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 Hours 30 Minutes ***Monday*, October 17, 2005 a.m.**

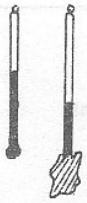
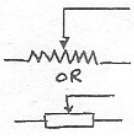
Instructions

1. This paper consists of **five (5)** questions.
2. Answer **all** questions.
3. Electronic 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).

CPB

This paper consists of *6* printed pages.

1. Fill in the gaps with correct responses.

Name of device	Sketch	(i) Physical Effect/Principle (ii) Application (uses)
(a) Spiral spring		(i) (ii)
(b)		(i) (ii)
(c) Scissors		(i) (ii)
(d) Carbon microphone		
(e)		(i) (ii)

2. In an experiment to investigate the Young's modulus of a wooden metre rule, the following data were recorded in a table as follows :

Table 1

Load (g)	0	50	100	150	200	250	300
Height h above ground (cm)	89.80	87.40	85.10	82.70		78.10	76.10
Depression d (cm)		2.40		7.10	9.30		

Length ℓ = 80 cm

Breadth b = 2.58 cm

Thickness t = 0.54 cm

(a) Complete table 1 by filling in the blank spaces. **(2½ marks)**

(b) Plot a graph of depression (vertical axis) against load (horizontal axis). **(4½ marks)**

(c) From the graph :

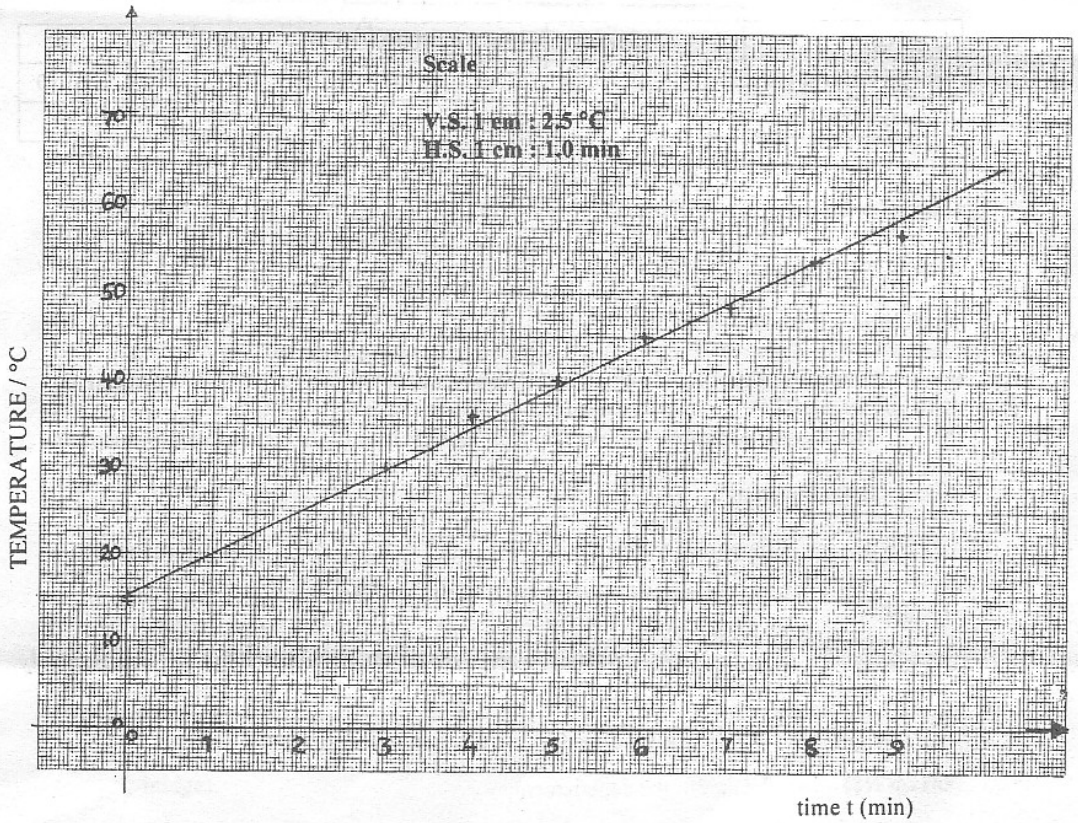
(i) Compute the slope G. **(01 mark)**

(ii) Determine Young's modulus E of the wooden metre rule given that $E = \frac{4}{Gb}\left(\frac{\ell}{t}\right)^3$, where ℓ, b and t are length, breadth and thickness respectively.

