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

031/2

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

TIME : 2½ Hours. 11 November 1999 A.M.

INSTRUCTIONS

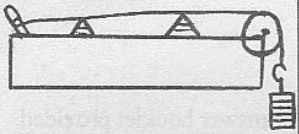
1. Answer ALL questions.
2. Write ALL your answers in the answer booklet provided.
3. Wherever calculations are involved, show your work and steps involved clearly.
4. The marks for each question or part thereof are indicated in brackets.
5. You may use the following constants where necessary:

   Acceleration due to gravity, $g = 9.8 m/s^2$

   $$\pi = \frac{22}{7}$$

This paper consists of 5 printed pages.

1. Fill in the gaps with the correct response.

Name of device	Sketch	(i) Physical effect/principle (ii) Application (use)	
(a) Erecting prism		(i) (ii)	[2]
(b)		(i) (ii)	[2]
(c)		(i) (ii)	[2]
(d) Leaf electroscope		(i) (ii)	[2]
(e) Diode valve		(i) (ii)	[2]

2. The graph given below was obtained from an experiment to determine the emf E and internal resistance, r of a cell. Use the graph to answer the following questions:

(a) (i) What is the resistance when the current is 2A? (02)

(ii) What is the current when the resistance is 9Ω ? (02)

(b) (i) What is the Y – intercept? (01)

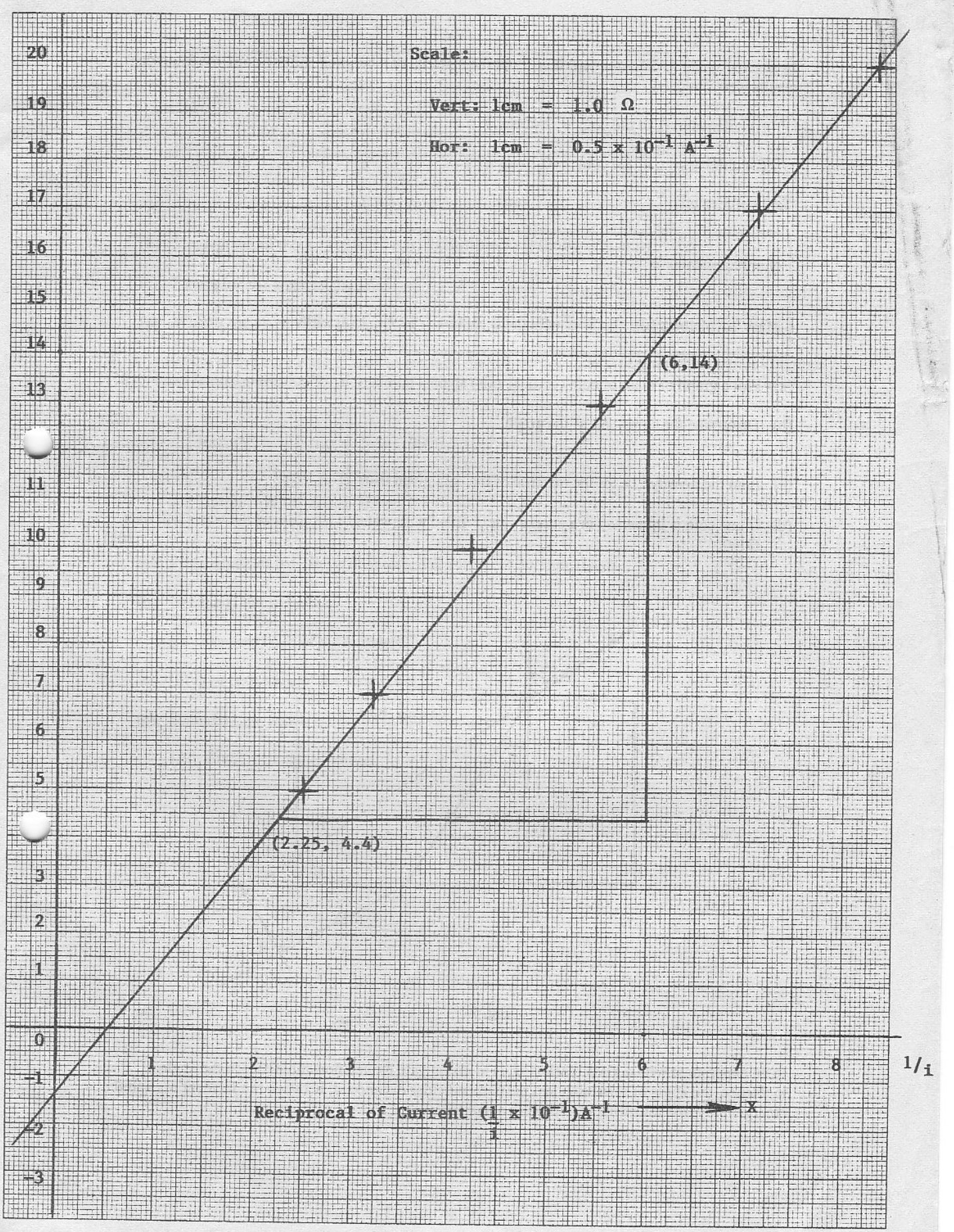
(ii) What is the X – intercept? (01)

