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

031/2 **PHYSICS 2**

ALTERNATIVE TO PRACTICAL

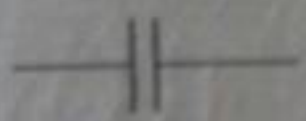
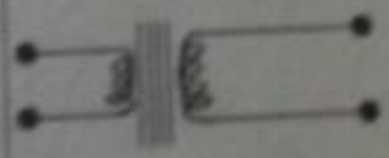
(For Both School and Private Candidates)

TIME: 2½ Hours 10 November 2000 A.M.

Instructions

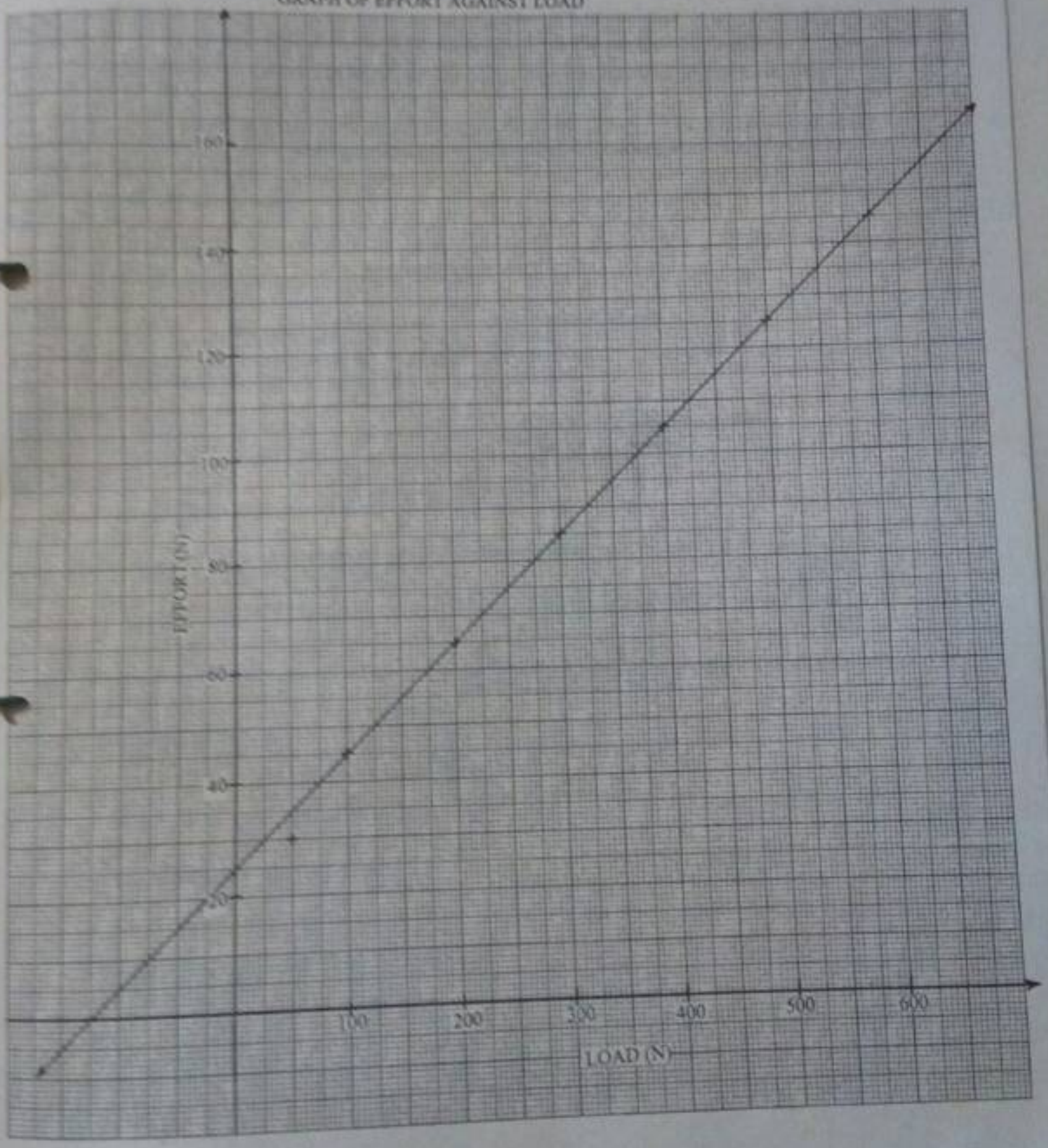
1. Answer ALL questions.
2. Write ALL your answers in the answer booklet(s) provided.
3. Whenever calculations are involved, show your working clearly.
4. Marks for each question or part thereof are indicated in parenthesis.
5. You may use the following constants where necessary:
   Acceleration due to gravity $g = 9.8\ m/s^2$
   $\pi = \frac{22}{7}$
6. Write your Examination Number on every page of your answer booklet(s).

