



UNNASE MOCK EXAMINATIONS

Uganda Certificate Of Education

PHYSICS (THEORY)

Paper 1

Time: 2Hours 30Minutes

INSTRUCTIONS TO CANDIDATES:

- This paper consists of two sections; **A** and **B**. It has seven examinations items.
- Section **A** has **THREE** compulsory items.
- Section **B** has **TWO** parts; **I** and **II**. Respond to **one** item from **each** Part.
- Respond to **FIVE** items in all.
- Any additional item(s) responded to will not be scored.
- All responses **MUST** be written in the booklet provided

SECTION A

Respond to **all** the item from this Section

ITEM 1

A community is excited for an event at 3:00 PM, where the sun will suddenly darken. They are told to pour water in a basin to safely view the reflection and avoid looking directly at the sun. They notice the reflection seems too close to the water surface, which puzzles them. One member insists on staring at the sun despite warnings. They learn the sun's direct light differs from reflected light, depending on frequency. They want to understand the event, the image behavior, and the light types.

Hint: Direct sunlight has a wavelength of $6.50 \times 10^{-11} \text{m}$, reflected light for seeing is $2.50 \times 10^{-11} \text{m}$, and light speed is $3 \times 10^8 \text{ms}^{-1}$.

Task: As a Physics student, explain:

- (a) The occurrence of the event.
- (b) Why the image looks closer to the water surface.
- (c) How the two lights differ.
- (d) One use for each type of light.

ITEM 2

A group of senior one student is preparing a project for visitation day. They know the moon changes shapes and sometimes disappears but do not know why. They need an illustration of the Earth, Sun, and Moon showing their positions and the distance between Earth and Moon for their model. One project includes a NOT gate, and they want its truth table. They have asked you for help.

Hint: Light from the moon takes 1.3 seconds to reach Earth, and the speed of light is $3 \times 10^8 \text{ms}^{-1}$.

Task: As a Physics student, help them:

- (a) Create their illustration.
- (b) Explain the changes in shapes of the moon.
- (c) Calculate the distance between the earth and the moon.
- (d) Provide the truth table for the NOT gate and any two uses of this gate.

ITEM 3

A farmer bought wheat for an agricultural fair and passed through a radiation scanning machine that checked his bags. He was amazed at how it could see inside and wants to know how it works, plus why it's not used to scan people directly. At the fair, he also bought fertilizer for his garden, but the label warned it's radioactive and should not be stored long. He bought an initial mass of 500 grams, and the fertilizer's half-life is 14 days. Now, the current mass is 125 grams. He's worried if it still works well for his plants and heard it's not active after 2 months.

Task: As a physics student,

(a) Help him understand

- i) With an illustration how the machine scans bags.
- ii) Why it's not used to scan people directly.
- iii) If the fertilizer can still be used now.

(b) List two uses of particles like those in the fertilizer.

SECTION B

PART I

*Respond to **one** item from this Part*

ITEM 4

A school wants a cooking system to cook 50 kg of beans without burning them by keeping the temperature safe. They need to set cooking time based on the bean amount. For 50 kg of beans, they use 25 liters of water. The specific heat capacity is $2000 \text{ J kg}^{-1}\text{C}^{-1}$ for beans, $4200 \text{ J kg}^{-1}\text{C}^{-1}$ for water, and $500 \text{ J kg}^{-1}\text{C}^{-1}$ for the saucepan. The temperature rises from 20°C to 90°C during cooking. Their current electric source is 2000 watts, but they plan to switch to solar energy. They need help with this change.

Hint: Mass of the saucepan = 5 kg

Task: As a physics student, help them:

- (a) Estimate the cooking time.
- (b) Suggest and explain to them a system to monitor temperature.
- (c) Compare electric and solar energy.
- (d) List two other uses for the temperature control system.

