**BASIC SCIENCE JSS 3**

**SECOND TERM**

## SCHEME OF WORK

**WEEK**  **TOPIC**

1. Electrical Energy
2. Skill Acquisition
3. Teenage Pregnancy and Abortion
4. Elements, Compound and Atomic Structure
5. Radioactivity
6. Chemical Formula
7. Writing and Balancing Chemical Equations.
8. Simple Machines
9. Digestive System
10. Circulatory System

**REFRENCES**

* Basis Science Made Easy for JSS Three by F.I Kehinde et al
* Basis Science Made Easy for JSS Two by F.I Kehinde et al
* STAN Integrated Science for JSS Three
* Precious Seeds Basic Science for JSSThree by J.O Otugboyega et al.

**\*\*Week One\*\***

**\*\*Topic: Electrical Energy\*\***

Content

Introduction

Electricity, defined as the flow of electric current, represents the continuous movement of charged particles, specifically electrons. This flow of electrons is crucial in various aspects of modern society, finding applications in industries, hospitals, offices, homes, schools, and research institutes. In Nigeria, the responsibility for power generation, distribution, and billing falls under the Electric Distribution Company of Nigeria (EDCN).

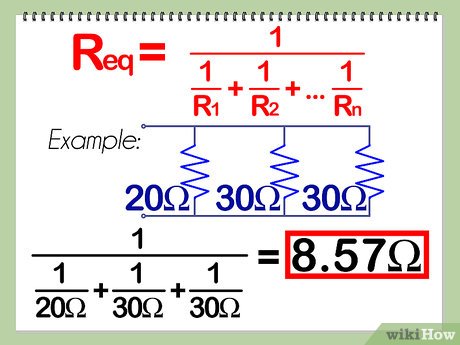
Concept of Electron Flow

When electric current passes through a wire, electrons move rapidly. Electrons carry negative charges, denoted by a minus sign. They circulate along a path known as a circuit.

Concept of Current, Resistance, and Potential Difference

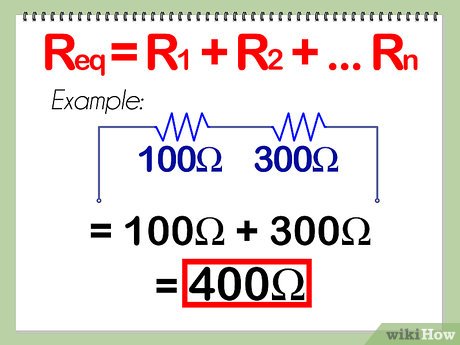
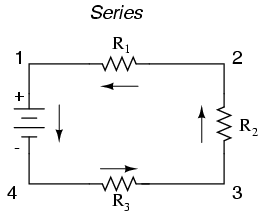
Current: It is the unceasing movement of electrons, quantified as the rate of charge flow. Represented as I, current is measured in amperes (A) using a device called an ammeter. There are two main types of current: Direct Current (DC) obtained from small generators, batteries, and inverters, and Alternating Current (AC) sourced from transmission lines and transformers.

Resistance: Resistance signifies the opposition encountered by electric current in a circuit. Denoted as R, it is measured in ohms with an instrument called an ohmmeter. In electronic circuits, a component specifically designed to introduce a predetermined level of resistance is referred to as a resistor.

**Potential difference (P.D):** This is the energy required to move charges from the positive terminal to the negative terminal. P.d is represented as **V** and measured in volt using an instrument called **Voltmeter.**

**Series and Parallel Arrangement in Electric Circuit.**

**Series Arrangement of Resistors.**

Series connection is the connection of resistors from one end to another.

RT = R1 + R2 + R3

RT means total or effective resistance.

**Parallel Arrangement of Resistors.**

This is the arrangement in which resistors are arranged side by side such their corresponding ends join together at two common junctions.

1/RT = 1/R1 + 1/R2 + 1/R3

**EVALUATION**

1. Differentiate between parallel and series arrangement.
2. Define the following (a) current (b) potential difference (c) Resistance.
3. What is electricity?

**HOUSE CIRCUIT: FUSE AND CIRCUIT BREAKER.**

220V of electricity enters our homes from the transformer and it us sent into the meter.

In order to prevent power surges or electrical problems, fuses and circuit breakers are used. A fuse is a safety device in an electric circuit. It consists of a thin resistance wire that will permit only a certain amount of electric current to pass through it, otherwise it will melt. Fuses are placed in the main electrical supply to protect wiring in the house. A circuit breaker has a switch that automatically goes off when there is an electrical problem it can be turned on later.

**Billing of Electric Meter Reading**

At home, electrical power is measured and billed. Power is the rate at which work is done.

Electrical power = current × voltage

Electrical power is measured in **watt** using an instrument known as **wattmeter.**

One watt is the power consumed in an electric circuit when one joule of work is done in one second. Larger units of power are the kilowatt (kW) and megawatts (MW).

1KW = 1000 watts = 103 W

1MW = 1000000 watts = 106 W= 103 KW.

In order to bill an electric Meter, electric energy consumption is measured and sold by the Electricity Distribution Company of Nigeria (EDCN) in units of kilowatt-hour.

Example: A radio set is used for 12 hours per day for 65days. Find the quality of energy consumed and the cost, if the radio set is rated 35W. Assume that the cost of 1 kWh is 50 kobo.

**Solution**

Quantity of energy consumed = power × time

Energy consumed= 35W × 12hours × 65days

Energy consumed= 27300Wh

Dividing by 1000 to make it KWh = 27300Wh

1000

Therefore, the quantity of energy consumed= 27.3kWh

Cost= quantity of energy consumed × the cost of 1 unit of energy

Cost of 1 unit of energy= 50kobo

Cost of energy consumed= 27.3kWh × 50kobo= 1365kobo= 13.65

**Electric meter reading**

Electric meter is a device installed in homes, industries, schools and offices to read the quantity of electrical energy used by local consumers of electricity. To read the meter, the previous unit is subtracted from the current unit, which will give the actual meter reading of the meter.

For example, if the previous unit or reading on the meter is 48,626.8 units and the current reading is 59,014.1 units, the actual meter reading for the month will be given as follows:

*Current reading - Previous reading = Actual reading*

50,014 - 48,626.8 = 1,387.3

Therefore, the meter reading for the month is 1387.3

**EVALUATION**

1. State the difference between fuse and circuit breaker.
2. What device is used to measure electrical power?

**GENERAL EVALUATION/REVISIONAL QUESTIONS**

1. What is electrical power?
2. State the use of: (a) ohmmeter (b) ammeter (c) wattmeter
3. What is work?
4. State the features that adapt (a) birds (b) fishes to their habitat
5. What is genetic counselling?

**WEEKEND ASSIGNMENT**

1. The instrument used for measuring electric current is A. Ammeter B. Wattmeter C. Voltmeter D. Ohmmeter
2. The kind of current generated by EDCN is \_\_\_\_\_ current A. Parallel B. Series C. Direct D. alternating
3. \_\_\_ is the opposition to electric current A. Potential difference B. Electrical power C. Resistance D. Fuse.
4. A device which is used to prevent power surges from damaging appliances is called A. Meter B. Fuse C. Coil D. Wattmeter
5. The type of connection commonly used at home is \_\_\_\_ A. Parallel B. Series C. Direct D. alternating

**THEORY**

1. What is electricity?
2. Explain electron flow.

**Week Two**

**Topic: Skill Acquisition**

Content

Meaning of Skill Acquisition

Skill refers to a specialized ability attained through training, enhancing one's proficiency in a particular activity. It involves the capacity to achieve desired outcomes with maximum certainty and minimal time and energy expenditure. It's crucial to distinguish between talent, an innate aptitude, and skill, which is honed through training, either formal or informal. Skill acquisition refines innate talents and abilities, evolving individuals from novices to professionals. Psychologists assert that consistent practice for approximately seven years or 10,000 hours integrates a skill into one's core abilities.