1. Fill in the gaps with the correct response:

Name of device	Sketch	(i) Physical effect/principle (ii) Application/use	
(a) Eureka can		(i) (ii)	(02 marks)
(b)		(i) (ii)	(02 marks)
(c)		(i) (ii)	(02 marks)
(d) X-rays tube		(i) (ii)	(02 marks)
(e) Transistor		(i) (ii)	(02 marks)

2. The graph given below was obtained from an experiment carried out to investigate the performance of a single movable pulley system with a velocity ratio of five.

GRAPH OF EFFORT AGAINST LOAD



Use the graph to find: (02 marks)

(a) the effort; (02 marks)

(b) the mechanical advantage; (02 marks)

(c) the efficiency corresponding to a load of 450 N;

(d) if a man uses the above pulley system to lift a mass of 50 kg at a velocity of 0.1 m/s determine the power rating of the machine as developed by the man. (04 marks)

3. In an experiment done by a student to determine the relative density of a stone by the principle of moments and Archimedes principle, the student obtained the following results:

Diagrams:

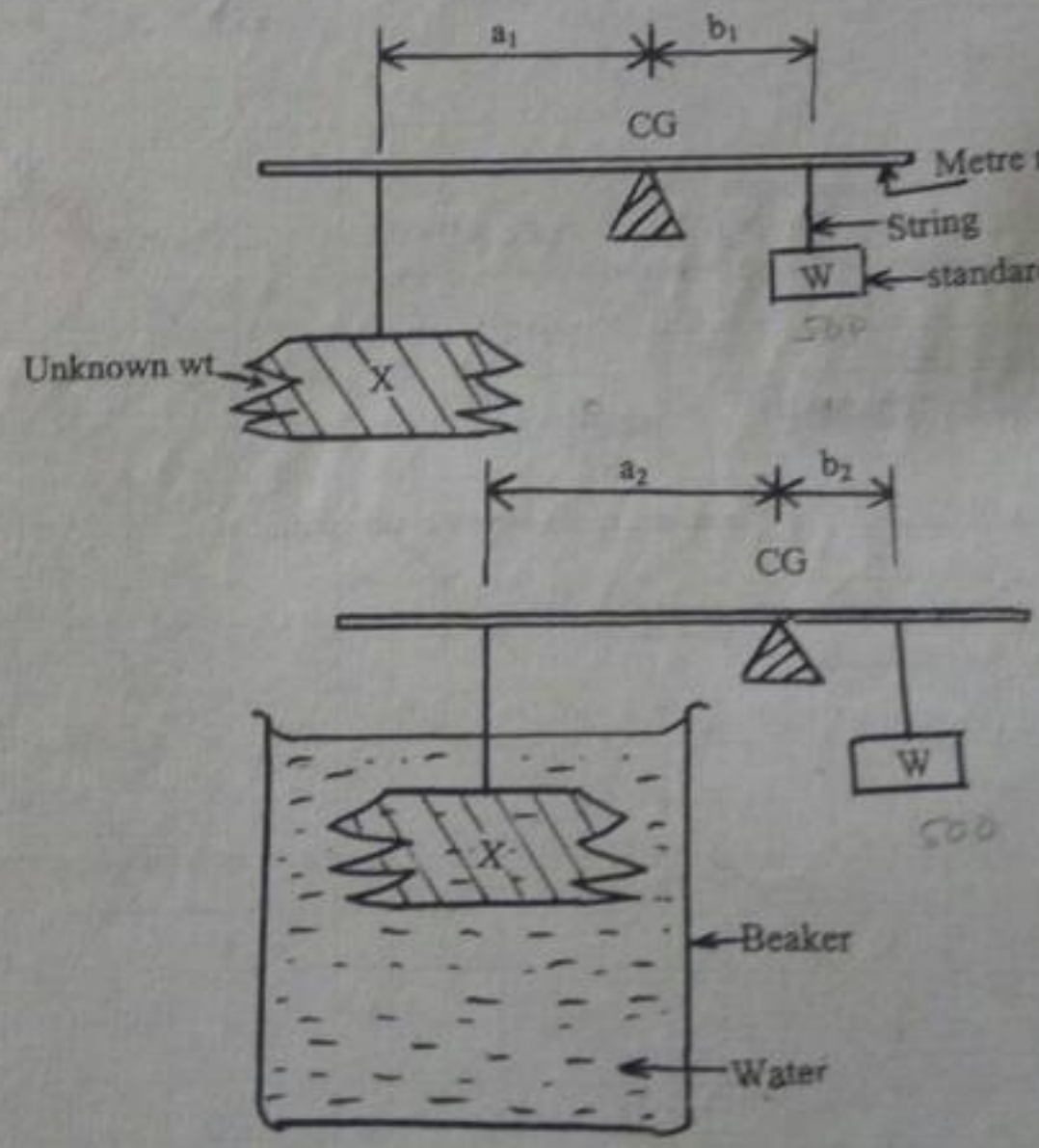


Table of Results:

W = 50 g.

Measurements when in air			Measurements when in water			Apparent weight
a_1 (cm)	b_1 (cm)	$W.\frac{b_1}{a_1} = x$	a_2 (cm)	b_2 (cm)	$W.\frac{b_2}{a_2} = X_w$	$X_{app} = X - X_w$
40	25.20	31.50	40	15.70		19.63
35	22.10		35		19.40	12.17
30	19.00	31.67	30	11.50		
20	12.50		20	7.60	19.00	
Total			Total			

