

JUNIOR HIGH SCHOOL 1

SECTION 1: INTRODUCTION TO SCIENCE

General Objectives: The pupil will

1. develop awareness of the relationship between various scientific fields and their interconnectedness.
2. develop scientific approach to problem solving.
3. be aware of the influence of Science and Technology on the development of society.
4. recognize the need for humans to quantify their interaction with the environment.
5. show an appreciation of scientific attitudes such as precision, and accuracy in making measurement.
6. recognize the need for humans to quantify their interactions with the environment through estimation and accurate measurement of physical quantities

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 INTRODUCTION TO INTEGRATED SCIENCE	The pupil will be able to: 1.1.1 explain what is meant by the term science. 1.1.2 outline the subjects that make up natural science and applied science. 1.1.3 explain the term integrated science. 1.1.4 describe how Scientist work.	Meaning of Science Natural Science: Biology, Physics, Chemistry, Geology, Astronomy and Meteorology Applied Science: Engineering, Medicine, Agriculture, Pharmacy, Electronics, ICT and Material science Meaning of Integrated Science How Scientists work: ✓ Observing ✓ Experimenting ✓ Analysing data ✓ Making conclusions	Let pupils: Brainstorm to bring out the meaning of the term science. List and discuss some fields of Natural Science and applied science in terms of what they do. Explain integrated science as a subject that involves teaching and learning several fields of science in a holistic manner. Discuss the skills of observing, experimenting, analysing and making inferences as some of the procedures used by scientists in their work. Teacher to engage pupils in activities that will make them observe, experiment, analyse and make inferences/conclusions.	Explain the term science.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION															
UNIT 1(CONT'D) INTRODUCTION TO INTEGRATED SCIENCE	The pupil will be able to: 1.1.5 distinguish between science and technology. 1.1.6 explain how science and technology affect society.	 Differences between science and technology Effects of science and technology on society in areas such as, health, education, communication and provision of agrochemicals for agriculture.	Let pupils: For example 1. Pupils bring leaves to class. In groups, pupils observe the leaves and come out with the differences among them. 2. Pupils to do simple experiment by filtering water containing solid particles using filter paper/cotton wool and suitable glassware and compare the filtered water and unfiltered water. Pupils to also differentiate between residue and filtrate. 3. Analyse data on number of pupils who were in basic schools in four regions in Ghana 2009 and make inferences/conclusions . <table border="1" data-bbox="1129 716 1669 922"> <thead> <tr> <th>Region</th> <th>Girls</th> <th>Boys</th> </tr> </thead> <tbody> <tr> <td>Greater Accra</td> <td>132,814</td> <td>124,356</td> </tr> <tr> <td>Ashanti</td> <td>258,621</td> <td>268,375</td> </tr> <tr> <td>Northern</td> <td>180,753</td> <td>212,567</td> </tr> <tr> <td>Volta</td> <td>131,272</td> <td>144,110</td> </tr> </tbody> </table> Find out which region had the largest number of pupils and the total number of boys in the four regions. Brainstorm and come out with the meaning of technology. Discuss the differences between science and technology. Brainstorm to come out with some improvements that science and technology have brought into health, education, communication and provision of agrochemicals for agriculture.	Region	Girls	Boys	Greater Accra	132,814	124,356	Ashanti	258,621	268,375	Northern	180,753	212,567	Volta	131,272	144,110	 State one problem facing your community and outline the steps scientists will go through to solve the problem. State the differences between science and technology. State four areas of life where science and technology have brought improvements.
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Greater Accra	132,814	124,356																	
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UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
<p>UNIT 1(CONT'D) INTRODUCTION TO INTEGRATED SCIENCE</p> <p>UNIT 2 MEASUREMENT</p>	<p>The pupil will be able to :</p> <p>1.1.7 outline some negative uses of science and technology.</p> <p>1.2.1 list some common physical quantities.</p> <p>1.2.2 identify and use appropriate instruments to measure different physical quantities accurately.</p> <p>1.2.3 identify and use the appropriate units for different physical quantities.</p> <p>1.2.4 relate and use the appropriate prefixes, milli-, centi-, or kilo- in relation to the units of length and mass.</p>	<p>Negative use of science and technology e.g. warfare and computer fraud</p> <p>Physical Quantities: Mass, Length, Time and Temperature</p> <p>Instruments for measuring physical quantities: Electronic balance/beam balance, metre rule/tape measure, stop watch, digital and analogue thermometers</p> <p>Units of measurement: Length – metre (m) Mass – kilogram (kg) Time – second (s) Temperature – degree celsius (°C)</p> <p>Other units of length: Millimetre, centimetre and kilometre</p> <p>Other units of mass: Milligram, Gram and Ton</p>	<p>Let pupils:</p> <p>Discuss how science and technology are negatively used e.g. warfare and computer fraud.</p> <p>Explore different ways in which human interactions with the environment have been quantified into mass, length, time and temperature.</p> <p>Teacher to engage students in hands-on activities that involve handling and use of measuring instruments (electronic balance, beam balance, metre rule, tape measure, stop watch, digital and analogue thermometers) to measure physical quantities accurately.</p> <p>Show appreciation of scientific attitudes such as precision, and accuracy in making measurement,</p> <p>Use the appropriate units for length, mass, time, and temperature.</p> <p>Note: A physical quantity is made up of two parts: a number or quantity and a unit.</p> <p>Interpret and use the appropriate prefixes milli-, centi- and kilo- in relation to the units of mass and length.</p> <p>Measure lengths, in metres and convert them into centimetres, millimetres and kilometres.</p> <p>Measure length in centimetres and convert into metres and kilometres. Estimate distances in kilometres.</p> <p>Measure masses of objects in kilograms and convert into tons, gram, and milligrams and vice-versa.</p>	<p>Name the instruments you would need to measure each of the following:</p> <ol style="list-style-type: none"> 1. Length of table 2. Volume of cement block 3. Volume of a liquid 4. Volume of a stone 5. Temperature of human body 6. Time taken by an athlete to complete a race.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 MEASUREMENT (CONT'D)	<p>The pupil will be able to :</p> <p>1.2.5 measure area and volume of objects.</p>	<p>Area of regular two dimensional figures:</p> <ul style="list-style-type: none"> ➤ square ➤ rectangle ➤ triangle ➤ circle <p>Volume of regular objects</p> <p>Determining and assigning units for the derived quantities, area and volume</p>	<p>Let pupils:</p> <p>Measure the length and calculate the area of two dimensional objects in their environment which have square, rectangular, triangular or circular shape. Use appropriate units(cm^2 or m^2) for area.</p> <p>In groups use some common but appropriate laboratory instruments to determine the volume of regular objects. Use appropriate units (cm^3 or m^3) for volume.</p> <p>Note: Encourage students to value teamwork and individual effort.</p>	<p>A rectangular field has a length of 120m and a width of 80m. Calculate the area of the field.</p>
	<p>1.2.6 read volume of liquids in graduated containers accurately.</p>	<p>Reading Volume of liquids in graduated containers</p>	<p>Note: Teacher to engage students in hands-on activities that require students to read volume of liquids in different graduated containers e.g. measuring cylinder and conical flask.</p> <p>Verify volume of liquids. For example, one sachet of water is supposed to be 500ml. Verify this by pouring the content of one sachet of water into a 600ml measuring cylinder. Comment on your observation. Repeat this exercise for a variety of soft drinks.</p>	
	<p>1.2.7 determine the volume of irregular solids using appropriate instruments.</p>	<p>Determining the volume of irregular solids</p>	<p>Determine the volume of irregular solids using appropriate laboratory apparatus (e.g. graduated cylinder) and assign correct units</p> <p>Students should also determine the volume of irregular solids using ungraduated cylinder whose internal diameter is given.</p> <p>Note: Assist students to acquire the skills for using graduated cylinder, metre rule, measuring tape, electronic balance, beam balance, stop clock or stop watch and thermometers accurately.</p>	

