

Candidates' Name:

Signature:

Random No.					Personal No.		

(Do not write your school / Center name or Number anywhere on this booklet)

535/1

PHYSICS

Paper 1

July / Aug 2024

2 ½ HOURS



KAMTEC EXAMINATIONS BOARD

Uganda Certificate Of Education

PHYSICS

Paper 1

TIME: 2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES

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

*All answers **must** be written in the booklets provided*

FOR EXAMINER'S USE ONLY			
SECTION	ITEM	SCORE(S)	EXAMINER'S SIGNATURE
A	1		
	2		
	3		
B	4		
	5		
	6		
	7		
TOTAL			

SECTION A

*Answer **all** the items in this section in the spaces provided.*

Item 1

Over a period of six months, the learners in Senior Two observed the following:

- The length of day and night kept varying on different days.
- The shape of the moon kept changing in a 1-month cycle.
- Different areas on earth had different weather.

However, the students cannot explain these phenomena and have approached you for help.

Task

As a physics learner, help them understand;

- (a) Why the length of daytime and nighttime varies.
- (b) Why the shape of the moon varies in a 1 month cycle.
- (c) The variation in weather between the various places.

Item 2

2. During a visit to a laboratory, students observed a ripple tank of depth 50cm filled with water where modifications had been made to create a shallow end of depth 30cm. A circular rod vibrating at 40 Hz from the shallow end is made to produce ripples. To their surprise, the spacing between successive troughs changed from 5cm to 2.5cm, the velocity of the ripples changes and are distorted when they strike the tank walls.

A stick that was in the tank appeared bent which scared the students.

Task

Use your knowledge of physics to explain:

- (a) Why there was a change in the velocity of the ripples.
- (b) How to reduce the distortion of the waves.
- (c) To the students why the stick appears bent.

Item 3

3. A certain group of people from a village with a mining area are experiencing skin disorders and general body weakness. Since they share a common water source, they decided to take a water sample to the National Nuclear Research Center. After two weeks, the nuclear center sent the authorities a report with a table as shown below.

Count rate (counts per minute)	1200	620	320	150	75
Time (minutes)	0	20	40	60	80

Task

Use your knowledge of physics to:

- Help the local authorities estimate the time required for the water to remain until it is safe if the background radiation in the area is 80 counts per second.
- Identify the dangers associated with radioactive materials.
- Suggest precautions to avoid potential problems associated with radioactive materials.

SECTION B

PART 1

Answer one item from this part

MECHANICS AND HEAT

Item 4

Students in a certain school are on a trip in a mountainous area where they are allowed to climb only 500 m per day. They moved along with a barometer. At a certain place A, the barometer read 69.5 cm Hg, while it read 75.6 cm Hg at another place B. The students reported that food cooked at point B took longer to get ready as compared to that at A. This led to an argument between the learners since the food was prepared with the same amount of fuel. On their first night, learners were warned of the possibility of nose bleeding during their journey. They were however not sure of which of the points A and B they were most likely to nose bleed.

Task

Use your knowledge of physics to help the students:

- (a) Determine if they had covered the required altitude for the day.
- (b) Identify when they were more likely to nosebleed.
- (c) to understand why the food prepared at B took longer to get ready as compared to that at A.

Item 5

An aluminium pan of mass 800g and specific heat capacity of $800 \text{ JKg}^{-1}\text{k}^{-1}$ containing 1.5 kg of ice blocks at -10°C was accidentally put under a tap producing steam at 100°C by a house help. After a few minutes, the ice had all melted and the temperature of the water in the pan was 15°C . The house help was surprised by the disappearance of the ice cubes and was tasked to determine how much steam had bubbled into the saucepan. The house help was tasked to ensure the water does not become warmer without putting it in a refrigerator.

(Hint; *Specific Heat Capacity of water* = $4200 \text{ JKg}^{-1}\text{K}^{-1}$, *Specific Latent Heat of Vaporization* = $3.36 \times 10^6 \text{ JKg}^{-1}$.)

Task

Use your knowledge of physics to;

- (a) Determine how much steam was bubbled into the saucepan.
- (b) Explain what happened to the ice blocks
- (c) Suggest ways in which the water can be kept at that temperature for a long time.

PART II

Answer one item from this part

ELECTRICITY AND MAGNETISM

Item 6

During a visit to an electricity generation substation, learners were told that electricity is transmitted as alternating current (AC) at 12 kV with a current of 0.05A for use inside a house at a voltage of 240 V. The learners were however surprised at why the power is transmitted at high voltages. The house has a television set (TV) that operates on direct current. The learners however, don't understand;

- How the voltage is changed from 13 kV to 240 V.
- The amount of current that flows in the house.
- How the current is changed from Alternating Current (AC) in the wires to direct current (DC) in the TV.

Task

Use your knowledge of physics to help the learners;

- (a) Understand how the voltage is changed from 13 kV to 240 V.
- (b) Determine the current in the house.
- (c) Understand how the current used in the TV was changed from AC to DC.
- (d) Understand why current is transmitted at high voltages and as alternating current.

Item 7

During a science project, an electromagnet was constructed by winding a wire around a steel nail, connecting it to an EMF source of 3V, and then placing it above a tin containing small pins, some of which are attracted to the nail. Upon disconnecting the cells, some nails fall off. However, when the steel nail is replaced with an iron nail of the same size, the pins are attracted more quickly. Surprisingly, when the EMF source is disconnected, almost all the nails fell off. The learners wanted to change the EMF source to 8V but were not sure of what would happen.

(Hint; Resistance of the nails = 0.5 Ω)

Task

Use your physics knowledge to:

- (a) Explain how the electromagnet operates.
- (b) Explain why there was a difference in the time taken before the steel and iron nails started attracting pins.
- (c) Explain what would happen if an EMF source of 8V was used instead of 3V.

END