



CENTRAL WEST EDUCATION DIVISION

**2025 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK
EXAMINATION**

PHYSICS

Subject Number: M164/I

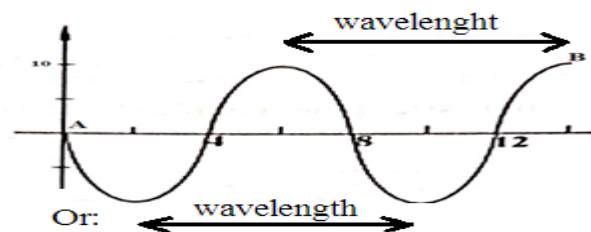
**PAPER I
MARKING KEY**

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1. a. Survival of fish in freezing water bodies, Weathering of rocks, improves circulation of oxygen in deep waters through convection, etc. **(any two points, 1 mark each)**
- b. Transverse waves / 1 mark
- c. - used in photography for medical purposes,
- used in fire alarms,
- used in car spraying to dry out paint **(Any two points, 1 mark each)**
- d. Because camera uses lens with fixed shape /1 mark
- e. mass of gas /1 and pressure of gas/1

2. a. (i)



/1 mark

(ii) $c = \lambda f$

$$\lambda = 80\text{cm} = 0.8\text{m}$$

$$f = \frac{1\frac{3}{4}}{10} = 0.175 \text{ seconds} \quad /1 \text{ mark}$$

$$c = 0.8\text{m} \times 0.175 \quad /1 \text{ mark}$$

$$= 0.14 \text{ m/s} \quad /1 \text{ mark}$$

OR

$$14 \text{ cm/s}$$

- b. Friction at the pivot /1 and Air resistance/1

3. a. - help to identify errors or bias that might lead to incorrect conclusion
- can lead to improvements in the future investigations
- b. - Helps to visualise the overall trend between variables.
- it provides a clear picture of whether variables have positive, negative or no correlation
- Helps to reduce the effect of outliers
- Helps to make predictions of future or other variables
- c. - Because it has both magnitude and direction / 1 mark

4. a. (i) Because heavier mass has a *greater contribution to the average position of the system*/1 mark

(ii) Let length from 2 kg to G be y and the other side be $20 - y$

Clockwise moment = anticlockwise moment /1 (formula = 1)

$$3\text{kg} \times 10 \times (20 - y) = 2\text{kg} \times 10 \times y \quad /1 \quad (\text{substitution} = 1 \text{ mark})$$

$$30(20-y) = 20y$$

$$600 - 30y = 20y$$

$$600 = 50y$$

$$12 = y$$

Therefore G is 12 cm /1 from the 2 kg mass (correct value = 1 mark)

b. – Opening/closing a door

- Opening a bottle using a bottle opener
- Using a pair of scissors or garden shears
- Playing on a see-saw
- Wheelbarrow lifting load
- Screwing or unscrewing using a screw driver, etc. (Any three points, 1 mark each)

5. a. - Conductivity of zener diode is restored when current falls to normal, while

conductivity of a fuse is lost even if current falls back to normal /1

- Zener diode provides voltage regulation and overvoltage protection and it doesn't get destroyed while the fuse simply breaks the circuit and itself gets destroyed /1

(1 mark for any correct answer)

b.

Input A	Input B	Output
On	On	Off
On	Off	On
Off	On	On
Off	Off	On

Note: Alternative for “On” is “1” and alternative for “Off” is “0”.

Each correct row = 1 mark (Thus input signal combination plus its corresponding correct output signal = 1 mark) Total = 4 marks.



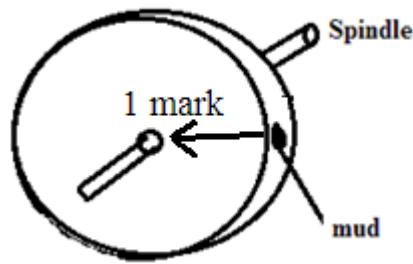
c. $E = \frac{L}{MA}$ /1

MA = 4 (Since the 4 pulleys are in a frictionless system) /1

$E = 200/4$ /1

$E = 50 \text{ N}$ /1

6. a. (i)



(ii) When speed increases, centripetal force increases / 1 until it exceeds the adhesion forces holding the mud to the wheel /1 Adhesion forces are then overcome /1 eventually mud skids off.

b. Particles of a spring are rearranged /1 thereby reducing their elastic resistance /1.

7. a. Work done = change in kinetic energy

Work done = $\frac{1}{2}mv^2 - \frac{1}{2}mu^2$ /1 (formula)

= $\frac{1}{2}(5)(8)^2 - \frac{1}{2}(5)(2)^2$ /1 (substitution)

= 160 -10 /1 (subtraction/summation)

= 150 J /1 (correct value)

b. The person pushes water backwards using paddles /1 In return, the water pushes the person forward /1 thereby making the boat move forward.

