MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
MATHEMATICS 121/ 2 MARKING SCHEME

1. $\int_{-2}^{2} (4x3 - 3x2 + 2x - 2)dx$

$(x4 - x^3 + x^2 - 2x)^2_{-2}$
$= [16 - 8 + 4 - 4] - [16 + 8 + 4 - 4]$
$= 16$

2.

$$\begin{pmatrix} 1 & k \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 1 \\ 4 \end{pmatrix} = \begin{pmatrix} 9 \\ 4 \end{pmatrix}$$

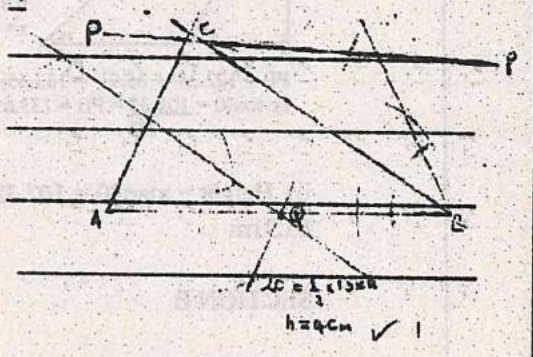
$1 + 4k = 9$
$4k = 8$
$k = 2$
$\therefore \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$

3. S

$$x\begin{pmatrix} 4 \\ -3 \end{pmatrix} - y\begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 16 \\ 11 \end{pmatrix}$$

$4x = 16 = x = 4$
$-3x - y = 11 = y = -23$

4. a)



ii) Locus Θ labeled
Bisector of AC and BC

5. Diagonal $= \sqrt{24^2 - 10^2} = 26$
Cost $= {}^{13}/_{26} = 0 = 600$

6. $OQ = \sqrt{12^2 - 10^2}$
$= \sqrt{44}$
$= 6.633$
$\text{Sin}\Theta = {}^{10}/_{12}$
$\Theta = 56.44$

Area Δ AOQ $= \frac{1}{2} \times 6.633 \times 10$
$= 33.165\text{cm}^2$
Area sector OQP $= \frac{56.44}{360} \times {}^{22}/_{7} \times 6.635$
$= 21.68\text{cm}^2$
Shaded area $= 2(33.165 - 21.68)$
$= 22.97\text{cm}^2$

7. $R^2 = \frac{k^2 + a^2}{Hg}$

$K^2 = hgR^2 - a^2$

$K = \pm \sqrt{hgR^2 - a^2}$

8. $4\log^2_x + 5\log_x{}^2 = 18$
$9\log_x{}^2 = 18$
$\text{Log}_x{}^2 = 2$
$X^2 = 2$
$X = \sqrt{2} = 1.4142$

9.

$$\frac{1+\sqrt{3}}{2}\left(\frac{\sqrt{2}}{2}\right) + \frac{1-\sqrt{3}}{2}\left(\frac{\sqrt{2}}{2}\right)$$

$$= \frac{4+\sqrt{6}}{4} \times \frac{4}{4-\sqrt{6}}$$

$$\frac{4+\sqrt{6}}{4-\sqrt{6}}\frac{(4+\sqrt{6})}{(4+\sqrt{6})} = \frac{16+8\sqrt{6}+6}{10}$$

$$= \frac{11}{5} + \frac{4\sqrt{6}}{5}$$

10. $Y = \frac{k}{X2}$

$\frac{k}{36} - \frac{k}{100} = 6$

$\frac{64k}{3600} = 6$

K=337.5

$4 = \frac{337.5}{X2}$

$X = \frac{\sqrt{337.5}}{4}$

$= 9.186$

11. $D = s \times T$

$22 \times 30 = 660nm$

$60\Theta = 660$

$\Theta = 110$

$\therefore B(48^0N, 53^0E)$

12. $6(1-\cos^2\Theta) - \cos\Theta - 5 = 0$

$6 - 6\cos^2\Theta - \cos\Theta - 5 = 0$

$6\cos^2\Theta + \cos\Theta - 1 = 0$

$6\cos^2\Theta + 3\cos\Theta - 2\cos\Theta - 1 = 0$

$3\cos\Theta(2\cos\Theta+1) - 1(2\cos\Theta+1) = 0$

$(3\cos\Theta-1)(2\cos\Theta+1) = 0$

$\cos\Theta = {}^1/_3$ or $\cos\Theta = -{}^1/_2$

$\Theta = 150^0, 210^0, 70.53^0, 289.47^0$

13.

X	F	Fx	d=x-m	d^2f
0....	11	0....	-2	0
1....	2	2....	-1	1
2....	5	10....	0	0
3....	8	24....	1	3
4....	3	12....	2	16
5....	2	10....	3	45
6....	1	6....	4	96
	32	64		161

$\text{Mean} = \frac{\Sigma fx}{fx}$

$= \frac{64}{32}$

$= 2$

$s.d = \sqrt{\frac{\Sigma d^2 f}{\Sigma f}}$

$= \sqrt{\frac{161}{32}}$

$= \sqrt{5.031} = 2.243$

14. $BD^2 = 15^2 + 10^2 - 2(15)(10)\cos 40$

$BD^2 = 95.19$

$BD = 9.756$

$\frac{12}{\sin B} = \frac{9.756}{\sin 50}$

$\sin B = \frac{12\sin 50}{9.756}$

$\angle B = 70.43$; $\angle D = 59.57$

$\frac{AB}{\sin 59.57} = \frac{9.756}{\sin 50}$

$\therefore AB = 10.98cm$

15. $Vw = \frac{6.4(5)}{6.4+5} = 2.8070$

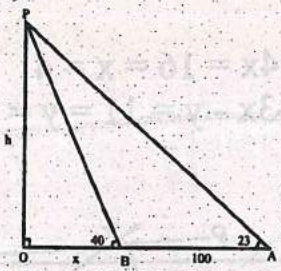
$Vmax = \frac{6.45(5.5)}{4.5+6.35} = 3.2696$

$Vmin = \frac{6.35(4.5)}{6.45+5.5} = 2.3912$

$A.E = \frac{3.2696 - 2.3912}{2} = 0.4392$

$\%E = \frac{0.4392}{2.8070} \times 100 = 15.6\%$

16. i)



$\tan 40 = \frac{h}{x}$

$\tan 23 = \frac{h}{100+x}$

$x\tan 40 = (100+x)\tan 23$

$0.8391x - 0.4245x = 42.45$

$x = 102.38m$

$PB = \sqrt{102.38^2 + 85.91^2} = 133.65m$

or $\cos 40 = \frac{102.35}{PB} = PB = 133.65m$

ii) Height = $x\tan 40 = 102.38 \times \tan 40 = 85.91m$

SECTION B

17. a) i) Capacity = $6 \times 5 \times 4 \times 1000$

$= 120000L$

ii) Amount = $\frac{{}^{22}/_7 \times 7^2 \times 40 \times 60 \times 60}{100}$

$= 22176\text{Litres}$

iii) Time = $\frac{120000}{22176}$

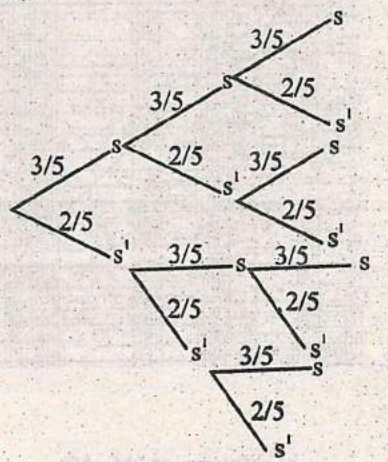
= 5.411 hours

b) No. of families = 120000 = 800
150

Amount = 800 x 350

= 280,000

18. a)



b) i) P (3s) = $^3/_5 \times ^3/_5 \times ^3/_5 = ^9/_{125}$

ii) P (1s only)

$^3/_5x^2/_5 \times ^2/_5 + ^2/_5x^3/_5x^2/_5 + ^2/_5 \times ^2/_5x^3/_5$

$= ^{36}/_{125}$

iii) P (2s only)

$^3/_5x^3/_5x^2/_5 + ^3/_5x^2/_5x^3/_5 + ^2/_5x^3/_5x^3/_5$

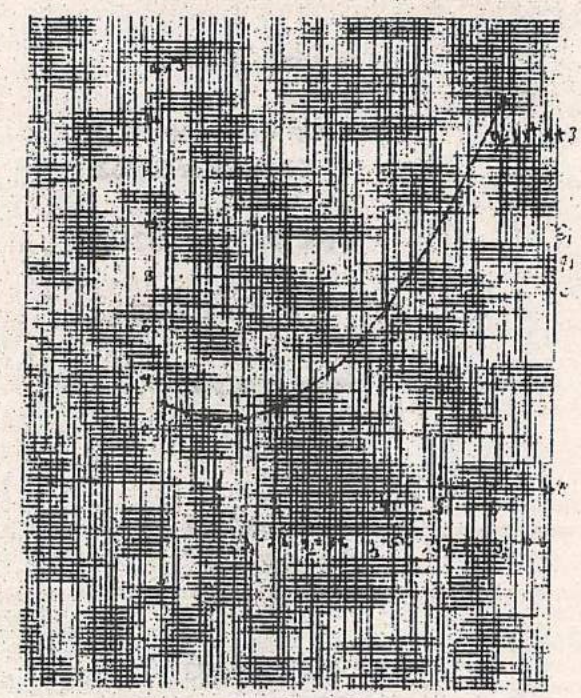
$= ^{54}/_{125}$

iv) P (none) = $^2/_5x^2/_5x^2/_5$

$= ^8/_{125}$

19.

