

# COMBINED SCIENCE

## EXAMINATION SAMPLE QUESTIONS

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2019

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## BIOLOGY SECTION

### DEFINE PHOTOSYNTHESIS

-Is the process whereby green plants manufacture their own food using carbon dioxide and water in the presence of sunlight and chlorophyll



### STATE THE FACTORS WHICH AFFECT PHOTOSYNTHESIS

1. Sunlight
2. Carbon dioxide
3. Water
4. Chlorophyll

### STATE THE PRODUCTS OF PHOTOSYNTHESIS AND THEIR USES

1. Oxygen – used in respiration
2. Carbohydrates (glucose) – used for respiration and excess glucose stored as starch in green plants

### DESCRIBE AND EXPLAIN THE FATE OF END PRODUCTS OF PHOTOSYNTHESIS

1. Glucose – translocated in phloem vessels to storage organs of the plants e.g. roots, stem or seed where it is stored in form of starch  
- Used by plant embryo during germination as source of energy
2. Oxygen – used in respiration by all living cells

### DESCRIBE AND EXPLAIN ADAPTATIONS OF A LEAF FOR PHOTOSYNTHESIS

1. Broadness, thinness and flat  
-The broadness of the leaf means it has a large surface area exposed to sunlight and carbon dioxide  
-Thinness of the leaf means that the gases diffuse across short distance
2. Large number of stomata on lower surface  
-The stomata allows gaseous exchange between the air space in leaf and the atmosphere
3. Numerous chloroplasts – the presence of these chloroplasts means more sunlight is absorbed
4. Arrangements along the stem – the arrangements of leaves along the stem in regular pattern to maximise exposure to sunlight energy
5. Air spaces – allows gases to diffuse easily

### DESCRIBE AND EXPLAIN THE DIGESTIVE SYSTEM OF A HUMAN

- (a) **Mouth** – the teeth masticate food into smaller particles
- (b) It consists of **oesophagus / gullet** which act as a passage of food and water
- (c) **Stomach** secretes gastric juice , hydrochloric acid which kills bacteria
- (d) **Liver** de-toxicate the food (remove poisonous from the food)
- (e) **Gall bladder** produce bile
- (f) **Duodenum** the bile emulsify fats to fatty acids and pancreatic juice digest proteins to amino acids
- NB.** Duodenum and ileum are small intestines or they form small intestines
- (g) **Ileum** responsible for absorption of nutrients into the body

(h) Colon or large intestines responsible for absorption of water

**NB.** Large intestines are made up of colon and a rectum

(h) Caecum digestion of cellulose to glucose by bacteria

-Temporary storage of undigested food

(i) Pancreas produce pancreatic juice

(j) Anus opening at the end of the alimentary canal for expulsion of faeces out of the body

### DEFINE THE FOOD TERM 'DIGESTION'

-Is the breakdown of large food molecules into smaller food molecules that can be swallowed or absorbed by the blood stream

### DISTINGUISH BETWEEN MECHANICAL DIGESTION AND CHEMICAL DIGESTION

MECHANICAL DIGESTION	CHEMICAL DIGESTION
The food is broken down by teeth so that the food can be easily swallowed	The nutrients are broken down by the enzymes in the alimentary canal so that the nutrients are easily absorbed by the blood stream

### WRITE DOWN THE END PRODUCTS OF DIGESTION AND THEIR USES

END PRODUCT	USES
Fatty acids and glycerol	Provide warmth and energy
Ammino acids	To repair worn out body tissues
Soluble sugars / Maltose	Provide energy

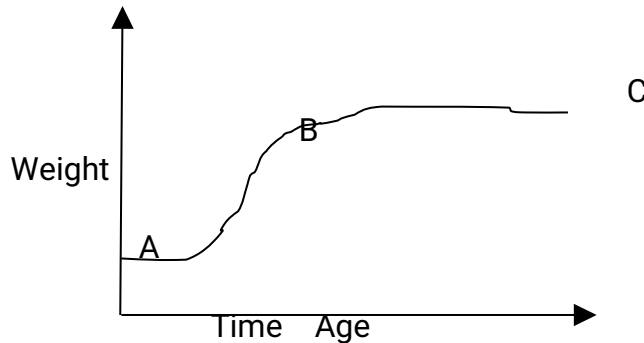
### DESCRIBE AND EXPLAIN THE STAGES INVOLVED IN THE FEEDING PROCESS

- 1) Ingestion. Is the taking in of food into mouth from outside
- 2) Digestion. Is the breaking down of food into smaller molecules that can be swallowed or absorbed by the blood stream
- 3) Absorption. Is the process whereby products of digestion pass into the blood stream
- 4) Assimilation. Is the utilisation of absorbed nutrients
- 5) Egestion. Is the release of undigested food (faeces) through the anus

### DESCRIBE THE MOVEMENT OF ABSORBED FOOD FROM THE SMALL INTESTINES

-After absorption of nutrients they are transported into the hepatic portal vein to the liver to the heart and to the rest of the body

DRAW AND EXPLAIN THE CURVE OF ANIMAL GROWTH



- A - Birth
- B - Start breeding
- C - Maturity

-Between birth and breeding weaning occurs  
-Slaughtering takes place between maturity and breeding when growth begins to slow down because further feeding is a waste of food

STATE THE COMMON PARASITES IN CATTLE AND GOATS IN ZIMBABWE

- a) Tapeworms
- b) Ticks
- c) Flukes
- d) Fleas

STATE COMMON DISEASE IN ZIMBABWE

- a) Foot and mouth
- b) Anthrax

TABULATE THE DISEASE, CAUSE, SYMPTOM AND THEIR CONTROL

Disease	Cause	Symptoms	Control
Foot and mouth	Virus	-increased production of saliva -Fever -Possible death -Loss of appetite	-No cure -Quarantine -Culling -Notify authorities

Anthrax	Bacterium	-blood in nose and mouth in dead animals -death in 24 hours	-Antibiotics -Notify authorities -Burn or bury dead animals
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### DEFINE RESPIRATION AND SUPPORT YOUR ANSWER WITH THE WORD EQUATION

-Respiration is the breakdown of glucose to release energy, carbon dioxide and water vapour

#### Word equation

Glucose + Oxygen → Energy + Carbon dioxide + Water vapour

### STATE TWO TYPES OF RESPIRATION

- 1) Aerobic Respiration (requires oxygen)
- 2) Anaerobic Respiration (takes place in the absence of oxygen)

### DRAW AND EXPLAIN THE RESPIRATORY SYSTEM OF A HUMAN BEING

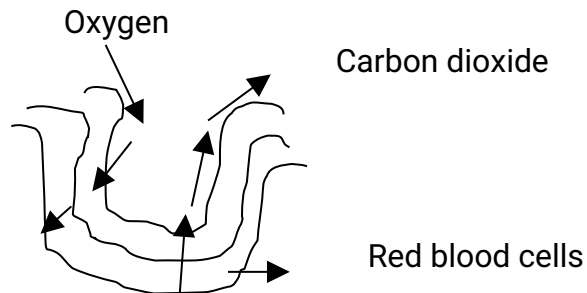
-It begins in the nose and ends in the lungs

- a) Nose – air is filtered, warmed and moistened
- b) Trachea – lined with mucous membrane and cilia  
-Passage of air  
-Trap dust particles and other harmful substances
- c) Bronchi The passage of air between the trachea and the bronchiole
- d) Bronchioles Passage of air between bronchi and the air sacs
- e) Air sac (alveolus) For gaseous exchange
- f) Diaphragm It separates digestive system and respiratory system
- g) Ribs For protection of inner parts of the system  
To protect the chest cavity

### DESCRIBE THE STRUCTURE OF AN AIR SAC

- Surrounded by many blood capillaries
- The blood capillaries enhance the exchange of gases
- During breathing in more concentration of oxygen inside the alveoli than in the blood capillaries

-During breathing out more concentration of carbon dioxide in the blood capillaries than in the alveoli



### WHAT IS THE ROLE OF ALVELVOUS IN GASEOUS EXCHANGE

- 1) They provide large surface area for gaseous exchange
  - 2) They provide sufficient breathing mechanisms to maintain diffusion gradient
- NB** High concentration of oxygen in inhaled air and high concentration of carbon dioxide in exhaled air

### TABULATE THE COMPOSITION OF AIR IN INHALED AIR AND EXHALED AIR

Air /Gas	Inhaled air	Exhaled air
Oxygen	21%	16%
Carbon dioxide	0.04%	4%
Nitrogen	79%	79%
Water vapour	Variable	Saturated

### DESCRIBE AND EXPLAIN THE CROSS SECTION OF AROOT AND A STEM SUPPORT YOUR ANSWER WITH DIAGRAM

-It consists of:

- 1) Phloem      Transportation of food
- 2) Xylem      Transportation of water
- 3) Epidermis      For protection
- 4) Cambium      Separates xylem and phloem
- 5) Pith      Increase stability of the plant

### DISTINGUISH THE FOLLOWING TERMS DIFFUSION AND OSMOSIS

- a) Diffusion Is the movement of particles from the region of higher concentration to a region of lower concentration
- b) Osmosis Is the movement of water molecules from a region of high concentration to a region of low concentration through a partially permeable membrane