Reasons for Skill Acquisition

Acquiring skills serves various purposes:

1. Livelihood: Skills are instrumental in securing a means of livelihood, enabling individuals to fulfill basic needs through earned income.

2. Employment: Skill acquisition fosters self-employment, reducing the stress of job hunting. Engaging in a profession enhances expertise and may lead to training opportunities and increased income. Skilled individuals often transition into decision-making roles, managing emergencies effectively.

3. Independence: Skill acquisition empowers individuals, reducing dependency on others for survival.

Additional reasons include risk management, decision-making, coping with emergencies, survival strategies, fostering social cohesion, enhancing quality of life, and appreciating human capacities.

Types of Skills

Various skills can be acquired, including but not limited to:

1. Automobile repairs (mechanical works)

2. Painting

3. Hairdressing/barber's work

4. Photography

5. Publishing

6. Catering

7. Panel beating

8. Bookbinding

9. Farming

10. Computer literacy

11. Fine art

12. Welding

13. Bricklaying

14. Plumbing

15. ICT

16. Metalwork

17. Electrical installation

18. Video coverage

19. Fish farming

20. Trading

21. Shoemaking

22. Fashion designing

23. Upholstery/carpentry

24. Hat/bead making

25. Desktop publishing

Importance of Skill Acquisition

1. Skill Enhancement: Skills and knowledge are significantly improved through acquisition.

2. Communication: Skill acquisition enhances effective communication abilities.

3. Quality of Life: Proficiency in various skills elevates the overall quality of life.

4. Survival: Skills serve as a vital survival strategy, providing financial sustenance.

5. Livelihood: Skills offer a means of livelihood, enabling self-sufficiency.

6. Self-Gratification: Acquired skills bring self-satisfaction and independence.

7. Societal Contribution: Skilled individuals meaningfully contribute to society.

Evaluation

1. Enumerate five reasons for acquiring skills.

2. List ten skills that can be acquired.

General Evaluation

1. Name ten types of skills.

2. What are the reasons for acquiring skills?

3. Mention four causes of flooding.

4. Define light energy.

5. State the laws of refraction.

Weekend Assignment

1. A specialized ability acquired through training is called

A. Method

B. Process

C. Entertainment

D. Skill.

2. One of the following is not an acquired skill

A. Photography

B. Sleeping

C. Catering

D. Weaving.

3. Someone who has acquired a skill is called a

A. Professor

B. Cohesion

C. Profession

D. Professional.

4. Which of the following is not a reason for acquiring skills?

A. Survival strategy

B. Dependency on friends

C. Self-employment

D. Training others.

5. A person who has little or no knowledge about a particular skill is called

A. Professional

B. Expert

C. Guru

D. Novice.

Theory

1. Define skill acquisition.

2. List five types of skills.

3. State four reasons for acquiring skills.

4. Enumerate four importance of skill acquisition.

**Week Three**

**Topic: Teenage Pregnancy and Abortion**

Content

Meaning of Teenage Pregnancy

Teenage pregnancy refers to pregnancy in a girl between the ages of 10-19. It is often unintended and unwanted. Physical maturity does not necessarily mean emotional, social, or financial readiness for parenthood.

Consequences of Teenage Pregnancy and Delivery

Teenage pregnancy can lead to various complications, such as pregnancy-induced hypertension, obstructed labor, and the need for caesarian section. Additionally, teenagers might resort to unsafe abortion methods due to social stigma and fear, resulting in further health risks.

Myths and Facts About Pregnancy

1. Myth: Girls should not use contraceptives.

Fact: While abstinence is ideal, contraceptives, when used, can prevent teenage pregnancy. Contraceptives do not damage the womb.

2. Myth: Condoms reduce sensitivity during sex.

Fact: There are thin and textured condoms that maintain sensitivity during sexual activities.

3. Myth: Pregnancy can occur through kissing.

Fact: Pregnancy requires sperm penetration in the vagina for fertilization.

4. Myth Having children at a young age ensures seeing them grow.

Fact: The ideal age for pregnancy is between 25 and 35.

5. Myth: Pregnancy secures a man's love.

Fact: Pregnancy does not guarantee a stable relationship; partners can leave even after having a child.

Evaluation

1. Reasons for Abstinence: As a JSS 3 student, list five reasons why you choose abstinence from sexual intercourse.

2. Preventing Teenage Pregnancy: Mention five ways teenage pregnancy can be prevented.

Content

Meaning of Abortion

Abortion is the deliberate termination of a pregnancy, either spontaneously (miscarriage) or induced. Induced abortion is a purposeful termination of pregnancy, which can be done medically or surgically.

Types of Abortion

1. Spontaneous Abortion: Also known as miscarriage, it occurs unintentionally due to various factors.

2. Induced Abortion: This can be medical, induced using pills, or surgical, involving minor operations.

Reasons for Abortion

Abortion might be considered due to reasons like unwanted pregnancies, rape, financial instability, medical complications, or lack of readiness for parenthood.

Unsafe Abortion and its Consequences

Unsafe abortions, performed without proper medical supervision, can lead to severe consequences like organ damage, infections, pain, and even death. Teenagers often resort to unsafe methods due to fear and societal pressures.

Ways to Prevent Abortion

Preventing abortion involves several measures:

1**. Abstinence**: Avoid sexual activities until emotionally, physically, and financially prepared.

2. **Safe Sex:** Use condoms to prevent unwanted pregnancies and sexually transmitted infections.

3. **Regular Check-ups:** Women should undergo medical check-ups to manage pregnancies better.

4. **Educational Initiatives:** Educate teenagers about the risks and consequences of unsafe abortion.

5. **Counseling:** Seek guidance from counselors, parents, or support groups if facing pregnancy-related challenges.

**Where to Get Help**

1. **Family:** Discuss the situation with parents for emotional and financial support.

2. **Counselors:** Consult school or professional counselors for advice and guidance.

3. **Support Groups:** Numerous NGOs and social clubs offer assistance to teenagers facing pregnancy issues.

4. **Education:** Join educational programs promoting awareness about teenage pregnancy and its prevention.

**Evaluation/Revisional Questions**

1. Teenage Pregnancy Implications: Enumerate seven implications of teenage pregnancy.

2. Understanding Hormones: Define hormones and their role in human physiology.

3. Abortion: Explain abortion and its ethical implications.

4. Reasons for Abortion: Mention four reasons people opt for abortion.

5. Natural Phenomenon: Explain why lightning is seen before thunder.

6. Machine Definition: Define a machine and provide an example.

**Weekend Assignment**

1. The type of abortion involving over-the-counter drugs is

A. Traditional

B. Medical

C. Surgical

D. None of the above.

2. A developing child in the womb is called a

A. Baby

B. Foetus

C. Zygote

D. None of the above.

3. Which of the following is not a way to prevent abortion?

A. Living a reckless life

B. Abstinence

C. Safe sex

D. None of the above.

4. Where does the foetus develop?

A. Fallopian tube

B. Uterus

C. Vagina

D. None of the above.

5. A person who constantly performs illegal abortions is called

A. Oncologist

B. Therapist

C. Abortionist

D. None of the above.

**Theory**

1. Discuss with reasons whether abortion should be legalized in Nigeria or not.

2. What advice would you give to a pregnant teenager based on your knowledge of the topic?

**WEEK FOUR**

**TOPIC: ELEMENTS, COMPOUNDS, AND ATOMIC STRUCTURE**

**Content**

**Element**

An element is a fundamental substance that cannot be further divided into simpler substances. There are over 100 known chemical elements, which can be categorized into metals and non-metals. Metallic elements often end with the letter "M," while non-metal elements may end with various alphabets except "M," with very few exceptions.