x	0	1	2	3	4	5	6
y	3	2.5	3	4.5	7	10.5	15



b) y_1, =2.6, y_2=3.6, y_3=5.6, y_4 =8.6, y_5=12.6

Area = 1[2.6+3.6+5.6_8.6+12.6]

= 33 sq. units

c)

$$A = \int_1^6 (^1/_2x^2 - x + 3)\,dx$$

$$A = [^x3/_6 - ^x2/_2 + 3x]_1^6$$

$$= 36 - 2^2/_3$$

$$= 33^1/_3$$

$$\% \text{ error} = \frac{^1/_3}{100} \times 100$$

$$= 1.01\%$$

20. x-intercept = when y=o

$(x-3)(2x^2 - 3x + 1) = 0$

X= 3 or $2x^2 - 2x - x + 1 = 0$

$(2x - 1)(x - 1) = 0$

X = ½ or 1

∴ (3,0), (½ , 0), (1, 0)

y-intercept = when x = 0

∴ y = -3 ∴ (0, -3)

St. pts = $y=2x^3 - 9x^2 + 10x-3$

$\frac{dy}{dx} = 6x2 - 18x + 10$

$6x^2 - 18x + 10 = 0$

$X = 2.264$ or 0.7362

St pts. (0.7362, 0.2821)

And

(2.264, -3.282)

Nature of st. pts

$\frac{d^2y}{dx^2} = 12x - 18$

when $x = 0.7362$

$\frac{d^2y}{dx^2} = -ve$

$\therefore$ (0.7362, 0.2821)
= Max st. pt

When $x = 2.264$

$\frac{d^2y}{dx^2} = +ve$

$\therefore$ (2.264, -3.282)
= Min st. pt.

b) i) $r^2 = 100 - h^2 = r = \sqrt{100-h2}$

ii) $V = {}^1/_3\ \pi (100 - h^2)h = V = \frac{100\pi h\ {}^1/_3}{3}$

$\frac{dv}{dh} = \frac{100\pi}{3} - \pi r2 = \frac{dv}{dh} = 0$

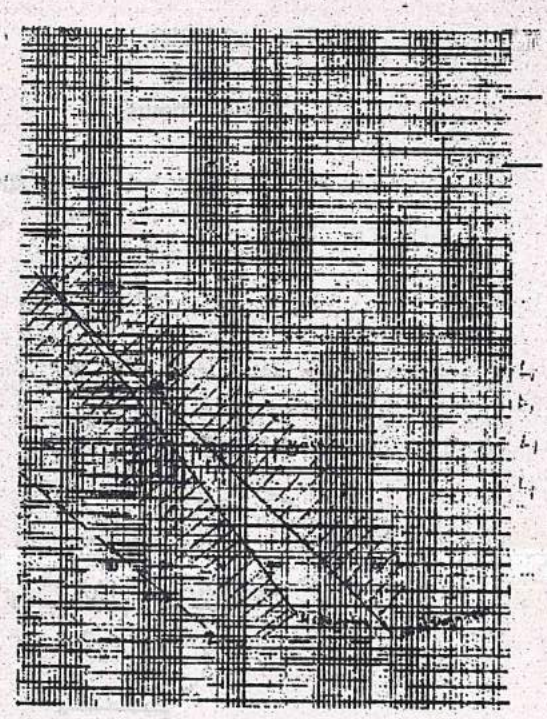
$h = \sqrt{\frac{100}{3}} = 5.773$

21. a) $4x + 6y \geq 144$

$100x + 200y \leq 4800$

$X \geq 16$ and $y > 10$

b)



c) Max point (16, 16)

Objective function: $z = 40x + 100y$

Profit = $40(16) + 100\ (16)$

= sh 2240

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
BIOLOGY 231/1 MARKING SCHEME

1. i) The name given to this initial stage.
   - Glycolysis

   ii) The name of the 3-carbon compound formed
   - Pyruvic acid/ pyruvate

   iii) Where the initial stages occur in cells
   - Cytoplasm

   iv) The total number of ATP molecules formed during this initial stage
   - Four;

2. Describe events that lead to inhalation in fish
   - Muscles during the buccal cavity contract; lowering the floor of the mouth; decreasing pressure but increasing volume; fish opens the mouth; and water flows into the mouth; operculum bulges outwards; while operculum slows pressure against the body; this lowers pressure in gill chambers and water in the mouth flows to the gills.

3. What is meant by the following term?
   - Crenated cell – An animal cell that has shrunk due to loss of water by osmosis.
   - Flaccid cell - A plant cell that is flabby/ shrunk due to loss of water by osmosis.

4. An individual is of blood A positive

   a) Name the antigens in the individual's blood
   - Antigen A - Rhesus antigen/ rhesus factor

   b) Give the reason why the individual cannot receive blood from a blood group B donor
   - He/she have b antibodies that will correspond with B antigen from the donor; causing agglutination.

5. How is human stomach adapted to;
   a) Protein digestion – Has gastric glands that secret gastric juice/ pepsin/ renin.
   b) Churning – Has thick muscular wall that contract and relax (to mix food with digestive enzymes/ enhance mechanical digestion.

6. a) Identify the cell
   - Relay/intermediate/ interneuron

   b) Name cell that transmit impulse to part A
   - Sensory neurone

   c) State one structural difference between motor and sensory neurone
   - Motor neurone has one nerve fibre while sensory has two.

7. a) During germination and early growth, dry weight of endosperm decreases while that of the embryo decreases. Explain
   - Food stored in the endosperm is hydrolysed and oxidized to provide energy; thus decrease in weight while embryo undergoes mutation cell division leading to growth;

   b) State 3 internal conditions with seeds that are necessary for germination
   - Enzymes
   - Hormones/ germination promoters
   - Viability of the seed.

8. State 3 physiological mechanism of controlling the human body temperature during a hot day
   - Vasodilation of blood capillaries;
   - Increased sweat production;
   - Erector pilli muscles relax
   - Decreased metabolism

9. How is the pressure in the thoracic cavity lowered?
   - Contraction of external intercostal muscles and relaxation of internal intercostal muscles; thus raising rib cage upwards and outwards; while diaphragm muscles relax flattening the diaphragm; thus lowering pressure.

10. a) Name a genetic mutation disorder that illustrates a case of incomplete dominance in human beings.
    - Sickle cell trait

    b) State the survival advantage associated with the trait named above
    - Individual have increased resistance to malaria

11. Name 2 structures in a mammalian body with ciliated epithelial tissue.
    - Fallopian tube;
    - Trachea

12. a) Name stage of meiosis II represented by the above diagram
    - Metaphase II

    b) Describe the next stage of meiosis II
    - Chromatids separate at centromere point; and migrate to opposite poles;

    c) Describe events that occurred in meiosis I that lead to the reduction in the number of chromosomes by half
    - Synapsis – pairing of homologous chromosomes;
    - Arrangement of homologous chromosomes at the equator o the spindle and during metaphase I.
    - Separation of homologous chromosomes and migration of individual homologous chromosomes to opposite poles.

13. a) Name evolutionary process that may have given rise to these structures
    - Divergent evolution

    b) What is the name given to such structure?
    - Homologous structures

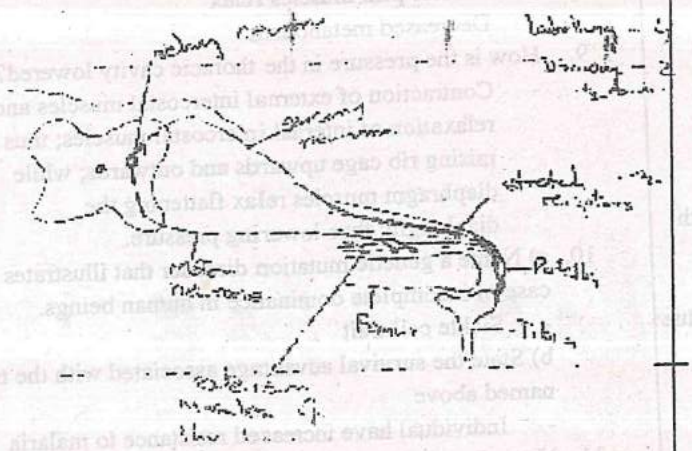
    d) Gie two examples of vestigial organs in man
    - Coccyx
    - Appendix
    - Nictating membrane
    - Body hair
    - Muscles that move the ear.

14. a) Name the part labeled B
    - Pollen tube nucleus

    b) Explain the role of part labeled A during fertilization
    - One male nucleus fuse with egg cell to form a zygote while the other with polar nuclei to form tripod nucleus/ primary endosperm nucleus.

    c) State structural difference between pollen grain produced by insect and wind pollinated flowers
    - Pollen grains produced by insect pollinated flowers are large/ heavy and smooth/ stick; polar grains while from wind pollinated flowers are small, smooth and light.

15. Using a simple but well labelled diagram illustrate reflex arch during a knee jerk reflex which occurs when the knee is tapped below the knee.



