

THE UNITED REPUBLIC OF TANZANIA
DODOMA REGION
FORM FOUR MOCK EXAMINATION-2023
031/1 PHYSICS 1- MARKING SCHEME

1.

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
E	D	B	D	D	B	D	A	C	A

(Each 01 marks)

2.

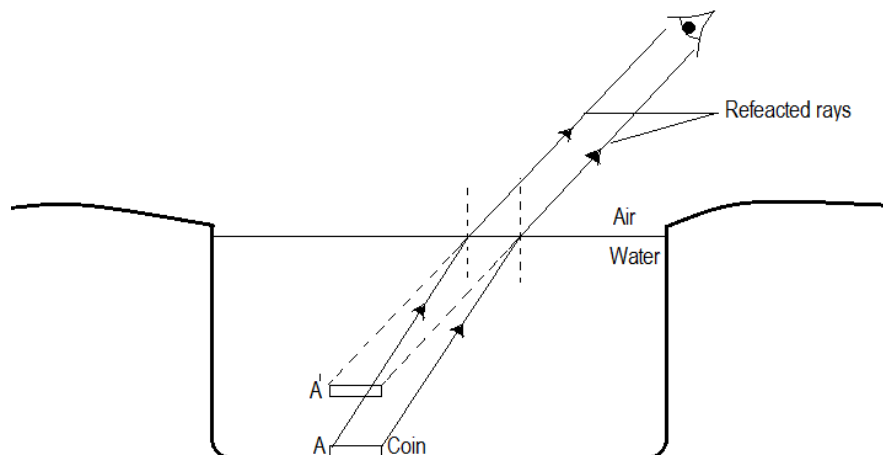
(i)	(ii)	(iii)	(iv)	(v)	(vi)
E	A	F	G	C	B

(Each 01 mark)

3.

(a) It is difficult because the image of the coin seen is at a position not exactly as normal'

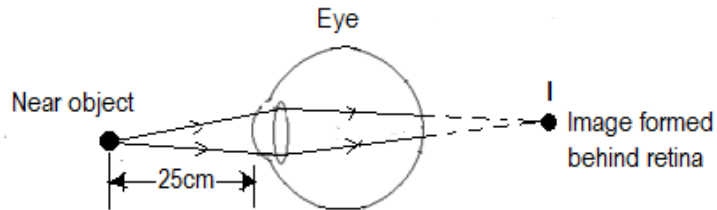
Consider a sketched diagram;-



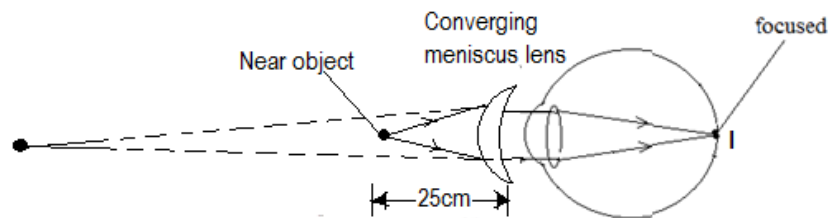
A light rays travelling from water to air, the refracted rays bends away from normal, hence an observer will see the coin raised at higher position at A' compared to normal at A **(05 marks)**

(b) A man defect is Long-sightedness (Hypermetropia) **(01 mark)**

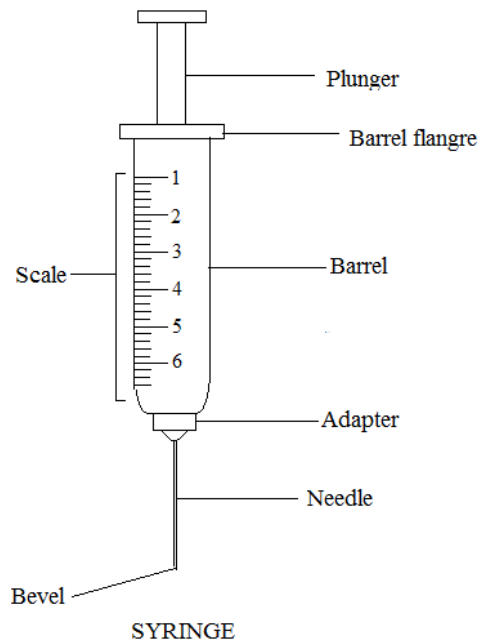
This is because the eyeball is too short as shown below, hence the image is formed behind the retina
(02 marks)



A converging meniscus lens can be used to correct long sightedness as shown below
(02 mark)



4. (a) Diagram



(02 marks)

When the plunger is pulled out the pressure inside the barrel become smaller than atmospheric pressure hence the atmospheric pressure outside pushes the liquid into the cylinder. **(01 mark)**

When the plunger is pushed in the pressure inside the barrel become greater than atmospheric pressure hence the liquid leaves the barrel. **(01 mark)**

(b) From, Upward force = Downward force

$$10N = X + Y \quad \textbf{(01 mark)}$$

From the diagram, If Y is the pivot;