**Compound**

Chemical compounds are formed when two or more elements combine. There are two main categories of chemical compounds: (a) Binary Compounds and (b) Non-Binary Compounds.

**Formula of Binary Compounds**

A binary compound is a chemical compound composed of two different elements. The elements in a binary compound are represented using their chemical symbols. For example, sodium chloride (table salt) is represented as NaCl, where Na stands for sodium and Cl stands for chlorine.

**Fundamental Particles of Atom**

Atoms, the basic units of matter, consist of fundamental particles. These particles include protons, neutrons, and electrons. Protons carry a positive charge, neutrons are neutral, and electrons carry a negative charge. The arrangement and interaction of these particles determine the chemical properties of elements and compounds.

In the study of atomic structure, scientists delve into the behavior and characteristics of these fundamental particles within the atom, leading to a deeper understanding of the elements and compounds that form the basis of our material world.

|  |  |
| --- | --- |
| **BINARY COMPOUNDS** | **NON-BINARY COMPOUNDS** |
| Their names end with-ide | Their names often end with-ate |
| They are made of only two elements | They are made of 3 or more elements |

**Examples of Elements and Symbols**

- Hydrogen: H

- Helium: He

- Lithium: Li

- Berilium: Be

- Boron: B

- Carbon: C

- Nitrogen: N

- Oxygen: O

- Flourine: F

- Neon: Ne

- Sodium: Na

- Magnesium: Mg

- Aluminium: Al

- Silicon: Si

- Phosphorous: P

- Sulphur: S

- Chlorine: Cl

- Argon: Ar

- Potassium: K

- Calcium: Ca

Examples of Compounds and Formulas

- Water: H2O

- Sand: SiO2

- Chalk: CaCO3

- Lime: CaO

In chemical compounds, the elements are chemically combined and cannot be easily separated. The ratios of the combination of atoms of these elements in compounds are fixed, unlike in mere mixtures.

**Evaluation**

1. Define:

(a) Element

(b) Compound.

2. What are binary compounds?

3. State five examples each of metals and non-metals.

**FORMULAE OF BINARY COMPOUNDS**

Binary Compounds are compounds of elements only and names ending with-ide. E.g. Magnesium chloride. Magnesium Chloride = Magnesium + Chlorine.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Elements** | **Atomic Electronic Number** | **Group Configuration** | **Valency** | **Oxidation number** |
| H | 1 | 1 | 1 | +1 |
| He | 2 | 2 | 0 | 0 |
| Li | 3 | 2,1 | 1 | +1 |
| Be | 4 | 2,2 | 2 | +2 |
| B | 5 | 2,3 | 3 | +3 |
| C | 6 | 2,4 | 4 | +4 |
| N | 7 | 2,5 | 3 | -3 |
| O | 8 | 2,6 | 2 | -2 |
| F | 9 | 2,7 | 1 | -1 |
| N | 10 | 2,8 | 0 | 0 |

Combinations of elements are made on the basis of their combining Capacities called valencies. Besides, every atom of element contain electrons by which distribution in a given order termed **ELECTRONIC**

**CONFIGURATION**, the group and hence valency of each element in combination is decided. For example, Magnesium nitride.

Mg = 12 = 2, 8, 2 = Group = 2, valency = +2

N = 7= 2 , 5 = Group = 5, valency = -3

Mg N = Mg3 N2 = Magnesium nitride.

2 3

**EVALUATION**

* + - 1. What is electronic configuration?
      2. Define the term Valency.
      3. What is the valency of an element found in group 6?
      4. Work out the formulae of Aluminum oxide and carbon dioxide.

**Fundamental particles of Atom**

The atom is made up of a number of different particles.

There are three fundamental units namely;

1. The electron (discovered 1897)
2. The proton (discovered 1920)
3. The neutron (discovered 1932)

**THE ELECTRON**

The electron carries a negative electric charge and indeed a very small function of the mass of even the smallest atom, hydrogen.

They are at a comparatively great distance from the centre of the atom and travel rapidly and continuously in orbits around its centre known as the nucleus.

The electrons were discovered first in 1897 by Sir J.J. Thomson.

**THE PROTON**

The proton is a positively charged particle found in the nucleus of an atom although the positive charge on the proton has same magnitude charge on the electron mass of the proton which is about 1800 times larger than that of the electros.

The number of protons in the nucleus of an atom is called atomic number. All atoms of the same element have the same atomic number but those of different elements have a different number of protons in their nuclei.

The sum of the protons and neutrons in the nucleus of an atom is called the mass number with the symbol. The proton was discovered by Sir, Ernest Rutherford in 1920.

**THE NEUTRON**

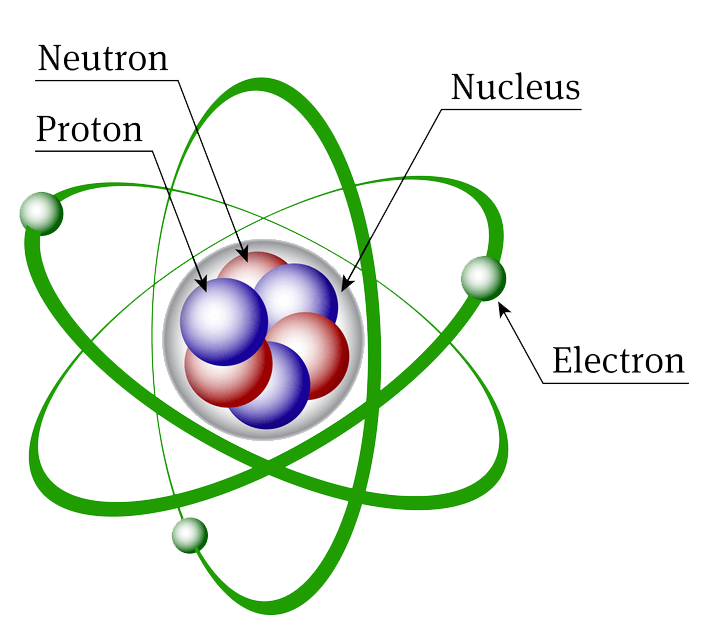
The neutron was discovered in 1932 by a British Scientist, James Chadwick. It has almost the same charge.

Whenever the neutron number in the nucleus of an atom of the same element varies, its mass number also varies and hence we have ‘Isotopes’.

Isotopes are atoms of elements of the same atomic number but different mass number because of the difference in their neutrons number. The three common isotopes of hydrogen are:

* 1. Proton – 1 proton
  2. Deuterium – 1 Proton + 1 neutron
  3. Tritium – 1 Proton + 2 neutrons

The particles proton and neutrons which make up the nucleus are – called Nucleons

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**EVALUATION/REVISIONAL QUESTIONS**

1. What are isotopes? Name the three isotopes of hydrogen.
2. How many neurons are present in the following atoms?
   1. 23Na, (b) 31P, (c) 39K (d) 35Cl.
3. Name the three fundamental particles of an atom.
4. What is light energy?
5. State the difference between echo and reverberation.