16. State four structural differences between class arachnida and insect

Arachnida	Insects
Has two body parts/ cephalothorax and abdomen	Has three body parts; head, thorax and abdomen
Have no antennae	Has a pair of antennae
Have four/ two pairs of walking legs	Has three pairs of walking legs
Has eight simple eyes on cephalothorax	As a pair of compound and several simple eyes on its head
Has two chelicerae on ventral side of cephalothorax	Has no chelicerae on its ventral side

17. Study the chart and answer questions that follow
    a) Identify the process and organelle in which it takes place
    - Process: Photosynthesis; Organelle: Chloroplast

    b) Identify process X and Y
    - X – Photolysis;
    - Y – Carbon IV Oxide fixation

    c) Identify gases C and P
    - C - Oxygen
    - P – Carbon (IV) oxide

    d) What is the role of substance D in the process
    - Reacts/ reduces carbon (IV) oxide leading to formation of sugar;

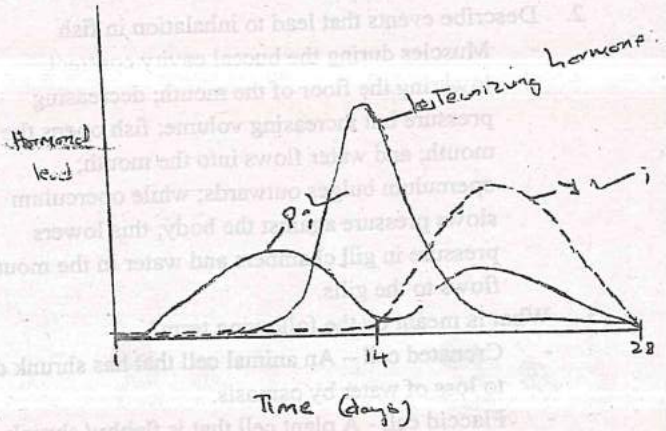
    e) Name the product E and Process Z
    - C – Glucose
    - Z – Condensation

18. Name fins in a bony fish which the following functions
    - Changing direction - Pectoral fins
    - Controlling pitching – Pelvic and pectoral fins.
    - Control yawing – Dorsal and anal fins

19. Structural differences between DNA and RNA

DNA	RNA
Double stranded/ double helix	Single stranded
Has rhythm	Has uracil instead of rhythm
Has deoxyribose sugar	Has ribose sugar;

20. The graph below shows relative levels of hormones during human menstrual cycle



    a) By labeling P and Y identify the curve that represents oestrogen and progesterone respectively

    b) What is the role of the above named hormones during menstrual cycle?
    - Progesterone – to promote/ stimulate thickening of the uterine walls;
    - Oestrogen – Stimulate repair of uterine wall/ endometrium; stimulate pituitary glands to secrete luteinizing hormone.

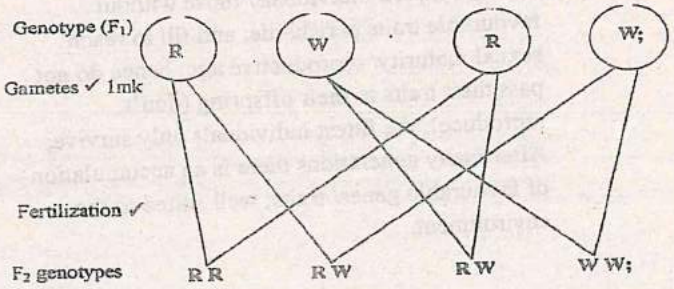
    c) On the graph draw a curve to show relative changes in the level of luteinizing hormone

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
BIOLOGY 231/2 MARKING SCHEME

1. a) P – Sporangium
   Q – Spore
   R – rhizoids
   b) Formation of spores
   c) i) Causes decomposition of dead matter thus releasing nutrients to the soil to increase its fertility
   ii) Destroy old cloths/ shoes/ timber;
   iii) Causes food spoilage
   d) i) Fungi
   ii) - They lack chlorophyll;
   - Has cell wall made up of chitin instead of cellulose; (chitinouscellwall)
   - Store carbohydrates as glycogen

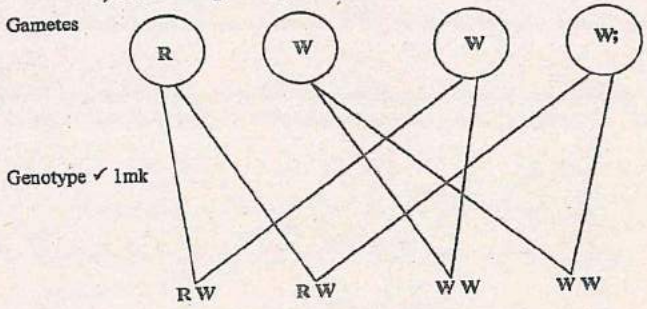
2. a) K – phloem
   L – xylem
   M – root hair
   b) Protects the apical meristem as the root is pushed into the soil
   c) Osmosis
   d) L is centrally located in the root while in the stem is arranged in a ring
   e) Y – region of cell division
   Z – region of cell elongation/ enlargement

3. a) Parental R W x R W;



Phenotypic ratio
Red : Roan : White
1 : 2 : 1
Rej; 1 : 2 : 1 only / rej ratio only

b) Parental genotypes (1mk) R W x W W



Genotypic ratio R W : WW
1 : 1
Ref: ratio only

c) Gene or red colour coat and white colour coat are condominant/ have equal dominance. Acc. incomplete dominance

4. a) i) Q;
ii) Ammonia requires a lot of water for dilution hence production of large volumes of dilute urine
b) i) S;
ii) Excretes small volumes of (concentrated) urine
c).

Nephron of Q	Nephron of S
Shorter loop of hence	Longer loop of hence
Larger glomeruli	Smaller glomeruli

Rej. short/ long nephron

d) – Increases osmotic pressure of blood; leading to increased water reabsorptial (by osmosis) from glomerular filtrate; hence production of small volumes of concentrated urine.

5. a) H – Eustachian tube
J – Semi-circular canals
b) H – Tube open/ connection to the phalynx and to the middle ear/ opens during swallowing/ yawning and vomiting to equalize the air pressure in the middle ear with the atmospheric air pressure.
M – Pinna – Curved/ funnel shaped to receive or collect and direct sound waves into the ear.
N – Cochlea – long/ highly coiled/ spiral in form to increase surface area for sound perception;
Has sensory hairs/ cells which convert sound vibrations to impulses/ generate impulses;
Has endolymph to transmit vibrations
c) Total deafness;
d) Endolymph
e) Balance; acc body balance/ posture

6. a) Axes 2;
Scale 1;
Plotting 2;
Curve 2;
Curve identity 1;
b) i) Population increases rapidly because of fewer predators/ less predation
ii) Population decreases/ declines/ reduces due to shortage of food/ inadequate supply of food/ few number of prey.
c) i) 100 ± 1;
ii) 65 ± 1;

d) i) population decreases/ reduces; due to many predators
ii) Population decreases/ reduces; due to competition over the same food source; (interspecific competition)

e) Using a sweep net the houseflies were caught, marked using ink that cannot be erased easily counted and recorded; the flies were then released to the population. After 24 – 48 hours the procedure was repeated the flies in the second capture counted and recorded

$$\text{Population of flies} = \frac{\text{first marked} \times \text{second captures}}{\text{Marked recaptured}}$$

7. Of vertebrae bones for their functions

i) Thoracic
- Long neural spine; to offer large surface area for attachment of back muscles
- Large/ broad centrum for firm articulation with the adjacent vertebrae.
- Short transverse process for articulation with the ribs
- Wide neural canal for the passage and protection of spinal cord
- Wide vertebraterial canal for the passage of nerves and blood vessels.

ii) Lumbar
- Long transverse process to provide a large surface area for attachment of muscles
- Short and broad neural spine to provide a large surface area for attachment o back muscles
- Thick/ large/ broad centrum or firm articulation with the adjacent vertebrae.
- Wide neural canal or the passage of nerves and blood vessels
- Large pre-zygapophyses, zygapophyses and post-zygapophyses. Articular facets to articulate with adjacent vertebrae bones/ provide additional surface area for muscle attachment.

iii) Cervical
- Large centrum except atlas for firm articulation with the adjacent vertebrae
- Axis has adontrict process to permit rotatory or turning movement with atlas/ act as a pivot or atlas and the skull/ articulates to the atlas
- Branched broad transverse process to provide a large surface area for attachment of neck muscles
- Wide neural canal for the passage and protection of the spinal chord.
- Short articular facets to articulate with adjacent vertebrae bones/ provide additional surface area or attachment of neck muscles
- Wide neural spine to provide large surface area for attachment of neck muscles.

iv) Sacrum
- Anterior vertebrae has large transverse process for fusion with pelvic girdle
- Vertebrae are fused to transmit weight of astatine animals to rest of the body/ for strength
- Sacrum has a large base to provide a large surface area for attachment o hip muscles
- Short neural spine to provide additional surface area for attachment of hip muscles
- Wide sacral canal for the passage of nerves and protection of spinal chord.

8. a) Nature selects those individuals/ organisms which are sufficient/ well adapted and allows them to survive; and rejects those that are poorly adapted by wiping them out.

b) – Individuals of the same species show variations; that are caused by genes
- The variations can be passed from parent to offspring; through genetic inheritance; some of the variations become more suited to the prevailing environmental conditions;
- Most organisms produce more offspring than the environment can support; hence there is always a struggle for existence; due to competition among individuals for scarce resources.
- Individuals possess traits/ characters that enable them to have competitive advantage to survive/ stand better chances to survive in the struggle; in the end the well adapted/ suited individuals survive; and reach reproductive age; and pass over their favourable traits to their offspring; since survival is of the fittest.
- Poorly adapted individuals/ those without favourable traits perish/ die; and fill to reach sexual maturity/ reproductive age; hence do not pass their traits to their offspring (don't reproduce); the fittest individuals only survive; After many generations there is an accumulation of favourable genes/ traits; well suited to the environment.