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 MEASUREMENT (cont'd)	<p>The pupil will be able to :</p> <p>1.2.8 measure temperature using a thermometer.</p> <p>1.2.9 measure time using watches and/or clocks.</p> <p>1.2.10 determine the densities of regular and irregular objects.</p>	<p>Measurement of temperature using a thermometer</p> <p>Measuring time using watches and/or clocks</p> <p>Density of regular and irregular objects</p>	<p>Let pupils:</p> <p>In groups, measure their body temperatures using digital thermometer and record. Compare their body temperatures to the standard body temperature (37°C) and make comments.</p> <p>Teacher to provide pupils with warm water and ask them to determine the temperature of the water using laboratory thermometer.</p> <p>Take a quick walk around the school park and record the time using watches and clocks. Make a report in class.</p> <p>Drop a tablet of an Alka Seltzer/Andrews Liver salt in water. Determine the time it takes for all the bubbles to leave the solution.</p> <p>Brainstorm to come out with the meaning of the term density.</p> <p>Write the mathematical expression to show the relationship between mass, density and volume and perform simple calculations using the expression.</p> <p>Fill three containers of the same weight and volume to the brim with water, sand and sawdust respectively. Weigh them separately and compare their weights. Give reasons for their observation.</p> <p>Measure the masses of rectangular blocks of various materials: aluminium, cork, iron, lead, rubber, wood. Determine their volumes and calculate their densities.</p> <p>Determine mass of irregular objects. Determine their volumes through the displacement of water and calculate their densities.</p> <p>Apply the concept of density to explain why objects sink or float.</p> <p>Explain why volume, density and area are referred to as derived quantities.</p>	<p>Describe how you find the density of a</p> <ol style="list-style-type: none"> 1. rectangular wooden block and 2. a stone.

