THE PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
UKEREWE DISTRICT COUNCIL

FORM THREE EXAMINATION
PHYSICS

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
D	D	C	C	C	D	C	B	D	B

QN 1…….01Mark @

2. **Qn 2…….01Mark @**

List B	B	C	D	A	E	G

3. (a)

Fog – is the cloud floating above low level ground. Fog reduces visibility to less than 200m……..……..02marks

- Smog – is the dense fog where the visibility is reduced to a few metres……..02marks

(b) Since air temperature is constant 22^0C The town with highest dew point indicates high relative humidity, Then

(i) The town with highest relative humidity is Morogoro due to highest dew point …….2.5marks

(ii) The town with lowest relative humidity is Arusha due to lowest dew point……2.5marks

4. (a) Name, draw and mention one use of the three different types of diverging lenses**.....**3marks) Types of diverging lens

(Biconcave)

Uses

Used to correct short – sightedness

(b) - Swimming pool appears much shallower than its actual depth because the light ray's bends as it passes from water to air. As the ray of light from the bottom passes water to air it is reflected with an

angle of refraction greater than the angle of incidence.

……..02marks

(c) Magnification (m) $= \frac{v}{u} =$ = 4

……...01mark

V = 4u

……....01mark

Also f = 25cm

From $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$\frac{1}{25} = \frac{1}{u} + \frac{1}{4u}$

……...01mark

u = 31.25cm

The object distance, u is 31.25cm ……..…01mark

5. (a) This is because it displaces less water than its own weight……..……02marks

(b) Mass of crown (Mc) = 1.05kg = 1050g

-Volume of crown (Vc) = 60cm_3

-Density gold = 19.3g/cm_3

-Density of crown =?

-Mass of gold (Mg) =?

-Volume of gold (Vg) =? -

Density of silver (ρ_s)= 10.5g/cm_3 -

Mass of silver (Ms) = -Volume of

silver (Vs) =?

The crown is mixture

Consider volume of mixture and mass of mixture for the crown

Volume of crown, Vc = Vg +

Vs……..01marks Then Vs = Vc-

Vg……..(i)

Mass of crown Mc = Mg + Ms…… (ii)
…….……01marks

But mass of silver Ms = Vs x

ρ_s Then Mc = ρ_gVg + (Vc -

Vg) x ρ_s

$note$ (Ms = Vc-Vg) and Mg =
ρ_gVg……..01marks

1050g = 19.3g/cm3 x Vg +(60cm_3-Vg)x10.5g/cm_3

1050g = 19.3g/cm_3 x Vg + 630g -10.5g/cm_3 x vg

1050g – 630 g = 8.8g/cm_3 x Vg 420g =

8.8g/cm_3 x Vg

Vg $= \frac{420g}{8.8g/cm3}$……..01mark

Vg = 47.73cm3

Then mass of gold Mg = ρ_gVg

Mg = 19.3 X 47.73

Mg=921.189g……..……..02mark

6. (a) Ways to improve the efficiency of the machines …… …….03Marks

- Oiling /greasing the movable parts of the machines
- Using light weight material for movable parts
- Avoid to overload the machine (only two points …….1.5@)

(b) Let E_a be effort arm

L_a be load arm

$E_a + L_a = 2.5m$……(i) ……..01mark

Also

$V.R = \frac{E_a}{L_a}$

$12 = \frac{E_a}{L_a}$

$E_a = 12L_a$……(ii) ……01mark

Substitute (ii) in (i)

$12L_a + L_a = 2.5m$

$L_a = 0.19 \approx 0.2m$

From

$E_a = 12L_a$

= 12 x 0.2

= 2.4m

Effort was applied at 2.4m from the fulcrum. ……..01marks

(c) $e = \frac{M.A}{V.R} X100\%$ ……01mark

$85\% = \frac{M.A}{12} X100\%$

M.A = 10.2 ……..……01mark

But

Effort = $\frac{load}{M.A} = \frac{75N}{10.2}$

Effort = 7.4N ……..……..……..01marks

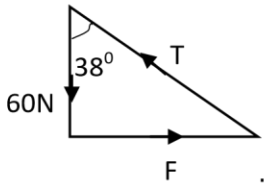
7. (a) the law “if two forces are represented in magnitude and direction by the adjacent side of a parallelogram ,then their resultant is represented in magnitude and direction by the diagonal of the parallelogram”……..4marks

(b)

Solution

Redraw the above diagram as follows

Also



……01mark

$\text{Cos } 38^0 = \frac{60N}{T}$ ……..01mark

Tension T =76.14N……..01marks

$\text{Tan } 38^0 = \frac{F}{60N}$ ……01mark

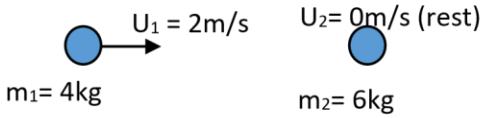
Horizontal force = F = 46.88N……..01marks