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
CHEMISTRY 233/1 MARKING SCHEME

1. a) Clearly outline how the patient should take the tablets
   - Take 2 tablets after every 8 hours

   b) Sate the conditions under which flame I is produced in Bunsen-burner
   - The flame should be produced when the air hole is open
2. State 2 properties of the liquids that make it possible to separate them using such apparatus
   - Difference in densities
   - They are immiscible
3. Describe how solid sales of salts can be obtained from a mixture of lead (II) chloride, sodium chloride and ammonium chloride
   - Heat to sublime ammonium chloride
   - Add water to dissolve sodium chloride
   - Filter the residue is lead (II) chloride
   - Evaporate the filtrate (sodium chloride solution) to obtain sodium chloride solid.
4. i) Write electronic configuration of ion of x.
   - 2 : 8

   ii) To which group does element x belong
   - Group 2 (II)
5. a) Name gas P
   - Hydrogen

   b) How would you expect copper to behave compared to magnesium in the combustion tube?
   - Copper would not react with steam

   c) Write the equation or the reaction between magnesium and steam
   - $Mg_{(s)} + H_2O_{(g)} \longrightarrow MgO_{(s)} + H_{2(g)}$
6. What is the molarity o the potassium manganite (III) solution?

   Mm = ?

   $Vm = 24.15cm^3$

   MFe = 0.1M

   $VFe = 25cm^3$

   Mole of Fe2+ = 0.1mole $= 1000cm^3$

   ? $= 25cm^3$

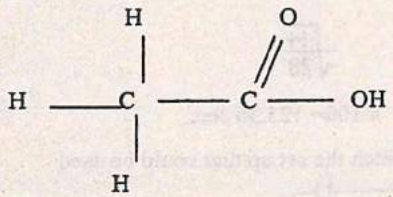
   Mole ratio = 1:5 = 0.0025 moles

   Moles of MnO_4 = 0.0025 = 0.005 moles
7. a) Molten slag – Protect the hot iron from being re-open

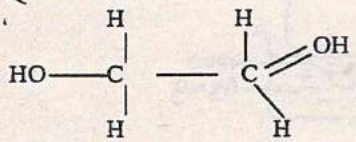
   b) Waste gases leaving the furnace – used to preheat the air between that time base of the furnace

   c) Limestone – Decompose to CaO which combine with unwanted silica forming slage
8. a) Draw the structure of compounds

   P

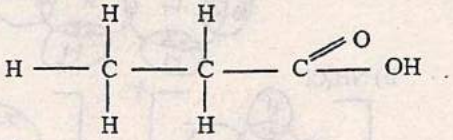


   Q

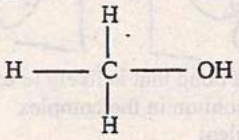


   b) Write the name of compound R
   - Sodium ethoxide
9. a) in which homologous series does the compound belong to?
   - Ester

   b) Name and draw structures of two compounds that can be used to prepare the above compound
   - Propanoic acid



   - Methanol



10. a) State one factor that can determine the stability of an atom
    - N/P ratio
    - Amount f energy released when heat collide with protons in the nucleus

    b) Find the value of M and n

    $216 = 208 + 4m + 0$

    $4m = 216 - 208$

    $4m = \frac{8}{4} = 2$

    $90 = 82 + 2m + -n$

    c) Calculate the half-life of polonium

    $1 \longrightarrow \frac{1}{2} \longrightarrow \frac{1}{4} \longrightarrow \frac{1}{8} \longrightarrow \frac{1}{16}$

    4 half lives = 112 days

    1 half life = ?

    $= \frac{1 \times 112}{4} = 28$ days
11. a) Write an equation to show how M form an ion

    $M_{(g)} - 3e^- \longrightarrow M_{(g)}^{3+}$

    $M_{(g)} \longrightarrow M_{(g)}^{3+} + 3e^-$

    b) Write the formula of the chlorine of M
    - MCl_3
12. a) State and explain one way in which the yield of ammonia can be increased
    - Increase in pressure
    - Withdraw of $NH_{3(g)}$ decrease in concentration of $NH_{3(g)}$ favours towards reaction
    - Use of low temperature RXA of exothermic decreases in temperature forms forward reaction
    - Addition of H_2/ N_2 increase in reaction of rnxns favour forward reaction
13. Calculate relative atomic mass

    moles of HCl used = $\frac{1 \times 20}{1000} = 0.02$ moles

    $CaCO_3$: HCl

    1 : 2

    Moles of $CaCO_3$ used = ½ x 0.02 moles = 0.01 moles

    0.01 mole = 1g

    1 mole = ?

    $= \frac{1 \times 1}{0.01} = 100g$

    Ca + 12 + 16 + 3 = 100

    Ca = 100 – 60

    Ca = 40
14. a) What is meant by the term solubility
    - Solubility is the mass of a substance that can dissolve per 100g of water

    b) How much salt A will remain undissolved

    100g o water = 25g

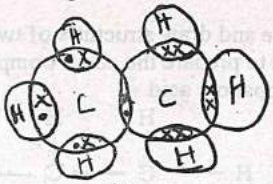
    112g of water = ?

$\frac{112g \times 25g}{100g} = 28g$

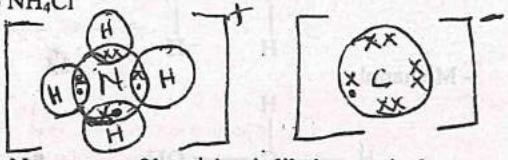
Un dissolved salt

$= (8 + 55) - 28 = 35g$

15. a) i) C_2H_6



ii) NH_4Cl

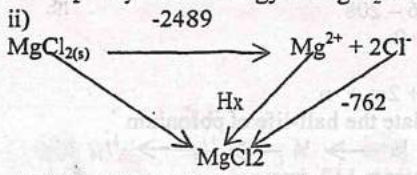


b) Name type of bond that is likely to exist between copper and ammonium in the complex
- Dative covalent

16. a) State Hess's law
- Enthalpy change of a reaction is the same regardless of the rate followed as long as the reactants and products are the same.

b) i) Name the enthalpies H_1 and H_2
- H_1 – lattice energy
- H_2 – Hydration energy of $MgCl_2$ solution

ii)



$-5142 = -2489 + Hx + -762 \times 2$

$Hx = -5142 + 2489 + 769 = -1893kj/mol$

17. a) give two reasons why carbon (IV) oxide is used as a fire extinguisher
- Denser than air
- Does not support combustion

b) State the function of tartaric acid in baking powder
- Reacts with $NaHCO_3$ to produce CO_2 which makes the dough to rise
- Reacts with Na_2CO_3 formed when $NaHCO_3$ is heated hence neutralize Na_2CO_3 in the dough

18. a) calculate quantity of electricity used

$Q = it = 0.5 \times 1930 \text{ sec} = 965c$

b) Determine value of x if the ion of metal J is represented as Jx

$Jx + xC \quad J(s) \quad 44g$

$965c = 0.44g$

$? \quad 44g \quad = 96500C$

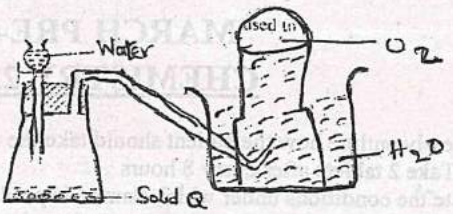
$X \times \frac{96500}{96500} = \frac{965500}{96500}$ $\quad X = 1$ Therefore charge $= +1$

19. a) What is meant by the term basicity of an acid
- It is the number of replaceable hydrogen atoms in an acid

b) Describe briefly how potassium sulphate can be prepared using $50cm^3$ of 1M potassium hydroxide
- Mix/ react $50cm^3$ of 0.5M H_2SO_4 or 25cm3 of 1M H_2SO_4 to obtain a neutral solution of K_2SO_4
- Heat to evaporate some water
- Cool slowly to crystallize the solution

20. a) Name substance Q
- Na_2O_2

b) Complete the set –up to show how oxygen has is collected



c) Write the equation for the reaction that occur

$2Na_2O_2 + 2H_2O_{(l)} \longrightarrow 4NaOH_{(aq)} + O_2$

21. a) Is strongly basic - R / 14.0

b) Reacts with sodium carbonate more vigorously
- R / 1.5

c) is ammonia solution - S/ 8.0

22. a) State and explain the observation that was made
- Yellow solid is formed
- $SO_{2(g)}$ is reduced by H_2S to S

b) State two conditions necessary for the reaction to take place
- Jars should be moist
- The jar with the denser has should be placed on top of the jar with the gas.

23. a) write an equation for the reaction

$2KMnO_{4(s)} + 16HCl_{(aq)} \longrightarrow KCl + 2MnCl_{(g)} + 8H_2O_{(l)} + 5Cl_2$

b) Give the formula o another reagent that can be used instead of potassium manganite (VII)
- MnO_2

c) Using an equation illustrate how chlorine bleach coloured substances

$Cl_{2(g)} + dye + H_2O_{(l)} \longrightarrow 2HCl_{(aq)} + dye - O$

24. a) Distinguish between ionization energy and electron affinity
- Ionization energy is the energy required to remove an electron from a gaseous atom/ ion
- Electron affinity is the energy required to add an electron to a gaseous atom

b) Explain why fluorine is more reactive than iodine
- Reactivity of halogens increase up the gp due to the decreased number of energy levels/ decrease in atomic radius

25. How long will it take $400cm^3$ of carbon (IV) oxide gas to diffuse through the same porous plug

$RN_2 = \frac{230}{70} = 4cm/sec$

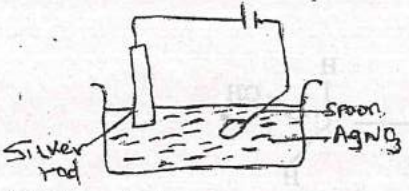
$RCO_2 = \frac{400}{t} =$

$\frac{4}{\frac{400}{t}} = \frac{\sqrt{44}}{\sqrt{28}}$

$\frac{t}{100} = \frac{\sqrt{44}}{\sqrt{28}}$

$t = \frac{\sqrt{44}}{\sqrt{28}} \times 100 = 125.36 \text{ sec.}$

26. Sketch the set up that could be used



27. a) Sodium nitrate

$2NaNO_{3(s)} \longrightarrow 2NaNO_{2(s)} + O_{2(g)}$

b) Copper (II) nitrate

$Cu(NO_3)_{2(s)} \longrightarrow 2CuO_{(s)} + 4NO_{2(g)} + O_{2(g)}$

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
CHEMISTRY 233/2 MARKING SCHEME