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SECTION 2: DIVERSITY OF MATTER

General Objectives: The pupil will:

1. recognise the variety of living and non-living things in nature and their connectedness
2. develop scientific approach to problem solving.
3. understand the nature of matter in its various forms
4. be aware of the physical properties of soil in relation to its uses.
5. be aware of hazards in the communities and the teaching/learning of science

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 MATTER	<p>The pupil will be able to :</p> <p>2.1.1 explain the term matter</p> <p>2.1.2 describe the nature and states of matter.</p> <p>2.1.3 outline the characteristics of the states of matter.</p> <p>2.1.4 demonstrate how matter is changed from one state to another.</p>	<p>Matter</p> <p>Nature of matter</p> <p>States of matter</p> <p>Characteristics of the states of matter</p> <p>Changing the state of matter; Melting, Evaporation, Boiling, Solidification/freezing, Condensation, Sublimation, deposition</p>	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the term matter.</p> <p>Use models/ charts or digital content to explain that matter is made up of small particles called atoms, molecules and ions.</p> <p>Describe the three states of matter. Collect various substances and group them into solid, liquid and gas.</p> <p>Make sketches to show the arrangement of particles in solids, liquids and gases.</p> <p>Compare solid, liquid and gas on the following characteristics: Arrangement of particles, shape, volume, fluidity and compressibility</p> <p>Use water or any suitable materials to demonstrate the change of state of matter.</p>	<p>Build models of atoms and molecules.</p> <p>What particles constitute matter? Give the differences between the particles.</p> <p>Describe how matter changes from one state to another</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 MATTER	<p>The pupil will be able to:</p> <p>2.1.5 distinguish between plant and animal cells.</p>	<p>Plant and animal cells:</p> <ul style="list-style-type: none"> - Cell structure - Components of the cells - Functions of components/parts of the typical cell <p>Comparing plant and animal cells</p>	<p>Let pupils:</p> <p>Explain what a living cell is. Observe models and charts of plant and animal cells.</p> <p>Observe prepared slides of plant cell (onion cell) and animal cell (cheek cell) under the light microscope. Draw the cells as seen under the light microscope.</p> <p>Teacher to assist pupils to draw and label typical plant and animal cells.</p> <p>State the functions of the parts of the cell labelled in the drawing.</p> <p>Compare plant and animal cells in terms of shape, thickness of the outer wall, size of the spaces in the cell, presence of green pigment, nucleus, cytoplasm and cell membrane.</p>	<p>Examine a plant and animal cell under a microscope and state four differences between them.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 NATURE OF SOIL	<p>The pupil will be able to:</p> <p>2.2.1 describe the nature of soil.</p> <p>2.2.2 outline the uses of soil.</p> <p>2.2.3 describe the physical properties of soil.</p> <p>2.2.4 explain the importance of soil profile in crop production.</p>	<p>Meaning, composition and soil types</p> <p>Uses of soil</p> <ul style="list-style-type: none"> ➤ Supports plant growth ➤ Source of water ➤ Construction of buildings, roads, bridges and as habitat for some living organisms <p>Physical properties of soils and their importance: soil texture and structure, soil air, soil water, soil temperature and soil organic matter</p> <p>Soil Profile, meaning, description and importance.</p>	<p>Let pupils:</p> <p>Brainstorm to explain the term soil. Perform experiments to show that soil is made up of air, water and living organisms. Demonstrate to show that soil is made up of particles of different sizes.</p> <p>Discuss the uses of soil in terms of the following: Supporting plant growth; as sources of water, for construction of buildings, roads, bridges and as habitat for some living organisms.</p> <p>Compare sandy, loamy and clayey soils based on their physical properties: Texture, structure, air content, water holding capacity, capillarity and organic matter content.</p> <p>Outline the effects of physical properties of soils on maize cultivation.</p> <p>Dig a pit or visit a dug out pit, examine and identify the different horizons{ organic matter layer (A), the top soil (B), the sub soil (C) and parent rock (D)} of the soil profile.</p> <p>Describe each horizon under the following headings: Colour, Texture, Porosity, Depth, and Organic Matter Content. Note: Limit instruction to these four layer profile only.</p> <p>Discuss the importance of the soil profile in crop production.</p>	<p>List the components of soils.</p> <p>Collect living organisms from the soil and preserve them.</p> <p>Describe each horizon of a soil profile under the following headings: Colour, Texture, Porosity, Depth, and Organic Matter Content.</p> <p>Outline the importance of the soil profile in crop production.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
<p>UNIT 3</p> <p>HAZARDS</p>	<p>The pupil will be able to:</p> <p>2.3.1 explain the term hazard.</p> <p>2.3.2 identify and interpret warning and safety signs in the community and laboratory.</p> <p>2.3.3 identify safety precautions to prevent accidents in the home and school.</p>	<p>Meaning of hazard</p> <p>Hazards encountered in teaching and learning of science: Toxic, inflammable, corrosive substances, broken glassware, faulty electrical gadgets, slippery floor, expired chemicals and volatile chemicals</p> <p>Warning and safety signs in the community and laboratory</p> <p>Safety precautions against accidents</p>	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the term hazard.</p> <p>Give examples of hazards encountered in the teaching and learning of science.</p> <p>Teacher to use charts to display safety and warning signs for pupils to observe</p> <p>Explain why hazards are dangerous.</p> <p>Identify and interpret safety and warning signs in their community.</p> <p>Identify and interpret safety and warning signs on chemical containers, glassware and electrical gadgets found in the home and school.</p> <p>Brainstorm to come out with precautions to be adopted to prevent accidents from occurring. Discuss ways to prevent accidents from occurring.</p> <p>Role-play accident situation in the laboratory and actions taken by pupils to rush the victims to hospital or clinic.</p> <p>Discuss the effects of accidents on victims.</p>	<p>Name and discuss three hazards that can occur in teaching and learning science. How do you prevent the hazards?</p> <p>Prepare a table of safety and warning signs and their meaning on a card for a community display.</p>