### DESCRIBE AND EXPLAIN WATER AND ION UPTAKE

- Ions are taken from the ground by the roots by the process called active transport
- When plant cells take up water their vacuoles become full and push the cytoplasm against the cell wall
- The cell become firm and are said to be turgid
- when plants cells lose water their vacuoles shrink and the cytoplasm no longer pushes against the cell wall
- The cell wall became flexible and said to be flaccid

### DEFINE TURGOR PRESSURE

- Is the pressure exerted to the cell wall by the cytoplasm of the cell

### DEFINE PLASMOLYSIS

- Is the process whereby the plant cell lose water, their vacuoles shrink and the cytoplasm no longer pushes against the cell wall hence the cell becomes flexible and is said to be flaccid

### DESCRIBE AND EXPLAIN HOW WILTING OCCURS IN PLANTS

- A result of excessive loss of water by transpiration into the atmosphere

### DESCRIBE THE EFFECTS OF WILTING IN PLANTS

1. Reduces rate of growth of plants
2. Causes loss of shape of the plant
3. Results in death of the plant

### DEFINE TRANSPIRATION

- Is the process by which plants lose water vapour through stomata in leaves in form of vapour to the atmosphere

### DEFINE TRANSPIRATION STREAM

- Is the movement of water from the soil through the plant until it is lost from the leaves

### DEFINE ACTIVE TRANSPORT

-Is the movement of nutrients from the ground, stem to all parts of the plant

### DESCRIBE AND EXPLAIN THE IMPORTANCE OF TRANSPIRATION

-Helps in the uptake and transportation of water and mineral salts in plants  
-Helps in cooling the plant

### DESCRIBE THE FACTORS AFFECTING THE RATE OF TRANSPIRATION

a) Wind or air movement. If wind movement increases the rate of transpiration also increase this is because as soon as water vapour is lost from leaves it is carried away by the wind leaving room for more vapour from the leaves

b) Light intensity

- If the rate of light intensity increases the rate of transpiration also increases this is because:

(i) More stomata/ more pores open allowing water to come out.

(ii) The light intensity enhances more glucose to be manufactured in leaves resulting in more water been drawn into leaf cells

c) Temperature

An increase in temperature result in increase in the rate of transpiration

d) Humidity

Low humidity or dry air increase the rate of transpiration

e) Surface area

The larger the surface area the high the rate of transpiration [vice versa]

### DESCRIBE THE ADAPTATION OF A LEAF TO MINIMISE WATER LOSS

1. Having hairs to trap water around the leaf thereby reducing evaporation
2. Reducing the number of stomata through which water is lost
3. Reducing leaf surface area
4. Increasing cuticle thickness

### DESCRIBE HOW A POTOMETER WORKS



- The plant lose water from the leaves
- The plant takes up water from the capillary tube
- The air bubble in the capillary tube moves towards the plant at a rate that gives an indication of rate of transpiration by the plant

### DESCRIBE THE REPRODUCTION IN PLANTS

- It involves the processes whereby plant reproduce young ones either by fusion of male sex cells or from the parent plant part

### STATE 2 TYPES OF REPRODUCTION

1. Sexual reproduction (fusion of male and female sex cells)
2. Asexual reproduction (vegetative reproduction- from the parent plant)

### STATE THE REPRODUCTIVE ORGAN OF A PLANT WHICH UNDERGOES SEXUAL REPRODUCTION

- Flower

### STATE THE REPRODUCTIVE PART OF A PLANT WHICH UNDERGOES VEGETATIVE REPRODUCTION

- Node or bud

### DEFINE FERTILISATION IN PLANTS

- Is the fusion of male and female sex cells in plants

### STATE THE SOURCE OF THE MALE SEX CELL AND THE FEMALE SEX CELL IN PLANTS

1. Male sex cells – Pollen grains
2. Female sex cells – Ovules

### STATE THE MALE PARTS OF A FLOWER (STAMEN)

1. Anther – to produce pollen grains
2. Filament – to support the anther

### STATE THE FEMALE PARTS OF A FLOWER (CARPEL)

1. Stigma – to receive pollen grains
2. Style – to support the stigma
  - allows movement of pollen cells to the ovary
3. Ovary – encloses the ovules
4. Ovule – produce female sex cells

DEFINE VEGETATIVE REPRODUCTION (ASEXUAL REPRODUCTION)

-Is the process where new plants are produced using the parent plant without using male and female sex cells

STATE VEGETATIVE STRUCTURES AND GIVE EXAMPLE FOR EACH

1. Tuber - Irish potato
2. Rhizom - Grass
3. Cuttings - Sweet potato and sugar cane

TABULATE THE ADVANTAGES AND DISADVANTAGES OF VEGETATIVE REPRODUCTION

Advantages	Disadvantages
-Many new plants obtained and cover a large area quickly	-Too many plants in short period of time result in overcrowding
-Food is readily available for the new plants hence increase the chances of survival	-Plants compete for sunlight, nutrients, space and air
-All plants obtained are exactly the same	-No variation
-Desirable characteristics are retained	New plants can be affected by the same disease

STATE 2 TYPES OF FLOWERS

Wind pollinated flowers and insect pollinated flowers

DEFINE POLLINATION AND STATE TWO TYPES OF POLLINATION

-Pollination is the transfer of pollen grains from anther to the stigma

TYPES

1. Self pollination – involves transfer of pollen grains from the anther to the stigma of the same flower in plant
2. Cross pollination – involves the transfer of pollen grains from the anther of one flower to the stigma of another flower

STATE AGENTS OF POLLINATION

- a) Wind
- b) Insects
- c) Water
- d) Animals

### TABULATE THE CHARACTERISTICS OF WIND AND INSECT POLLINATED FLOWER

Wind pollinated flower	Insect pollinated flower
1. Reduce or absence of petals, dull petals	Large coloured or scented petals
2. No nectar	Nectary produce sweet nectar
3. Anthers are exposed outside the flower	Anthers inside the flower
4. Light pollen grains	Pollen grains are sticky

### DESCRIBE POLLINATION TO FERTILISATION OF THE FLOWER

- The pollen grains are transferred from the anther to the stigma by other insects or wind –The pollen grain germinate the pollen tubes when they are deposited on the stigma through which the pollen cells will travel to the ovary where these pollen cells will fuse with ovules to form a zygote (fertilisation)
- Ovary develop to a fruit and ovules develop to a seed

### DEFINE GERMINATION

- Is the process where by seeds produce new plants

### STATE 2 TYPES OF SEED

1. Monocotyledon seed e.g Maize seed
2. Dicotyledonous seed e.g Bean seed

### WITH FULLY LABELLED DIAGRAM DESCRIBE AND EXPLAIN THE INTERNAL STRUCTURE OF A BEAN SEED

1. Testa – protect the seed parts
2. Microplye – It allows the movement of gas and water during germination
3. Radicle – It develop into roots during germination
4. Plumule – It develop into plants shoots
5. Cotyledon – It stores food

### STATE THE 3 FACTORS AFFECTING GERMINATION AND THEIR FUNCTION

1. Warmth / favourable temperature - for enzyme activity
2. Water / moisture - for enzyme activity
3. Oxygen - for respiration (the energy source for germination to occur)

### DEFINE PERCENTAGE GERMINATION

Percentage germination =  $\frac{\text{Number of seeds germinated}}{\text{Total number of seeds}} \times 100$

### DEFINE VARIATION

-Variation is the difference between organisms of the same type from one extreme to another with reference to a specific characteristic

### DESCRIBE AND EXPLAIN TWO FORMS OF VARIATION AND GIVE EXAMPLE FOR EACH

1. Continuous variation is the difference between organisms from one extreme to another extreme with intermediate stage e.g height, weight and mass.
2. Discontinuous variation is the difference between organisms from extreme to another extreme without intermediate stage e.g tongue rolling, complexion, sex and earlobe

### DESCRIBE AND EXPLAIN TWO CAUSES OF VARIATION IN LIVING THINGS

- a) Environmental factors These are acquired and non heritable they are due to the environment
- b) Genetic factors These are due to genes and they are heritable

### DEFINE SELECTION AS APPLIED IN ORGANISMS

-Selection is a process by which certain organisms are favoured to survive and produce the next generation of offspring

### DESCRIBE AND EXPLAIN TWO TYPES OF SELECTION

- a) Natural selection This selection involve the influence of the environment such that better adapted organisms survive to reach maturity and produce the offspring for the next generation
- b) Artificial selection This selection is done by human beings on plant and animals such that the organisms of the desired characteristics are allowed to breed

### DESCRIBE AND EXPLAIN ADVANTAGES OF ARTIFICIAL SELECTION IN (I) ANIMALS (II) PLANTS

- (i) In animals  
High production of animals with most desirable characteristics e.g high milk yields, good quality and quantity of meat, disease resistance animals
- (ii) In plants  
-Production of drought tolerant plants

-Production of early maturing and disease resistant plants

### DEFINE BREEDING

-Is when animals or plants are mated in order to produce offspring with desirable characteristics