1. a) i) What name is given to the group to which the element belong?
   - Alkaline earth metals

   ii) Write the electronic configuration of the element
   - 2:8:18:8:2

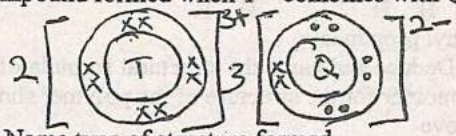
   b) i) Name nature of the oxide formed when T^{3+} forms an oxide
   - Amphoteric oxide

   ii) Identify ion of the most electronegative element
   - Q2-

   iii) Compare the reactivity of elements forming ions W^+ and X^+
   - W is more reactive than X

   iv) State observation made
   - Turns from orange to red.

   v) Draw 'dot' and 'cross' diagram illustrating on the compound formed when T^{3+} combines with Q^{-2}



   ii) Name type of structure formed
   - Giant Ionic Structure

   vi) I) Chlorine formed by W^+
   - Mobile ions

   II) Element of X^+
   - Delocalized electrons

   c) i) State the electronic configuration of the ion R
   - 2:8:8

   ii) S is a solid while R is a gas. Explain
   - Has larger molecules than R hence stronger van der waal forces of attraction

2. a) i) What would be observed if aqueous ammonia is added to the yellow solution
   - A brown precipitate is formed

   ii) Write the ionic equation for the reaction above in (i)

$$Fe^{3+}_{(aq)} + 3OH^-_{(aq)} \longrightarrow Fe(OH)_{3(s)}$$

   b) i) I) Colourless solution X

$$Pb(OH)_{2(s)} + 2OH^-_{(aq)} \longrightarrow [Pb(OH)_4]^{2+}_{(aq)}$$

   II) Yellow precipitate

$$Pb(NO)_{3(aq)} + 2I^-_{(aq)} \longrightarrow PbI_{(s)}$$

   ii) What observations are made when white precipitate S is heated strongly?
   - Turns from white to orange/ red when hot then yellow on cooling or turns from white to yellow.

   iii) Write the equation for the reactions that took place

$$Pb(NO_3)_{2(aq)} + H_2S_{(g)} \longrightarrow PbS_{(s)} + 2HNO_{3(aq)}$$

   c) i) Describe how the student would obtain copper metal
   - Ass water to copper (II) sulphate crystals and stir to form $CuSO_4$ solution. Add iron fillings to the solution and stir. Continue adding iron fillings till the pale blue colour of solution just fades. Filter the mixture to obtain copper metal s residue. Wash and dry the residue between filter papers.

   ii) I) Name the product at cathode
   - Hydrogen gas

   II) Calculate mass of the product formed at the anode if a current of 0.15A was passed for 1 hour 5 seconds at stp

   Q = It
   = 0.15A x (60 x 60 + 5)
   = 0.15A x 3605
   = 540.75C

$$4OH^-(aq) \longrightarrow 2H_2O_{(l)} + O_{2(g)} + 4e^-$$

   (96500C x 4) yield 32g of O_2
   540.75C yield x

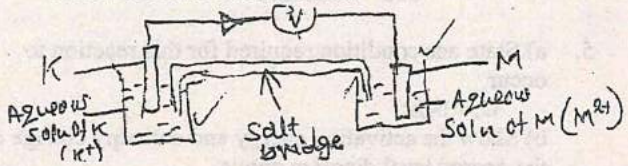
$$X = \frac{540.75C \times 32}{96500C \times 4} = 0.0448g$$

3. a) i) What is metal L likely to be
   - Copper

   Give a reason
   - It is reference electrode hence E° of 0.00

   ii) Which metal cannot be displaced from its salt by any other metal in the table?
   - J

   b) i) Draw a well labeled diagram of this cell and the direction of the electrons flow



   ii) Write the reaction of the cell

$$K(s) + M2+(aq) \longrightarrow K2+(aq) + M(s)$$

   iv) Calculate the e.m.f of the cell
   +0.45 - 0.47 = +0.92V

   d) i) Write the reactions that took place at the cathode and the anode

   I) Cathode

$$Cu^{2+}_{(aq)} + 2e \longrightarrow Cu_{(s)}$$

   II) Anode

$$4OH^-_{(aq)} \longrightarrow 2H_2O_{(l)} + O_2$$

   ii) I) Solid
   0.5 x 3 x 60 = 90C
   2 x 96500 = 63.5

$$90 = \frac{63.5 \times 90}{2 \times 96500} = 1.77668g$$

   II) gas
   4 x 96500C = 22.41

$$90 = \frac{22.4 \times 90}{4 \times 96500} = 0.00522 \text{ litres}$$

4. a) i) Name gas K
   - SO_2

   ii) Write an equation for reaction taking place in the 1st roasting furnace

$$2CuFeS_{2(s)} + 4O_{2(g)} \longrightarrow Cu_2S_{(s)} + 2FeO_{(s)} + 3SO_{2(g)}$$

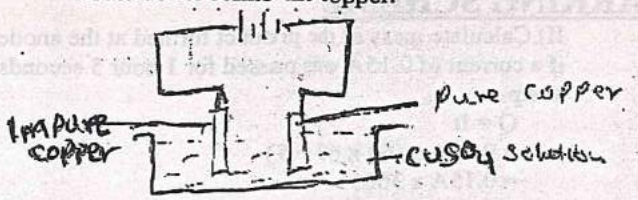
   iii) Name the slag M
   - Iron (II) salicate ($FeSiO_3$)

   iv) What name is given to the reaction taking place in chamber N?
   - Redox

Write the reaction

$Cu_2S_{(l)} + 2Cu_2O_{(l)} \longrightarrow 6Cu_{(l)} + SO_{2(g)}$

b) Draw a well labeled diagram to show the set up you would use to refine the copper.



c) Determine percentage purity of the copper pyrite if 810kg of it was fed to the 1st roasting furnace

$2CuFeS_2 \longrightarrow Cu_2S$

$Cu_2S \longrightarrow Cu_2O$

$Cu_2O \longrightarrow 3Cu$

Moles of Cu = $\frac{210000}{64} = 3.281$

Moles of Cu_2O = $\frac{3.28}{3} = 1.09375$

Moles of $Cu_2S = 0.09375$

Moles of $CuFeS_2 = 1.09375 \times 2 = 2.1875$

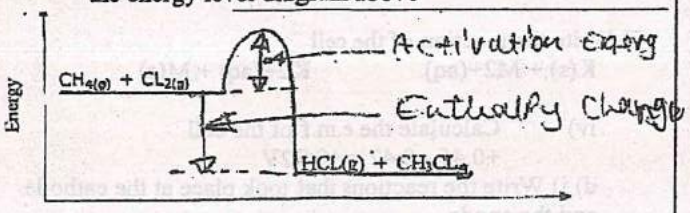
Mass of $CuFeS_2 = 2.1875 \times 151$

$= 402.5$

% purity = $\frac{402.5}{810} \times 100 = 49.69\%$

5. a) State one condition required for this reaction to occur
   - U.V light

   b) Show the activation energy and enthalpy change on the energy level diagram above



   c) Calculate the enthalpy change o the reaction above

   H = (413 + 242) – (346 + 431)

   = -122kJ

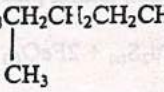
   d) What is the effect of increasing pressure on the reaction rate of the above reaction? Explain
   - Reaction rate increase
   - Increase in pressure brings reacting particles closer thus increasing the rate of effective collisions.

   e) State and explain observation made when dilute HCl is added to the reaction
   - Intensity of orange colour increases
   - HCl increases H^+ concentration hence equation shifts to the right, more $Cr_2O_7^{2-}$ is formed.

6. a) Name substance X in the equation below
   - X – Octane (C_8H_{18})

   b) What is the name of the process?
   - Cracking

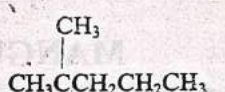
   c) Name and write the formula of 3 isomers of hexane



   $CH_3CH_2CH_2CH_2CH_3$

   CH_3

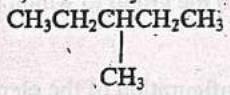
   2-methylpentane



   $CH_3CCH_2CH_2CH_3$

   CH_3

   2,2-Dimethyl butane



   $CH_3CH_2CHCH_2CH_3$

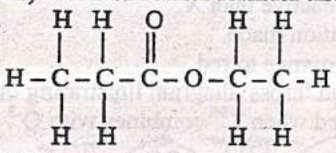
   CH_3

   3-methyl pentane

   d) i) Name substances A, B and Process X
   - A – Glucose
   - B - yeast
   - Process X – Fractional distillation

   ii) Name type of reaction that occurs when ethanol is converted to $CH_2 = CH_2$
   - Dehydration

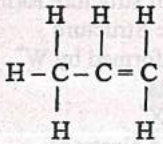
   iii) Write structural formula and name of compound D.



