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PHYSICS  
Paper 1  
Jul./Aug.2025  
2½ hours



WEST NILE SECONDARY SCHOOLS EXAMINATION COUNCIL  
(WENSSEC)

Uganda Certificate of Education

PHYSICS

Paper 1

(Theory)

2 hours 30 minutes

**INSTRUCTIONS TO CANDIDATES:**

*This paper consists of two sections A and B. It has a total of **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.*

*Answers to all items **must** be written in the answer booklet(s) provided.*

*Graph paper is provided.*

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**Turn Over**



## SECTION A

Respond to **all** the items in this section.

### Item 1.

The attendant of a swimming pool that is located between two tall buildings screamed loudly when the phone he was holding accidentally fell in the swimming pool. The attendant was confused when he heard himself twice after screaming and wondered whether someone was repeating after him. On looking down into the water, he noticed his appearance and the phone appeared nearer to the water surface. When he tried to pick it with his hand, he could not reach it and his appearance disappeared the moment his hand was in the water. While returning home later he noticed regularly that a pool of water appeared in the middle of the tarmac road but disappeared whenever he approached it. This confused him further.

### Hint:

- Speed of sound in air =  $330 \text{ ms}^{-1}$
- The attendant heard himself first after  $0.20 \text{ s}$  and then again  $0.02 \text{ s}$  later.

### Task:

As a student of physics, help the attendant understand why he;

- (a)
  - (i) heard himself twice after screaming.
  - (ii) noticed his appearance that disappeared when he put his hand in water.
- (b) was unable to reach his phone with his hand yet the phone seemed to be nearer to the surface of the water in the pool.
- (c) noticed a pool of water on the road that disappeared when ever he approached it.



**Item 2.**

The government has discovered a precious and rare mineral in a certain area.

A team of scientists picked some samples and kept in a store of a nearby hospital where photographic plates are stored. The mineral was checked on at regular time-intervals and the following observations were noted.

- All photographic plates had darkened.
- Its mass reduced with time as shown below.

Mass (g)	200	150	70	33	25
Time (s)	0	4	16	28	30

**Task:**

As a physics student,

- (a) support the view that the mineral is radioactive
- (b) using graph, estimate the half- life of the mineral.
- (c) what dangers are associated to exposing this rare mineral to the public.
- (d) advise on the best way of storing this rare mineral.
- (e) briefly describe a real life application of one of the scientific concepts in the above scenario.

**Item 3.**

Two men who were watching a football match at **7:30pm** were surprised they could see the players as compared to some three months ago when it would be dark by **6:45pm**. the players also complained that the last three months, it had been very hot with no rains which led to the drying of the grass in the field. The players were told by the men that the weather could be accurately predicted such that measures are taken to ensure their field does not dry up.

The men however left without explaining how it was done because it was getting late.

**Task:**

As a physics student, explain;

- (a) to the players how the weather can accurately be predicted.
- (b) what caused the dryness and extension of the day time.



## SECTION B

### PART I

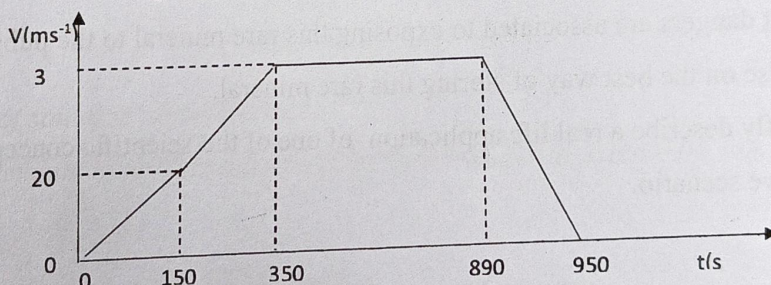
Respond to **one** item in this section.

#### Item 4.

The bus that was hired to transport learners for a study tour was equipped with a Computer Software that draws the motion of the bus from which analysis is made so that refueling is done. This refueling is done based on the distance the bus has moved and the driver should refuel every after 210 km using reverse fuel carried in well-sealed jerrycans.

The newly employed supervisor of the bus is not yet conversant with the interpretation and analysis of this graph to determine whether the bus was indeed refueled.

**Figure 1:** Below shows the motion of the bus.



During the journey, some learners were inconvenienced by the forward and backward jerking whenever the bus reduced and increased speed suddenly. The learners also wondered why despite the bus being closed all the time, the interior remained cold.

#### Task:

As a physics student, help the learners,

- understand why they experienced that kind of movement.
- how the car interior was kept cold?
- advise the supervisor whether the vehicle was refueled or not since the fuel was used.



### Item 5

Tourists who visited a port were told ships were made of steel whose density is  $152\text{gcm}^{-3}$ . This surprised the tourists as they thought that such a material could not float on water. They started a journey of 60km at exactly 12.00pm for an Island where they were to arrive in 80 minutes' time. They started from rest and attained a velocity of  $80\text{kmh}^{-1}$  in 30 minutes. The ship stopped for 15 minutes for sightseeing. Some of the tourists in the ship who were wearing black suits complained about them feeling so hot which surprised those wearing white suits.

The conscious tourists started wondering on what speed the ship was moving in order to reach their final destination in time.

### Task

As a physics student,

- explain to the tourists how the ship was able to float on water.
- determine the minimum average speed that the ship has to move with to get to its final destination in time.
- explain to the tourists why those in black suits were feeling hotter than those in white.

**Turn Over**



## PART II

*Respond to one item in this section.*

### Item 6.

In a certain poultry farm, a farmer discovered some small pieces of metal which are unsafe to be eaten by chicken in their feeds bought from a milling company.

The small pieces of metal were later identified as iron. The farmer thought of disposing off the feeds but remembered that the pieces of the metals could be sorted with a magnet which he did not have.

A nail, connecting wires of resistance  $0.5\Omega$ , two dry cells each of  $1.4\text{v}$  were available to the farmer.

### Task:

As a physics student,

- (a) help the farmer to remove the pieces of iron from the feeds.
- (b) comment on the effectiveness of what you have designed, given that current of  $4.0\text{A}$  is enough to create a strong magnet.

### Item 7.

A tall video hall has been struck by a lightening causing damage to its electrical system including the fuse, a copper wire used as an earthing and a transformer that was used as a voltage regulator.

The video halls owner has decided to replace the transformer for now and then plans to solve the issue of the fuse and earth connection later. However, he does not know if the newly bought transformer will perform adequately. The previous transformer had an output current between  $0.35\text{A} - 0.38\text{A}$ , the video hall's owner has decided to install a lightening conductor.



### **Hint**

- *The new transformer is designed to work on a 240v, 60w supply.*
- *The primary coil has 300 turns and second coil has 200 turns and its efficiency is 80%.*

### **Task**

As a physics student, explain to the owner of the Video Hall;

- how installing a lightening conductor will protect his Hall.
- whether the newly bought transformer is suitable for the hall's needs.
- the dangers associated with delaying the replacement of the fuse and the re-establishment of a proper earth connection.

**END**