

P510/2
PHYSICS
Paper 2
(Practical)
2026
3 hours



UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

PHYSICS

Paper 2

3 hours

INSTRUCTIONS TO CANDIDATES:

*This examination paper consists of **two** compulsory items.*

*Use **blue** or **black** ink. Any work done in pencil **except** graphs and diagrams will **not** be scored.*

Scores are awarded mainly for a clear record of the observations actually made, for their suitability, accuracy and for the use made of them.

Details on the question paper should not be repeated in the responses.

Graph paper is provided.

Silent non-programmable scientific calculators may be used.

1. A patient visited a health centre complaining of not seeing the distant objects clearly, yet nearby objects appear clear. After medical examination, the Optician discovered that the eye muscles were unable to make the eye lens thin enough to focus light from a distant object on the retina.

The Optician prescribed spectacles fitted with lenses, which he claimed were of focal length in the range, 14.0 - 15.0 cm. The patient purchased the spectacles and began using them. However, after a few days, the patient experienced some level of discomfort and felt that the spectacles provided may not be of the right specifications.

Determined to verify the cause of the discomfort, the patient went back to the Optician. The Optician then suggested that there is a need to verify the properties of the lenses using a **scientific investigation**.

You are provided with the concave and convex lenses that were given to the patient for verification. One of the lenses has similar properties to the ones in the spectacles.

Task:

Investigate whether the lenses in the spectacles conform to the required specifications, and present your findings in a scientific report.

2. The heating element of an electric kettle is made of a thin wire whose resistance per metre length is 14.0 - 16.0 $\Omega \text{ m}^{-1}$. Recently while one of the teachers was boiling water for tea, the element got damaged.

The laboratory attendant wishes to replace the damaged element. Available is a thin bare wire which she intends to use for the replacement. She remembers that one of the conditions prescribed in the manual is that, the replacement of the material of the heating element of the electric kettle requires a bare wire of similar properties to that of the original one the manufacturer had fitted. However, the resistance per metre length of the wire the attendant has is not known.

You are provided with the bare wire and the other apparatus required for the investigation.

Task

Follow the instructions provided and use the result obtained to give feedback to the attendant.

Part I:

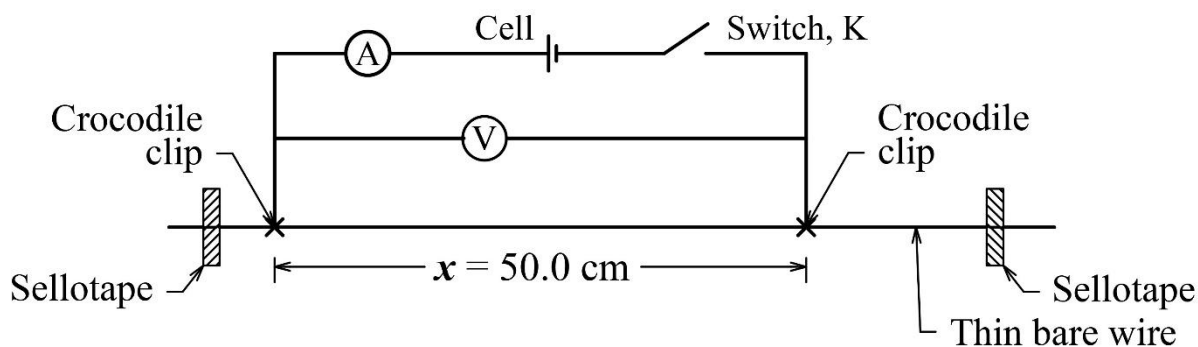


Fig. 1

- Connect the circuit as shown in the figure 1.
- Close switch, K.
- Read and record the ammeter and voltmeter readings, I and V , respectively.
- Open the switch.
- Calculate the resistance per metre length, T_1 , of the bare wire using the expression: $V = IT_1x$.

Part II:

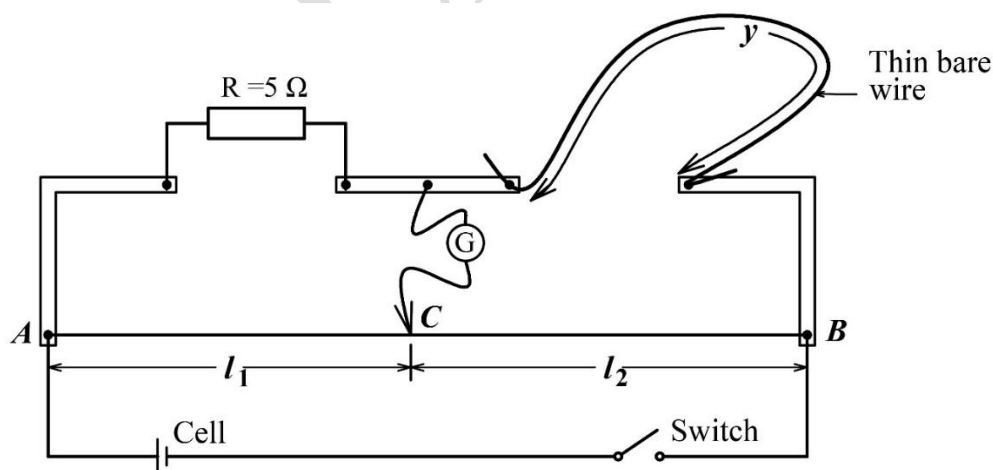


Fig. 2

- Connect the circuit as shown in the figure 2.
- Adjust the length of the thin bare wire provided to, $y = 0.200 \text{ m}$.
- Close the switch and locate the balance point, C, along the bridge wire AB.
- Read and record (in metres), the balance lengths, l_1 and l_2 .

- (e) Open the switch.
- (f) Repeat steps (b) to (e) for other values of, $y = 0.300, 0.400, 0.500, 0.600$ and 0.700 m.
- (g) Tabulate the results including values of $\frac{l_1}{l_2}$ and $\frac{1}{y}$.
- (h) State sources of errors and their corresponding precautions taken to mitigate them.
- (i) Plot a graph of $\frac{l_1}{l_2}$ against $\frac{1}{y}$.
- (j) Obtain slope, S , of the graph.
- (k) Obtain the resistance per unit length, T_2 , of the bare wire using an appropriate expression containing T_2 , T_1 and S .
- (l) Provide feedback to the laboratory attendant, based on your finding.