

**535/1**  
**PHYSICS**  
**Paper 1**  
**2024**



**UGANDA NATIONAL EXAMINATIONS BOARD**

**Uganda Certificate of Education**

**PHYSICS**  
**Theory**

**Paper 1**

*New Lower Secondary Curriculum*

***SCORING GUIDE***

## 535/1 - PHYSICS SAMPLE PAPER SCORING GUIDE

### SECTION A

1. (a) First 4s and 2<sup>nd</sup> 5s.

First Distance = speed  $\times$  time.

$$= 330 \times 4 = 1320\text{m.}$$

$$2^{\text{nd}} \text{ Distance} = 330 \times 5 = 1650 \text{ m.}$$

They heard sound at different time intervals because they were standing at different distances away from the playing band.

- (b) Unclear, confused, indistinct sound:

- Reverberation.
- Echoes.
- Noise from the environment.

- (c) Colour changes of the clothes are due to appearance of coloured objects in coloured light.

- Due to colour mixing.
  - In red, appeared red.
  - In green, appeared green.
  - In blue, appeared black.

2. From the graph, the water will be safe for use after 38 days. (32–38 days).  
If no more waste was allowed in the lake.

**OR:** Using half-life = 7 days.

$$1200 \xrightarrow{7 \text{ days}} 600 \xrightarrow{7 \text{ days}} 300 \xrightarrow{7 \text{ days}} 150 \xrightarrow{7 \text{ days}} 75 \xrightarrow{7 \text{ days}} 37.5 \xrightarrow{7 \text{ days}} \dots$$

– A number of small doses received over time radioactive materials build up cumulatively in the body system and may **lead to leukaemia or cancer**.

– Strong doses of radiations from radioactive materials will lead to **burning of the skin and body tissues**.

– Extreme radiation penetration will lead to **damage deep in the body tissues** and particularly **to the body nuclei**.

– This may affect **chromosomes** and **make cells abnormal** and the **genetic effects** arising may be passed onto future generations.

– Radioisotopes are handled by mechanical tongs operated by **remote control equipment** from behind this **wall made of lead, concrete** or other suitable material that **absorb the dangerous radiations e.g. radiation badges**.

– **Thick-walled lead containers** are used.

– **A decay curve plotted with:**

- Axes labelled,
- Shape (with correct plotting),
- Reading the corresponding number of days (35 days).

3. (a) The possibility of day in one place and night in another. This is caused by the rotation of the earth about its axis (spinning). A point directly facing the sun will experience day while the one on the other side of the earth will be experiencing darkness (night).  
As the earth rotates, the point ceases to be directly under the sun hence becoming dark. At this time, the other side of the earth will be experiencing day time.
- (b) Occurrence of the high ocean tides.  
High tides are caused by the **moon's gravitational pull**. The **tidal forces** cause the earth and its water **to bulge out** on the side **closest** to the moon and the side **furthest** from the moon. These bulges are the high tides.
- (c) • **Images are picked by cameras** and changed to a frequency (signals) suitable for satellite transmission.
- The signals are transmitted from a ground based satellite dish (station transmitter) to a satellite in a geo-stationary orbit.
  - The signals are then amplified/modulated another frequency to satellite dishes on the earth's surface at TV stations.
  - The received signals are decoded by a decoder and then sent to the television for display.

## SECTION B: Part I

4. (a) (i) Heater fixed at the bottom so that water in the tank is warmed faster.  
Heat transfer in liquids is by convection.  
Convection currents from the heater take place upwards.  
Water near the heater warms up first, expands, becomes less dense and rises. Dense cold water near the top of the tank sinks to the bottom of the tank where it is also heated.  
Convection currents are set up and continue until all the water is heated, warmed up.
- (ii) At point A water comes out at a high pressure.  
Pressure increases with depth.  
( $P = \rho g \times h$ ).  
Accept calculation method to arrive at the conclusion.
- (b) Heater is working if there is a temperature increase.  
Heat Quantity =  $mc\theta$ .  
Heat supplied = Heat gained.                      Formula  
 $20,000 \times 10^3 = 5000 \times 4200 (\theta - 20)$ .  
 $\theta = 20.95^\circ\text{C}$ .  
Since temperature increased to  $20.95^\circ\text{C}$ , then heater is working.
- (c) Using: more struts / ties / girders.  
Metallic stand put up in concrete slab.
5. (a) Heat lost by hot water = Heat gained by cold water.  
 $M_h \times 4200 (80 - 32) = 10 \times 4200 (32 - 20)$ .  
 $M_h = 2.5 \text{ kg. or } 2.5 \text{ litres}$ .  
  
Each customer will need 2.5kg or 2.5 litres of hot water to mix with the cold water to achieve bathing water temperature.
- (b) Using vacuum flasks, Process – lagging by insulating materials.  
[Hot water tied at one end of the inextensible string that passes over a pulley. Effort is applied at the other end at the 3<sup>rd</sup> floor. In this way the bucket of hot water will be .....  
Identify a method + Explanation. ]  
**Heat loss, by conduction**  
– Minimised by enclosure in insulating materials.  
– Keeping water in poor water conducting materials, for example by using vacuum flasks.

### Heat loss, by convection

- By covering the container with an insulating cover.
- Filling up the container with hot water.

- (c) Pulley system - for example lifts.  
Wheel and axle.  
Pumping.  
Hot water supply system.

## Part II

6. (a) An electrical method for making .....

- A magnet is required.
- A circuit diagram.
- Description:-
  - current flowing,
  - Polarity,
  - Dipoles,

The current flowing creates a magnetic field which aligns the nail dipoles in the same direction making the nail magnetised

The magnetised nail is then moved on top of the feeds continuously to pick all the pieces of iron by attracting them away from the mixture (feeds and metals) .

(b)  $V = IR$

$$3 = I \times 0.5$$

$$I = \frac{3}{0.5} = 6A.$$

Since  $I$  proportional to  $\beta$ .

And  $6A > 4A$ , then the magnet formed will be highly effective.

7. A transformer is a device that steps up (increases) or steps down (reduces) the input voltage (e.m.f.).  
A device the changes voltage.

**A diagram of the transformer with two labels (Secondary source and a Primary source. (a score)**

If an alternating current is passed through the Primary coil, an alternating magnetic flux will be set up and will induce an alternating e.m.f. in the Secondary coil.

The magnitude of this induced e.m.f. will depend on the e.m.f. applied to the primary and on the relative numbers of turns in the two coils.

- A step up transformer is required.
- Because the voltage must be increased from 120V to 240V for this bulb and appliances to work,  $\frac{N_p}{N_s} = \frac{V_p}{V_s}$ .

- $\frac{N_p}{N_s} = \frac{120}{240}$ ,

- $N_s = 2N_p$ .

- A step up transformer of number of turns on Secondary twice as that on the Primary will change 120V to 240V.
- The bulbs and other appliances will be connected in parallel from so that they operate at the same voltage, and a fault in one does not affect the working of the other.

