw the diagram for this experiment.

(g)   Repeat the procedures in 2 (c), (d) and (e) for the angle of incidence of 40° 50°, 60° and 70°

(h)   Tabulate your results as follows:

Angle of incidence, i^o	Angle of refraction, r^o	Sin i^o	Sin r^o
30			
40			
50			
60			
70			

(i)   Plot a graph of Sin i^o against Sin r^o.

(j)   What is the nature of the graph?

(k)   Find the slope of the graph.

(l)   What does the slope of the graph represent?

(m)   Read and record Sin i^o intercept of the graph.

(n)   State the relationship between Sin i^o and Sin r^o.

(o)   State a possible source of error in this experiment.

(p)   How can you minimize the error in 2 (o)?

(q)   Suggest the aim of this experiment.

Note: Attach with your answer booklet diagrams drawn on a single sheet of paper.