   Ethyl propanoate

   e) Deduce and name the structural formula of the monomer for the structure of the polymer shown above

   Propene



7. a) Identify the catalyst used in step I
   - Iron

   b) Describe the chemical test of gas E
   - Bring a glowing splint to the mouth of the test tube contravening gas E
   - The glowing splints relights

   c) Name the optimum conditions or the production of ammonia gas
   - Iron catalyst
   - 500 atmospheres
   - 400°C to 500°C

   d) Identify X and Y and their sources
   - X – Nitrogen – From fractional distillation acquired from air
   - Y – Hydrogen – from contracting of petroleum products

   e) Write a chemical equation between substance c and copper metal

$Cu_{(s)} + 4HNO_3)_{(l)} \longrightarrow Cu(NO_3)_{2(aq)} + 2NO_{2(g)} + 2H_2O_{(l)}$

OR

$3Cu_{(s)} + 8HNO_3)_{(aq)} \longrightarrow 3Cu(NO_3)_{2(aq)} + 4H_2O_{(l)} + 2NO_{2(g)}$

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
CHEMISTRY 233/3 MARKING SCHEME

1. TABLE.
   - Constant reading or rise award 0
   - Pen ½ once for empty spaces, subject to at least 5 readings
   - 5 readings pen. fully
   - Pen. ½ constant readings
   - Dec. to whole no. /0.5
   - Acc. ± 1 – 1 mk
     ± 2 – ½ mk

On grid provided, plot a graph of temperature (vertical axis) against time.

Trend
Lab – ½
Scale ½
Plot 1
Shape 1
Total = 3 mks

a) Determine temperature (Ts) when 2.0g of substance A dissolves completely in 10.0cm^3 of distilled water.
- Reading at the constant(Ts)

b) Calculate solubility of substance A in gram per 100g water at temperature, Ts.
Solubility of A = $\frac{2 \times 100}{10}$ = 20g/100g of water

Or
10g of water = 2g
100g of water = $\frac{100 \times 2}{10}$ = 20g/100g of water

Table 2
T – 1 S – 1
AC – 1 P.A 1
F.A – 1 Total 5 mks

a) Calculate the
i) Average volume of solution A used
$\frac{1 + 11 + 111}{3}$ = Answer (collect)

ii) Number of moles of hydrochloric acid, solution B used
moles of HCL (b) used = $\frac{0.05 \times 25}{1000}$ = 0.00125 moles

b) i) No. o moles substance A used
moles of substance A = $\frac{\text{answer is a (ii) above}}{2}$

Correct answer.
Or $\frac{0.00125}{2}$ = 0.000625

ii) Concentration of solution A in moles per litre
$\frac{\text{Answer in b(ii)} \times 1000}{\text{Average titre}}$ = correct answer

iii) concentration of solution A in g per litre
$\frac{2 \times 1000}{250}$ = 8g/l
Or
2g = 250
8g/l = 1000cm

iv) Relative formula mass of substance A
R.F.M of A = $\frac{\text{Ans in b(iii)}}{\text{Ans in b(ii)}}$ = correct Answ.
NB: 367 – 429

2. a)

Observation	Inferences
- Colourless liquid form on the cooler parts of test tube mouth of test tube - White fumes with HCl - Solid sublimes	- Hydrated salt/ cpd or water of crystallization - NH_4^+

b) i)

Observation	Inferences
- White Precipitate - Insoluble	- Pb^{2+} Present - Al^{3+} Present Pen. ½ mk for ny contradicting ion to a max of 1 mk Ignore Mg^{2+} if mentioned present

ii)

Observation	Inferences
- No white precipitate/ suspension/ solid - No effervescence - No observable change - No reaction; - No precipitate/ substance - No change	Al3+ If candidate mentions Pb^{2+} absent without mentioning Al^{3+} present award ½ mk for Pb^{2+} absent CO_3^{2-} or SO_3^{2-} absent NB: - To award for Cl3+ present it must have been credited 10 in b(i) above - To award for Pb^{2+} absent it must be mentioned in b(i) above as present - Ignore Ag^+ is mentioned absent

iii)

Observation	Inferences
- White precipitate which doesn't dissolve on boiling Rej. ppt insoluble on warming	- SO_4^{2-} present - If the candidate mentions Cl^- absent without giving SO_4^{2-} present award ½ mk for the Cl^- absent

3. a)

Observation	Inferences
Blue flame or blue clear flame	Saturated org (pd) - -C-C- Present C=C /- C≡C- Absent unsaturated org cpd absent Rej. R -OH

b)

Observation	Inferences
Miscible liquids/ no separation Acc. No separate layers L dissolves in water and vice versa Rej. No observable change/ no change	R – OH / polar org. cpd / polar cpd

c)

Observation	Inferences
No effervescence/ No bubbles/ fizzing Rej. No hissing	Absence of H^+ Not acidic Gnore R-COOH absent

d)

Observation	Inferences
Solution changes from orange to green Or Acidified $K_2Cr_2O_7$ changes from orange to green	R-OH Rej. Alcohol present in words Pen. Fully for an contradicting functions group

e)

Observation	Inferences
Sweet smell ; Pleasant smell Or smell of ripe bananas	Ester present

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
AGRICULTURE 443/1 MARKING SCHEME

1. Name any 2 methods which can be used to detect mineral nutrient deficiency in crops
- Soil testing
- Plant tissue analysis
- Observing deficiency symptoms

2. Why should a layer of top soil be added during preparation of compost manure
- Introduce bacteria for decomposition of organic matter.

3. Give four reasons for practicing crop rotation
- Improve soil fertility
- Improve soil structure
- Control soil erosion
- Control weeds
- Control soil borne pests and diseases
- Maximum utilization of nutrients

4. Give three reasons for practicing minimum tillage
- Control soil erosion
- Reduce cost of cultivation
- Maintain soil structure
- Conserve moisture
- Prevent root disturbance and other underground structures
- Prevent tubers and bulbs
- Exposure of humus

5. Give four reasons why horticultural crops are important to the economy of Kenya
- Foreign exchange
- Source of income

6. 4 farming practices which help to improve soil structure
- Crop rotation
- Addition of organic matter
- Minimum tillage

7. 3 effects of good transport network and communication systems on agriculture
- Easier, quicker movement of bulky and perishable products
- Efficient distribution of products to consumers
- Information on market and research is easily passed on.
- Reduces transport costs.

8. Give 3 methods of land reform in the farm
- Land consolidation
- Land adjudication and registration
- Settlement and resettlement

9. State 3 reasons why leveling is done on the land
- Uniform depth of planting
- Facilitate operation of field equipment harvesters
- Uniform penetration of irrigation water
- Soil clods with crushed - increase seed soil contact
- Field – ready for agriculture operations – planting, fertilizer and manure
- Reduces possibility of waterlogging and soil erosion.

10. State 4 types of water pumps for lifting water on the farm
- Hydram
- Reciprocating pump
- Centrifugal pump
- Piston pump
- Rotary/ semi rotary pump.

11. State 2 methods of breaking seed dormancy in certain seeds before planting
- Soaking
- Chemical treatment

12. List four materials used in the construction of a gabion
- Wire mesh
- Stones
- Metal bars

13. State four criteria used in classifying herbicides
- Formulation
- Selectivity
- Mode of action
- Time of application

14. State the use of each one of the documents given below
- Cash receipts – issued when payment in cash for goods is made
- Purchase order – Prepared by the consumer – shows description and quantities of goods desired.
- Delivery note – Prepared by supplier to show items in an order.

15. State any 4 farming practices which help to improve soil structure
- Use of organic manure
- Crop rotation
- Living land fallow
- Mulching and cover cropping
- Proper tillage/ cultivation practices

16. What does the term close season mean in crop production
- A certain crop should not be grown to control a pest or disease.

17. State 2 functions of plastic materials when used as mulch in crop production
- Moderate temperature
- Conserve moisture

18. State 4 pieces of information contained on a land title deed.
- Name of land owner
- Size of land
- Land parcel number
- Seal of issuing officer
- Date of registration
- Type of land ownership
- Signature of issuing offices

19. What are the three classifications of farm credit according to the repayment period
- Short-term credit
- Medium-term credit
- Long-term credit

20. Answer questions that follow after studying carefully

a) Identify the varieties labeled L, M and N
- L – Open Panicle
- M – Compact Panicle
- L – Goose necked

b) Which of the three varieties is less likely to be damaged by birds
- Variety L

c) Give a reason for your answer in (a) above
- Curved stalk – swings bird pests

d) Name four methods that are used to control bird pests in a field of sorghum
- Scaring
- Trapping
- Scarecrows
- Poisoning
- Destroy breeding

e) Name two other pests that attack this crop
- Sorghum shootfly
- Midges
- Stalk borer

f) Give 2 effective cultural methods of controlling one of the pests you have identified in (e) above
- Destroy infected crop residue
- Crop rotation

21. Study diagrams B and C and answer questions below

a) Identify the weeds
- B – Tagetes Minilta (Mexican Marigold)

- C – Oxalis Latifolia

b) .

c) Why is it difficult to control weed B

- Many seeds

22. Study illustrations and answer questions that follow

a) Identify structures Q and R

- Q – Gabion
- R – Trash line

b) Name the types of soil erosion controlled by the structures

- Gabion – Gully erosion
- Trash line – Rill sheet

c) State 2 ways in which the structures help to control soil erosion

- Trap soil
- Prevent overland flow

d) Give 2 materials that can be used in the construction of structure Q

- Mesh wire
- Stones/ hardcore

23. Study diagram carefully then answer questions that follow.

a) Identify the disease

- Headsmut

b) Name organism that causes the disease

- Fungus/ Ustilago nuda

c) State three cultural methods for controlling the disease

- Clean seed
- Crop rotation
- Destroy crop residues

24. Calculate amount of fertilizer they would require for the plot

$10000m^2$ require 200kg

$12m^2$ require ?

