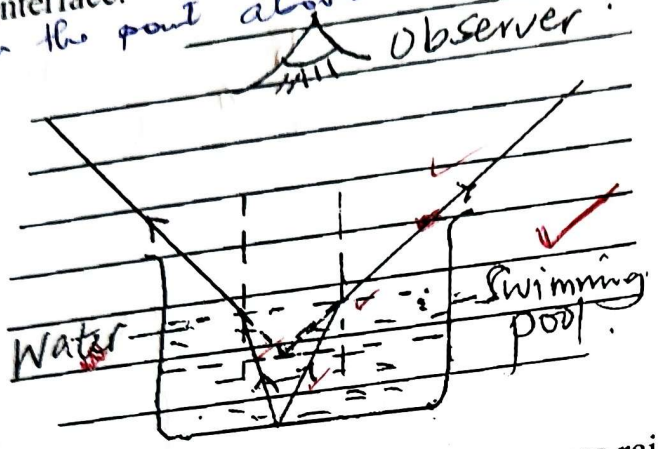
06

Item 1

(a) (i) Because of refraction, the light rays from the bottom of the pool are refracted away from the normal at the water air interface. The refracted rays appear to come from the point above the bottom.



To the observer from above the base appears raised and hence the pool appears shallower.

IR₁ - 12

IR - 8-12-3
4-7-2
1-3-1
0-0

Diagram only scores 4

(ii) To minimize reverberation. The walls are well covered with curtains to ensure that they do not reflect sound from the speakers to avoid echo formation.
The echoes interface with the original sound hence distorting it and making it unclear.

- Multiple echoing/reverberation
- Absorbing sound
- Makes sound clear

(iii) The appearances is done to absorption and reflection of light. yellow color is a mixture of red and green. When green is incident on a yellow shirt, it reflects green and hence appears green. No transmits ✗

Reflects green light because it is a common colour in yellow

(b) $t_1 = \frac{d_1}{speed} = \frac{50}{320}$

$= 0.156$ seconds

$t_2 = \frac{d_2}{speed} = \frac{40}{320}$

$= 0.125$ seconds

Time interval $= t_1 - t_2 = 0.156 - 0.125$

$= 0.031$ seconds

Conclusion

5-8 = 3
3-4 = 2
1-2 = 1
0-0

MC₂ - 08

4-8-2
1-3-1
0-0

08

Item 2

a) Because it darkens photographic plates.
b) From the graph *(at the back)*
$t_{1/2}$ = 11 days
c) The mineral should be stored in lead boxes.
It should also be kept in reinforced concrete rooms
d) Dangers:
- Destroys body cells.
- Causes cancer
- Causes mutations
- Destroys reproductive cells.
- Destroys eye sight
- Causes burns

Item 3

(a)
- Satellites help in communication by transmitting signals for TVs, radios, internet and phone services.
- They are used in navigation such as CTPs, for Aero planes, shops etc.
- They are used in military operations like for surveillance and communication
- Used in search and rescue missions.
- Resource management

(b) A natural satellite is any celestial body in space that orbits around a large body for example
- Moon orbiting a planet.
- Planet orbiting a star.

An artificial satellite is a human built object launched into an orbit using a rocket.

Examples
International space station (ISS) orbiting the earth.
- Hubble space telescope orbiting the earth.
- Our own pearl Africa SAT-1 orbiting the earth.

(c) Season changes are caused by the tilled nature of the earth on its axis as it revolves around the sun.
This causes different regions to receive different amounts of solar energy which results into climatic and weather changes.
When the northern hemisphere tilts towards the sun, it experiences summer while the southern hemisphere experiences winter.
As the southern hemisphere also tilts towards the sun, it experiences summer and the northern hemisphere experiences winter.
During the time of night time are equal, Autumn and spring are experienced

The mass reduces after every time
Conclusion
became can stop penetration
to reduce