(a) Complete the table (05 marks)

(b) Using the appropriate data from the table, determine the relative density of the stone X. (03 marks)

(c) Mention two possible sources of error. (02 marks)

4. In an experiment to determine the relationship between the length of a vibrating string and its frequency at constant tension, the length of the string was varied in order to tune the string to a series of tuning forks. The results obtained were tabulated as follows.

Frequency of forks (Hz)	250	286	333	400	500
Length of string, ℓ (cm)	80	70	60	50	40

(a) Compute the values of $^1/_\ell$ (cm^{-1}) and draw the appropriate graph. (07 marks)

(b) Using the graph in (a) above state the relationship between the frequency of vibrations and the length of the stretched string. (02 marks)

(c) Determine the frequency of an unmarked fork which was in tune with 45 cm of the string. (01 mark)

5. In an experiment to determine the – emf E and internal resistance r of a certain battery, the following readings of the current i were recorded for different values of resistance R:

Resistance R (Ω)	0.70	2.50	5.50
Current i (A)	5.00	2.00	1.00

(a) Calculate the reciprocal $^1/_i$ (A^{-1}) for each value of i; (01½ marks)

(b) Plot a graph of $^1/_i$ against R; (05 marks)

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

(d) Find the values of E and r using your graph. (01½ marks)