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Physics

Paper one

S.3 assessment items

Term Two, 2025

ALLIANCE JOINT EXAMINATIONS BOARD (AJEB)

Uganda Certificate Of Education

Physics

Theory

Senior Three

Term Two

Instructions:

*This item paper consists of **Four** items.*

*Section **A** is compulsory and you are required to answer **only one** item from section **B***

*Answer only **three** items in all*

Responses should be written in blue or black ball point pen ink. (but not in both ink color)

Any working should be shown clearly with in the responses

A scientific, silent and non-programmable calculator should be used where necessary

Section A

Answer all items in this section

Item One

In St. Kizito Secondary School, located in rural Eastern Uganda, students are learning how thermometers work. Their teacher explains that before a thermometer can be used, it must be calibrated by marking the lower fixed point (0°C) and the upper fixed point (100°C). The school has a science club that decided to make a simple liquid-in-glass thermometer using a narrow glass tube and colored alcohol.

The class discusses how these fixed points help to divide the thermometer scale and allow for temperature measurement in real-world settings, such as in food storage, body temperature checks, or weather observation.

Tasks:

a). Using the scenario, explain how the students obtained the **lower and upper fixed points** of their homemade thermometer.

b). Explain the conditions used, why **melting ice** and **steam from boiling water** were chosen.

c). Briefly elaborate why correctly identifying these two fixed points is important when calibrating a thermometer.

Item Two

During a school holiday, your sister visits her grandmother in the village. One evening, as the sun sets, she notices the bright "evening star" in the sky and asks her cousin what it is. He tells her it's Venus, one of the planets in our Solar System. Curious, she begins to wonder: Why is Venus visible from Earth, what makes the planets in our Solar System different from stars and how do the planets move around the sun?

Her curiosity grows, and she decides to research more about the structure, components, and movement of objects in the Solar System.

Task.

a). Based on Amina's experience, explain what the Solar System is, identify four components it contains besides planets, and state one reason why Venus appears visible in the evening sky.

b). Imagine you are part of a team advising a space agency on selecting a planet for possible human settlement. Using your knowledge of the inner planets (Mercury,

Venus, Earth, Mars), compare their features and justify why Earth is currently the only planet suitable for human life.

SECTION B

Choose one item from this section

Item three

At a school science laboratory, a group of students is conducting an experiment to investigate how pressure works in liquids. They use a cylindrical container filled with water up to a height of 50 cm. The base of the container has an area of **0.02 m²**. The density of water is **1000 kg/m³** and acceleration due to gravity is **10 m/s²**. One student, Sharon, notices that the water exerts more pressure at the bottom of the container than near the top. She also notices that when she replaces water with a denser liquid like oil (density **800 kg/m³**), the pressure changes.

Task:

a). Determine the total pressure at the base of the vessel (absolute pressure) when filled with water, taking into account both the hydrostatic pressure of the liquid and the force due to the load.

b). Find the pressure at the base when the container is filled with oil, and explain in simple words why the pressure is different from when water was used.

c). A second identical container is filled with water to the same height but placed at the top of a mountain where gravity is slightly lower ($g=9.8\ m/s^2$). Predict how the pressure at the base will compare to the first container, and explain your reasoning.

Item four

At Kyanika Secondary School, students are learning about linear motion. The teacher gives this situation: A boda boda rider moves along a straight road at 10 m/s for 5 seconds, then accelerates uniformly to 25 m/s in the next 4 seconds to overtake a truck. After overtaking, he sees a goat and brakes, coming to rest in 3 seconds.

The students are asked to calculate his acceleration, the distance covered, and explain how Newton's laws and gravity apply in this motion.

Task

a). Obtain the **acceleration** of the boda boda as he increases his velocity from 10 m/s to 25 m/s in 4 seconds.

b). Calculate the **total distance** the rider travelled from the start until he comes to rest.

Hint: use Newon's equations of motion

c). Using the same scenario, explain how **Newton's three laws of motion** apply to the rider's movement.

END