Any 02

IR_2 5-8 = 3
3-4 = 2
1-2 = 1
0 = 0

MC_2 5-10 = 2
1-4 = 1
0 = 0

Any 2 of explanation

IR_3 9-14-3
5-8 = 2
1-4 = 1
0 = 0

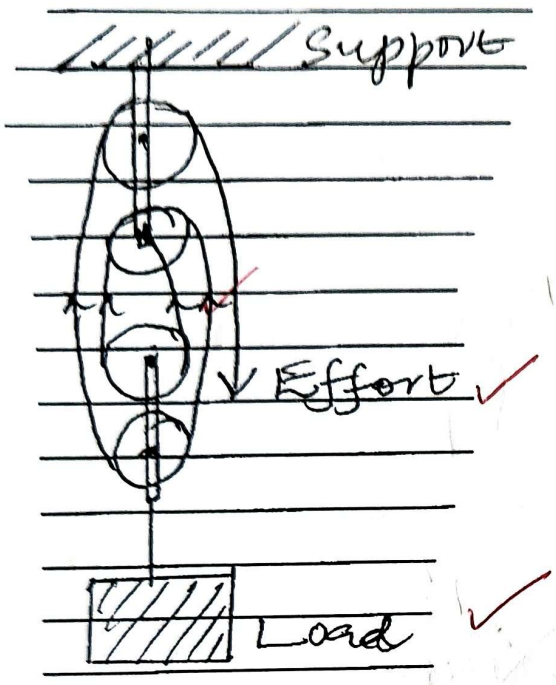
Rotation, wrong

Time
Distance
10

02
04
02
04
06

a) Metals feel cold in the morning and hot in the afternoon because they are good conductors of heat.
In the morning metals absorb heat from the hands of the workers making them to feel cold.
In the afternoon metals absorb heat and transmit it to the hands of the workers hence feel hot.

b)



The effort applied to the system through a string is multiplied many times in the pulley system hence lifting the load.

c) Efficiency $= \frac{MA}{4}$ X 100%

80 $= \frac{MA}{4}$ X 100

80 = 25MA

MA = 3.2

MA $= \frac{L}{E}$

3.2 $= \frac{6 \times 10}{E}$

E = 18.75N.

Conclusion

d) Work done

E gain = mgh

= 6 x 10 x 15

= 900 J

Heat = MCθ

= 6 x 400 x θ

900 = 2400θ

θ = 0.375^{0}C

Hence the string was not suitable for the purpose because the temperature change is less than 28^{0}C.

e) By oiling / greasing ✓
Use of ball bearings ✓
Reducing weights of pulleys of strings. } Any two correct

Item 5

(a) Sound travels faster in solids than in air.this is due to particles in solids which are closely packed than those in air. The student who put his ears near the railway line was able to hear its sound before the rest could hear it.
Increase of the velocity of a fluid reduces its pressure. (Bernoulli's effect)
As the train passes by the air between the students and the train is at a high speed and hence at low pressure.
The air behind the students is at low speed hence at high pressure.
The pressure difference between the students and the train pushes the students towards the train.

(b) When water is heated it becomes less dense and flows upwards against gravity.

