

535/1

PHYSICS

Theory

Paper 1

November 2024

2½ hours



ASK INTEGRATED TEACHER'S EXAMINATIONS BUREAU LTD

Uganda Lower Secondary Certificate of Education

END OF YEAR ASSESSMENT 2024

PHYSICS PAPER 1

SENIOR THREE

(Theory)

2½ Hours

INSTRUCTIONS TO CANDIDATES:

This paper consists of two sections A and B

*This paper contains **seven** items. Answer **5** items only*

*Section A is **compulsory***

*Section B contains two parts (i) and (ii) attempt **one** item from **each** part*

*Any additional item answered **will not** be scored*

All responses should be answered on answer booklets provided

Graph papers will be provided

Silent non programmable calculators and mathematical tables can be used

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SECTION A (COMPULSORY)

Item 1

During an English lesson in senior two which normally takes place in the school main hall, Joan one of the students has always been complaining that when she sits in front, she is unable to see letters on the chalkboard clearly, she always wants to seat at the back of the class but the English teacher doesn't allow her to sit at the back thinking that she will not be attentive. Ketra is also a student in this class, she found out that whenever the **main hall is empty, and** noise is made, a lot of **repeated sound** is heard which is never heard when the main hall is full of students, this has always puzzled her

Task

As the a physics student help and explain to;

- a) The English teacher and the entire class the reason why Joan is **unable to see** clearly when she sits in front of the class and what should be done to solve this problem
- b) Ketra the cause of the repeated sounds when the hall is empty

Item 2

In a certain country, a Television (TV) reporter was reporting live near the ocean about the high tides during night time. Viewers in another country were watching the live broadcast of the news bulletin during day time. The viewers wondered how it could be day and night at the same time, and how the event in one country could be watched live on TV in another country.

Task

Using your knowledge of physics to help the viewers to understand;

- (a) The possibility of it being day in one place and night in another place.
- (b) The occurrence of High Ocean tides.
- (c) How an event in one place can be broadcast live in another country.

SECTION B

PART I

Attempt one item from this part

Item 3

Uganda national Bureau of standards is an organization which checks on the standards and purity of products in the country. In its campaign at the start of the year, they visited a new company at midday with the temperature of the environment at 30°C which is going to manufacture cooking oil. They were given a sample of cooking oil which had a temperature of 10°C , mass $1,104\text{g}$ in a container in form of a cuboid with a length of 5cm , width of 3cm and height of 8cm painted black. Unfortunately, they had not moved with the necessary equipment so they decided to take the sample back to their laboratory for testing which is to be done when the oil is at 10°C and they also have a standard quantity for oil which is pure.

Task:

As a learner of physics, how would you ensure that you provide an accurate report about the standard of the oil produced by the company?

Item 4

During the midday heat of an extremely hot day, district engineers made a visit to a construction site situated near a primary school. However, one of the engineers expressed concern about a foul odor coming from the primary school latrines. This prompted him to approach the school administrators, who admitted their lack of knowledge regarding the cause of the odor spread, attributing it to hot weather conditions beyond their control. A week later the engineers presented their findings:

- Some construction materials lacked sufficient mechanical properties.
- Carrying concrete on their heads posed a risk to the builder's safety. They urged them to continue using concrete however recommended reinforcing concrete for increased strength.
- A small material of the same type as the iron bars used at the site measuring 14cm in length, exhibited an extension of 0.3cm when subjected to a load of 20kg .

This information caused confusion among the builders.

Hint: *The diameter of the iron sample material (having the same properties as the iron bars used at the site) was $7 \times 10^{-2}\text{mm}$, the recommended iron bars should have a Young's modulus of at least $4.0 \times 10^9\text{Nm}^{-2}$, acceleration due to gravity, $g = 10\text{ms}^{-2}$*

Task:

Having acquired some physics knowledge, help

- a) The builders understand
 - i) The emphasized mechanical properties highlighted in the report.
 - ii) Why they urged them to continue using concrete, what it means by reinforcing concrete and suggest alternative methods for transporting concrete to higher floors.
- b) The builders evaluate whether the iron bars used were suitable for construction of such structures.
- c) The school administrators understand why the odor could spread much during hot days and provide strategies to minimize the odor spread

Item 5

On April 15th, a rivalry between the army and the paramilitary Rapid Support Forces (RSF) exploded in to war affecting different parts of Sudan such as Khartoum the capital, Darfur as well as Kordofanian and the Blue Nile states. The African union is planning to supply relief food and other basic utilities in metallic packages each of mass $200K\text{ g}$ to the people stuck in these regions using airplanes. However, the airplanes cannot enter in to the country neither can they land on the ground due to the insecurity. The packages will be projected horizontally from the plane at a velocity of $20m\text{ s}^{-1}$ as the plane flies over the country. They are to fly at a speed of at a height $9,000m$ above the ground. The damage caused on the packages depends on their momentum as they collide with the ground. Given that the material of the casing of the packages can with stand a collision with the ground with the package having a momentum of $30,000K\text{ g m s}^{-1}$.



- (a) At what distance will the packages land from the airplane.
- (b) Will the packages be damaged as they are landing on the ground?
- (c) Advise the pilots and engineers on what can be done in order to ensure that the packages are delivered safely to the people without getting too much damage.

PART II

Attempt any one item from this part.

Item 6

The head teacher of a certain school has just bought posho for students to eat which is claimed to be containing some small metallic particles which can be deadly to student's lives.

He is confused about what to do with the posho and has already spent the school's money to buy it and cannot return it to the shop.

Support material.



The school has got a long insulated copper wire, switch, a 6-inch iron nail, connecting wires, a battery and iron fillings. The head teacher is advised by the food prefect to call you to come and give a help.

Task:

- As a physics learner, help the head teacher on how he can use the available materials to design a prototype simple device that can be used to sort the impurities from the flour.
- Suggest the precautions that must be taken while designing and using the device.
- Advise the head teacher on how he can improve the strength of his device

Item 7

One of the schools in Mubende town council its building was struck by a flash of light and the Director of the school attributed it to witch craft. As he was addressing the learners on the assembly one the learners also told him that as he was coming to school in using an umbrella, he was shocked also by a flash of light. The director of the school is worried that his school may be destroyed by witch craft and he want to advertise for sale.

Task

Using the knowledge of physics,

- (a) Advise the director of the school how that flash of light arose and what he can do to protect his school buildings from that danger
- (b) Write a report about the precautions that should be taken by learners to avoid the dangers of that flash of light

END

MERRY X-MASS and HAPPY NEW YEAR 2025.

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