### DESCRIBE AND EXPLAIN TWO TYPES OF BREEDING

a) Cross-breeding

-This involves combining useful qualities of the two different varieties of breeds

b) In-breeding

-This is when a herd is allowed to breed freely amongst themselves without bringing in any new animal

### TABULATE THE ADVANTAGES AND DISADVANTAGES OF (a) CROSS-BREEDING (b) IN-BREEDING IN BOTH ANIMALS AND PLANTS

CROSS-BREEDING	
Advantages	Disadvantages
<u>Animals</u> : fast growing animals  Disease resistant animals are produced  <u>Plants</u> : High yields  Disease resistant plants are produced  Early maturity plants	-Takes time  -Requires a lot of resources both material and financial for its success
IN-BREEDING	
Advantages	Disadvantages
-It helps to maintain the desired characteristics  -It is cheaper than cross-breeding	-It is less productive  -Variation is reduced  -Selection is reduced

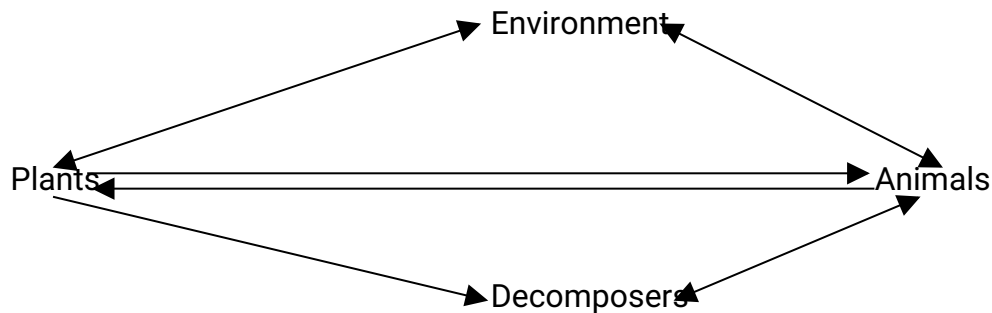
### DEFINE ECOSYSTEM

-Is a self-contained system of interdependent organisms and their environment

STATE THE SOURCE OF ENERGY IN AN ECOSYSTEM

-The sun

SKETCH A DIAGRAM SHOWING ENERGY TRANSFER IN AN ECOSYSTEM



STATE PHYSICAL COMPONENTS AND BIOLOGICAL COMPONENTS OF AN ECOSYSTEM

Physical components

- Air
- Soil
- Light
- Water
- Rock particles

Biological components

- Animals
- Plants
- Litter
- Fungi
- Bacteria
- Humus

DESCRIBE AND EXPLAIN THE ROLE OF THE FOLLOWING BIOLOGICAL COMPONENTS IN SOIL (i) TERMITES (ii) EARTHWORMS

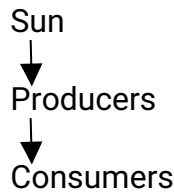
(i) Termites - Increase soil fertility by cutting down the dead plants so that they can easily decompose

(ii) Earthworms - They increase aeration, drainage and soil structure by barrowing into the soil

EXPLAIN FOOD CHAIN AND STATE THE BASIC COMPONENTS OF THE FOOD CHAIN

-Food chain is a linear feeding relationship. It consists of Sun → Producers → Primary consumers → Secondary consumers → Tertiary consumers → Decomposers  
e.g grass → cow → man

### Components



### DESCRIBE THE IMPORTANCE OF NUTRIENT RECYCLING IN AN ECOSYSTEM

- The decomposers act on animal and plant remains so that the nutrients in them re-enter the soil
- The nutrients are taken up again by living plants hence re-enters the food chain and web

### Carbon Cycle

- During photosynthesis plants take in carbon as carbon dioxide to form carbohydrates
- The carbohydrates are used to make fats and proteins in plants
- Carbohydrates and fats are also used for energy during respiration releasing carbon dioxide into the atmosphere
- Carbon dioxide is also released into the atmosphere when plants and animals die and decay
- Fossil fuels like oil, coal and gas are formed from plants and released during combustion or burning

### Nitrogen Cycle

- Nitrogen from the atmosphere is added to the soil as nitrates during lightening
- Denitrifying bacteria reduce nitrates into nitrogen which passes from the soil into the atmosphere
- Nitrogen fixing bacteria found in the soil and root nodules of leguminous plants use nitrogen in the atmosphere to synthesize nitrogen compounds
- The proteins from the animal remains are broken down by decomposers into ammonium compounds

### DESCRIBE ARTIFICIAL ECOSYSTEM

- These are manmade ecosystem
- Can be a result of cultivation of same plant or crop
- They result in limited species diversity

### PROBLEMS CAUSED BY LIMITED SPECIES DIVERSITY

- 1) Infertility of soil
- 2) Pest problem
- 3) Production meant for human consumption only
- 4) Overgrazing
- 5) Soil erosion

### DESCRIBE AND EXPLAIN THE STRUCTURE OF PYRAMID COMPONENT OF AN ECOSYSTEM

-The pyramid is wider at the base because the producers are at a larger number

### STATE THE EFFECTS OF GROUND COVER

- Evaporation is reduced
- Erosion is reduced
- Surface run-off is also reduced

### EXPLAIN THE EFFECTS OF HUMAN ACTIVITIES ON ECOSYSTEM

- Acid rain is a result of release of sulphur dioxide in the atmosphere from the industry
- Acid rain has resulted in destruction of large areas
- Eutrophication (sewage and fertilisers are deposited in water bodies thereby reducing the amount of air in water bodies due to excessive growth of plants and water animals end up dying due to suffocation)
- Soil erosion

### STATE THE CHARACTERISTICS OF ZIMBABWEAN SAVANNA SOILS

- Low fertility
- High temperature
- Few earthworms

### STATE THE PROBLEMS OF FARMING IN MARGINAL LANDS

- Low rainfall
- Low fertility
- Unreliable rainfall patterns

### DEFINE CARRYING CAPACITY

-Is the maximum number of organisms an area can support without deterioration

### STATE THE LIMITING FACTORS OF CARRYING CAPACITY

1. Water
2. Food
3. Shelter



4. Space
5. Oxygen

### STATE THE EFFECTS OF EXCEEDING THE CARRYING CAPACITY

- Overstocking
- Overgrazing
- Soil erosion

### DESCRIBE AND EXPLAIN WAYS OF MAINTAINING AND CONTROLLING ANIMAL POPULATIONS WITHIN THE CARRYING CAPACITY

- 1) Culling –killing of animals
- 2) Destocking –reducing numbers to sustainable levels
- 3) Paddock – keeping animals in paddocks and rotating them accordingly

### DEFINE HEALTH

-Is the state of complete physical, mental and social well being not merely the absence of disease

### DEFINE DIET

-Refers to all different kinds of foods eaten by a person or group of people

### DEFINE BALANCED DIET

-Refers to the diet containing all the important nutrients required by the body in their correct proportions (amount)

### STATE THE COMPONENTS OF BALANCED DIET

- 1) Carbohydrates
- 2) Proteins
- 3) Fats
- 4) Mineral Salts
- 5) Vitamins
- 6) Water
- 7) Fibre / Roughage

### TABULATE THE FUNCTIONS OF THE COMPONENTS OF THE BALANCED DIET

	<b><i>Component</i></b>	<b><i>Function</i></b>
1.	Carbohydrates	-Energy source
2.	Fats	-Energy source

		-Insulator -making of cell membrane
3.	Proteins	-Growth and repair of worn out tissues
4.	Mineral salts	-Metabolism
5.	Vitamins	-Metabolism -Protection against diseases
6.	Fibre / Roughage	-Facilitates peristalsis
7.	Water	-Assists the removal of waste from the body

**TABULATE THE REAGENTS AND THE RESULTS FOR THE FOLLOWING FOOD TESTS: STARCH, GLUCOSE, PROTEINS AND FATS**

	<b><i>Component</i></b>	<b><i>Reagent</i></b>	<b><i>Result if nutrient is present</i></b>	<b><i>Result if nutrient is absent</i></b>
1.	Carbohydrates	Iodine Solution	Change from brown to blue-black	Remains brown
2.	Glucose	Benedicts Solution / Clinistix	-Change from blue to orange or brick red -Pink to purple	-Remains blue -Pink
3.	Proteins	Biuret Solution / Albustix	-Change from blue to purple or violet -Green to dark green	-Remains blue -Green
4.	Fats	Ethanol	White emulsion	Remain clear

**STATE FACTORS WHICH DETERMINE QUALITY AND QUANTITY OF NUTRIENTS IN ONE'S DIET**

- 1) Sex
- 2) Activity
- 3) State of health

**STATE OF TYPE OF NUTRIENT REQUIRED BY:**

- 1) Builder – Carbohydrates (more energy is required)
- 2) Pregnant woman – Proteins, Iron, Calcium, Carbohydrates
- 3) Sedentary worker – Proteins, Vitamins

### STATE THE ADVANTAGES OF BREASTFEEDING

- The milk is germ free
- The milk contains anti-bodies for protection
- Increase the bond between the mother and child
- Contains almost all the nutrients required by the body