ITEM 5

A family bought land in a windy area where strong winds often lift roofs off houses, leaving walls safe, which confuses the father. He is told to build a strong house with good ventilation for the heat but does not want to spend much on it. He likes mud to save money, but people suggest concrete. To compare the materials, they tested samples: each is 0.50 m long and 0.16 m wide, with a cross-sectional area of 0.020 m^2 . They placed each sample in a machine and applied a steady force of 50,000 N. The mud sample shrank by 10 mm, while the concrete sample shrank by only 0.1 mm. He needs help understanding this.

Hint: A better material has a bigger stress strain ratio.

Task: As a Physics student:

- (a) Explain why wind lifts only the roof.
- (b) Advise on the need for ventilation materials.
- (c) Decide if mud or concrete is better.
- (d) List two uses of the principle that lifts the roof.

Part II
*Respond to **one** item from this Part*

ITEM 6

A man runs a small speaker business. One of his speakers stopped working, so he opened it and noticed it has just a few parts. He is curious how these parts create sound. He called a technician, who checked it and said a resistor in the amplification system, which uses a potential divider, might be damaged. The speaker has an input voltage of 12 V, an output voltage of 4 V, and a fixed resistor of $200\ \Omega$. The man needs help understanding this.

Task: As a Physics student:

- (a) Help him;
 - (i) Explain with illustrations how the speaker produces sound.
 - (ii) Briefly describe how the potential divider system works.
 - (ii) Calculate the unknown resistor's value.
- (b) List two uses of potential divider systems.

ITEM 7

A small electronics shop owner is concerned about a phone charger he sell. The charger uses a mains adapter with an input power of 4.8 W at 230 V, but customers say it charges slowly. The owner wants to check the input current and efficiency, labeled as 5 V DC with a current range of 0.1 A to 0.5 VA. They suspect the switch from AC to DC might be causing issues and want to know how this conversion works. An efficient phone charger should have an efficiency of 85%. The shop owner has requested for your help.

Task: As a Physics student:

- (a) Confirm if the charger is efficient.
- (b) Explain with illustrations how the conversion happens.
- (c) State two uses of a component in this charging system.

END

535/2

PHYSICS

Paper 2

2 HOURS



UNNASE MOCK EXAMINATIONS

UGANDA CERTIFICATE OF EDUCATION (UCE)

PHYSICS PAPER 2

535/2 (PRACTICAL)

Time: 2 Hours

INSTRUCTIONS TO TEST-TAKERS:

- This paper consists of two (2) examination scenarios (items).
- Respond to one scenario (item) only.
- Test-takers are **NOT** allowed to start working with the apparatus for the **first 15 minutes**. This time is to allow the test-takers read the scenarios (items) thoroughly, and as well check the apparatus they need and plan accordingly.
- Graph paper will be provided
- Scientific and non-programmable calculators can be used.
- Untidy and crossed responses (work) will lead to reduction in the scores.

ITEM ONE (1):

On one rainy day, the trader's umbrella was blown off by strong winds. The mechanic discovered that the spring of force constant ranging from 60Nm^{-1} to 120Nm^{-1} , in the umbrella was destroyed and needed replacement. The trader bought a new spring without specification from a nearby hardware, and approached you for help

TASK

You are provided with a spring from the laboratory, with similar properties as the one bought by the trader and whose force constant is half of that in the umbrella, advice the trader whether it can work in the umbrella.

HINT: (In your report include the following in your report; Aim, variables (Independent, dependent and controlled), hypothesis, procedure, errors anticipated, precautions to mitigate the errors, present data accurately (At least 5 sets), analyse data (Using graph) and advice/recommend.

ITEM TWO (2):

In one of the schools, during the project work, S.4 learners chose to make a reflecting telescope. All the other materials were available apart from the concave mirror of radius of curvature between 18.0cm and 22.0cm inclusive. A person donates a concave mirror to the learners, but it did not have any label on it, and the learners came to you for assistance.

TASK

You are provided with a concave mirror from the laboratory with similar properties as the one donated, determine if it is fit for use by the learners in their telescope.

HINT: (In your report include the following in your report; Aim, variables (Independent, dependent and controlled), hypothesis, procedure, errors anticipated, precautions to mitigate the errors, present data accurately (At least 5 sets), analyse data (Using graph) and advice/recommend.

END