8. (a) Difference between elastic collision and inelastic collision ……03marks

Elastic collision	Inelastic collision
Both K.E and momentum are conserved	Only momentum is conserved while K.E is not conserved
Bodies separate after collision	Bodies stick together after collision
Bodies moves with individual velocity	Bodies movies with common velocity

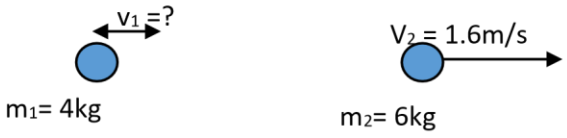
(i) Condition of the problem

(i) Before collision



collision

(ii) After



From principle of conservation of linear momentum

Total momentum before collision = total momentum after collision ……01mark

$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$

But u_2 = 0m/s (since body is stationary)

(b)

$m_1u_1 = m_1v_1 + m_2v_2$

$v_1 = \frac{m_1u_1 - m_2v_2}{m_1}$

$$v_1 = \frac{4 \times 2 - 6 \times 1.6}{4}$$

$v_1 = \frac{8-9.6}{4}$

$v_1 = \frac{-1.6}{4} =$ -0.4m/s

…….01mark

v_1 = -0.4m/s.

……..…….……01marks

Negative sign shows the body will move with a velocity 0.4m/s in opposite direction. (ii) K.E before collision

$K.E_{before} = \frac{1}{2}m_1{u_1}^2 + \frac{1}{2}m_2{u_2}^2$ but u_2

$K.E_{before} = \frac{1}{2} \times 4 \times 2^2$ = 0m/s (stationary body)

$K.E_{before}$ = 8J

……..……..……1.5marks

K.E After collision

$K.E_{after} = \frac{1}{2}m_1{v_1}^2 + \frac{1}{2}m_2{v_2}^2$

$K.E_{after} = \frac{1}{2} \times 4 \times (-0.4)^2 + \frac{1}{2} \times 6 \times (1.6)^2$

= 0.32J + 7.68J

=

8J……..……1.5marks

So kinetic energy is conserved since K.E before collision = K.E after collision

9. (a) (i) It would be less efficient. This is because the metal would conduct heat from inside the bottle to the outside through the contact edge……..04marks

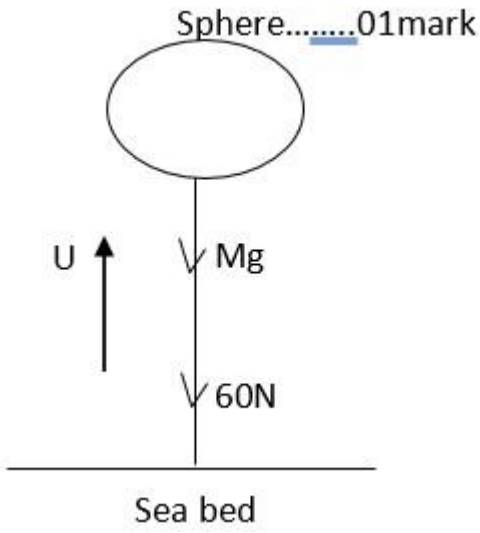
(ii) Clouds traps heat emitted from the earth's surface and reflects it back to the surface of the earth. This is why cloud days are warmer than the

clear cloudless days …04marks (iii) A is the heater because brass expands more than iron. At high temperature bimetallic

Strip bends toward ……

……..……..02 Marks

(b) Solution



Required to get volume of sphere From the diagram

U = mg + T

…….01mark

But U = $\rho_w V$

Then

$\rho_w V_w g$ = mg + T

…….01mark

$$V_w = V_{sphere} = \frac{mg+T}{\rho_w g}$$

$$= \frac{5 \times 10 + 60}{1100 \times 10}$$

…….**01mark**

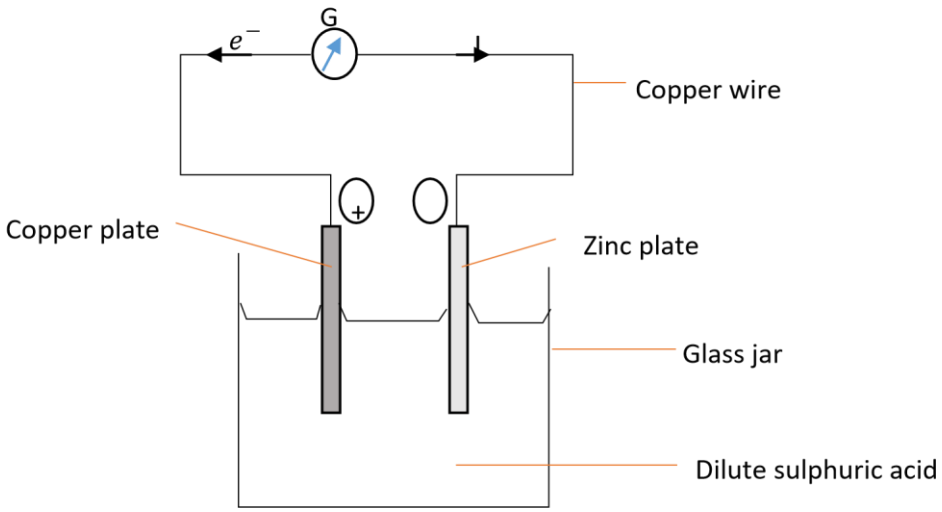
= 0.01 m^3 $volume\ of\ sphere$ = 0.01 m^3**…….01 marks**