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SECTION 3: CYCLES

General Objectives: The pupil will:

1. recognise that there are repeated patterns of change in nature and understand how these patterns arise
2. develop an understanding that agricultural production is cyclic in nature
3. appreciate the cyclic nature of the life of plants and its importance in crop production.
4. develop skills in vegetable crop production

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 LIFE CYCLE OF FLOWERING PLANTS	<p>The pupil will be able to:</p> <p>3.1.1 describe the life cycle of flowering plants</p> <p>3.1.2 demonstrate the conditions necessary for germination of a seed.</p> <p>3.1.3 explain how knowledge about life cycle of flowering plants is important in vegetable crop production.</p>	<p>Stages in the life cycle of flowering plants: Pollination, Flowering, Fertilization, Fruit/Seed formation Seed dispersal and Seed germination</p> <p>Conditions for germination: Air (Oxygen), water/moisture, suitable temperature and viability of the seed.</p> <p>Life cycle of flowering plants and vegetable crop production</p>	<p>Let pupils:</p> <p>Brainstorm to list the stages flowering plants go through from pollination, through fertilization to seed germination.</p> <p>Arrange the stages in the life cycle of a flowering plant as they occur in nature.</p> <p>Set up an experiment to demonstrate the conditions for germination.</p> <p>Explain how the knowledge about the life cycle of flowering plants is used in vegetable crop production.</p>	<p>Arrange the stages in the life cycle of a flowering plant as they occur in nature</p> <p>How would you verify one of the conditions necessary for germination through an experiment?</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 VEGETABLE CROP PRODUCTION	<p>The pupil will be able to:</p> <p>3.2.1 describe the principles in crop production.</p> <p>3.2.2 explain the term vegetable crop.</p> <p>3.2.3 explain the factors influencing vegetable crop production.</p> <p>3.2.4 perform cultural practices in vegetable production.</p> <p>3.2.5 outline the uses of vegetable crops.</p>	<p>Principles in crop production</p> <p>Meaning of vegetable crop</p> <p>Factors in vegetable crop production</p> <p>Cultural practices in tomato and cabbage production</p> <p>Importance of vegetables crops to humans</p>	<p>Let pupils:</p> <p>Outline the principles in vegetable crop production: land selection, selection of varieties, method of propagation, cultural practices, pests and disease control, harvesting, processing and marketing.</p> <p>Note: Detailed treatment of each principle not required.</p> <p>Brainstorm to bring out the meaning of vegetable crop.</p> <p>Discuss the factors in vegetable crop production: climatic factors, soil factors, nearness to source of water and nearness to market.</p> <p>NOTE: Teacher to explain to pupils that a successful vegetable crop production process takes into consideration all the stages and factors affecting the life cycle of a particular crop.</p> <p>Project: In groups, grow a named vegetable crop (tomato or cabbage) and care for it by weeding, watering, applying fertilizer and controlling pest from seed to harvesting.</p> <p>Undertake field trips to farms to observe and participate in cultural practices like weeding, watering, fertilizer application and pest control in vegetable crop production.</p> <p>Brainstorm to bring out the importance of vegetable crops to humans.</p>	<p>Explain the effects of three factors considered in vegetable crop production.</p> <p>Describe four cultural practices in the cultivation of a named vegetable crop.</p> <p>State four benefits of vegetables to humans.</p>

