

P535/1

Physics

Paper 1 (Theory)

April/May 2024

$2\frac{1}{2}$ Hours



MEBU EXAMINATION CONSULT

Uganda Certificate of Lower Secondary Education

End of Term I Assessment Examinations 2024

Competence Based Curriculum

S.4 Physics

Paper 1 (Theory)

2 Hours: 30 Minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of **seven (7)** scenario-based items carrying equal marks with **two** sections **A** and **B**. Section **A** consists of only **three (3)** compulsory items.

Section **B** has **two** parts **I** and **II**, each containing **two (2)** items.

You are required to attempt any **one (1)** question from each part of section **B**. Any additional question(s) attempted shall not be marked.

Silent non-programmable scientific calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate S.I units.

Poor handwriting and untidy work shall lead to loss of marks.

At the end of the examination, fasten all your work securely together.

Where necessary, assume;

- Acceleration due to gravity, g = 10 ms^{-2}
- Density of water = 1000 kgm^{-3}
- Specific heat capacity of water = $4200 \text{ Jkg}^{-1}\text{K}^{-1}$
- Speed of light in vacuum, C = $3.0 \times 10^8 \text{ ms}^{-1}$

Section A: (Compulsory)

Item 1

In a certain town, it is a must for drivers to be tested with their vehicles for road-worthiness. On a certain day, a car started from rest and accelerated to 50 ms^{-1} in **10 seconds**. The driver maintained that velocity for **20 seconds** and suddenly decelerated to rest in **2 seconds** causing him to crash into windscreen. As a result, the car tyres wore out on the tarmac causing a lot of heat on the ground.

Support material



Task

You have been tasked to write a report to explain the scene. In your report include a motion graph, find the rate at which the car's velocity reduces and explain, with reasons, why driver crashed into the wind screen. Advise by stating whether the driver's average speed exceeded the speed limit of 8 ms^{-1} and how he would prevent the crushing. (20 scores)

Item 2

Challenges arise in a community of an isolated district in Uganda. Mixed beliefs, anxiety, mistrust and poverty have cropped up. Rainbows happening to some places when it rains and illusionary water pools on sunny days on road surfaces, have been attributed to area clergy and witch-doctors. Furthermore, there is change in colour where different objects when placed in the night security lights of one of the residents, who is believed to have miraculous powers of God. A lot of money is being spent by residents to get miracles or avoid misfortunes and evil spirits from spiritual people.

Prepare a speech you would give in the upcoming community gathering to address this challenge. (20 scores)

Item 3

Of recent, a storied building being constructed in Kampala near Munyonyo collapsed and took very many lives. However, when police arrested the contractor and asked the cause of the collapse, he complained that the client did not give enough money to buy the appropriate materials for constructing the building given that the place is affected much by harsh weather conditions. However, when the **KCCA** Engineer was tasked to analyse the situation, he said “the mechanical properties of the materials being used are below the standard required for a storied building near such areas. He said Young’s modulus of steel should be about $2.0 \times 10^{11} \text{ Nm}^{-2}$ ”. This statement confused the public the more.

Support material



A force of **500 N** causes an extension of **20 mm** on an iron bar of length **100 cm** whose cross-sectional area is **0.05 cm^2** .

Task

As a learner of Physics, you have been asked by police to produce a report about the scene to help the police carry out investigation on the contractor.
(20 scores)

Section B: (Attempt any one question from each part)

Part I

Item 4

There has been an outbreak of malaria in your community and your friend is admitted in hospital. You have been delivering a warm meal; however, you are required to deliver a hot meal for her in the hospital.

Without using a food flask, how would you ensure that the food you have prepared remains hot until you reach the hospital? (20 scores)

Item 5

On evening, Catherine kept juice in a tightly filled and corked glass bottle in a deep freezer. On opening the freezer, the following morning, she found the glass bottle broken with the juice frozen. As a Physics learner, explain to her what happened and advise her on what to do next time. (20 scores)

Part II

Item 6

A boy was travelling with her parents by means of water transport. He carried a ball and a phone taking selfies along the journey. On their way, water waves disturbed the boat and all he had on his hands dropped in water. However, with much disappointment of losing his phone, allover sudden, he realized the ball was still on top of water though his phone was nowhere to be seen. This scene left them wondering the magic with the ball. As they continued, they looked in the air and saw two people seated in a bucket connected to a balloon with burning flame was carrying them in space. The boy was confused and wondered how the two men would land safely on the ground though his parents could not explain anything to him.

Support information



- Take the density of water = 1000 kgm^{-3}
- Acceleration due to gravity = 10 ms^{-2}
- Mass of the boat = 200 kg
- Mass of a phone = 500 g
- Volume of a phone = 50 cm^3
- Volume of a ball = 20 cm^3
- Volume of the boat = 3000 cm^3

Task

As a Physics learner, help the boy understand what happened while on the boat and explain for him how the two heavy men were carried by just a balloon with burning air. (20 scores)

Item 7

The rampant rains in the country have caused destruction of lives and property. The citizens have been advised to relocate to the nearby camp gazetted by the government. However, they do not have enough food. The World Food Programme (WFP) has supplied bags of maize flour packed in **50 kg** sacks, but wishes to give the flour in different ratios. That is,

- Families with more than **10** members: **25 kg**.
- Between **7-9** members: **20 kg**
- Between **4-6** members: **15 kg**
- Below **4** members: **10 kg**
- All district leaders to take **50 kg** each.

Unfortunately, they did not carry the weighing machine, but there is a nearby carpentry with a uniform piece of wood of mass **30 kg** and length **4 m**.

Write a report to the store man explaining how he can measure the different masses using the piece of wood. (20 scores)

THE END