10. (a)

(i) The simple cell can simply be constructed by using glass vessel filled with dilute sulphuric acid in which copper and zinc plates are immersed. The two act as electrodes and are joined externally by a wire. Due to potential difference between the two plates, electrons flows from zinc plate to copper plate and therefore convectional currents from copper plate to zinc plate. Electron leaves the solution by a zinc plate (cathode) and enters the solution through copper

plate (anode).
……..02marks

(ii) Diagram of simple cell……..……..…..03marks



(iii)The action of simple cell can be explained as follows ;

At anode

Zinc dissolve into acid solution and liberates electrons to the external circuits

Zn → $Zn^{2+}2e^-$……..……02marks

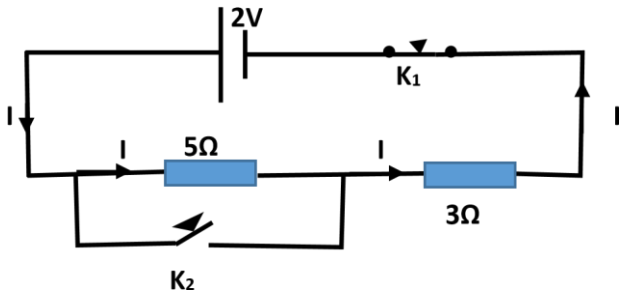
At cathode

Hydrogen ions drift to the copper plate where they combine with electrons and liberated as hydrogen gas (bubbles)

$2H^+ + 2e^- = H_{2(g)}$……..……02marks

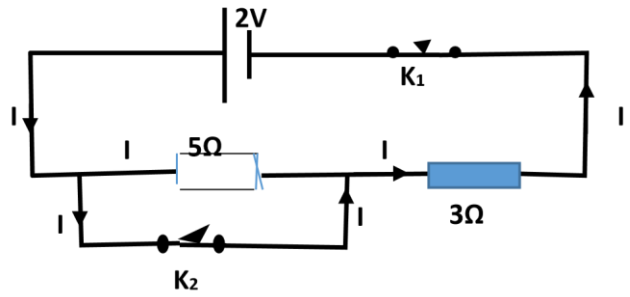
(b) calculate the current passing through the circuit when.

(i) When switch K_1 is closed



Current, I = $\frac{Emf}{total\ resistance} = \frac{2V}{5\Omega+3\Omega}$= 0.25A……..……02marks

(ii) When switch K_1 and K_2 are both closed 5Ω resistor is by passed



Current, I = $\frac{V}{R} = \frac{2V}{3\Omega}$= 0.67A……..02marks

(iii) When switch $K_1$is open and $_2$ is closed the circuit is said to be open. In an open circuit NO

current flows i.e. I = 0 ……..…..02marks

11. (a) Magnetic strips are installed on the door of a refrigerator……02marks

Reasons

Is to create an airtight seal, maintaining the internal temperature. They are not typically found on microwave ovens……..……..….03marks

(b)Because they absorb very little amount of sun's radiations and thus keep our body

cool……....04marks

(c) Given specific heat capacity of plastic = 1050J/kgK; specific latent heat of fusion of water = 335000J/kg. **Solution**

(i) Mass of tray, m_t = 48g = 0.04kg

Mass of water = 200g = 0.2kg

Initial temperature θ_1= 20^0C

Final temperature = θ_2= 0^0C

Rate of heat transfer, h =

2100J/min

Specific heat capacity of tray, c_t= 1050J/kgK

Specific heat capacity of water, c_w= 4200J/kgK

H = $m_t c_t \Delta\theta + m_w c_w \Delta\theta$ = 0.048 x 1050 x -20 + 0.2 x 4200 x -20

= - 17808J 9 (-ve indicate heat is being lost) Heat transferred 17808J

Rate of heat transfer, h = $\frac{heat\ transfeered\ ,H}{time\ ,t}$

t = $\frac{H}{h} = \frac{17808J}{2100J/min} = 8.48min$

……..……..……..03marks

(ii) Heat lost during freezing = $m_w L$

H = 0.2 x 335,000 = 67000J

Now

t = $\frac{H}{h} = \frac{67000J}{21000J/min} = 31.9\text{min}$

……..……..03marks