(c) $H\vartheta g = h\vartheta g$

$H \times 1.3 \times 10 = \frac{(760-740)}{1000} \times 13{,}600 \times 10$

$H \times 13 = 0.02 \times 13{,}600 \times 10$

$H = \frac{2{,}720}{13}$

$H = 209.2\text{m}$

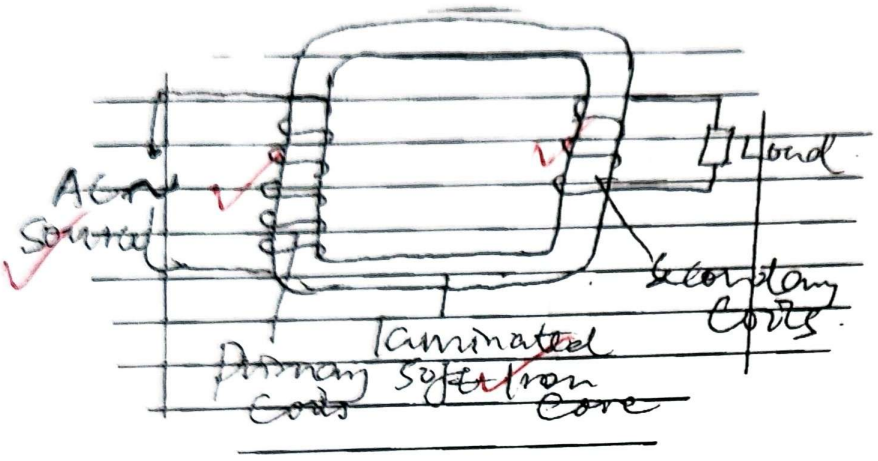
Conclusion ✓

IR 7-11 = 3, 4-6 = 2, 1-3 = 1, 0 0

MC 3-6 = 2, 1-2 = 1, 0 0

i) It is transmitted at high voltage to reduce power loss.
Transmission at high voltage leads low current.
The low current reduces the heating effect hence reducing energy loss inform of heat.
Thick aluminum wires have low resistance and high conductivity hence reducing energy loss in the power loss process.

b) The device is a step-down transformer.



The Ac connected in the primary coil causes a changing magnetic field in the secondary coil.

A changing current is induced in the secondary coil by the mutual induction which flows through the lord.

For a step-down transformer, the number of turns in the secondary coil is less those in the primary coil. Therefore, voltage across the load is less than that applied by the source.

c) Learners are told to put on rubber shoes and gloves so that in case of an accidental contact with live wires, the risk of electric shock is minimized since rubber is a poor conductor of electricity.

Item 7

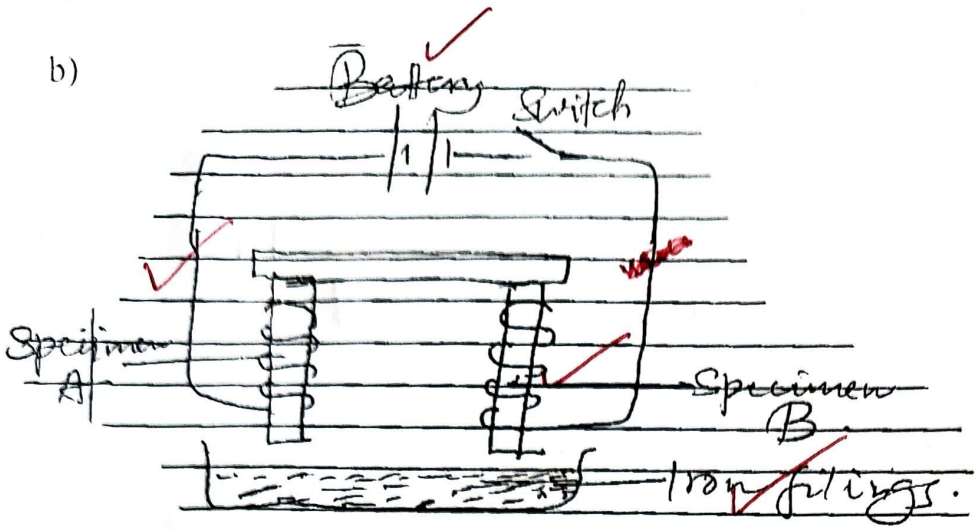
a) Soft magnetic materials easily acquire and easily lose their magnetism.

Hard magnetic materials don't easily acquired and don't easily lose their magnetism.

Examples of soft magnetic materials are: soft iron, soft nickel, soft cobalt.

Hard magnetic materials steel, Al-Nickel.

b)



The specimens are connected as shown above.
The switch is closed for a short time and opened.

The amount of iron fillings attracted by the specimen and the amount lost in a short time after opening the switch is noted.

Conclusion;
The material which gains more iron fillings and loses more of them easily is a soft magnetic material.

c) 2.5 Kw and 240V on the heater means that when the heater is connected to 240V supply, it converts 2500J in every second to heat energy.

d)

Heater $E = Pxt$

$2.5 \times 2 \times 7 = 35$ KwH

3 lamps

$\frac{15}{1000} \times 3 \times 8 \times 7 = 2.52$ KwH (Score answer only without units)

Flat Iron

$1.2 \times \frac{30}{60} \times 2 = 1.2$ KwH

Total

$= 1.2 + 2.52 + 35$

$= 38.72$KwH (units)