**WEEKEND ASSIGNMENT**

1. A substance which cannot be further divided into simpler substances is…………(a) Elements (b) Compound (c) Radical (d) Mixture
2. One of these is NOT a binary compound ……..(a) Sodium chloride (b) Magnesium nitride

(c) Aluminium oxide (d) Calcium Phosphate

1. The positively charged sub atomic particle is (a) element (b) electron (c) neutron (d) proton
2. \_\_\_\_\_\_ discovered the electron (a) James Chadwick (b) Sir, Ernest Rutherford (c) Sir J.J. Thomson (d) Issac Newton
3. The sub atomic particle involved in chemical reaction is (a) electron (b) neutron (c) shell

(d) proton

**THEORY**

1. Explain the term ‘atom’.
2. Differentiate between a binary compound and non-binary compound.

**WEEK FIVE**

**TOPIC: RADIOACTIVITY**

**CONTENT**

**Meaning of Radioactivity**

Radioactivity is the spontaneous disintegration or breaking down of the nucleus of an atom, emitting radiation. Any element that disintegrates spontaneously and emits rays is called a radioactive element.

**Discovery of Radioactivity**

Discovered by French physicist Henri Becquerel in 1896, radioactivity involves atoms emitting rays. This phenomenon was confirmed by Marie and Pierre Curie.

**Types of Radioactivity**

i. **Natural Radioactivity:** Occurs naturally without human intervention.

ii. **Artificial Radioactivity:** Caused by human activity.

**Radioactive Elements**

Elements that emit rays from the nuclei of their atoms are called radioactive elements. Natural ones include uranium, radium, plutonium, radon, and thorium. Artificial radioactive elements are produced by bombarding nonradioactive elements with radioactive particles, forming radioactive isotopes.

**EVALUATION**

1. What is radioactivity?

2. What are the types of radioactivity?

3. What are radioactive elements?

Types of Radiation and Their Properties

There are three types of rays:

i. Alpha particles

ii. Beta particles

iii. Gamma rays

**Alpha particles (α-rays):**

- Positively charged helium nucleus with 2 protons and 2 neutrons.

- Heaviest radiation with low penetrating power, stopped by paper.

**Beta particles (β-rays):**

- Fast-moving electrons.

- Negatively charged, more penetrating than alpha rays, stopped by aluminum foil.

**Gamma rays (ϒ-rays):**

- Electromagnetic radiation, no charge.

- Highest penetrating power, only stopped by lead.

**Nuclear Transmutation**

Changes in the nucleus of an atom caused by radioactive emission are called nuclear transmutation. For example, Radium-226 emitting α-rays turns into radon-222.

22688Ra--->42He + 22286Rn

Artificial changes in the nucleus are called artificial nuclear transmutation.

**EVALUATION**

1. Differentiate between alpha, beta, and gamma radiations.

2. What is nuclear transmutation?

**Uses of Radioactivity**

1. **Medical Field:**

- Sterilization of syringes and medical equipment.

- Cancer treatment.

- Sterilization of bottled drinks and canned food.

2. **Agricultural and Scientific Research:**

- Radioactive tracers.

- Radioactive or carbon dating.

3. **Industrial Field:**

- Studying defects in metals and welded joints.

- Checking metal weaknesses.

- Tracing underground pipe leakages.

Effect or Dangers of Using Radiation

1. Long exposure destroys body cells.

2. Can lead to gene mutations.

3. Causes deformities in fetuses.

4. Radiation from nuclear weapons can be lethal.

5. Radioactive waste pollutes the environment.

**EVALUATION**

1. State the uses of radioactivity in (a) medical field (b) industries (c) agricultural and scientific research.

2. List the hazards of radioactivity.

**EVALUATION/REVISIONAL QUESTIONS**

1. What is radioactivity?

2. What is reproduction?

3. Mention three benefits of acquiring skills.

4. What is ozone layer depletion?

5. What is reflection?

**WEEKEND ASSIGNMENT**

1. \_\_\_\_ is referred to as the father of radioactivity.

(a) Henri Ford (b) Pierre Curie (c) Marie Curie (d) Albert Einstein

2. Positively charged radiation that can be stopped by a thin sheet of paper is

(a) X-ray (b) Beta particles (c) Alpha particles (d) Gamma rays

3. Blood moves out of the heart to the lungs through \_\_\_\_

(a) Aorta (b) Pulmonary artery (c) Vena Cava (d) Hepatic artery

4. Which of the following is an electronegative element?

(a) Na (b) F (c) Hg (d) Au

5. Which of the following is not a result of excess exposure to radiation?

(a) HPV (b) Cancer (c) Mutation in fetus (d) Radioactive poisoning

THEORY

1. State five benefits of radioactivity.

2. Should Nigeria embark on nuclear power as an alternative source of electricity? Give reasons for your answer.

**WEEK SIX**

**TOPIC: CHEMICAL SYMBOLS AND FORMULAE**

CONTENT

- Symbols of Elements

- Electronic Configuration

- Group and Valency of Compounds

- Formulas of Compounds

- IUPAC Nomenclature

- Fundamental Particles of Atom

SYMBOLS OF ELEMENT

An element is a substance consisting of only one kind of matter. Over 100 elements are known, and these elements are usually represented by symbols instead of writing their names in full. The abbreviation for each element is called the symbol for that element. It also represents one atom of the element it stands for (Elements 1-20). There are 4 groups of symbols:

Symbols formed from the first letter of element

**Element Symbols**

Hydrogen H

Carbon C

Nitrogen N

Oxygen O

Sulphur S

Phosphorus P

Iodine I

Fluorine F

(b) Symbols formed from the first two letters of the element.

**Elements** **Symbols**

Helium He

Lithium Li

Beryllium Be

Neon Ne

Aluminum Al

Calcium Ca

Barium Ba

Bromine Br

(c) Symbols formed from the first and any letter in the name of the elements

**Elements** **Symbols**

Magnesium Mg

Chlorine Cl

Manganese Mn

Zinc Zn

Cadmium Cd

Platinum Pt

(d) Symbols derived from latin name of the elements

**Element** **Latin Name Symbols**

Sodium Natrium Na

Iron Ferrum Fe

Copper Cuprum Cu

Gold Aurum Au

Potassium Kalium K

Silver Argentun Ag

Lead Plumbum Pb

Mercury Hydragyrum Hg

**EVALUATION**

1. Define the term symbol of an element.
2. Mention the four groups of symbols that we have.

**ELECTRONICCONFIGURATION**

ElectronicConfigurationistherepresentationofhowelectronsarearranged on the shells of an element.

The pattern of how electrons are arranged is of the fashion:

K 1stshell–2electrons

L 2ndshell–maximumof8electrons

M 3rdshell–maximumof8electrons

N 4thshell–maximumof8electrons

This pattern works for at least the first 20elements.

Theelectronicconfigurationhelpsustocorrectlyplaceelementsintotheirgroupsandperiodwithinperiodictable.Thisinformationalsohelpsinthedeterminationofcombiningpowersofelements.

**EVALUATION**

1. What is electronic configuration?
2. Write the electronic configuration of Na=11,P=15.

**GROUP AND VALENCY**

The group refers to the vertical arrangement in columns of elements in the periodic table. Valency is the combining power of an element. It must be correctly determined and the correct chemical formulae of compounds are to be determined.

**Group Valency**

I +1

II +2

III +3

IV –4

V –3

VI –2

VII -1

O 0

**EVALUATION**

1. Define the term valency.

2. What is the valency of

(a) Group III element

(b)Group IV element.

**FORMULAEOFBINARYCOMPOUND**

Formulae of binary compound

Acompoundisasubstancemadeof2ormoreelementschemicallycombinedtogether.Compoundof2elementsonlyareknownasbinarycompoundsandhavethefollowingcharacteristics.

* Names end with–IDE.
* Composedofonly2elements.

E.g. Carbon dioxide, Magnesium chloride, Aluminum Oxide, Aluminum Chloride.

