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

031/2

PHYSICS 2
ALTERNATIVE TO PRACTICAL
(For Both School and Private Candidates)

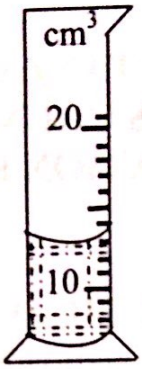
Time: 2:30 Hours **Wednesday, 17th October 2012 a.m.**

Instructions

1. This paper consists of **five (5)** questions. Answer **all** questions.
2. Marks for each question or part thereof are indicated beside the question.
3. Calculators are **not** allowed in the examination room.
4. 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. (a) Study the following instruments and provide in the space provided the name, application and the correct reading from the scale.

(i)



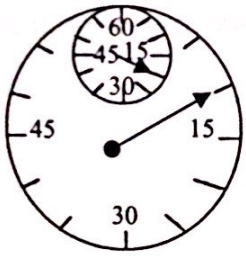
Name..... **(0.5 mark)**
Application..... **(1 mark)**
Reading..... **(0.5 mark)**

(ii)



Name..... **(0.5 mark)**
Application..... **(1 mark)**
Reading..... **(0.5 mark)**

(iii)



Name..... **(0.5 mark)**
Application..... **(1 mark)**
Reading..... **(0.5 mark)**

(b) Is there any difference in terms of taking readings for instruments in (a) (i) and (ii) above? Give reason for your answer. **(1 mark)**

(c) Explain a possible source of error when taking reading of the above instruments. **(1 mark)**

(d) Mention any four safety rules for physics laboratory. **(2 marks)**

2. Table 1 contains data of an experiment carried out with the aim of determining acceleration due to gravity g, and the height H of the Physics laboratory room from the floor to the ceiling board using a simple pendulum.

Table 1

Height from the floor to the pendulum bob, d (cm)	Time for 10 oscillations t (s)	Periodic time, T (s)	T^2 (s^2)
10	34.0	3.40	
20	33.4		11.2
30	32.8	3.28	
40	32.2		10.4
50	31.6		

(a) Complete Table 1 by obtaining the values of T and T^2. **(3 marks)**
(b) Plot the graph of T^2 against d. **(3 marks)**
(c) Determine the slope of the graph. **(1 mark)**
(d) Determine T^2 intercept. **(1 mark)**
(e) Given that $T = 2\pi\sqrt{\frac{H-d}{g}}$, determine the values of g and H. **(2 marks)**

3. A 180 watt heater and a thermometer were immersed in 0.5 Kg of water in a copper calorimeter. The data in Table 2 were collected in an experiment to determine the specific heat capacity of water.

Table 2

Temperature, T (°C)	30	36	40	45	49	54	57
Time, t (Minutes)	3	4	5	6	7	8	9

(a) Plot a graph of temperature against time. **(3 marks)**
(b) Determine the room temperature. **(1 mark)**
(c) Determine the slope of the graph. **(1 mark)**
(d) Find the specific heat capacity, c, of water. **(2 marks)**
(e) Give two reasons why the value obtained for the specific heat capacity is greater than the accepted value. **(2 marks)**
(f) State a precaution you would take in carrying out this experiment to ensure a more accurate value for the specific heat capacity. **(1 mark)**

4. In an experiment carried out with a rectangular block of Perspex, the data in Table 3 were obtained in order to verify Snell's law.

Table 3

Angle of incidence, i	30°	40°	50°	70°
Angle of refraction, r	19°	25°	30°	38°
Sin i	0.5		0.77	
Sin r	0.33	0.42		
$\frac{Sin\,i}{Sin\,r}$	1.52			1.52

(a) Complete Table 3. **(3 marks)**

(b) Plot the graph of sin i against sin r. **(3 marks)**

(c) Determine the slope of the graph. **(1 mark)**

(d) What is the physical meaning of the slope obtained in (c) above? **(1 mark)**

(e) Find the average of all values of $\frac{\sin i}{\sin r}$ computed in Table 3. **(1 mark)**

(f) Comment on the values obtained in 4 (c) and (e) above? **(1 mark)**

5. In a certain experiment, John connected the circuit as shown in Figure 1 and collected the data which he filled them in Table 4.

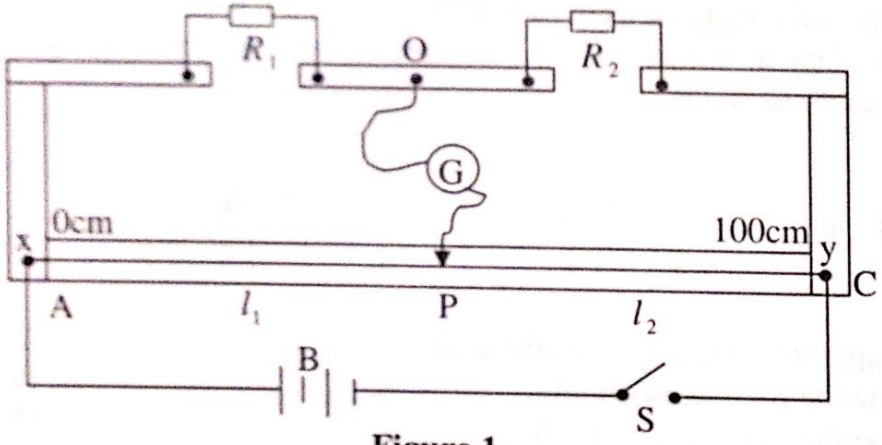


Figure 1

Table 4

R_1 (Ω)	R_2 (Ω)	l_1 (cm)	l_2 (cm)
	5.0	42.1	
	3.6		60.3

(a) Complete Table 4. **(2 marks)**

(b) Establish the formula used to find R_1. **(1 mark)**

(c) Explain briefly how the current enters the bridge when the switch S is closed. **(2 marks)**

(d) Name the apparatus xy. **(0.5 mark)**

(e) Explain why the galvanometer G reads zero when the joke is at point P. **(2 marks)**

(f) State a possible source of error in this experiment. **(1 mark)**

(g) How can you minimize the error in 5 (f) above? **(1 mark)**

(h) Suggest a title for the experiment. **(0.5 mark)**