

Name:.....Class:.....Adm No:.....

PHYSICS MARKING SCHEME

2021/2022 FORM 2 TERM 1 OPENER EXAM-AUGUST

TIME:

INSTRUCTIONS.

Answer all the questions in the spaces provided.

1. List two career opportunities in physics. (2mks)

- *Bachelor of medicine*
- *Bachelor of Architecture*

2. Match the following basic physical quantities. (5mks)

Basic physical quantity	SI unit	Symbol
Time	Second	<i>s</i>
Electric current	<i>Ampere</i>	A
Amount of substance	<i>Mole</i>	mol
Thermodynamic temperature	<i>Kelvin</i>	<i>k</i>

3. Give three differences between mass and weight. (3mks)

- *Mass is quantity of matter in a body while weight is pull of gravity on a body.*
- *Mass is measured in kilograms while weight is measured in Newtons.*
- *Mass is same everywhere while weight changes from place to place.*

4. A wire of radius 3.0mm and length 200m is melted into a sphere. Calculate the radius of the sphere in metres. (3mks)

- *$R = 0.003$
 $V = \pi r^2 h$
 $= \frac{22}{7} \times 0.003^2 \times 200$
 $= 0.00566m^3$
 $V = \frac{4}{3}\pi r^3$
 $0.00566 \times \frac{3}{4} \times \frac{7}{22} = r^3$
 $r^3 = 0.00135$
 $r = 0.1105m$*

5. Give two precautions necessary while handling a density.

- a. Bottle (2mks)

- *The outside of the bottle must be wiped carefully.*
- *Ensure no air bubbles when bottle is filled with liquid.*

- b. The mass of an empty density bottle is 20g. its mass when filled with water is 40g and 50g when filled with liquid X. calculate the density of liquid X if the density of water is 1000Kg^m-³. (3mks)

$$\begin{aligned} \text{water} &= 40 - 20 = 20g \\ p &= 1g/cm^3 \\ \text{volume} &= \frac{20g}{1g/cm^3} = 20cm^3 \end{aligned}$$

$$=20\text{cm}^3$$

Mass liquid 50-20=30g

$$P=\frac{m}{v}=\frac{30}{20}=1.5\text{g/cm}^3$$

6. 1800cm³ of fresh water of density 1000kg/m³ is mixed with 2200cm³ of sea water of density 1025kg/m³. Calculate the density of the mixture. (3mks)

Mass of fresh water =PV

$$=1800 \times 1$$

$$=1800\text{g}$$

Sea water m=PV

$$=2200 \times 1.025$$

$$=2255\text{g}$$

$$dm. = \frac{m.m}{v.m}$$

$$= \frac{1800+2255}{1800+2200}$$

$$= \frac{4055}{4000}$$

$$=1.01375\text{ g/cm}^3$$

7. Define force and state its SI Unit. (2mks)

- **Force is a push or a pull**
- **S.I unit Newtons**

8. Explain why water rises up in narrow tubes but mercury, which is also a liquid, falls in narrow tubes to a level below the outside surface. (2mks)

- **Adhesive force between water and glass molecules is greater than cohesive forces hence water rises.**
- **Force of cohesion within mercury is greater than adhesive force between mercury and glass.**

9. Give two factors affecting surface tension. (2mks)

- **Impurities**
- **Temperature**

10. Describe the working mechanism of a hydraulic brake system. (4mks)

- **Force applied on brake pedal exerts pressure on master cylinder.**
- **The pressure is transmitted by the brake fluid to the slave cylinder. This opens the piston and brake shoe hence brake lining press the drum hence motion is resisted.**

11. The figure below shows a U-tube filled with water, mercury and another liquid, determine the density of the liquid. (3mks)

$$P_w = h\rho g$$

$$\begin{aligned}
 &= 0.25 \text{ m} \times 1000 \text{ kg/m}^3 \times 1000 / \text{kg} \\
 &= 2500 \text{ N/m}^2 \\
 Pl &= hpg \\
 &= 0.22 \times p \times 10 \\
 &= 2.2p \\
 2500 &= 2.2p \\
 \frac{2500}{2.2} &= \frac{2.2p}{2.2} \\
 P &= 1136.36 \text{ kg/m}^3
 \end{aligned}$$

12. The figure below, ammonia gas and an acid gas diffuse and react to form a white deposit on the walls of the glass tube, the deposit forms nearer end B.