### DEFINE MALNUTRITION

- Is the taking in food with excess or inadequate nutrients

### STATE TWO MALNUTRITIONAL DISEASES

- 1) Goitre → Lack of iodine
- 2) Kwashiorkor → Lack of proteins
- 3) Obesity → Excess of carbohydrates and fats

### STATE THE SYMPTOMS OF KWASHIORKOR

- Abdomen swells
- The hair takes a reddish colour
- Oedema in limbs (thin limbs)
- Child becomes very weak

### WHAT ARE THE EFFECTS OF KWASHIORKOR

- 1) Affects the functioning of the liver
- 2) The brain fails to develop to its full potential
- 3) Stunted growth

### STATE TWO CAUSES OF DENTAL DECAY

- 1) Bacteria
- 2) Plaque

### DEFINE PLAQUE

- Is a thin layer of food which remain on the tooth surface and contains bacteria
- \*The bacteria digest the food remains producing acids which dissolve away the enamel of the tooth

### DESCRIBE THE STAGES IN TOOTH DECAY

- 1) Enamel dissolve first and no pain being felt
- 2) From the enamel to the dentine which result in extreme cold or heat causing a

sensation

- 3) Pulp cavity results in severe toothache as a result of exposure of blood capillaries

### DESCRIBE THE PROPER CARE OF TEETH

- 1) Clean teeth daily especially before going to bed
- 2) Visit the dentist regularly or twice a year
- 3) Use toothpaste or safer alternatives such as salt or soda

### DESCRIBE THE FUNCTIONS OF TEETH

-To chew the food

### STATE THE EFFECTS OF SMOKING ON HEALTH

- 1) Bronchitis
- 2) Lung cancer
- 3) Emphysema (blocking or widening of air sacs)
- 4) Low birth weight for babies born to smoking mothers

### DESCRIBE THE EFFECTS OF EXCESSIVE CONSUMPTION OF ALCOHOL

- 1) Reduces the reaction time
- 2) It has social implications e.g. family neglected financially
- 3) Damages the liver

### DESCRIBE THE EFFECTS OF MANDRAX AND CANNABIS (MBANJE)

- 1) Criminal tendencies like violence or murder
- 2) Hallucinations
- 3) Increase chances of HIV infections
- 4) Addictive

### DESCRIBE THE EFFECTS OF INHALING SOLVENTS E.G GLUEING

- 1) Hallucinations
- 2) Reduced self control
- 3) Damage to nasal passage

### DESCRIBE AND EXPLAIN THE CIRCULATORY SYSTEM OF A MAMMAL

- The movement of substances within the body is caused by the heart (pumping machine)
- It consists of 2 sides (halves) separated by septum
- Each half is divided or consists of 2 chambers i.e. Upper chamber (Atrium) and

### Lower chamber (Ventricle)

- The left side deals with oxygenated blood
- The right side deals with deoxygenated blood

**L**eft side      **O**xygenated      **R**ight side      **D**eoxygenated

- Right atrium receives deoxygenated blood from all parts of the body
- Right ventricle pumps blood to the lungs to collect more oxygen through a vessel called Pulmonary Artery (PA)
- Oxygenated blood is transported back to the heart the left atrium through the pulmonary vein
- The blood is now released to the left ventricle through a valve called Bicuspid valve
- The left ventricle pump blood to all parts of the body through a vessel called Aorta
- NB.**    Valve prevent the backflow of blood
- The left ventricle of the heart is thicker than the right ventricle because it pumps blood to all parts of the body whilst the right ventricle pumps blood to the lungs only
- NB.**    The function of valves there is to prevent back flow of blood

### DESCRIBE AND EXPLAIN THE STRUCTURE OF THE HEART

- It is divided in 2 halves by the septum
- Each half consists of the Atrium which receives blood and ventricle which pumps blood
- The right side receives and pumps deoxygenated blood
- The left side receives and pumps oxygenated blood
- The left side is thicker than the right side because it pumps oxygenated blood to all parts of the body
- The function of the valve is to prevent backflow of blood

### THE HEART IS SOMETIMES CALLED THE DOUBLE PUMP. GIVE REASONS:

- It pumps deoxygenated and oxygenated blood at the same time
- It consists of (1) Pulmonary circulation (between the heart and the lungs) (2) Systematic circulation

### STATE THE COMPONENTS OF BLOOD AND THEIR FUNCTIONS

1.    White blood cells – fight against diseases
2.    Red blood cells – transportation of oxygen
3.    Platelets – prevent too much loss of blood by clotting
4.    Plasma – dissolve nutrients

### STATE MAJOR FUNCTIONS OF BLOOD

1.    Transportation of substances e.g. nutrients, oxygen
2.    Homeostasis (maintaining and balance of things) e.g. body temperature, water, sugar
3.    Defence

### WITH FULLY LABELLED DIAGRAM. TABULATE THE DIFFERENCE BETWEEN VEIN AND ARTERY

<b>ARTERY</b>	<b>VEIN</b>
Carry blood from the heart	Carry blood to the heart
Small lumen	Wide lumen (large)
Thicker elastic walls	Thinner elastic walls
No valves except to those connected to the heart	Valve present to prevent back flow of blood

### DEFINE DISEASE

-Any change or deviation from the normal functioning of the body

### STATE 4 CAUSES OF DISEASES

1. Bacteria
2. Virus
3. Fungi
4. Protozoa

### DEFINE PATHOGEN

-Disease causing organisms

### STATE WAYS OF TRANSMITTING PATHOGENS

1. By vectors e.g. malaria
2. By contact e.g. gonorrhoea
3. By droplets e.g. tuberculosis
4. By contaminated food e.g. cholera, typhoid, dysentery

### STATE SYMPTOMS OF CHOLERA

1. Fever
2. Vomiting
3. Diarrhoea

### DESCRIBE THE TREATMENT OF CHOLERA

1. Oral rehydration
2. Anti-biotics

### STATE THE COMPONENTS OF SUGAR AND SALT SOLUTION USED TO TREAT

### CHOLERA

1. 750ml of boiled water
2. ½ teaspoon of salt
3. 6 teaspoons of sugar

### DESCRIBE WAYS OF CONTROLLING CHOLERA

1. Good sanitation
2. Protection of water sources
3. Isolation of infected persons
4. Vaccination

### DESCRIBE THE ROLE OF HYGIENE IN DISEASE CONTROL

a) Personal Hygiene. This is hygiene of the individual. It involves the care of food, exercise, having enough sleep

-This type of hygiene helps to prevent the onset of and spreading of diseases

b) Domestic Hygiene. This is the hygiene within the household to prevent contamination of food and water

-This type of hygiene helps to prevent breeding of vectors

c) Community Hygiene. It involves proper water treatment, proper sewerage disposal and treatment, proper immunisation of children, control of vectors

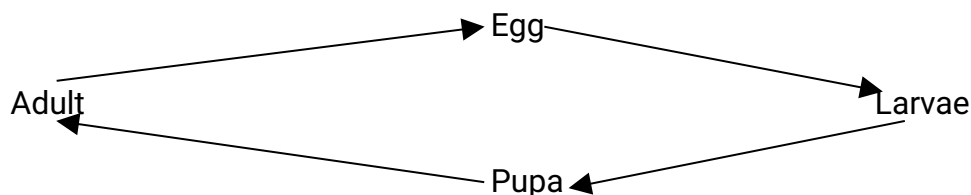
-This type of hygiene is important to prevent epidemics

### STATE THE CAUSATIVE AGENT OF MALARIA

-Plasmodium (transmitted by female anopheles mosquito)

### DESCRIBE THE LIFE CYCLE OF ANOPHELES MOSQUITO

ELPA



### DESCRIBE THE LIFE CYCLE OF PLASMODIUM

-Two hosts are:

- 1) In mosquito
- 2) In human

<b>Mosquito</b>	<b>Human</b>
Bites ↓	P enters in liver cells Cells burst after 10 days ↓
P occupy more white blood cells ↓	P enters in white blood cells and multiply Burst of white blood cells

### DESCRIBE METHODS OF CONTROLLING MALARIA

- 1) Preventing breeding of mosquitoes – this can be done by identifying places in which mosquitoes breed then eliminate the conditions e.g. avoid stagnant water  
-Removal of vegetation e.g. grass around water source
- 2) Preventing mosquitoes from biting people e.g. use of mosquito nets, mosquito repellents, having wire mesh screens on windows and doors to prevent entry of mosquitoes

### DESCRIBE AND EXPLAIN BODY'S DEFENCE MECHANISMS AND BARRIERS

<b>Description</b>	<b>Explanation</b>
Skin	-Is a barrier against all bacteria and other pathogens
Wax and hairs	Found in the ears to prevent invasion by micro organisms
Mucous and hairs	Found in nose to trap bacteria and spores
Tears	Have anti-septic to kill bacteria in the eyes
Blood clotting	Clots prevents loss of blood and entry of bacteria
White blood cells	To destroy bacteria by engulfing and digest
Stomach acids	The kill bacteria in the food