C=6\_\_\_\_\_\_2,4 Al=13\_\_\_\_\_\_2,8,3

Mg=12\_\_\_\_\_\_2,8,2O=8\_\_\_\_\_\_2,6

Cl=17 \_\_\_\_\_\_\_2,8,7

Mg Cl A1 0

+2 1 +3 2

MgC12 Al203

Al C

+3 -4

Al4C3

**NON-BINARYCOMPOUNDS**

These are compounds of 2 or more elements whose names end with ATE examples are: Magnesiumtrioxocarbonate(IV)

Berylliumtrioxonitrate(V)

Calciumtetraoxosulphate(VI)

PotassiumheptaxodichromateVI

SodiumhexachloroplatimateII

Non-binary compounds have these characteristics:

**EVALUATION**

1. What are non-binary compounds?
2. Give two of their characteristics.
3. State any five example of non-binary compound.

**DETERMINATIONOFVELENCIESOFRADICALS**

Radicals are group of atoms bearing a charge. They are the polyatomic ions i.e. ions which contain more than one type of atom. Example include;

1. Trioxonitrate (V) ion N03-

2. Trioxocarbonate(IV) ion C032-

3. Tetraoxosulphate(VI) ion S042–

4. Hydroxideion OH-

5. Cyanideion CH-

6. Tetraoxophosphate (V) ion PO43-

7. Hydrogentrioxocarbonate(IV)ion HC03-

The charge on a polyatomic ion is determined thus:

S+4(O)

But O=-2andS=6

S+4(-2)

6–8=-2

SO42-

CO32-

C+3(O)

But C=4,O=-2

4+3(-2)

4–6=-2

C032-

**FORMULAEOFNON-BINARYCOMPUNDS**

SodiumhexachloroplatinateII

Na=11\_\_\_\_\_\_\_\_2,8,1

Valency of sodium=1

HexachlroroplatinateII=PtCl6

Pt+6Cl

2+6(-1)

2–6

=-4

ValencyofPtCl6=-4

Na PtCl6

1 4

Na4PtCl6

**EVALUATION**

Name the following: (i) CaCO₃ - Calcium Carbonate (ii) Na₃PO₄ - Sodium Phosphate

Work out the charge on the following polyatomic ions: (a) SO₃²⁻ - Sulfite Ion (-2) (b) NO₃⁻ - Nitrate Ion (-1)

IUPAC NOMENCLATURE

The International Union of Pure and Applied Chemistry has agreed to a common way of naming chemical compounds according to a set of rules. This naming system is termed IUPAC nomenclature. The rules involved in IUPAC nomenclature are as follows:

Take oxygen as -2.

Hydrogen as +1 with non-metals.

Hydrogen as -1 with metals.

These numbers are the oxidation numbers.

CO₃²⁻ C + 3(-2) = -2 C - 6 = -2 C = -2 + 6 = +4 Name: Trioxocarbonate (IV) ion, i.e., 3 atoms of oxygen and carbon's oxidation number is 4.

EVALUATION/REVISIONAL QUESTIONS

What are binary compounds?

Give the correct chemical formulas of: (a) Aluminum Sulphide - Al₂S₃ (b) Sodium Phosphate - Na₃PO₄

Define the term accommodation.

Describe briefly what is meant by: (a) Hypermetropia (b) Myopia

WEEKEND ASSIGNMENT

The symbol Ag represents the element: (b) Silver

The electronic configuration 2,8,3 is that of: (a) Sodium

The correct formula of tetraoxophosphate (V) ion is: (d) PO₄³⁻

The compound Na₃AlF₆ has the IUPAC name: (b) Sodium Hexafluoroaluminate III

The acronym IUPAC represents: (c) International Union of Pure and Applied Chemistry

**THEORY**

What are binary compounds?

State any two examples of binary compounds.

Write the electronic configuration of: (a) Silicon - 1s² 2s² 2p⁶ 3s² 3p² (b) Potassium - 1s² 2s² 2p⁶ 3s² 3p⁶ 4s¹

Work out the oxidation number of chromium in Cr₂O₇²⁻ - Chromium has an oxidation number of +6 in this compound.

What are radicals?

State three examples of radicals.

**WEEK SEVEN**

**TOPIC: SIMPLE CHEMICAL EQUATIONS**

**CONTENT**

- Chemical Equations

- Equations and the Law of Conservation of Matter

- Writing Chemical Equations

- Balancing Chemical Equations

The law of conservation of matter states that matter is neither created nor destroyed in the course of a chemical reaction. To adhere to this law, there must be the same number of atoms in each half of the equation. The number of atoms in reactants must balance those in the products, and vice versa.

So, the equation: Na + H₂O = NaOH + H₂ is considered unbalanced and hence not acceptable.

This has to be balanced as: 2Na + 2H₂O = 2NaOH (aq) + H₂ (g)

(S = solid, L = liquid, Aq = aqueous, g = gas)

**EVALUATION**

1. State the law of conservation of matter.

2. What is a balanced equation?

**WRITING CHEMICAL EQUATIONS**

Chemical equations are written using chemical symbols and formulae. It is necessary to have as much detail as possible about what is going on in a reaction, e.g., hydrogen gas reacts with oxygen gas to produce water.

We translate this information into a word equation:

Hydrogen (gas) + Oxygen (gas) = Water

(Reactants) (Product)

2H₂ + O₂ 2H₂O

(Balanced equation)

Common chemical reactions include (a) Combustion of hydrocarbons (b) Neutralization reactions (c) Double decomposition.

Examples:

a) C₃H₈ + O₂ → CO₂ + H₂O

b) HCl + NaOH → NaCl + H₂O

c) AgNO₃ + NaCl → AgCl + NaNO₃

**EVALUATION**

1. What kind of reaction is a neutralization reaction?

2. What are the usual products of the combustion of hydrocarbons?

**BALANCING CHEMICAL EQUATIONS**

aN₂ + bH₂ = cNH₃

N: 2a = C … (i)

H: 2b = 3C … (ii)

Let a = 1

From equation (i): 2(1) = C

2 = C C = 2

From equation (ii): 2b = 3(2)

2b = 6

b = 3

A = 1, b = 3, C = 2

N₂ + 3H₂ = 2NH₃

Two methods are commonly employed in chemical equations:

1. Balancing by inspection.

2. Balancing by the use of simultaneous equations.

**EVALUATION/REVISIONAL QUESTIONS**

1. What two methods are commonly used in balancing chemical equations?

2. Give the balanced equation for the formation of water from hydrogen and oxygen.

3. What are hormones?

4. What glands produce the minerals?

**WEEKEND ASSIGNMENT**

1. A short story which tells us what happens in a chemical reaction is known as:

(a) chemical reaction

(b) chemical formulae

(c) chemical formulae

(d) chemical balance

2. The subscript (aq) in a written chemical equation symbolizes:

(a) Aquiline

(b) Aquarium

(c) Aquarius

(d) Aqueous

3. What law governs the writing of balanced chemical equations?

(a) law of constant composition

(b) law of conservation of matter

(c) law of multiple proportions

(d) law of reciprocal proportions

4. aN₂ + bH₂ = cNH₃. What do a, b, and c represent in the equation written respectively?

(a) a = 3, b = 1, c = 2

(b) a = 2, b = 3, c = 1

(c) a = 1, b = 3, c = 2

(d) a = 1, b = 2, c = 3

5. The reaction involving an acid and a base to form salt and water only is known as:

(a) Combustion reaction

(b) Neutralization reaction

(c) Redox reaction

(d) Precipitation

**THEORY**

1. Write out the chemical equation of the reaction described below:

(a) Magnesium ribbon reacts with hydrochloric acid to form magnesium chloride and hydrogen gas.

2. What are the products of combustion of hydrocarbons?

**WEEK EIGHT**

**TOPIC: SIMPLEMACHINE**

**CONTENT**

* Definitionof Simple Machine
* Types of Machine
* Importance of Simple Machine

**Definition of Simple Machine**

A machine is a tool or device that makes work easier. It is defined as a tool which uses force applied (effort) at one point to overcome another resisting force (effort) at another point. Examples of machine include: a plier, the human arm, a gear, a pulley etc.