The sum of clockwise moment = the sum of anticlockwise moment

$$X \times 50cm = 10N \times 30cm \quad \textbf{(01 mark)}$$

$$X = \frac{10N \times 30}{50} = 6N \quad \textbf{(01 mark)}$$

$$Y = 10N - 6N = 4N \quad \textbf{(01 mark)}$$

5. (a) From the diagram consider the value of force F_1 on piston of area $50mm^2$

$$60N \times 200mm = F_1 \times 40mm \quad \textbf{(01 mark)}$$

$$F_1 = \frac{60N \times 200mm}{40mm} = 300N \quad \textbf{(01 mark)}$$

Consider the force applied to the brake F_2 the same as force on the piston of area

$$100mm^2 \quad \frac{300N}{50mm^2} = \frac{F_2}{100mm^2} \quad \textbf{(01 mark)}$$

$$F_2 = \frac{300N \times 100mm^2}{50mm^2} = 600N \quad \textbf{(02 marks)}$$

(b) From principle of conservation of linear momentum

$$0 = mu_1 - Mu_2 \quad \textbf{(01 mark)}$$

$$mu_1 = Mu_2$$

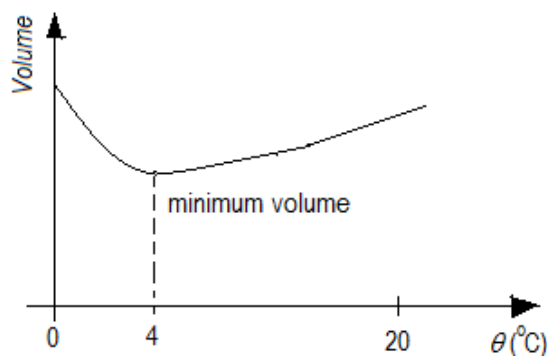
$$u_2 = \frac{m_1 u_1}{M} \quad (01 \text{ mark})$$

$$= \frac{50 \times 3}{300} \quad (01 \text{ mark})$$

$$= 0.5 \text{ m/s} \quad (01 \text{ mark})$$

6. (a) The surface of the bottle is at low temperature so the water molecules from air condensed to form liquid droplets (04 marks)

(b) Sketched graph



(05

marks)

7. (a) (i) By using magnetic field
Cathode rays are deflected by magnetic field but X ray does not
- (ii) By using electric field
Cathode rays are deflected toward anode when placed in electric field while X ray does not.
- (iii) By checking penetrating power
X rays has high penetrating power
- (iv) By using paddle-wheel discharge tube
Cathode rays cause the paddle wheel to rotate while X-ray does not.

(Any two @ 02 marks)

- (b) Initial count rate of the mixture = $160 + 160 = 320$ count rate per second

Consider count rate A_t after a time taken t

$$\frac{A_t}{A_o} = \left(\frac{1}{2}\right)^n \quad \text{(01 mark)}$$

$$n = \frac{t}{T_{\frac{1}{2}}} = \frac{8}{2} = 4$$

For P after 8 hours;-

$$A_t = 160 \times \left(\frac{1}{2}\right)^4 = \frac{160}{16} = 10 \quad \text{Count rate per second} \quad \text{(01 mark)}$$

$$n = \frac{t}{T_{\frac{1}{2}}} = \frac{8}{4} = 2$$

For Q after 8 hours;-

$$A_t = 160 \times \left(\frac{1}{2}\right)^2 = \frac{160}{4} = 40 \quad \text{Count rate per second} \quad \text{(01 mark)}$$

Count rate for the mixture $= 10 + 40 = 50$ Count rate per second

(02 marks)

8. (a) (i) Human kind will lack natural visible radiation from the sun.
(ii) The Earth's warmth temperature will decrease; freezing of water will take place
(iii) The food chain from producer will break since high percentage of green plants undergoes photosynthesis in the presence of light coming from the sun.
(iv) Human kind will lack solar energy as the main source of energy to wind, ocean tides etc.
(v) Some human activities such as drying clothes will be impossible.

(Any four @01 mark)

(b) Measures;-

- (i) Put in place energy conservation measures to reduce the use of fossil fuels.
(ii) Use of cleaner alternative sources of energy such as solar energy.
(iii) Afforestation which absorbs carbon dioxide in the atmosphere
(iv) Recycling of waste product such as plastic bottles etc.