### DEFINE IMMUNITY

-The ability of the body to fight against diseases or resist diseases

### DESCRIBE AND EXPLAIN TYPES OF IMMUNITY

- 1) Naturally Acquired Immunity – Antigens enter the body naturally resulting in the body being stimulated to produce antibodies against a specific antigen leading to recovery.
- 2) Artificially Acquired Immunity – Antigens introduced in the body by means of vaccines
- 3) Naturally Passive Immunity – Receiving ready made antibodies e.g. with infants when receiving antibodies from their mothers through breastfeeding
- 4) Artificially Passive Immunity – Obtained by injecting serum containing antibodies into the body  
-Is given when there is risk of infection  
**NB** The serum is prepared from blood of an animal

### DEFINE ANTIGEN

-Any substance that causes the immune system to produce antibodies against it

### STATE DISEASE FOUND ON IMMUNISATION SCHEDULE

- 1) BCG (against TB)
- 2) Tetanus
- 3) Rubella (German measles)
- 4) Polio
- 5) DPT Polio 1
- 6) DPT Polio 2
- 7) DPT Polio 3

### DESCRIBE THE EFFECTS OF HIV AND THE BODY

-The virus reduces the body's ability to fight infection by destroying the body's white blood cells responsible for producing antibodies

### WHAT IS THE MEANING OF (a) AIDS (b) HIV

- a) AIDS – Acquired Immuno Deficiency
- b) HIV – Human Immuno-Deficiency Virus

### DESCRIBE THE DIFFERENCE BETWEEN HIV AND AIDS

<b><i>HIV</i></b>	<b><i>AIDS</i></b>
-It is a stage in which an individual blood is tested positive	-It is a stage during HIV infection has destroyed the body's defence system

-The person can be looking healthy and recovers from infections normally

causing an individual to become more susceptible to multiple infections and failing to recover and leads to death

### DEFINE REPRODUCTION

-Is the process whereby living organisms reproduce their offsprings

### STATE 2 TYPES OF REPRODUCTION

- a) Sexual Reproduction
- b) Asexual Reproduction (vegetative)

### DEFINE SEXUAL REPRODUCTION

-It involves the fusion of the male and female sex cells

### WHAT NAME IS GIVEN TO THE MALE SEX CELL (GAMETE) AND THE FEMALE SEX CELL (GAMETE)

- Male sex cell – Sperm
- Female sex cell – Ovum

### DEFINE FERTILISATION AS APPLIED IN HUMAN REPRODUCTION

-Is the fusion of sperm and ovum to form a zygote

### DESCRIBE AND EXPLAIN THE REPRODUCTIVE SYSTEM OF A MALE

- 1) Testis. For the production of sperms and also produce the male sex hormone (testosterone)
- 2) Epididymis. For the storage of sperms
- 3) Sperm duct. Passage of sperms from the testis to the Urethra
- 4) Seminal vesicle. Produces fluids that lubricate sperms
- 5) Prostate gland. Produce nutrients and enzymes which activate sperms
- 6) Urethra. Is the passage of sperms
- 7) Penis. Direct sperms to the vagina

### DESCRIBE AND EXPLAIN THE REPRODUCTIVE SYSTEM OF A FEMALE

- 1) Vagina. The passage of sperms into the uterus and also birth canal
- 2) Cervix. Is a ring of muscles at the neck of the uterus which closes during pregnancy and dilates during birth
- 3) Uterus or Womb. It is a chamber where the foetus or embryo develops
- 4) Oviduct or Fallopian Tube. For passage of ova from ovaries to the uterus  
Where fertilisation takes place
- 5) Ovary. To release the ovum

DEFINE (1) OVULATION (2) IMPLANTATION

- 1) Ovulation is the movement of ovum through the oviduct
- 2) Implantation is the process whereby the zygote implants to the walls of the uterus

DESCRIBE AND EXPLAIN 2 HORMONES PRODUCED BY THE UTERUS

- 1) Oestrogen. Produce the lining of the uterus
- 2 Progesterone. To keep the lining of the uterus in position

WRITE DOWN THE DEVELOPMENT STAGES OF THE FERTILISED EG

Zygote → Embryo → Foetus ZEF

WITH FULLY LABELLED DIAGRAM. TABULATE THE DIFFERENCE BETWEEN OVUM AND SPERMS

<i>Ovum</i>	<i>Sperm</i>
Oval Shape	Tadpole structure
No head	Head present
Cytoplasm	No cytoplasm

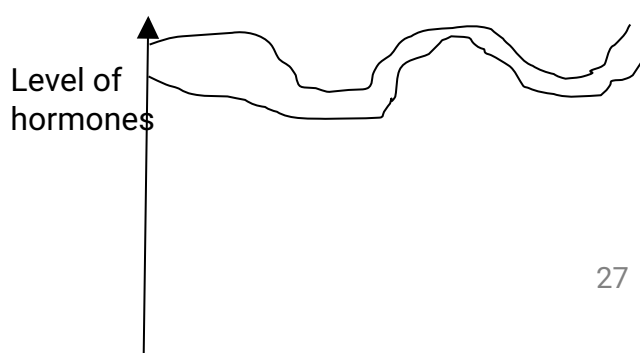
DEFINE MENSTRUATION

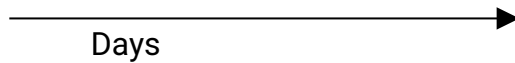
-Is the breakdown of the lining of the uterus and release of the unfertilised egg through the vagina in form of blood

DESCRIBE THE MENSTRUAL CYCLE

- 1) Day 1 – 5 Menstruation
- 2) Day 5 – 10 Lining of the uterus
- 3) Day 10 – 14 Ovulation takes place
- 4) Day 14 – 21 Womb is ready to receive fertilised egg
- 5) Day 21 – 28 Pre-menstrual phase

SKETCH THE GRAPH TO SHOW THE LEVEL OF PROGESTERONE AND OESTROGEN AGAINST TIME (DAYS)





### STATE THE CAUSES OF INFERTILITY

- 1) Low sperm count
- 2) Poor quality of sperms
- 3) Physical conditions
- 4) Cancer
- 5) Damage by STDs
- 6) Blockage of Oviducts and sperm ducts

### DESCRIBE THE GROWTH OF AN EMBRYO

- After fertilisation the zygote is formed and moves along the fallopian tube to the uterus
- In the uterus it attaches itself to the lining of the uterus by the process called implantation
- After implantation the placenta is formed
- The placenta facilitates the exchange of substances e.g. oxygen from the mother to the embryo, antibodies from the mother to the embryo, nutrients from the mother to the embryo, carbon dioxide from the embryo to the mother, waste products from the embryo to the mother
- The placenta separates mother's blood from the embryo's blood
- The embryo develops in a fluid filled sac called amniotic sac
- The fluid is called amnion

### STATE THE FUNCTIONS OF THE PLACENTA

- 1) Facilitates exchange of substances
- 2) Separates maternal blood from the embryo's blood

### STATE THE FUNCTION OF THE AMNION

- 1) Supports the embryo
- 2) Protects the embryo from mechanical or physical damage

### STATE 2 VESSELS FOUND INSIDE THE UMBILICAL AND THEIR FUNCTIONS

- 1) Umbilical Vein – transport substances to the embryo
  - 2) Umbilical Artery – transport substances from the embryo to the mother
- E.g. (1) Oxygen, nutrients (2) Waste products, carbon dioxide

### DEFINE CONTRACEPTION

- Is the process of preventing fertilisation?

### STATE METHODS OF CONTRACEPTION AND THEIR EFFECTIVENESS

- 1) Natural family planning e.g. use of calendar 60-90%
- 2) Hormonal method e.g. pill 99, 6 to 99, 8 %
- 3) Barrier method e.g. male and female condoms 99, 6 – 99, 8 %
- 4) Spermicides 60-95%
- 5) Abstinence 100%

### STATE THE 3 SEXUALLY TRANSMITTED DISEASES AND THEIR CAUSATIVE AGENTS

- |    |           |           |              |
|----|-----------|-----------|--------------|
| 1) | HIV/AIDS  | Virus     | No cure      |
| 2) | Syphilis  | Bacterium | Anti-biotics |
| 3) | Chancroid | Bacterium | Anti-biotics |

## Chemistry section

### DESCRIBE AND EXPLAIN THE PURIFICATION OF COPPER (BLISTER COPPER)

- Blister copper is purified by the process called electrolysis
- The blister copper (to be purified) is connected to the anode (positive terminal)
- The pure copper is connected to the cathode (negative terminal)
- Copper sulphate solution is used as an electrolyte (liquid to allow electricity to pass through)
- When the current flow the circuit the blister copper dissolve to form Copper positive ions
- \*Blister Copper → Copper positive ions
- The copper positive ions migrate towards the cathode where they gain electrons to form copper atoms
- \*Copper positive ions + Electrons → Copper atoms
- The impurities (unwanted substances) settle at the bottom of the electrolytic tank
- \*The blue colour of the solution disappear
- \*The anode (blister copper) decrease in size
- \*The cathode (pure copper) increase in size