- State which gas diffused faster. (1mk)
 - Ammonia gas***
 - Explain how the rate of diffusion depends on the density of a gas. (2mks)
 - The denser the heavier the particles and hence the slower the gas.***
 - Explain the effect of performing the experiment above at a higher temperature. (2mks)
 - The rate at which Ammonia gas travels towards B will be higher hence less time taken to form the white deposit.***
13. A faulty mercury thermometer reads 10°C when dipped into melting ice and 90°C when on steam at normal atmospheric pressure. Determine the reading of this thermometer when dipped into a liquid at 20°C . (3mks)
- $$\begin{aligned}
 90 - 10 &= 0.08 \text{ K}^{-1} = 0.08 \text{ K}^{-1} \\
 10(100 - 0) \\
 L_2 - L_0 &= L_0 \alpha (t_2 - t_0) \\
 L_2 &= 10 + 10 \times 0.08 (20 - 0) \\
 \text{Reading} &= 26^\circ\text{C}
 \end{aligned}$$

14. What is the purpose of a translucent screen on the:

- a. Pinhole camera. (1mk)
This is where the image forms.
- b. Give two characteristics of image formed by a pinhole camera. (2mks)
Image is inverted
Image is real
- c. The distance between the pinhole and screen of a pinhole camera is 10cm. the height of the screen is 20cm. at what minimum distance from the pinhole must a man 1.6m tall stand if a full length image is required? (3mks)

$$h_i = 0.2m$$

$$h_o = 1.6m$$

$$v = 0.1m$$

$$u = ?$$

$$u = \frac{h_o \times v}{h_i}$$

$$= \frac{1.6 \times 0.1}{0.2}$$

$$= 0.8m$$

15. State the laws of reflection. (2mks)

- a. Angle of incidence (2mks)
 - ***Equals the angle of reflection. Incident ray, reflected ray and normal at point of incidence all lie on the same plane.***
- b. Give three characteristics of the images formed by a plane mirror. (3mks)
 - ***Image is same size as the object.***
 - ***Image is far behind the mirror as object is in front of the mirror.***
 - ***Image is virtual, erect and laterally inverted.***
- c. How many images would be seen from two mirrors when reflecting surfaces make an angle of 60° with each other? (2mks)
 - $$N = \frac{360^\circ - 1}{\theta}$$

$$= \frac{360^\circ - 1}{60}$$

$$= 5$$
- d. A plane mirror is suspended using a string and makes an angle of 35° with the wall as shown below,

- e. A ray of light strikes the mirror horizontally. Calculate the angle between the horizontal and the reflected ray. (3mks)
- $$\theta = 35^\circ + 35^\circ$$
- $$= 70^\circ$$
16. State the basic law of electrostatic charges. (1mk)
- *Like charges repel and unlike charges attract each other.*
- b. List three uses of the electroscope. (3mks)
- *To detect the presence of charge on a body.*
 - *To test the sign of charge on a charged body.*
 - *To test the quantity of charge on a charged body.*
- c. List down the hazards of electrostatics. (2mks)
- *Sparks and fires*
 - *Electric shock*
 - *Lightening*
17. Define electric current. (1mk)
- b. A charge of 180 coulombs flows through a lamp:
- *Electric current – rate of flow of charge.*
- i. Every minute. Calculate the current flowing through the lamp. (2mks)
- $Q = 180C$
 - $T = 1 \text{ minute}$
 - $I = Q/t = 180/60 = 3A$
- ii. Calculate the number of electrons involved (charge of electron is $1.6 \times 10^{-19}C$) (3mks)
- $He = Q$
 - $Q = IT$
 - $he = it$
 - $$\frac{n \times 1.6 \times 10^{-19}}{1.6 \times 10^{-19}} = \frac{3 \times 60}{1.6 \times 10^{-19}}$$

$$h = 1.25 \times 10^{21} \text{ electrons}$$