

535/1

Physics

Paper 1

July/August 2025

2½ hours

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of education

PHYSICS

PAPER 1

(Theory)

2HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

- This paper has **two** sections **A** and **B** and **seven** examination items.
- Section **A** has **three** compulsory items.
- Section **B** has **two** parts; I and II. Answer **one** item from each part.
- Answer **five** items in all
- Any additional item(s) answered will not be scored

Turn over

Item 1

Recently your cousin enrolled in an astrophysics course in one of the outside countries. A few days later, she called her parents in Uganda by 9 a.m local time in that country. However, in Uganda it was 8.00 p.m. Her parents had just received the news that the full moon had been sighted using satellite communication, indicating the start of fasting for the holy month of Ramadhan. During the phone conversation, she mentioned that her first lecture was about how occurrences of seasons come about, and they were curious about the significant time difference between the two countries.

Tasks

As a physics learner, help the parents to understand;

- the cause of difference in time between the two countries.
- different phases of the moon
- How seasons come about on earth
- How it is possible to talk to her parents.

Item 2

A new company has just built next to your home, and while they have hired security guards, the security cameras they intended to purchase are currently out of stock. At the moment, they were looking for a basic tool that would enable them view over the wall and what is outside the perimeter fence. In addition, the company has been advised to install a laser rather than a regular light bulb for night time security.

Hint

Available is a plane mirror and a glass prism

The laser chosen for the security system has a wave length of $5.32 \times 10^{-11} \text{m}$

Speed of light in a vacuum is $3 \times 10^8 \text{ms}^{-1}$

Frequency of laser suitable for security system should be less than $6 \times 10^{14} \text{Hz}$.

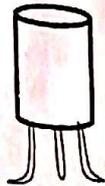
Task

As a physics student;

- Choose between a plane mirror and a glass prism for the design of the simple instrument and explain your choice with reasons.
- Use a diagram to illustrate the design and operation of the simple instrument.
- Explain to the company how the regular light bulb is different from a laser
- Advise on whether the laser purchased is suitable for their needs.

Item 3

A certain high way restaurant in one of the towns in Uganda is known to provide warm water to its customers for washing hands. An attendant who works in this hotel was given two similar plastic cylindrical tanks each with a cross-sectional area of 18380cm^2 and height of 5.5m . One of the tanks is painted white and the other is painted black. The attendant is supposed to store 10m^3 of warm water in any of the tanks. She is worried on which tank she can use to keep water and accommodate all the available water. To ensure smartness in the restaurant, each tank is supported on plastic stands as shown in the figure.



Task

As a learner of physics,

- (a) Help to explain to the attendant;
 - (i) the capacity of the tank she would use to store the required amount of water.
 - (ii) the type of tank that would keep water for customers at required temperature.
- (b) If one of the tanks was to be used for hand washing and the owner of the restaurant wants to put a tap on it,
 - (i) Redraw the figure and show him by letter, T, the position where the tap can be put.
 - (ii) Explain to the restaurant owner on the choice of position T.
- (c) What advice would you give to the restaurant owner on the measures he would ensure for the tank stand to withstand the weight of the tank for a long time?

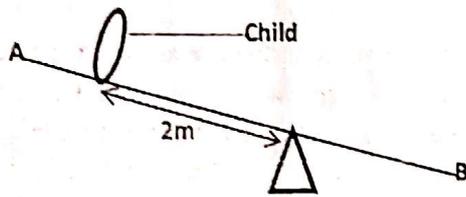
SECTION B

Part 1

Answer one item from this part

Item 4

The manager at a children's play centre is worried about the reduced number of children who use the see saw in the afternoon when it is hot. The children who were asked why they did not use the see saw in the afternoon said it was very hot. The see saw AB is metallic, of length 6m painted black and is pivoted at its centre. On a certain day, a child of mass 45kg wanted to play on the see saw but was alone.



One of the workers whose mass was 55kg decided to play with the child but was not sure if the see saw would balance when he sat mid-way between the pivot and end B which is 1.5m from the pivot. He also wondered whether to adjust his position towards the pivot or away from it if another child was on the same side as the first.

Task

Use your knowledge of physics;

- to determine if the see-saw would balance when the worker was seated mid-way between the pivot and end B.
- Advise the worker on what to do to make see-saw balance again in case another child sat close to the first.
- Explain to the manager what made the see-saw hot in the afternoon
- Suggest to the manager measures that can be taken to ensure that the see-saw does not become hot.

Item 5

A certain team of sailors was navigating along Lake Victoria. The team was involved in a series of violent thunderstorms at the lake. They lost the direction of their journey. Some members thought of sailing any how until they meet the shore while others refused because they knew fuel would get used up before arriving.

Hint. A steel sewing needle, 2 bar magnets, circular piece of plastic, medium sized bowl and water were available for the sailors.

Task

As a student of physics

- Help the sailors to determine the direction for their journey.
 - Comment on the effectiveness of what you have designed
- Provide guidance on how the bar magnets can safely be stored.

PART II

Answer *one* item from this part

Item 6

On a rainy day, a certain house was struck by a flash of light from the sky, instantly causing a fire which burnt part of the electrical wiring in the house. Luckily, the family members who were inside the house remained safe, but were advised to always take precautions while it is raining.

Task

Using your knowledge of physics;

- (a) Explain to the home owner how he can safe guard his house from such occurrences in the future.
- (b) Suggest precautions the family members should always take to be safe when such a situation arises.

Item 7

A house hold with various appliances, 2.9kW cooker used for 180 minutes daily, 10 bulbs of 40W each used for 8 hours daily and a 2.9kW water heater used for 120 minutes daily is connected to a 240V mains supply. The land lord was discouraged from connecting the sockets in series by an electrician who also emphasized earthing of the sockets. The land lord intends to spend shs. 80,000/= on electricity every week.

Hint:

One unit of electricity costs shs. 1000. Use your knowledge of physics to;

Task

- (a) explain why the electrician made the recommendations above.
- (b) determine if the amount budgeted for is sufficient.
- (c) identify ways of reducing the electricity bill.

END