(c) Calculate the slope of the graph. (02)

(d) The graph for the experiment is based on the equation $R = E\left(\frac{1}{i}\right) - r$. What is the significance of

(i) E and (ii) r ? (02)

GRAPH OF R(Ω) AGAINST 1/i (A^{-1})



3. In an experiment to determine the density of the material of a hundred shilling coin, the following results were obtained:

(i) diameter, d, of the coin = 2.42cm

(ii) thickness, t, of the coin = 0.22cm

Table of results

Number of coins n	2	5	8	11	14	17	20
Mass m of coins (g)	15	45	70	104	125	152	180

(a) Plot a graph of mass of coin (vertical axis) against number, n, of coins (horizontal axis) (05)

(b) Determine the slope, S, of the graph. (02)

(c) Find the density, D, of the material of the coin given that; $D = \frac{4S}{\pi d^2 t}$ (02)

(d) If one coin is immersed in a eureka can filled with water, what mass of the water will over flow? (01)

4.

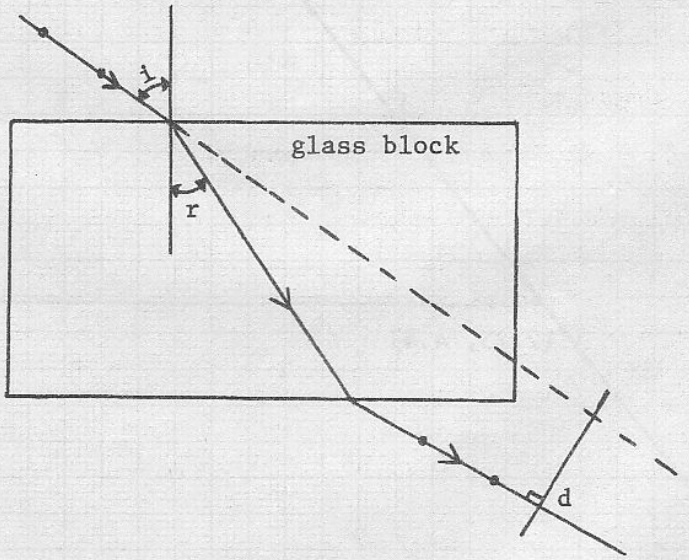


Fig. 1

In an experiment with a glass block (Fig.1) to investigate the relationship between the angle of incidence, the angle of refraction and the perpendicular distance, d, between the incident ray and the emergent ray; the following results were obtained:

i Degrees	r Degrees	d (cm)		cos r	d cos r (cm)	sin(i-r)
30	20	1.1				
40	25	1.8		0.899		
50	30	2.6				0.326
60	35	3.4		0.819	2.79	

(a) Complete the remaining columns of the table above. (02)

(b) Plot a graph of d cos r (vertical axis) against sin(i - r) (horizontal axis) (05)

(c) Determine the slope of the graph (02)

(d) What is the slope when the angle of incidence is equal to the angle of refraction? (01)

5. A voltmeter with a zero error is used to measure the p.d. across a metal resistor when various currents flow. The results were:

P.d. (V)	1.6	5.5	9.4	13.3	17.2
Current (A)	0.1	0.4	0.7	1.0	1.3

(a) Plot a graph of p.d., in vertical axis, and current in horizontal axis. (05)

(b) Use the graph to find:

(i) The zero error of the voltmeter (01)

(ii) The resistance of the resistor. (02)

(c) State the Law which is obeyed in this experiment.

NB: Emphasize the condition. (02)