

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

131/3A

PHYSICS 3A
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

Time: 3:10 Hours

Wednesday, 15th February 2012 a.m.

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question **Number 1** carries 20 marks and other **two (2)**, 15 marks each.
4. Calculations should be clearly shown.
5. Mathematical tables and non-programmable calculators may be used.
6. Cellular phones are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet (s).
8. Use the following:
 $\pi = 3.14$.



1. You are required to determine the acceleration due to gravity g .

Proceed as follows:

- (a) Suspend a pendulum bob from the table such that its thread length is 100 cm (see Figure 1).
- (b) Set the bob oscillating through a small angle and record the time, t , for 20 complete oscillations. Determine the period T .

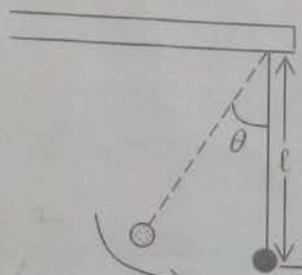


Figure 1

- (c) Repeat procedures (a) - (b) above for values of $l = 80$ cm, 60 cm, 40 cm, and 20 cm.
- (d) Tabulate your results.
- (e)
 - (i) Plot a graph of l against T^2 .
 - (ii) Use the graph and the relation $gT^2 = 4\pi^2 l$ to determine the value of g .
- (f) State two possible sources of error in this experiment.

2. The aim of this experiment is to investigate the rate of cooling of calorimeter containing hot water.

Proceed as follows:

- (a) Measure the room temperature θ_R .
- (b) Heat the beaker containing water on a burner until the water reaches a temperature of about 90°C . Pour the hot water into the calorimeter to about $\frac{3}{4}$ full.
- (c) Starting with temperature = 80°C , record the temperature of water at the interval of one (1) minute. Do this until the temperature is about 55°C .

Note: Stir water thoroughly until the end of your experiment.

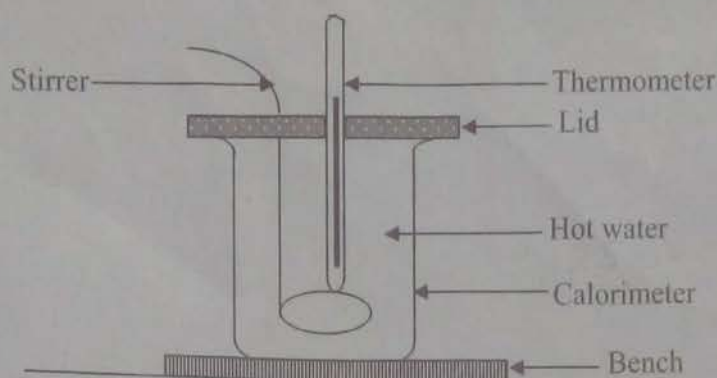


Figure 2

- (d) Record the values as shown in Table 1.

Table 1

t(min)						
θ °C						

- (e) Plot the graph of θ °C against time t.
- (f) From your graph in 2 (e), choose five (5) points along the curve (θ , t) and record the rate of change of temperature and the excess temperature $\theta - \theta_R$ corresponding to each of the five points. Record your results as shown in Table 2.

Table 2

Temperature θ °C					
Rate of change of temperature $\frac{\Delta \theta}{\Delta t} / \frac{^{\circ}\text{C}}{\text{min}}$					
Excess temperature $\theta - \theta_R$ °C					

- (g) Plot the graph of $\frac{\Delta \theta}{\Delta t}$ against $\theta - \theta_R$.
- (h) In your own words, comment on the graph in (g).

3. In this experiment you are required to estimate the resistance r_a of an ammeter and e.m.f. E of the cell.

Proceed as follows:

- (a) Connect the circuit as shown in Figure 3.

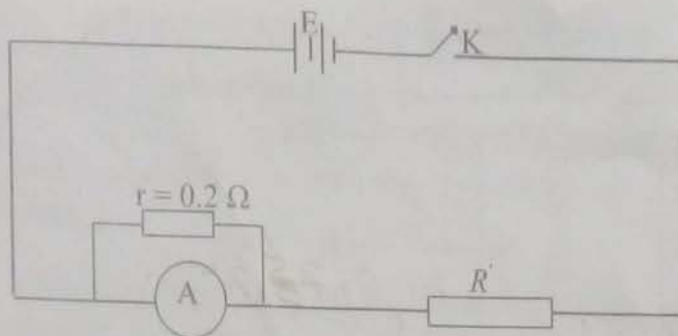


Figure 3

- (b) Set $R' = 5\Omega$ and record the ammeter reading I . If $R = R' + 1.5$ where 1.5 is resistance in ohm of the two new dry cells connected together to form E , record the values of R and those of the ammeter reading.
- (c) Repeat the procedure in (b) above. For values of $R' = 4\Omega, 3\Omega, 2\Omega$ and 1Ω respectively.

- (d) Tabulate your results and include $\frac{1}{I}$.

- (e) Plot a graph of R against $\frac{1}{I}$.

- (f) Use your graph to determine the resistance of the ammeter r_a and the e.m.f. E of the cell.

The relation governing the experiment is

$$\frac{E}{I} = R \left(1 + \frac{0.2r_a}{(0.2 + r_a)R} \right).$$

- (g) Mention a source of error in this experiment.