### STATE TWO ALLOYS OF COPPER AND THEIR CONSTITUENCIES

#### Alloys of Copper

1. Bronze → Copper + Iron or Tin

2. Brass → Copper + Zinc

### DESCRIBE AND EXPLAIN USES OF COPPER

#### **Uses of Copper**

1. Water pipes → resist corrosion
2. Solar water heater → good conductor of heat
3. Electrical cables → good conductor of electricity

### DESCRIBE AND EXPLAIN 3 METHODS OF COATING MATERIALS

1. Painting. Paint forms a plastic like material thereby preventing the metal to be in contact with oxygen and water.
2. Galvanising. The metal is dipped in molten zinc and left to dry.
3. Electroplating. The material to be coated is connected at the negative. The material used for coating is connected at the positive.  
-The electrolyte used is the solution of the metal used for coating

### STATE TWO REASONS FOR COATING MATERIALS

1. To prevent rust.
2. For decoration.

### DESCRIBE AND EXPLAIN THE PRODUCTION OF NITROGEN, CARBON DIOXIDE AND OXYGEN FROM AIR

- Air is collected and cooled to about  $-55^{\circ}\text{C}$
- At this temperature water and carbon dioxide become solid (ice)
- The carbon dioxide and water vapour are now removed
- The remaining gases are repeatedly compressed and cooled to a temperature of about  $-200^{\circ}\text{C}$
- At  $-200^{\circ}\text{C}$  Nitrogen and Oxygen turn to liquids
- The liquid gases are now put in a fractional distillation chamber
- The liquid gases are now heated to  $-196^{\circ}\text{C}$
- The Nitrogen liquid gas is now collected from the top of the tank because the boiling point is  $-196^{\circ}\text{C}$
- The Oxygen is collected as liquid because the boiling point is  $-183^{\circ}\text{C}$

### STATE TWO USES OF (1) CARBON DIOXIDE (2) OXYGEN (3) NITROGEN

CARBON DIOXIDE	NITROGEN	OXYGEN
As a refrigerant	Manufacture of fertilisers	In school laboratories
In fire extinguishers	Manufacture of ammonia	Medical purposes
In fizzy drinks		In blast furnace

### DESCRIBE AND EXPLAIN PRODUCTION OF HYDROGEN AND OXYGEN FROM WATER

- Oxygen and Hydrogen are produced by the process called electrolysis
- During the process drops of sulphuric acid are added to ionise water ( to make water to conduct electricity)
- The electricity will break down to hydroxyl ions ( $\text{OH}^-$ ) and hydrogen positive ions ( $\text{H}^+$ )
- The hydroxyl ions migrate to the positive where they lose electrons to form Oxygen gas
- \*Hydroxyl - Electrons  $\longrightarrow$  Oxygen + Water
- the hydrogen positive ions migrate towards the negative where they gain electrons to form hydrogen gas
- \*Hydrogen positive ions + Electrons  $\longrightarrow$  Hydrogen gas
- the volume of the hydrogen produced is more than the oxygen produced because hydrogen and oxygen occur in a ration of 2:1

### DESCRIBE AND EXPLAIN THE TEST FOR OXYGEN AND HYDROGEN

<i>GAS</i>	<i>TEST</i>	<i>RESULT</i>
Oxygen	Glowing Splint	Relights
Hydrogen	Glowing Splint	Pop sound produced

### STATE THE USES OF GASES PRODUCED FROM WATER

<i>HYDROGEN</i>	<i>OXYGEN</i>
Manufacture of ammonia	In school laboratories
Manufacture of margarine	In blast furnace
	Medical purposes

### DESCRIBE THE RELATIONSHIP BETWEEN ZESA, ZISCOSTEEL AND SABLE CHEMICALS

- ZESA supplies electricity to Sable Chemicals
- Sable chemicals uses electricity for the electrolysis of water to produce hydrogen and oxygen
- Oxygen is sent to ZISCOSTEEL to purify iron
- Hydrogen and Nitrogen are used in Sable Chemicals to manufacture ammonia

### DESCRIBE AND EXPLAIN THE PRODUCTION OF AMMONIA

- The process is called Haber process
- The raw materials required are (1) Nitrogen from Air and (2) Hydrogen from electrolysis of water

-Nitrogen and Hydrogen are now passed into the reaction chamber where they react in the ratio of 1 volume of Nitrogen and 3 volumes of Hydrogen under the following conditions:

- (1) Temperature of 450°C
- (2) Pressure of 250 – 300 atms
- (3) Catalyst of powdered iron

\*Nitrogen + Hydrogen  $\rightleftharpoons$  Ammonia gas

-Ammonia gas is now passed into the condensation chamber where ammonia gas is condensed to ammonia liquid

#### STATE FOUR USES OF AMMONIA

1. Production of fertilisers
2. Production of dyes
3. Production detergents
4. Production of explosives

#### DESCRIBE AND EXPLAIN THE PRODUCTION OF NITRIC ACID

-The process is called oxidation process

-The raw materials are ammonia gas and oxygen gas

-The two gases are passed into the reaction chamber where they react under the following conditions:

- (1) Temperature of 800-900°C
- (2) Platinum / Rhodium as a catalyst
- (3) Pressure of 8-10 atm

-Nitrogen dioxide is produced in the reaction chamber

\*Ammonia + Oxygen  $\longrightarrow$  Nitrogen dioxide

-Nitrogen dioxide is passed into the absorption chamber where Nitrogen dioxide react with water to give Nitric acid

\*Nitrogen dioxide + Water  $\longrightarrow$  Nitric Acid

#### STATE FOUR USES OF NITRIC ACID

- (1) Production of fertilisers
- (2) Production of detergents
- (3) Production of dyes
- (4) Production of explosives

#### DESCRIBE AND EXPLAIN THE PRODUCTION OF SULPHURIC ACID

-The process is called Contact process

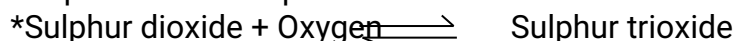
-The raw materials are Sulphur dioxide and Oxygen

-The two gases are now passed into the reaction chamber where they react under the conditions of:

- (1) Temperature of 450°C
- (2) Catalyst of Vanadium Oxide
- (3) Pressure of 1 atm



-Sulphur trioxide is produced and is a reversible reaction



-Sulphur trioxide produced react with reserved concentrated sulphuric acid to produce the liquid called Oleum

-Oleum react with water to produce sulphuric acid

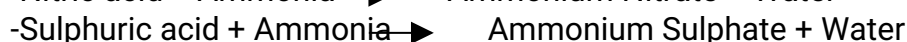


#### STATE FOUR USES OF SULPHURIC ACID

- (1) Production of fertilisers
- (2) Production of plastics
- (3) Production of detergents
- (4) Can be used in car batteries

#### DESCRIBE AND EXPLAIN THE PRODUCTION OF AMMONIUM FERTILISERS (AMMONIUM NITRATE AND AMMONIUM SULPHATE)

-Ammonium fertilisers are produced by the process called neutralisation (reaction of acid and base)



#### THE PERCENTAGE OF NITROGEN IN AMMONIUM SULPHATE FERTILISERS IN 60% AND IN AMMONIUM NITRATE IS 25%, BUT MOST FARMERS USE AMMONIUM NITRATE, GIVE TWO POSSIBLE REASONS

- (1) Ammonium Sulphate is explosive when exposed to high temperature hence difficult to transport from one point to another.
- (2) Ammonium Sulphate is deliquescent (absorb moisture and recrystalline)

#### DEFINE MATTER

-Matter is anything that occupies space and has a volume and mass

#### STATE THREE STATES OF MATTER

1. Solid
2. Liquid
3. Gas

#### STATE THE KINETIC THEORY OF MATTER

-Matter is made up of particles which are always in constant motion because they have kinetic energy

#### DESCRIBE AND EXPLAIN USING KINETIC THEORY OF MATTER WHEN ICE IS

HEATED TO FORM WATER VAPOUR (GAS)

- The particles of the solid (ice) have kinetic energy
- If the solid is heated the kinetic energy increases forcing the particles to move away from each other thereby forming a liquid
- If the liquid is continuously heated the particles gain more kinetic energy forcing the particles to move away from each other thereby forming a gas (water vapour)

USING THE KINETIC THEORY OF MATTER DESCRIBE AND EXPLAIN HOW WATER IS CONVERTED TO ICE

- If the temperature is decreased the kinetic energy of particles is reduced thereby forcing the particles to become closer to each other forming the liquid
- If the liquid is continuously cooled the kinetic energy is reduced forcing the particles to become closer to each other to form solid (ice)

USING A SKETCH DIAGRAM TO SHOW THE FOLLOWING PROCESSES AND GIVE ONE EXAMPLE FOR EACH PROCESS

a) Evaporation, b) Sublimation, c) Condensation, d) Freezing, e) Melting

- |    |                 |   |              |                 |
|----|-----------------|---|--------------|-----------------|
| 1. | Solid to Liquid | = | Melting      | -Margarine, ice |
| 2. | Liquid to Gas   | = | Evaporation  | -Paraffin       |
| 3. | Gas to Liquid   | = | Condensation | -Water vapour   |
| 4. | Liquid to Solid | = | Freezing     | -Margarine      |
| 5. | Solid to Gas    | = | Sublimation  | -Naphthalene    |
| 6. | Gas to Solid    | = | Sublimation  | -Naphthalene    |