(v) Farmers to invest on organic farming which is free from the use of fertilizers. **(05 marks)**

9. (a) From, $E = I(R + r)$ **(01 mark)**

$$V = IR \quad \textbf{(01 mark)}$$

$$I = \frac{V}{R} = \frac{10}{0.04} = 250 A \quad \textbf{(01 mark)}$$

$$r = \frac{E}{I} - R = \frac{12}{250} - 0.04 \quad \textbf{(01 mark)}$$

$$= 0.008 \Omega \quad \textbf{(01 mark)}$$

(b) I will agree with a suggestion of student A **(02 marks)**

Since large heating effect is directly proportional to the length of the wire, the resistance of the wire increases as the length is increases. The current flowing through cattle socket is controlled by the fuse and p.d of the main power supply is the same, so the one which can be varied is the resistance of the wire in the coil. **(03 marks)**

(c) From $\frac{N_s}{N_p} = \frac{V_s}{V_p}$ **(01 mark)**

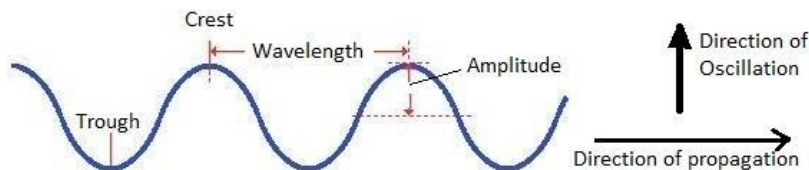
$$N_s = \left(\frac{V_s}{V_p} \right) N_p \quad \textbf{(01 mark)}$$

$$= \left(\frac{8}{240} \right) \times 4800 \quad \textbf{(01 mark)}$$

$$= 160 \text{ Turns} \quad \textbf{(02 marks)}$$

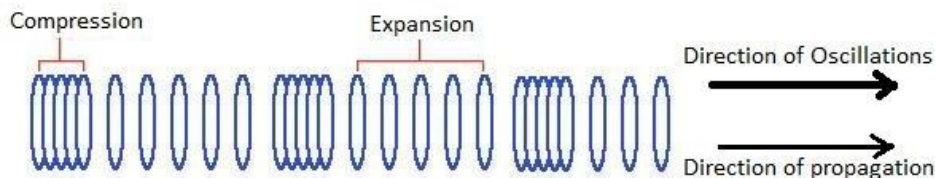
10. (a) Sound wave is a longitudinal wave in which direction of propagation of the wave is the same as the direction of vibration of wave. **(01 mark)**

Sketched diagram



(01 mark)

Water wave is the transverse wave in which direction of vibration is perpendicular to the direction of propagation of wave. **(01 mark)**



(01 mark)

(b) From:-

$$t = \frac{s}{v}$$

For the light, $t_L = \frac{h}{c} = \frac{h}{3 \times 10^8}$ **(01 mark)**

For the sound, $t_s = \frac{h}{v_s} = \frac{h}{330}$ **(01 mark)**

But $t_s - t_L = 5s = \frac{h}{330} - \frac{h}{3 \times 10^8} = \frac{3 \times 10^8 h - 330h}{330 \times 3 \times 10^8}$ **(01mark)**

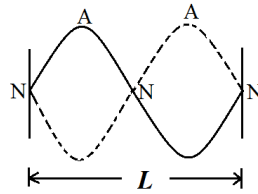
$$5 = \frac{299999970h}{9.9 \times 10^{10}}$$
 (01 mark)

$$h = \frac{5 \times 9.9 \times 10^{10}}{2.99999970}$$
 (01 mark)

$$h = 1650m$$

(01 mark)

(c) (i) Diagram:-



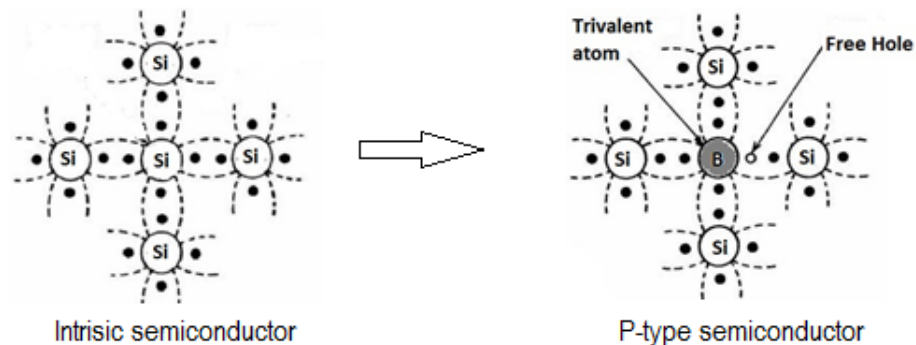
(03 marks)

(ii) Frequency produced $f = \frac{v}{L}$ (02 marks)

11. (a) (i) A silicon material is a semiconductor while copper material is a conductor.
- (ii) The resistance of the silicon decrease with increase in temperature, while the resistance of copper increases with increase in temperature.
- (iii) The current carriers in silicon are both holes and electrons while in copper is only electrons.
- (iv) There is a narrow forbidden gap between conduction band and valence band insilicon while in copper the conduction band and valence band overlaps.

(Any two @02 marks)

(b) When trivalent atom (boron) is added to intrinsic semiconductor will create a shortage of electrons or a hole in a valence band (Since it has only three electrons for sharing instead of four). The impure crystal formed is called **P-type semiconductor**. Since the semiconductor will conduct electricity by using holes as major charge carries in conduction band. (03 marks)



(03 marks)

- (c) Diagram of the single stage common emitter amplifier using NPN transistor
(05 marks)