$$\frac{12 \times 200}{10000} = \frac{24}{100} = 0.024kg / 240g$$

25. a) Factors in farm planning

- Climatic actors
- Security
- Accessibility to main road
- Communication within the farm
- Water and power supply
- Soil type
- Farm size
- Government regulations/ policy
- Personal preference

b) Factors to be considered when selecting seeds for planting

- Quality parent material – healthy, high yielding, vigorous in growth
- Age of seeds – mature seeds
- Storage period of seeds
- Size of seeds
- Shape of seeds
- Purity of seeds

c) Role of magnesium in crop production

- Component of chlorophyll
- Promotes nitrogen fixation
- Activates enzymes
- Synthesis of oil in oil crops

26. a) Explain importance of irrigation in crop production

- Farmer can grow crops when rain is in shortage
- Crops like rice can be grown
- Method of land reclamation/ ASAL
- Crops can be grown throughout the year food supply guaranteed
- Pest control – armyworms, aphids

b) 5 physical methods of controlling crop pests

- Use of lethal temperature – extreme temperature e.g hot water
- Proper drying of produce – dry against too hard for pests to penetrate, discourage mould.
- Flooding – armyworms and cut worms – drowning moles
- Suffocation – use of CO_2 – storage bins
- Proper spacing
- Physical destruction – through hand picking or trapping pests and killing eg squirrels
- Use of scarecrows – structures erected in the field to frighten birds and large animals e.g dikdik
- Use of physical barriers – materials to prevent pests from getting to crops e.g metal plates in raised granaries, construction of fences, trenches – large animals
- Use of electromagnetic radiation – radio waves – deactivates enzymes in insects. Moths attracted by UV, aphids – yellow highly destroyed by heat or chemicals.

c) 5 management practices that can increase productive lie of pasture stand

- Weeding – prevent competition – nutrients, moisture
- Top dressing – nitrogenous fertilizer – vigorous growing
- Topping – remove steaming fibrous materials left or after growing – stimulate fresh regrowth.
- Re-seedling – gapping. Refilling patches of grasses and legumes if partially demanded by overgrazing
- Controlled grazing – control damage caused by livestock on forage during grazing. Recommendation. Control grazing by paddocking, strip grazing or tethering
- Pest control – avoid damage to crops e.g moles by trapping and use of pesticides.

27. a) Roles of trees in soil water conservation

- Protect soil from rain drop erosion reduce force of falling onto ground.
- Provide shade ad reduce loss of moisture by evaporation
- Acts as wind breaks
- Roots of trees bind soil particles together
- Reduce speed of running water – reduce erosive power
- Leaves decay and supply humus to soil – improves infiltration rate of the soil.

b) Objectives of land reforms

- Encourage conservation measures of land and general improvement of land
- Increase productivity of both land and labour
- Encourage commercial instead of subsistence farming – meaning self-employment in rural areas
- Encourage farmers to invest more- security of tenure improvement
- Achieve flexibility in farming patterns to meet changing national and market demands
- Achieve effective use of national land resources e.g settlement of unused land and introduction of irrigation schemes where possible and applicable.

c) Spacing of crops – factors influencing

- Type of machinery used – free passage of machines e.g coffee tractor ± spraying equipment
- Soil fertility – fertile –close spacing – high pop
- The size of plant – tall varieties – wide spacing , short varieties – closer, katumani, kitale
- Moisture availability – high rainfall areas
- Use of crop – forage or silage crop – closer spacing
- Pest and disease control – proper spacing – movement of pests e.g aphids in groundnuts
- Growth habit of the crop – spreading and tilling crop varieties – wider spacing

d) Importance of nursery

- Production of many seedlings in a small area
- Routine management practices – easily and timely done
- Best conditions provided for growth – fine filth shading and watering
- Planting of small seeds develop into strong seedlings before transplanting
- Ensures transplanting only those seedlings that are healthy and vigorous growth.

MANGU HIGH SCHOOL
MARCH PRE-MOCK EXAMINATION
PHYSICS 232/1 MARKING SCHEME

1. Given that the density of water is $1/g/cm^3$ express the density of liquid in terms of M_L and M_w

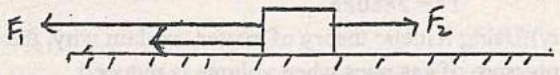
   $VL = \frac{M_L}{d_L}$

   And $Vw = \frac{M_w}{d_1}$ $\quad \frac{M_L}{d_L} = \frac{M_w}{1}$

   therefore $d_2 = \frac{M_L}{M_W}$

2. Explain how metre rule can be used to find the pitch of the screw
   - Measure the length of the threads part
   - Divide length with no. of threads

3. Draw a force F_3 that has same effect on the body s the two forces.



   Length = 2.2cm
   Direction and arrow

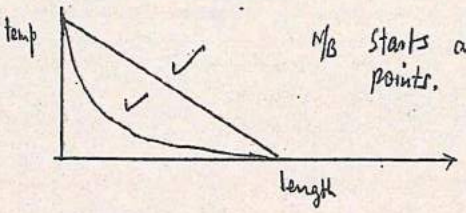
4. What will be the pressure in N/M^2 If density of mercury is $13600kg/m^3$.

   $P = hdg$
   $= 0.7 \times 13600 \times 10$
   $= 95,200$

5. State the use of bend
   - To provide room for expansion

6. State special features in a clinical thermometer and explain how these features makes it measure temperature conveniently
   - Constriction – holds mercury thread in position when reading are taken
   - Scale between 35 – 42 – range within human body temperature.

7. Sketch two graphs in same axis to show how temperatures and varies between hot end and cold end for the two metals



8. What is the reading on vernier calipers shown below

   0.50
   + 0.05
   0.55cm

9. Given that the rule is uniform, determine its weight

   Clockwise moment – Anticlockwise moment
   $0.1w + 0.6 \times 1 = 0.4 \times 2$
   $W = \frac{0.2}{0.1} = 2N$

10. Find the speed at which the mass start moving

    Elastic potential = kinetic energy acquired by mass
    Energy in spring
    $\frac{1}{2} ke^2 = \frac{1}{2} mv^2$
    $20 \times (0.01)2 = 0.02v2$
    $V = \sqrt{\frac{20 \times (0.02)_2}{0.02}} = 0.3162m/s$

11. Describe the motion of the body during the 10 seconds
    - A body projected vertically upwards at 20m/s reaches the highest point and comes back to the point of projection

12. a) Explain the role of the smoke particles, lens and microscope in the experiment
    - Smoke particles – reflect light as they move around
    - Lens – focuses light into smoke cell
    - Microscope – magnifies the smoke particles for easier visibility.

    b) State and explain what kind of motion is observed within the smoke cell
    - Smoke particles are seen moving in a continuous random motion, due to combinement by invisible air molecules

    c) State what will be observed if the smoke cell is kept in a very cold environment and the experiment repeated
    - The random motion of the particles will reduce

    d) Explain briefly why liquids have constant volumes but no constant shapes
    - Intermolecular distance between liquid molecules is constant at a particular temperature hence constant volume. The molecules can easily change positions within the bulk of the liquid hence no constant shape

    e) Compare the motion observed on smoke cell with what would be observed with dust particles suspended in water and viewed with a powerful microscope
    - Higher constant random motion in gone the two weak intermolecular forces.
    - Lower constant random motion in liquids due to stronger intermolecular forces.

13. a) Define the term specific latent heat o vapourisation of a substance
    - Heat energy required to vapourise a unit mass of a liquid at a constant temperature

    b) i) Determine the heat supplied by heater within the 10 minutes of boiling

    Heat = power x time
    $= 15 \times 10 \times 60$
    = 9000 Joules

    ii) Determine specific latent heat o vaporization of the liquid

Heat = Latent heat x mass

$9000 = \frac{35}{1000} \times Lv$

$Lv = 2.571 \times 10^6 J/kg$

iii) Explain why this method of determination of latent het of a substance may not be accurate

- Some heat is absorbed by containee
- Some heat is radiated away during heating

14. a) State the archmede's principle
    - An object partially or fully submerged in a liquid experiences upthrust equal to weight displaced.

    b) i) Determine downward force on the top surface of the block

    $F = P \times A$

    $= 0.2 \times 1200 \times 10 \times 0.008 = 192N$

    c) Explain why bodies in circular motion undergoes acceleration even when the speed is constant.
    - Bodies moves in constantly changing directions hence acceleration.

    d) i) Its angular velocity

    $W = \frac{\square}{t}$

    $\square_1 = \frac{\text{arc length}}{\text{Radius}} = \frac{2}{5} = 0.4$

    $= \frac{0.4}{1} = 0.4 rad/s$

    ii) Its periodic time

    $f = \frac{w}{2\Pi} = \frac{0.4}{6.284} = 0.0637 sec$

    $T = \frac{1}{f} = 15.71 sec$

    iii) Number of evolutions per second

    no of revolutions/sec = f = 0.0637

    e) Calculate the maximum tension in the string

    $T = \frac{mv^2}{r} + mg \qquad V = 2\Pi rf = 6.284 m/s$

    $= \frac{0.04 \times 39.4889}{0.5} + 0.4 = 3.159N$

15. a) show that $V_1A_1 = V_2A_2 = V_3A_3$

    $V_1 \frac{1}{A1} = VA = K$

    $V_2 \frac{1}{A2} = V_2 A_2 = K$

    $V_1A_1 = V_2 A_2$

    b) i) Explain how air is drawn into the barrel when the gas supply is opened
    - Air enters the barrel at very high speed creating low pressure within barrel, air of forced in the barrel by atmospheric pressure to occupy the low pressure region

    ii) State the purpose of metal ring
    - To regulate the amount of air entering

    c) i) Speed of water in narrow section

    $A_1V_1 = A_2V_2$

    $0.0176 \times 1.2 = 4.536 \times V_2$

    Therefore $V_2 = 4.655 m/s$

    ii) rate of discharge

    volume flux = $AV = 0.0211 m^3/s$

16. a) Define the term absolute zero temperature
    - Temperature at which gases molecules ceases to move

    b) i) State law that relates volume and temperature of the gas as shown on the graph above.
    - Charles law – That temperature of a fixed mass of a gas is directly proportional to absolute temperature as long as p is constant.

    ii) Determine value of P

    Slope = $\frac{(5 - 1.8) \times 10^{-3}}{600 - 200}$

    $8 \times 10^{-6} m^3/K = \frac{0.831}{OP} \qquad = P = 103Pa$

    iii) Find the new temperature of the gas given that the volume is constant

    $\frac{P_1}{T_1} = \frac{P_2}{T_2} = \frac{8 \times 10^5}{288} = \frac{8 \times 10^6}{T^2}$

    $T^2 = 2880Pa$

    iv) Using Kinetic theory of matter, explain why, the pressure of gas rises when volume is reduced
    - Number of collisions increases due to decreased volume hence increased pressure.