SKETCH THE DIAGRAMS SHOWING THE HEATING CURVE AND COOLING CURVE OF A SUBSTANCE e.g. WATER

WHAT IS THE DIFFERENCE BETWEEN BOILING AND EVAPORSTION

<b>BOILING</b>	<b>EVAPORATION</b>
-Occurs when all particles have enough energy to break from each other	-Occurs at any temperature below the boiling point  -Only the particles on the surface break away from the rest forming vapour

TABULATE THE DIFFERENCES IN SOLIDS, LIQUIDS AND GASES IN TERMS OF VOLUME, SHAPE, KINETIC ENERGY AND PARTICLE MOVEMENT

	<b><i>SOLID</i></b>	<b><i>LIQUID</i></b>	<b><i>GAS</i></b>
<b><i>VOLUME</i></b>	Fixed	Fixed	Take volume of the container
<b><i>SHAPE</i></b>	Fixed	Take shape of container	Take shape of council
<b><i>KINETIC ENERGY</i></b>	Very slow	High	Very high
<b><i>PARTICLE MOVEMENT</i></b>	Vibrate on fixed position	Move freely	Move freely

**DEFINE AN ATOM**

- An atom is the smallest particle of matter
- Atoms take part in a chemical reaction

**STATE THREE SUB-ATOMIC PARTICLES OF AN ATOM**

1. Protons
2. Neutrons
3. Electrons

**SKETCH THE STRUCTURE OF AN ATOM SHOWING THE LOCATION OF EACH SUB-ATOMIC PARTICLE****TABULATE THE CHARACTERISTICS OF SUB-ATOMIC PARTICLES IN TERMS OF MASS, CHARGE AND LOCATION**

<b><i>PARTICLE</i></b>	<b><i>MASS</i></b>	<b><i>CHARGE</i></b>	<b><i>LOCATION</i></b>
Proton	1	+	Nucleus
Electron	Negligible	-	Shells
Neutron	1	0	Nucleus

**DEFINE THE FOLLOWING TERMS AND GIVE 2 EXAMPLES FOR EACH :  
Element, Compound, Mixture, Molecule**

1. Element. Is a substance made up of one type of atoms and cannot be split into two or more substances e.g. Iron, Hydrogen, Magnesium, Oxygen

2. Compound. Is a substance made up of two or more different elements chemically combined e.g. Carbon dioxide, water, copper sulphate solution
3. Mixture. Contains two or more different substances which are not chemically combined
4. Molecule. Is the smallest particle of an element or a compound that can exist naturally

- NB.** 1. In a molecule of an element atoms joined together are the same e.g. H<sub>2</sub>  
2. In a molecule of a compound atoms joined together are different e.g. H<sub>2</sub>O

GIVE AN EXAMPLE OF A MIXTURE AND A COMPOUND

1. Mixture – Sulphur + Iron fillings
2. Compound – Iron sulphide

TABULATE THE DIFFERENCE BETWEEN A COMPOUND AND A MIXTURE

<b>COMPOUND</b>	<b>MIXTURE</b>
The ratios of the elements are fixed	The ratios of elements are not fixed
It can only be separated chemically	It can be separated physically
Properties are different from the original elements	Properties of elements are retained

DEFINE CHEMICAL REACTION

-Is whereby reactants combine together to give products and is shown by arrow  
e.g. Iron + Sulphur → Iron Sulphide

DEFINE REVERSIBLE REACTION

-Is a reaction which can go forward to give products and also backwards to give reactants and indicated by

DESCRIBE AND EXPLAIN PHYSICAL PROPERTIES OF METALS

1. Sonorous. (they produce sound) – because of that sonorosity they can be used to make bell gongs.
2. Ductile. (they can be drawn into wires) – because of their ductility they can be used to make electrical cables or electrical wires.
3. Malleable. Can be hammered into any shape without breaking hence they are used to make car bodies, window frames

4. Lustrous. They can shine when polished

WRITE DOWN THE CHEMICAL PROPERTIES OF METALS AND GIVE TWO EXAMPLES FOR EACH

1. Metals react with oxygen to form Metal Oxide

Metal + Oxygen  $\longrightarrow$  Metal Oxide

Zinc + Oxygen  $\longrightarrow$  Zinc Oxide

Magnesium + Oxygen  $\longrightarrow$  Magnesium Oxide

2. Metals react with acid to give salt and hydrogen

Magnesium + Sulphuric acid  $\longrightarrow$  Magnesium Sulphate + Hydrogen gas

Zinc + Hydrochloric acid  $\longrightarrow$  Zinc Chloride + Hydrogen gas

3. Metals react with water to give Metal Oxide + Hydrogen gas

Copper + Water  $\longrightarrow$  Copper Oxide + Hydrogen gas

Zinc + Water  $\longrightarrow$  Zinc Oxide + Hydrogen gas

STATE TWO FACTORS THAT CAN BE USED TO DETERMINE THAT THE REACTION IS TAKING PLACE

1. Colour change
2. Production of gas

STATE 3 FACTORS WHICH AFFECT THE SPEED OF REACTION

1. Temperature
2. Concentration
3. Catalyst
4. Surface Area

DESCRIBE AND EXPLAIN THE FACTORS WHICH AFFECT THE SPEED OF REACTION

1. Temperature. The higher the temperature, the higher the kinetic energy of particles

-If the kinetic energy of particles increase the chances of those particles to collide increase hence the reaction occur faster (vice versa is very true)

2. Concentration. The higher the concentration, the higher the number of particles present

-If the number of particles is high the chances of those particles to collide is also high and the reaction will occur at a faster rate (vice versa is very true)

3. Catalyst. Is a substance that speed up reaction.

-It does not react with product or reactants. It lowers the binding energy (activation energy) of the reaction.

4. Surface Area (Particle Size). The larger the surface area the higher the number of particles, the higher the chances of those particles to collide hence the higher the speed of reaction (vice versa is very true)

\*If the surface area is large it means many particles are present

5. Pressure.

SKETCH THE GRAPH OF GAS PRODUCED AGAINST TIME TO SHOW THE EFFECT OF CONCENTRATION ON SPEED OF REACTION. USE YOUR GRAPH TO EXPLAIN THE FLAT REGION OF THE GRAPH

-No more reaction is taking place at point C to D because there is no more gas produced.

STATE PROPERTIES OF ACIDS

1. They are corrosive.
2. They undergo neutralisation reaction (salt + water are the products)
3. They react with metal (salt + hydrogen gas are products)

**NB.** All sulphates and chlorides are acids e.g. Sulphuric acid

All oxides and hydroxides are bases e.g. Sodium hydroxide

e.g. Sodium Hydroxide + Hydrochloric Acid  $\rightarrow$  Sodium Chloride + Water

Sulphuric Acid + Sodium Hydroxide  $\rightarrow$  Sodium Sulphate + Water

Magnesium + Hydrochloric Acid  $\rightarrow$  Magnesium Chloride + Hydrogen gas

**NB.** Metal + Acid  $\rightarrow$  Salt + Hydrogen gas

Acid + Base  $\rightarrow$  Salt + Water

FRACTIONAL DISTILLATION OF COAL

STATE THE PRODUCTS OF DESTRUCTIVE DISTILLATION OF COAL AND STATE THEIR USES

- |    |                |   |                            |
|----|----------------|---|----------------------------|
| a) | Coal tar       | - | For road surfacing         |
| b) | Coal gas       | - | As a fuel                  |
| c) | Ammonia liquor | - | To manufacture fertilisers |
| d) | Coke           | - | As a fuel                  |

## PHYSICS SECTION

### DEFINE ELECTROSTATIC

-Is the study of static electricity

### DESCRIBE AND EXPLAIN THE PRODUCTION OF CHARGES

-Objects are charged by removal or addition of electrons

-Excess of electrons is negative charge and deficiency of electrons is positive charge

### DESCRIBE THE BEHAVIOUR OF CHARGES

-Like charges repel, unlike charges attract

\* + +    ←    →

\* - - ← →  
\* + - → ←

### DEFINE THE FOLLOWING TERMS (1) POLYTHENE ROD (2) PERSPEX ROD

- (1) Polythene rods gain electrons and become negatively charged
- (2) Perspex rods lose electrons and become positively charged

### DESCRIBE AND EXPLAIN THE PRODUCTION OF LIGHTNING

-lightning is a brilliant flash of light formed when negatively charges of the thunder cloud rub against positively charges in the atmosphere (from the ground)

### STATE THREE DANGERS OF LIGHTNING

- (1) Electrocution
- (2) Destruction of buildings
- (3) Destruction of vegetation

### DESCRIBE AND EXPLAIN HOW LIGHTNING CONDUCTOR WORKS

-The lightning conductor provides an alternative path for the charges to get into the earth

-It consists of :