Cost $= 38.72 \times 800$ Shs $= 30,976/=$

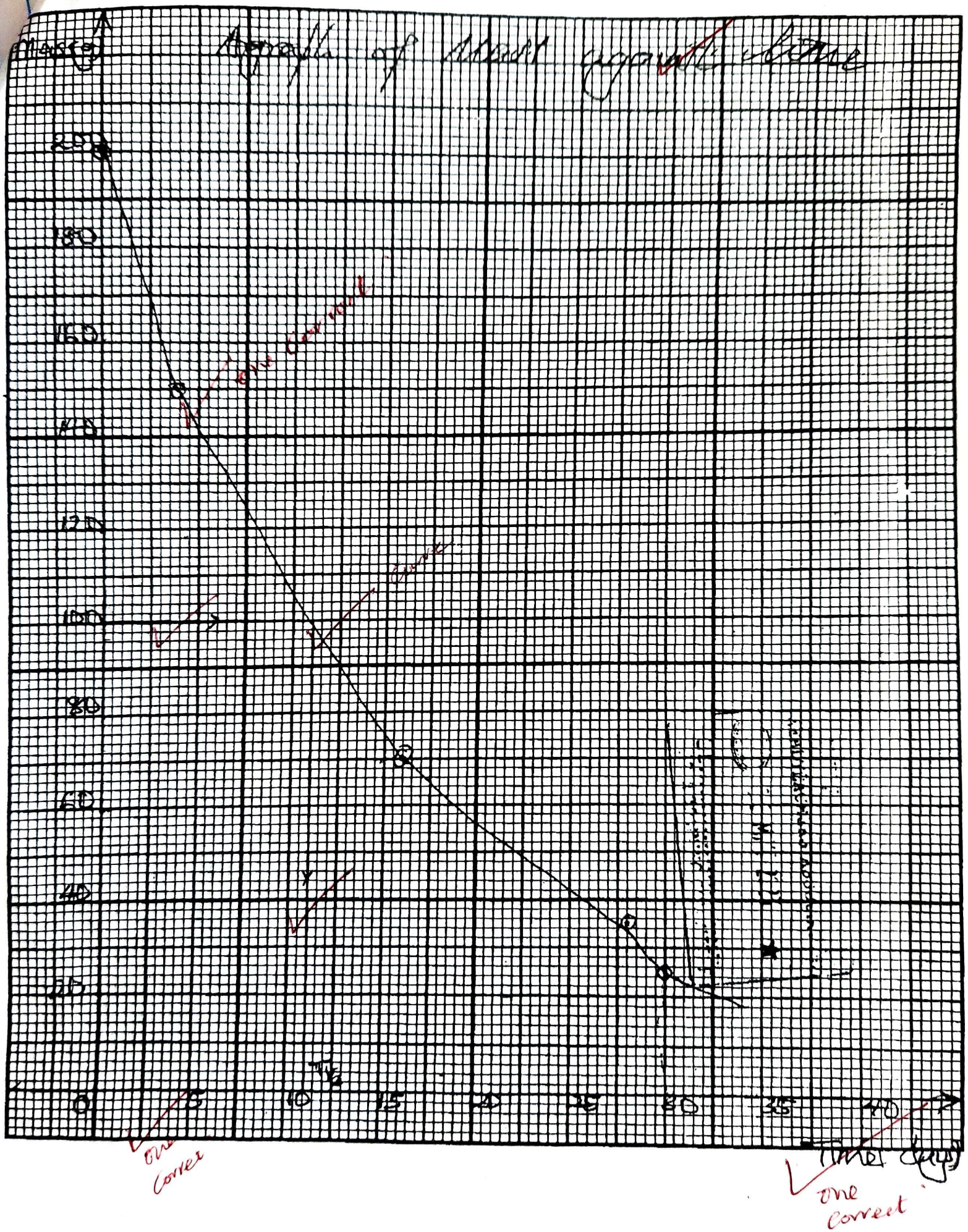
Conclusion

IR

$10 - 16 = 3$
$5 - 9 = 2$
$1 - 4 = 1$
$0 - 0$

ML

$5 - 10 = 2$
$1 - 4 = 1$
$0 = 0$



END