535/1

Physics

Paper one

S.3 assessment items

Term Two

ALLIANCE JOINT EXAMINATIONS BOARD

END OF TERM TWO

ACTIVITIES OF INTEGRATION

Physics

Senior Three

2025

Instructions:

- This item paper consists of ***two*** sections, **A** and **B**
- Section **A** is compulsory while a learner should choose ***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

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Section A

Answer all items in this section

Item One

Student X is preparing for a job interview and decides to shave early in the morning. He uses a **shaving mirror** fixed above his sink. He notices that when his face is **close to the mirror**, the image appears **upright, larger**, and very clear. Curious, he slowly **moves his face farther** from the mirror and observes that the image **becomes inverted and smaller**. He wonders how this change happens and what makes the mirror special compared to a flat mirror.

Task 1:

(a) Draw a ray diagram to show how the concave mirror forms an image when the face is placed **between the mirror and its focal point**.

(b) From the diagram and scenario, describe:

I. The **nature** of the image formed (in terms of size, orientation, and type).

II. The **application** of the mirror based on this nature of the image.

Task 2:

(a) Explain what would happen to the image if Student X placed his face **beyond the centre of curvature** of the mirror.

(b) Give **two other practical uses** of concave mirrors in daily life and briefly explain how the nature of the image suits those applications.

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 1:

Based on Amina's experience, **explain what the Solar System is**, **identify four**

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components it contains besides planets, and **state one reason** why Venus appears visible in the evening sky.

Task 2:
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

A business woman intends to install a storage gravity water tank in his home which should supply pressure at 10 kPa. She also needs her tank to have a ladder with steps each of height 40 cm for climbing up to clean his tank. Due to extreme weather conditions the tank may burst as a result of the expansion and contraction of the pipes used. To avoid this, the business woman has been advised to buy a pipe made of a suitable material and get a person who will fit them well. Unfortunately, she does not have enough knowledge about such installation works and is looking for further assistance.

Hint:

Density of water = $1 gcm^{-3}$

Acceleration due to gravity = $10 ms^{-2}$

Task: Using the knowledge of physics to help the business woman to;

(a) Determine:

(i) the height the tank must be raised to.

(ii) the number of steps to be put in the ladder

(b) Understand:

(i) how the pipes would be connected to the tank.

(ii) how the suitable material of the pipes to be used would be determined.

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Item four

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

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 why driver crushed into the wind screen. Advise by stating whether the drivers average speed exceeded the speed limit of 8 ms-1 and how he would prevent the crushing*"

END

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