- (1) Metal spikes → to attract the charges
- (2) Copper wire → acts as a passage of charges because copper wire is a good conductor of electricity
- (3) Metal plate buried in the ground → to earth the charges

-Lightning conductor should be taller than the building

### GIVE FOUR PRECAUTIONARY MEASURES AGAINST LIGHTNING

Avoid :

- (1) Squatting under trees
- (2) Cycling
- (3) Being the tallest object
- (4) Fishing
- (5) Bathing
- (6) Swimming where there is lightning

### DEFINE ELECTRICITY

-The movement of electrons from one point to another

### DEFINE VOLTAGE AND STATE THE UNITS OF VOLTAGE

-Voltage is the potential difference across source of electrical energy  
-The units are volts (V)



-An instrument used to measure voltage is called the voltmeter

### DEFINE CURRENT AND STATE THE UNITS OF CURRENT

-Current is the flow of charges in an electric circuit

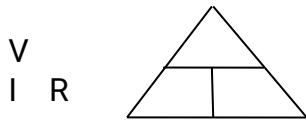
-The units are amperes (A)

### COPY AND COMPLETE THE FOLLOWING TABLE

	<i>Units</i>	<i>Symbol</i>
Current	Amperes	I
Voltage	Volts	V
Resistance	Ohms	

### STATE OHMS LAW

-Voltage is directly proportional to current in a conductor between two points;  $V \propto I$ ,  
 $V = RI$



### DESCRIBE HOW EACH OF THE FOLLOWING COMPONENTS ARE CONNECTED IN A CIRCUIT (1) AMMETER (2) VOLTMETER

- Ammeter always connected in series (in line)

-Voltmeter is always connected in parallel (not in line)

### CALCULATE THE RESISTANCE OFFERED BY A WIRE DRAWING A CURRENT OF 2A FROM A BATTERY OF 12 VOLTS

$$I = 2A$$

$$V = 12V$$

$$R = ?$$

$$R = \frac{V}{I}$$

$$\frac{12}{2} = 6 \text{ Ohms}$$

### WRITE THREE FORMULAE USED TO CALCULATE POWER

(1)  $P = VI$ , Power = Voltage x Current

(2)  $P = I^2R$ , Power = Current<sup>2</sup> x Resistance

(3)  $P = \frac{V^2}{R}$ , Power =  $\frac{\text{Voltage}^2}{\text{Resistance}}$

### CALCULATE THE POWER GENERATED BY A WIRE DRAWING A CURRENT OF 2A

FROM A BATTERY OF 12V

$$\begin{array}{ll} I = 2A & P = VI \\ V = 12V & = 12 \times 2 \\ P = ? & = 24 \text{ Watts} \end{array}$$

STATE UNITS FOR POWER

-Watts

STATE THE EFFECTS OF CONNECTING CELLS IN :

- 1) In series → high voltage same current
- 2) In parallel → high current same voltage

WRITE DOWN 3 PINS FOUND ON A 3 PIN PLUG AND STATE THEIR COLOURS

- 1) Neutral → Blue
- 2) Earth → Green / Yellow
- 3) Live → Brown

WRITE 2 PINS WHICH ARE FOUND ON A 2 PIN PLUG AND STATE THEIR COLOURS

- 1) Neutral → Blue
- 2) Live → Brown

STATE TWO PRECAUTIONS TO PREVENT ELECTROCUTION

- 1) Make sure all wires are well connected
- 2) Make sure the wires are well insulated
- 3) Make sure plugs are tightly screwed
- 4) Avoid overloading

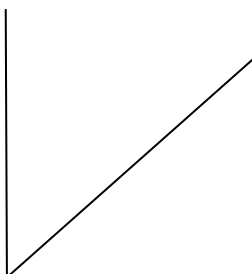
DESCRIBE AND EXPLAIN THE FUNCTION OF THE FUSE

-To prevent electrocution by melting when there is : (1) a fault (2) excess current

STATE 2 FUSE RATING FOR MOST DOMESTIC APPLIANCES

-13A and 3A

SKETCH A GRAPH SHOWING THE RELATIONSHIP OF CURRENT AND VOLTAGE USING OHMS LAW



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-The gradient of the line is equals to resistance

### DEFINE POWER

-Power is work done per unit time

### DEFINE MACHINE

-Machine is an instrument that makes work easier by using small effort e.g. pair of scissors, wheelbarrow

### STATE FOUR TYPES OF MACHINES

1) Inclined plane

a. Mechanical Advantage =  $\frac{\text{Load}}{\text{Effort}}$  MA =  $\frac{L}{E}$

b. Velocity Ratio =  $\frac{\text{Distance moved by Effort}}{\text{Distance moved by Load}}$  / VR =  $\frac{DE}{DL}$

c. Efficiency =  $\frac{MA}{VR} \times 100$

2) Pulley

A PULLEY SYSTEM WITH FOUR WHEELS IS USED TO RAISE A LOAD OF 100N USING AN EFFORT OF 50N. DRAW THE DIAGRAM OF THE PULLEY SYSTEM

VR = number of ropes except the effort rope or number of wheels

3) Gears

VR =  $\frac{\text{No. of teeth of load gear}}{\text{No. of teeth of effort gear}}$  or  $\frac{\text{Diameter of load gear}}{\text{Diameter of effort gear}}$  or  $\frac{\text{Radius of load gear}}{\text{Radius of effort gear}}$

4) Lever

STATE THREE REASONS WHY MACHINES ARE NOT 100% EFFICIENT

- 1) Because of friction
- 2) Some of the energy is used to overcome the weight of the machine
- 3) Some of the energy is converted to other forms of energy e.g. sound

STATE THREE WAYS OF IMPROVING EFFICIENCY OF MACHINES

- 1) Lubrication
- 2) Use lighter materials to build the machines
- 3) Increase length of plane if its inclined plane

DEFINE PRESSURE

-Is force acting per unit area  $\frac{F_{\text{Force}}}{A}$   
Area

WHAT ARE THE SCIENTIFIC UNITS OF PRESSURE

-Pascals (Pa)

NAME THE INSTRUMENT USED TO MEASURE FLUID PRESSURE

-Manometer

DESCRIBE AND EXPLAIN HOW MANOMETER WORKS

- It consists of U shaped transparent tube
- One arm of the tube is connected to the fluid supply
- The pressure of the fluid supply will force liquid inside the manometer to move a certain height given by  $h_2 - h_1$

-The pressure is calculated using the formula  $P = D \times h \times g + \text{atm}$  (atmospheric pressure)

### STATE TWO PROPERTIES OF LIQUID PRESSURE AND DRAW A DIAGRAM FOR EACH PROPERTY

- 1) Liquid pressure acts equally at a given depth
- 2) Pressure of the liquid increase with depth

### DESCRIBE AND EXPLAIN HOW A SIPHON WORKS

- The pipe should be primed i.e. to get rid of air so as to reduce the pressure inside the pipe
- The atmospheric pressure will force water to enter into the pipe
- The container which receive the liquid should be a lower level

### STATE 3 TYPES OF PUMPS

1. Bicycle pump
2. Lift pump
3. Blair pump
4. Force pump

### DESCRIBE AND EXPLAIN HOW EACH OF THE FOLLOWING PUMPS WORKS

1. Bicycle pump. When the piston is pulled out the valve (the leather) detaches itself from the walls of the barell

- The atmospheric pressure enters in the barell to occupy the space
- When the piston is pushed in, the valve attaches itself to the walls of the barell thereby forcing the valve on the tyre to open and the air enters the tube / tyre

2. Lift pump

Upstroke – Piston moves up, upper valve closes

- atmospheric pressure pushes water to enter through the lower valve which opens and water flows upwards into the cylinder

Downstroke – The piston moves downwards the lower valve closes and the upper valve opens

- Water flows into the spaces above upper valve
- After several upstrokes and downstrokes water will; start flowing out of the spout on each stroke (upstroke)

3. Force pump

Upstroke – The piston moves upwards and the valve on the cylinder opens thereby allowing water to enter

Downstroke - The piston moves downwards, the upper valve opens and the lower valve closes

- Water enters into the reservoir where there is air apace for continuous supply of water through the spout

4. Blair pump

Upstroke – Piston moves up, lower valve opens , upper valve closes

-atmospheric pressure pushes water through the lower valve and water enters into the cylinder

Downstroke – Piston moves downwards, lower valve closes and upper valve opens thereby allowing water into spout

DESCRIBE AND EXPLAIN HOW HYDROLIC JACK WORKS

-Effort is applied on the small piston

-The pressure is transmitted through fluid to large piston

-Small effort lifts big load on a large piston

DESCRIBE AND EXPLAIN HOW THE CAR BRAKE SYSTEM WORKS

-When the brake pedal is pressed down the piston in the master cylinder pushes in on brake fluid

-The brake fluid transmit the pressure equally to all the four wheel cylinders equally

-The wheel cylinder piston push out against the brake shoes

-The brake shoes push against the wheel drums and the resulting friction slows down and stops the car

STATE 2 HYDROLIC PROPERTIES OF LIQUIDS

1. Liquid pressure is transmitted equally in all directions
2. Liquids cannot be compressed

