

535/2
PHYSICS
Paper 2
July - August,
2024
2 hours



UGANDA MUSLIM TEACHERS' ASSOCIATION
UMTA JOINT MOCK EXAMINATIONS - 2024

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of **two** examination items.*
- *Answer only **one** item.*
- *Any additional item answered will **not** be scored.*
- *Candidates are **not** allowed to start working with the apparatus for the **first quarter (15minutes) of an hour**. This time is given to enable candidates; read the items thoroughly, checking for the apparatus they will need and plan appropriately.*
- *A graph paper will be provided.*
- *Mathematical tables and silent non-programmable calculators may be used.*

Item 1.

- ✓ A farmer dealing in the grafting of coffee seedlings realized that the grafting scissors used were no longer providing an efficient force to cut the grafting stems appropriately. The farmer is advised by the technician to replace the spring in the grafting scissors to make them more efficient. **Figure 1** shows the grafting scissors whose spring is to be replaced. The technician recommends a replacement of the spring with another **one** of force constant between 18 Nm^{-1} - 25 Nm^{-1} . The springs available on market found by the farmer did not have the specified force constants labelled. Therefore, this necessitates for a scientific investigation.

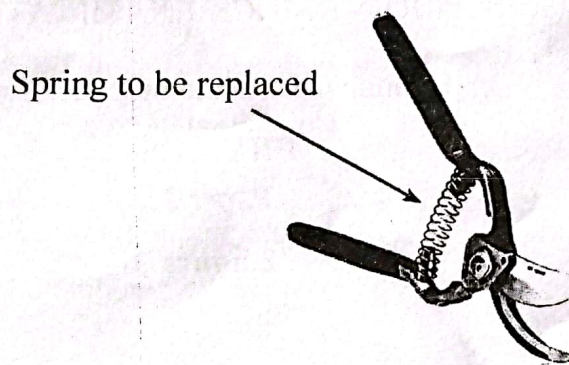


Figure 1: Grafting Scissors.

Task:

As a physic student, you are provided with a spring of similar physical properties and dimensions as the **one** found by the farmer in the market. Carryout a scientific investigation to determine the force constant of the spring provided and advise the farmer whether it is appropriate to replace the one in the grafting scissors. **Figure 2** gives an illustration of the scientific setup having other materials that can be of use during the scientific investigation.

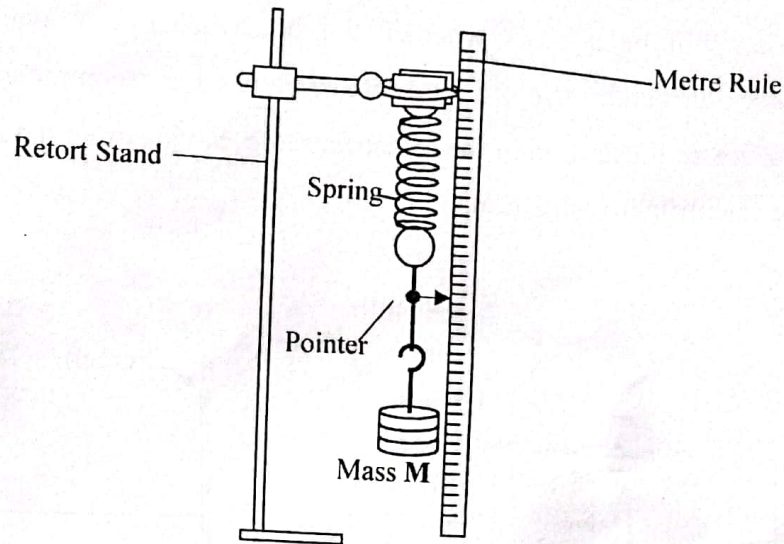


Figure 2: Illustration of the Scientific setup.

Hint: Appropriate and neat recordings of your investigation are necessary.

Item 2.

A school nurse carried out a study on the symptoms exhibited by students in the sickbay. The nurse recommended to the headteacher that students should wash their hands with warm water after visiting the school latrines. This was aimed at reducing diarrhoea among the school students' population. To achieve this, the headteacher was advised to put up a water heating system that uses a concave solar concentrator. The appropriate concave solar concentrator that concentrates incident radiations at its focal point ranges from **80cm** to **220cm** of its reflecting surface. The headteacher does not know whether the available concave solar concentrator that was donated by the old students of the school can be used. Therefore, the headteacher seeks to be scientifically advised about the available solar concave concentrator in the school.

Task:

You have been provided with a concave mirror whose focal length is $\left(\frac{1}{10}\right)^{th}$ of the focal length of the available solar concave concentrator. As a student of physics, carry out a

scientific investigation to determine the focal length of the concave mirror. The investigation will be a basis whether the headteacher can avail the solar concave concentrator donated by the old students to be used as recommended by the school nurse. **Figure 3** gives an illustration of the scientific setup, having other materials that can be of use during the scientific investigation.

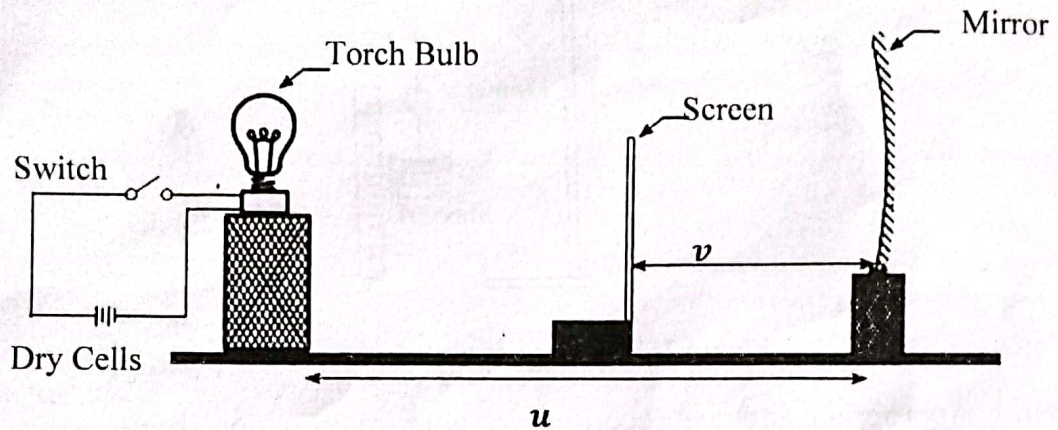


Figure 3: Illustration of the Scientific setup.

Hint:

(i) Where necessary a student can use $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

f = focal length

u = object distance from the mirror

v = image distance from the mirror

(ii) Appropriately and neat recordings of your investigation are necessary.

END