**Types of Machine**

There are six types of simple machines. They are;

1. Lever
2. Wheel and axle
3. Pulley
4. Wedge
5. Inclined plane
6. Screw

**Lever**

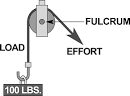
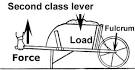
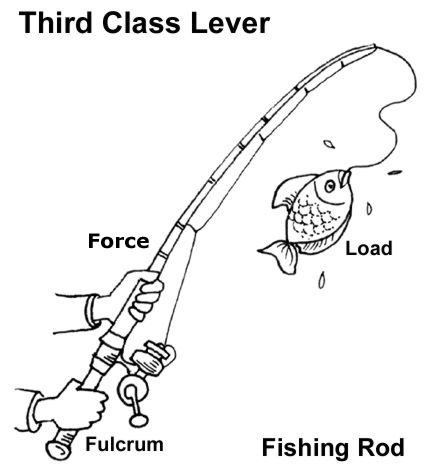
A lever is a simple machine built on the principle of a stiff bar resting on a pivot or fulcrum with a load placed at one end and effort applied on the other end.

There are three parts of the lever;

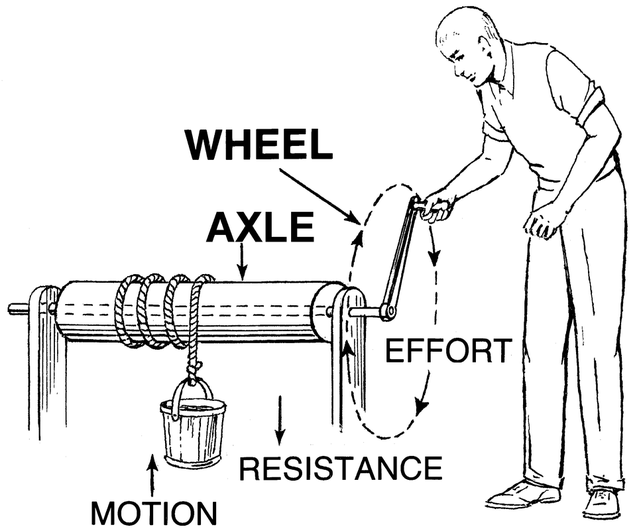
1. Load: This is the point of the resisting force.
2. Effort: This is the point where force is applied.
3. Fulcrum: This is the turning point of the lever.

**Types of Lever**

There are three classes or order of lever. They are;

* + - 1. ****First Order Lever: In this lever, the fulcrum is between the load and effort (LFE). Examples include: scissors, claw hammer.
      2. ****Second Order Lever: In this lever, the load (L) is between the effort (E) and the fulcrum (F) (FLE). Example of this including; wheelbarrow, nutcracker, bottle opener etc.
      3. Third Order Lever: In this lever, the effort is between load and effort. (FEL). Example of this include; fore arm.

**Wheel and Axle**

****This simple machine is used to lift heavy load from depth. It consists of a Large wheel on a small axle that turns in the same axis. Examples of wheel and axle include: bicycles, fan, wagon etc.

**Use**

1. It is used to draw out heavy load from depths
2. It is used to create the turning effects in bicycle

**EVALUATION**

* + - 1. Define simple machine.

1. List two uses of (a) Lever (b)Wheel and Axle.

**Pulley**

A machine consisting of a wheel over which a pulled rope or chain runs to change the direction of the pull used for lifting a load. Combinations of two or more pulleys working together reduce the force needed to lift a load.

**Uses**

1. It is used lift and move load in cranes
2. It is also used in lifts (elevators)

**Wedge**

A wedge is a triangular shaped tool, and is a portable inclined plane. It can be used to separate two objects or portions of an object, lift up an object, or hold an object in place.

****

**Use**

It is used to split objects open especially wood.

**Screw**

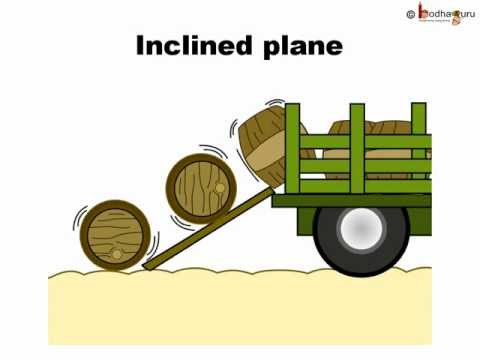
****A screw is a type of fastener characterized by a helical ridge known as thread. Most screw rotate in clockwise manner but few rotate in anticlockwise manner.

**Use**

It allows drilling into hard surfaces

**Inclined plane**

An inclined plane is a flat supporting surface tilted at an angle, with one end higher than the other, used as an aid for raising or lowering a load. The inclined plane is often used to lift a load over a vertical obstacle.



**Importance of Simple Machine**

1. Simple helps man to overcome friction in doing work.
2. It helps to move load over a long distance.
3. It helps to save time and effort
4. It is more efficient.
5. Simple machines are basic and simple to operate.

**GENERAL EVALUATION\REVISIONAL QUESTIONS**

1. What is a machine?
2. Categorize the following to the class of lever they belong to: fore arm, plier, nutcracker, fishing rod.
3. State five effect of radiation.
4. State four reasons for abortion.
5. What is nuclear transmutation?

**WEEKEND ASSIGNMENT**

1. An example of a first order lever is (a) fore arm (b) nutcracker (c) seesaw (d) pulley
2. The principle of inclined plane is used in the construction of which of the following (a) pulley (b) staircase (c) lift (d) crane
3. \_\_\_ has the load between the fulcrum and effort (a) First Order lever (b) Second Order Lever (c) Third Order Lever (d) Wedge
4. Which of the following radiation has the lowest penetrating power?(a) alpha rays (b) beta rays (c) gamma rays (d) X-ray
5. The clear outer layer of the eye is (a) iris (b) cornea (c) retina (d) lens

**THEORY**

1. Explain the three types of lever giving an example for each.
2. State the importance of machine.

**WEEK NINE** **Date:……………………………..**

**TOPIC: DIGESTIVE SYSTEM**

**CONTENT**

- Parts of the Digestive System

- Digestion at Various Parts

- Functions of the Enzymes

- Simple Food Tests

**PARTS OF THE DIGESTIVE SYSTEM**

The digestive system comprises the alimentary canal, a lengthy tube that extends from the mouth, connecting various organs and terminating at the anus.

The alimentary canal serves as the passage through which food substances travel, undergoing digestion (breakdown), partial absorption, and eventual elimination of waste.