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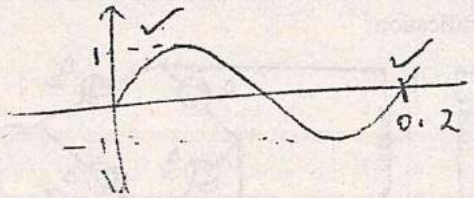
MARCH PRE-MOCK EXAMINATION
PHYSICS 232/2 MARKING SCHEME

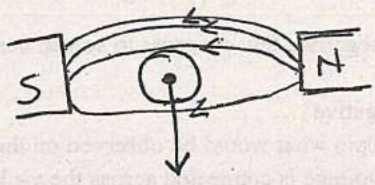
1. State the effect of increasing the intensity of illumination on the magnitude of the photo current
   - Number of photoelectrons produced increase; hence more photocurrent.
2. Sketch a displacement – time graph for a wave with an amplitude of 1m and a frequency of 5Hz
   $T = {}^{1}/_{f}$ $T = 0.2$ seconds



3. State 2 differences between the eye lens and the lens of a camera

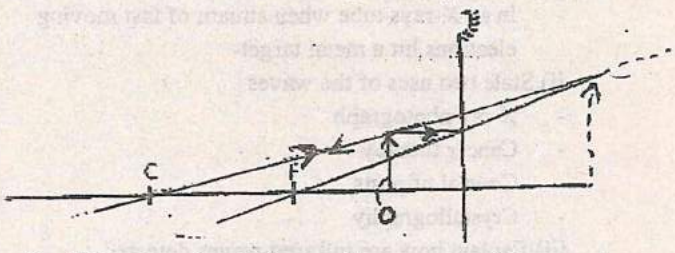
Eye lens	Camera lens
F variable	F fixed
Constant	Take one photo at a time
	V varies for zoom lens

4. Define polarization as used in simple cells and state how it can be minimized
   - Formation of hydrogen bubbles
   - Use depolarizer, eg potassium dichromate
5. Calculate value of x
   $30 + 30 = 60$
   ${}^{1}/_{x} + {}^{1}/_{60} = {}^{1}/_{5}$
   $5 = \frac{60x}{60 + x}$
   $300 + 5x = 60x$
   $55x = 300$
   $X = 5.45$
6. Draw and indicate direction of the magnetic field

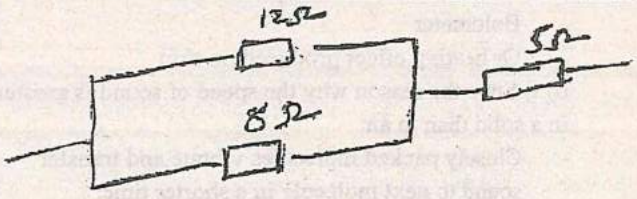


7. i) the kinetic energy of the electrons emitted
   $\frac{1}{2} mv^2 = ev$
   $= 1.6 \times 10^{-19} \times 2 \times 100$
   $= 3.2 \times 10^{-16} J$

   ii) The velocity of the electrons
   $3.2 \times 10^{-16} = \frac{1}{2} \times 9 \times 10^{-31} \times v^2$
   $v^2 = \frac{3.2 \times 10^{-16}}{4.5 \times 10^{-31}}$
   $V = \sqrt{7.1 \times 10^{-31}}$
   $V = 2.66 m/s \times 10^{-31}$
8. Complete the light ray diagram to locate the position of the image



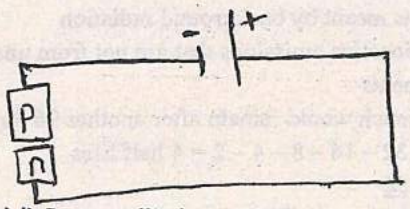
9. Show in a circuit diagram how you would connect them so as to give an effective resistance of 9.8Ω



$\frac{8 \times 12}{8 + 12} = \frac{96}{20} = 4.8$

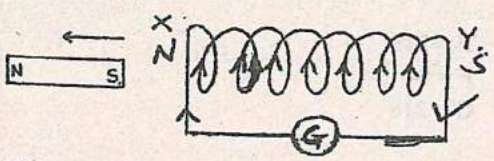
$4.8 + 5 = 9.8$

10. .
11. On the same diagram, show how a cell may be connected to make it is reverse biased



12. a) i) State snell's law with words
    $h = \frac{\sin i}{\sin r}$
    ii) Determine the angle of refraction for the ray
    $wna = \frac{1}{1.33}$ $(90 - 42 = 48)$
    $\frac{1}{1.33} = \frac{\sin 48}{\sin r}$ $r = \sin^{-1}(1.33 \sin 48)$
    $r = 82.14°$
    iii) Determine angle of incidence for which the angle of refraction
    $1.33 = \frac{1}{\sin c}$ $\sin^{-1} 0.7519$
    $C = 48.76$
    b) i) State faradays law of electromagnetic induction
    - magnitude of induced emf is directly proportional to rate of change of magnetic flux linkage

    ii) Label polarity at the points marked X and Y



    iii) Determine number of turns in the secondary coil of the ammeter reads 1.5A

$\frac{Ns}{1000} = \frac{1.5 \times 100}{250}$

$Ns = \frac{150000}{250}$ = 600 turns

13. i) How are waves B produced
    - in an X-rays tube when stream of fast moving electrons hit a metal target

    ii) State two uses of the waves
    - X-ray photograph
    - Cancer therapy
    - Control of pests
    - Crystallography

    iii) Explain how are infrared waves detected
    - Thermopile
    - Thermometer with blackened bulb
    - Bolometer
    - Or heating effect produced on skin

    b) i) State the reason why the speed of sound is greater in a solid than in air
    - Closely packed molecules vibrate and transfer sound to next molecule in a shorter time.

    ii) Calculate the depth of the sea bed

$$V = \frac{2d}{t}$$

$$d = \frac{1500 \times 2}{0.4}$$

$d = 7500m$

14. a) What is meant by background radiation
    - Radioactive emissions that are not from unstable elements

    b) How much would remain after another 96 days

$32 - 16 - 8 - 4 - 2 = 4$ half lifes

$\frac{96}{4} = 24$ days

$2 - 1 - 0.5 - 0.25 = {}^{1}/_{8}$

    c) I) which particle(s)/ radiations are detected at points
    - A – Alpha, Beta, Gamma
    - B – Beta
    - C – None

    II) State 2 dangers of radioactive emissions
    - Over exposure leads to cancer
    - Overexposure leads to skin burn

    d) i) Write down an equation to show this decay

$$^{226}_{88}Ra \xrightarrow{^{4}_{2}He} {}^{222}_{86}Rn$$

    ii) Determine the values of E, F G

$$^{222}_{86}Rn \xrightarrow{^{4}_{2}He} {}^{218}_{84}Po$$

    - E = 218
    - F = 84
    - G = 218

15. a) i) Define 'work function' of a surface
    - Minimum energy below which no photoelectrons are emitted.

    ii) Find work function of magnesium in joules

$2.8 \times 1.6 \times 10\text{-}19$

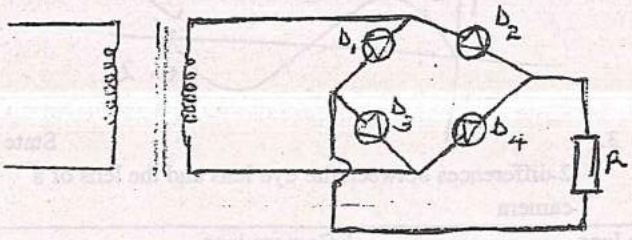
    iii) Determine the threshold wavelength for Beryllium

$$w = \frac{hc}{\lambda}$$

$$= 3.9 \times 1.6 \times 10^{-19} = \frac{6.34 \times 10^{-34} \times 3 \times 10^{8}}{\Lambda}$$

$\lambda =$

    c) i) Fix adiode in the circuit to show full wave rectification



    ii) explain how doping produces a p-type semiconductor
    - Doping with trivalent
    - Hole remains, 3 e's from trivalent bond
    - With intrinsic semiconductor
    - Holes become majority charge carriers

16. a) Define term thermionic emission
    - Emission of e's by heat

    b) i) Name parts labeled P, R, M
    - P – Anode
    - R – Y-plates
    - M – X-plates

    ii) Explain how electrons are produced in the tube
    - Thermionic emission
    - Cathode is heated liberates e's that are accelerated

    iii) State and explain the function of the grid
    - Controls number of e's emitted; hence brightness of screen
    - Grid move negative, few e's cross to screen hence less bright
    - Grid less negative

    iv) State and explain what would be observed on the screen if an a.c. voltage is connected across the y-plate
    - 2 d. diagram seen
    - Gives deflection in x-plates and deflection along y-axis

    v) State how deflection system of a television differs from that of a C.R.O
    - That of television by magnetic coils while that of C.R.O by electric field.