(02 marks)

3. The graph below was obtained by doing an experiment to determine the specific heat capacity of water.

A graph of Temperature Vs time.



(a) Determine the slope S of the graph. **(03 marks)**

(b) From the graph find the room temperature. **(03 marks)**

(c) Calculate the specific heat capacity of water in SI units given that $T = \frac{10800\ t}{mc}$

where T = temperature in °C
t = time in minutes
m = mass of water = 0.5 kg
c = specific heat capacity of water

(04 marks)

4. A concave mirror was used in an experiment with the arrangement shown in figure 1.

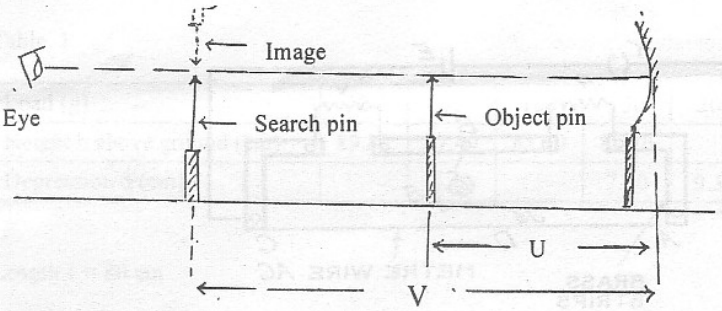


Fig. 1

The results were as follows.

Table 2

Object distance U (cm)	30	40	50	60	100
Image distance V (cm)	59.80	40.00	33.50	29.80	25.20
$\frac{1}{U}$ **(cm^{-1})**	0.033	0.025	0.020	0.017	0.01
$\frac{1}{V}$ **(cm^{-1})**		0.025	0.030	0.034	

(a) Suggest the aim of the experiement. **(01 mark)**

(b) (i) Complete table 2 by inserting the missing values. **(01 mark)**

(ii) Plot graph of $\frac{1}{V}$ against $\frac{1}{U}$. **(05 marks)**

(c) Find the average of intercepts. **(01 mark)**

(d) What is the significance of the intercepts ? **(01 mark)**

(e) Evaluate your answer in 4. (d). **(01 mark)**

5.

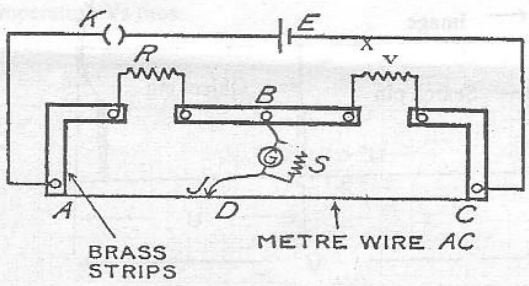


Fig. 2

The diagram above (figure 1) shows a metre bridge with two resistances X and R connected for comparison. A balance point is measured by d, the distance from the left end of the bridge. An unknown resistance X, is placed as shown and a balance point for different values of R were recorded as follows :

Table 3

Resistance R in ohms	1.0	2.0	5.0	7.0	8.0
Distance d in cm	75.00	60.00	37.50	30.00	27.30
ℓ/d					

(a) Complete table 3 by calculating the ℓ/d where ℓ = 100 cm, (the total length of the bridge). **(2½ marks)**

(b) Plot a graph of R (vertical axis) against ℓ/d (horizontal axis). **(05marks)**

(c) From the graph find the value of R where ℓ/d = 2 and ℓ/d = 3.00. **(01 mark)**

(d) From these results determine the resistance of X. **(01 mark)**