**The alimentary canal consists of five main parts:**

(i) The mouth

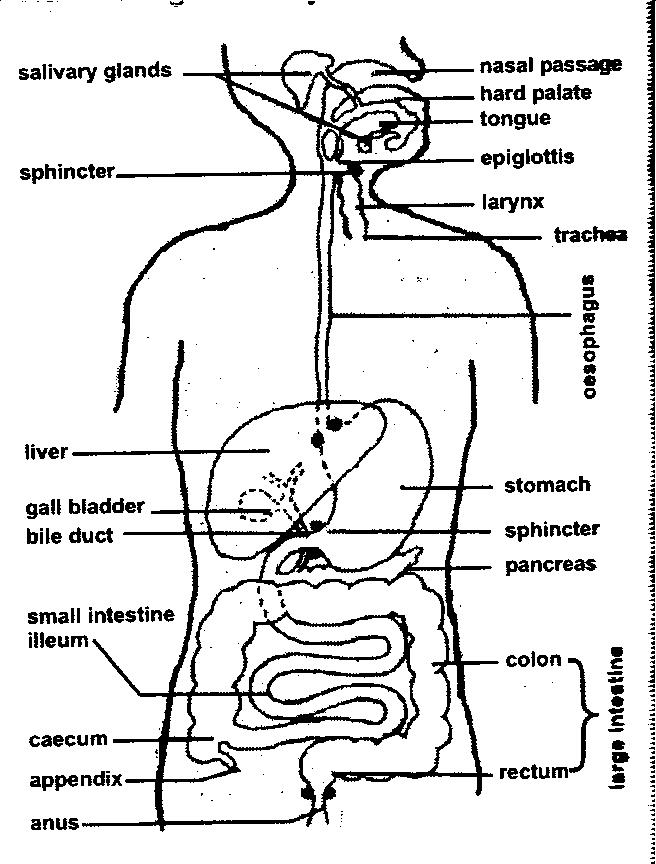
(ii) The gullet (or Esophagus)

(iii) The stomach

(iv) The small intestine

(v) The large intestine.

**THE HUMAN ALIMENTARY CANAL**



**THE MOUTH:** The mouth consists of three significant structures for digestion: the teeth, salivary glands, and the tongue.

**TEETH:** These structures are essential for food mastication.

**SALIVARY GLANDS:** They secrete SALIVA, a digestive juice.

**TONGUE:** It serves as the organ of taste.

**THE GULLET**

Also known as the Oesophagus, the gullet is lined with smooth involuntary muscles that regulate the contraction of food from the mouth into the stomach through PERISTALSIS. Peristalsis is the motion that propels food along the gullet and the rest of the digestive tract.

**THE STOMACH**

The stomach, a muscular organ, plays a crucial role in food digestion and also acts as a temporary food store. It secretes a digestive juice called GASTRIC JUICE through both PEPTIC and OXYNTIC CELLS.

**THE SMALL INTESTINE**

This is the longest part of the digestive tract, approximately 9m in length when fully stretched out. It begins with the C-shaped DUODENUM, to which the LIVER and PANCREAS are attached. Both organs discharge their secretions – BILE and PANCREATIC JUICE respectively – into the duodenum.

**THE LARGE INTESTINE**

Also referred to as the COLON, it processes undigested food portions into FAECES for elimination from the body through the ANUS. The large intestine does not participate in digestion. It primarily functions to remove excess water from the feces.

**EVALUATION**

1. Name the five main parts of the human digestive system.

2. What are the digestive juices present along the digestive tract?

**DIGESTION AT VARIOUS PARTS**

A balanced diet comprises carbohydrates, fats & oils, proteins, mineral salts, vitamins, and water. Carbohydrates, proteins, and fats are large complex molecules that need to be broken down into smaller, simpler molecules for the body to utilize them.

Digestion, the process of converting large complex molecules into small, absorbable molecules, occurs in the mouth, stomach, and small intestine. There are four digestive juices along the digestive tract:

(i) SALIVA

(ii) GASTRIC JUICE

(iii) PANCREATIC JUICE

(iv) INTESTINAL JUICE

Each of these juices contains one or more digestive enzymes that convert specific complex food substances into simpler forms.

The following are the components of each digestive juice.

|  |  |  |
| --- | --- | --- |
| **Parts of Alimentary Canal** | **Digestive Juice** | **Components** |
| Mouth | Saliva | Ptyalin + Water |
| Stomach | Gastric juice | Pepsin + Rennin |
| S.I (Duodenum) | Pancreatic Juice | Amylase + Lactase + Sucrase + Trypsin |
| S.I (Ileum) | Intestinal Juice | Maltase + Lactase + Sucrase + Erepsin + Lipase |

**FUNCTIONS OF THE ENZYMES**

**Ptyalin** converts cooked starch into maltose, facilitating starch digestion.

**Pepsin** breaks down proteins into peptones and polypeptides.

**Rennin** coagulates liquid proteins (milk) into a thick, digestible form.

**Trypsin** further breaks down proteins into peptones and polypeptides.

**Amylase** assists in breaking down starch into maltose.

**Lipase** breaks down fats into fatty acids and glycerol.

**Maltase** breaks maltose down into glucose.

**Lactase** breaks lactose down into glucose and fructose.

**Sucrase** breaks sucrose down into glucose and galactose.

**Erepsin** breaks down polypeptides into amino acids.

**MOUTH:**

The digestion of starch commences in the mouth, where Ptyalin converts starch into maltose sugar.

**STOMACH:**

In the stomach, only proteins undergo digestion. Pepsin transforms solid proteins into peptones and polypeptides, and Rennin curdles milk proteins.

**SMALL INTESTINE (DUODENUM):**

The three major classes of foods – proteins, starch, and fats/oils – undergo digestion here.

Trypsin converts proteins into peptones and polypeptides.

Amylopsin converts starch into maltose.

Lipase converts fats and oils into fatty acids and glycerol.

**SMALL INTESTINE (ILEUM):**

This part completes digestion, turning all partially digested food substances into simple molecules.

Maltase breaks down maltose into glucose.

Erepsin breaks down polypeptides into amino acids.

Lipase further breaks down fats and oils into fatty acids and glycerol.

These simplified molecules are then absorbed into the bloodstream through the finger-like projections called VILLI in the small intestine, ensuring efficient nutrient absorption. The indigestible part of the food is directed to the large intestine, where it's dehydrated and processed into semisolid feces for elimination from the body.

**EVALUATION:**

1. a. Components of a balanced diet include carbohydrates, fats & oils, proteins, mineral salts, vitamins, and water.

b. Carbohydrates, proteins, and fats are large complex molecules requiring digestion.

2. a. The four digestive juices are Saliva, Gastric Juice, Pancreatic Juice, and Intestinal Juice.

b. Enzymes present in these juices include Ptyalin, Pepsin, Trypsin, Amylopsin, Lipase, Maltase, Lactase, Sucrase, and Erepsin.

3. a. Absorption of food is the process where digested nutrients are taken up by the bloodstream for distribution.

b. Egestion is the elimination of undigested or unabsorbed waste materials from the body.

**SIMPLE FOOD TESTS:**

1. **Starch Test:**

Starch + Iodine Solution

Result: Blue-black color confirms the presence of starch.

2. **Test for Reducing Sugars (e.g., glucose):**

Glucose + Fehling's Solution

Boil the mixture.

Result: Brick-red precipitate confirms the presence of reducing sugar.

3. **Test for Non-reducing Sugars (e.g., Sucrose):**

Sucrose + Dilute HCl

Boil for about 5 minutes.

Cool the mixture.

Add NaHCO3 until effervescence stops.

Now add Fehling’s Solution.

Warm the tubes.

Result: Brick-red precipitate indicates the presence of non-reducing sugar.

4. **Protein Test:**

2cm³ of protein (milk) + 2-3 drops of Millon's Reagent

Boil the mixture.

Result: Orange color or brick-red precipitate confirms the presence of protein.

5. **Lipid Test:**

Oil + Sudan III Solution

Result: Red stains confirm the presence of oil or fat.

OR: Oil + Paper

Result: Paper turns translucent, indicating the presence of lipids.

6. **Water Test:**

Water + White Anhydrous CuSO4

Result: Blue color confirms the presence of water.

OR: Water + Blue Cobalt II Chloride Paper

Result: Pink color confirms the presence of water.

**GENERAL EVALUATION:**

1. a. Reducing Sugars: Glucose, Maltose, Lactose, Galactose, Fructose.

b. Reagents:

- Starch: Iodine Solution

- Protein: Millon's Reagent

- Reducing Sugar: Fehling's Solution

- Lipid: Sudan III Solution or Paper

- Water: White Anhydrous CuSO4 or Blue Cobalt II Chloride Paper

- Non-reducing Sugar: Sucrose + Dilute HCl, then Fehling’s Solution.