8. a. (i) To amplify sound /1 or – enhance the sound /1

(ii) Bar E has lowest frequency /1 because it is longer. Lower frequencies produce low pitch /1.

b. 1st half- life = $\frac{1}{2} \times 32\text{g} = 16\text{g}$

2nd half –life = $\frac{1}{2} \times 16\text{g} = 8\text{g}$ (method = 1 mark)

3rd half –life = $\frac{1}{2} \times 8\text{g} = 4\text{g}$

4th half-life = $\frac{1}{2} \times 4\text{g} = 2\text{g}$

4 half-lives = 20 days /1 mark

1 half-life = 20/4 /1 mark

= 5 days /1 mark

Or: $A_t = A_0 \left(\frac{1}{2}\right)^{\frac{T}{H}}$ /1 mark (formula)

$$2 = 32 \left(\frac{1}{2}\right)^{\frac{20}{H}}$$
 /1 mark (substitution)

$$\frac{1}{16} = \left(\frac{1}{2}\right)^{\frac{20}{H}}$$

$$\left(\frac{1}{2}\right)^4 = \left(\frac{1}{2}\right)^{\frac{20}{H}}$$

$$4 = 20/H$$
 /1 mark (method)

$$H = 5 \text{ days}$$
 /1 mark

c. It is mixed with fertilizer and fed into plants/1 to study uptake of fertilizer./ 1

9. a. $\text{Actual value} = \frac{\text{observed value}}{(1 - \text{Relative error})}$ /1 mark (formula)

$$= \frac{1.1}{1 - 0.1}$$
 /1 mark (substitution)

$$= \frac{1.1}{0.9}$$

$$= 1.22$$
 /1 mark (correct value)

b. At 5m high,

$$LP = dgh$$
 / 1 mark (formula)

$$= d (10)(5),$$

$$680,000 = 50D$$

$$D = 13,600.$$
 (1 mark)

At 2m,

$$LP = dgh$$

$$= 13,600 (10)(2)$$
 (1 mark)

$$= 272, 000 \text{ Pa}$$
 (1 mark)

10. a Eddy currents result in energy losses in transformers /1. This reduces energy output /1
thereby reducing efficiency in transformers /1.



- b. (i) B2 is brighter than B1 /1
 (ii) because B2 is sharing its voltage with B3 /1
 (iii)

$$\text{Total current} = \frac{\text{total voltage}}{\text{total resistance}} \quad /1 \quad (\text{formula})$$

$$\text{Total voltage} = 3.0 \text{ V}$$

$$\text{Total resistance: R in series} = 3 + 3 = 6$$

$$\frac{1}{R_T} = \frac{1}{6} + \frac{1}{3}$$

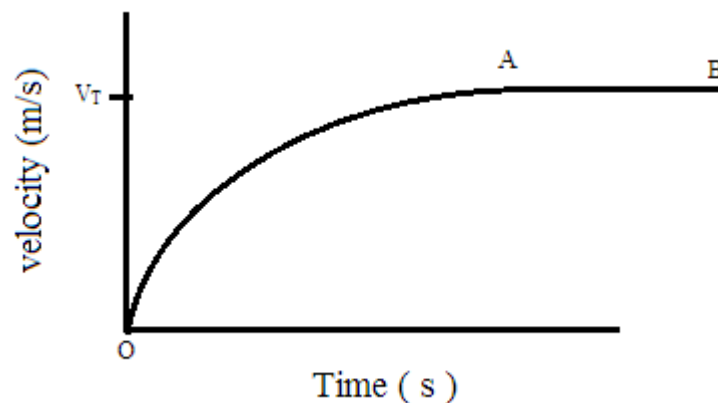
$$R_T = 2 \quad /1 \text{ mark}$$

$$\text{Total current} = \frac{3}{2} = 1.5 \text{ A} \quad /1 \text{ mark}$$

SECTION B (30 MARKS)

- 11.a. Radio waves for a particular station are trapped by the radio's receiver /1. The current in a tuning circuit is adjusted accordingly /1 until the two frequencies coincide /1. This makes the current to resonate /1 and large current is set up and transmitted /1 to produce sound.

b.



Labels = 1 mark , Graph line = 1 mark graph **total: 2 marks**

At point O. the parachutist with a closed parachute starts accelerating because downward force is greater than upward force. / **1 mark**

As speed increases, friction force also increases /**1 mark** until downward force is equal to upward force /**1 mark** and the parachutist attains a terminal velocity.



12. a. A small force is exerted on the smaller piston./1 This creates pressure on the fluid at the smaller piston./1 This pressure is transmitted equally /1 to the larger piston on the brake pads /1 where a greater force output is produced /1.
- b. When alternating current flows through the primary coil/ **1**, a magnetic field builds up/**1** which grows out and collapses i.e moves to and fro. /**1**. The secondary coil cuts and re-cuts the field lines as they grow out and collapse/ **1** thereby producing induced EMF/ **1** in the secondary circuit.
13. a. They are separated by placing them upright /1 in warm water /1 and pouring very cold water /1 in the inner tumbler /1. The inner tumbler contracts while the outer tumbler expands creating a gap in between them /1 hence can be separated.
- b. The base-emitter circuit is in forward bias and the base-collector circuit is in reverse mode. /**1**.
- Holes from the base circuit enter the p-doped base region of a transistor /**1** where they combine with electrons from the emitter / **1**.
- Excess electrons are then forced out of the transistor to the base-collector junction /**1** and flow through the collector region, thereby conducting current to the main circuit /**1**

END OF MARKING KEY