2. a. Components of a balanced diet include carbohydrates, fats & oils, proteins, mineral salts, vitamins, and water.

b. Carbohydrates, proteins, and fats are large complex molecules requiring digestion.

3. a. Digestive Juices: Saliva, Gastric Juice, Pancreatic Juice, Intestinal Juice.

b. Enzymes in the juices include Ptyalin, Pepsin, Trypsin, Amylopsin, Lipase, Maltase, Lactase, Sucrase, and Erepsin.

4. a. Absorption of food is the process where digested nutrients are taken up by the bloodstream for distribution.

b. Egestion is the elimination of undigested or unabsorbed waste materials from the body.

**WEEKEND ASSIGNMENT:**

1. The process by which complex molecules in food are reduced into simpler absorbable ones is:

A. Egestion

B. Ingestion

C. Digestion

D. Absorption

2. One of these is NOT a digestive enzyme:

A. Mucin

B. Ptyalin

C. Pepsin

D. Amylase

3. Which reagent is most suitable for testing for the presence of starch in heat?

A. Osmic Acid

B. Iodine Solution

C. Million’s Reagent

D. Sudan III Solution

4. All of these are digestive juices except:

A. Salivary Glands

B. Pancreatic Juice

C. Bile Pigment

D. Succus Entericus

5. Oxyntic cells secrete ………… into the stomach:

A. Dilute HCl

B. Trypsin

C. Pepsin

D. Rennin

**THEORY:**

1. The five main parts of the digestive system are the mouth, gullet (or esophagus), stomach, small intestine, and large intestine.

2. Definitions:

a. Peristalsis: Involuntary constriction and relaxation of the muscles of the intestine or another canal, creating wave-like movements that push the contents of the canal forward.

b. Egestion: The process of eliminating undigested or unabsorbed waste materials from the body.

**WEEK TEN**  **Date:……………………………..**

**Topic: The Circulatory System**

**Content:**

- Blood Components and Functions

- The Heart and Blood Vessels

- The Human Circulatory System

- Blood Defects and Diseases

**Blood Components and Functions:**

Blood, a liquid connective tissue, circulates constantly throughout the body. In certain organisms, blood flows within a closed system of interconnected vessels, while in others, it follows a different pattern.

Human blood, with a pH of 7.4, consists of four main components:

1. **Plasma:** The liquid portion of blood, constituting approximately 55% of its volume. Plasma contains about 90% water, along with proteins and mineral salts. It transports digested food from the small intestine to where it's needed and carries waste products to excretory organs for removal.

2. **Red Blood Cells (Erythrocytes):** These cells, responsible for the red color of blood, are the most numerous. Each red blood cell contains hemoglobin, a respiratory pigment enabling them to transport oxygen in the blood. Erythrocytes are produced in the bone marrow and are eliminated in the liver and spleen when they become too old to function properly, usually after about 120 days.

3. **White Blood Cells (Leucocytes):** The least numerous cells in the blood, these cells combat microorganisms and infections. White blood cells also aid the body in destroying bacteria and viruses through antibodies present in the blood plasma.

4. **Blood Platelets (Thrombocytes):** These small cells, often found as fragments, help blood to clot in wounds. Thrombocytes, the second most numerous blood cells, play a crucial role in the body's coagulation process.

**Evaluation**:

1. What is the composition of blood?

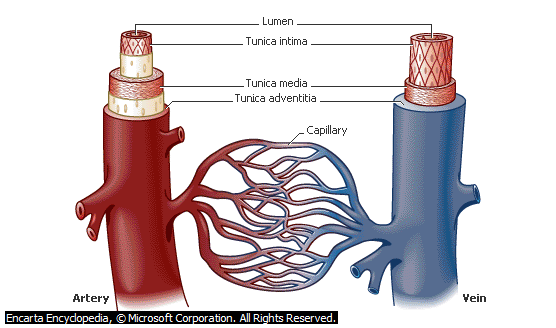
2. Describe the functions of each blood component briefly.

3. Explain the role of white blood cells in the immune system.

**The Heart and Blood Vessels:**

The heart, a muscular pumping organ, maintains a continuous blood flow throughout the body. It consists of four chambers: the two upper and smaller chambers (atria or auricles) and the two lower and larger chambers called ventricles. The heart is intricately connected to blood vessels through which blood is transported across the body.

THE BLOOD VESSELS

****

Three types of blood vessels known are:

**Veins** : Return blood to the heart

**Arteries**: Carry blood away from the heart.

**Capillaries:** Link arteries with venules

**Differences between Arteries and Vein**

**ARTERIES VEINS**

1. Carry blood away from the heart Returns blood to the heart

2. Carry oxygenated blood at high Carry deoxygenated blood under low pressure pressure

3. Are deeply located under the skin. Are superficially located beneath the skin

**Evaluation:**

1. Identify the chambers and valves associated with blood vessels in the human heart.

2. Outline two distinctions between arteries and veins.

**The Human Circulatory System:**

The human circulatory system is characterized as a closed circulatory system, where blood circulates throughout the body via interconnected blood vessels. It's also described as double circulation, involving two separate pathways through which blood flows, ensuring oxygenation and delivery to body tissues and cells.

**The two pathways are named:**

a. Lung or Pulmonary pathway

b. Body or systemic pathway

The lung pathway facilitates blood re-oxygenation, while the body pathway ensures oxygen delivery to body tissues and cells.

**Evaluation:**

1. Explain the meanings of describing the human circulatory system as:

a. Closed circulation

b. Double circulation

2. Specify the type of blood conveyed by:

a. Pulmonary artery

b. Pulmonary vein

c. Aorta

d. Vena cava

**Blood Defects and Diseases:**

Certain individuals suffer from insufficient red blood cells, leading to inadequate oxygen supply, a condition known as anemia. Anemia is a significant blood defect. Other blood diseases include:

1.Leukemia: Imbalance of red and white blood cells due to a preponderance of defective and cancerous WBCs, caused by exposure to radiation or excessive x-ray exposure.

2. Sickle Cell Anemia: Hereditary disease resulting in the formation of sickle-shaped red blood cells that struggle to promptly deliver oxygen to the body.

3. Hemophilia: Inability of the blood to naturally control blood loss from minor injuries, also hereditary.

4. Septicemia: Blood poisoning caused by specific bacterial infections, leading to blood contamination.

5. Hypertension: Clinical condition of high blood pressure.

6. Hypotension: Low blood pressure. Occasionally, bleeding might occur due to vessel damage or ruptures in accidents, wounds, or certain illnesses.

**General Evaluation:**

1. Name two heritable blood diseases.

2. Differentiate between hypertension and hypotension.

3. Define blood and list its components.

4. Provide brief explanations for each blood component.

**Weekend Assignment:**

1. Identify the non-blood compound cell among these options:

A. Plasma

B. Erythrocytes

C. Leucocytes

D. Thrombocytes

2. A disease caused by an abundance of cancerous and defective white blood cells in the blood is called:

A. Septicemia

B. Leukemia

C. Hemophilia

D. Hypertension

3. Blood vessels connecting arterioles with venules are known as:

A. Arterioles

B. Vena cava

C. Capillaries

D. Venules

4. The heart chamber with the thickest wall is the:

A. Left ventricle

B. Right auricle

C. Left auricle

D. Right ventricle

5. The largest artery in the body is the:

A. Pulmonary artery

B. Aorta

C. Hepatic artery

D. Renal artery

**Theory:**

1. Illustrate and label the human heart.

2. Provide a brief overview of the human circulatory system.