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SECTION 4: SYSTEMS

General Objectives: The pupil will

1. recognise that a system is a whole, consisting of parts that work together to perform a function
2. show an understanding of the role of the respiratory system of humans
3. appreciate the basic principles underlying various farming systems.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
<p>UNIT 1</p> <p>FARMING SYSTEMS</p>	<p>The pupil will be able to:</p> <p>4.1.1 differentiate between various farming systems.</p> <p>4.1.2 draw a plan for a crop rotation programme.</p>	<p>Farming Systems:</p> <ul style="list-style-type: none"> ➤ Land Rotation ➤ Crop Rotation ➤ Mixed Cropping ➤ Mixed Farming ➤ Organic Farming <p>Crop Rotation</p>	<p>Let pupils:</p> <p>Discuss the various farming systems and note the differences among them.</p> <p>Organise visits to farms where the various farming systems are practised. You may use pictures and films to explain the concepts of each farming system.</p> <p>Discuss the advantages and disadvantages of each farming system.</p> <p>In groups, draw up a 3-year rotation programme using the crops that grow in their locality and discuss e.g. yam, maize, millet, tomatoes and cowpea.</p> <p>Mount work for inspection and discussion.</p> <p>Teacher to guide pupils to implement the programme.</p>	<p>Distinguish between the following pairs of farming systems:</p> <ol style="list-style-type: none"> 1. Mixed cropping and land rotation. 2. Mixed farming and mixed cropping. 3. Organic farming and crop rotation

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 RESPIRATORY SYSTEM OF HUMANS	<p>The pupil will be able to:</p> <p>4.2.1 explain what is meant by the term respiration</p> <p>4.2.2 draw and label the human respiratory system.</p> <p>4.2.3 distinguish between the two types of respiration in terms of the use of oxygen.</p>	<p>Respiration</p> <p>Structure of the respiratory system</p> <p>Types of respiration:</p> <ul style="list-style-type: none"> ➤ Aerobic respiration ➤ Anaerobic respiration 	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the term respiration.</p> <p>Identify the organs (nose, larynx, trachea, bronchus and lungs) that form the respiratory system using charts/models.</p> <p>Draw and label the respiratory system.</p> <p>NOTE: Detailed structure of individual organs not required</p> <p>Use digital content/CD-ROM, Video for the discussion of types of respiration.</p> <p>Write word equation for aerobic respiration e.g. Glucose + Oxygen → Carbon dioxide + Water + Energy</p> <p>Note: 1. Air gets into the body through the process of breathing. 2. Discussion should be limited to aerobic respiration only.</p>	<p>Distinguish between aerobic respiration and anaerobic respiration.</p>

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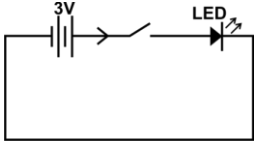
SECTION 5: ENERGY

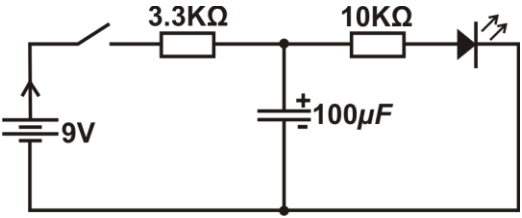
General Objectives: The pupil will

1. recognise that energy has a source, can be transformed into various forms
2. be aware of renewable and non renewable sources of energy.
3. understand the transformation pathways of various sources of energy.
4. understand the mechanics of and the use of LEDs, diodes, resistors and capacitors
5. be aware of some of the characteristics and uses of light energy.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 SOURCES OF ENERGY	The pupil will be able to: 5.1.1 explain the term energy 5.1.2 describe renewable and non renewable sources of energy. 5.1.3 demonstrate the production of energy from a renewable source.	Energy Renewable and Non renewable sources of energy Wind, Coal, Hydro-, Crude oil, Natural gas, Solar and Biogas Production of energy from a renewable source	Let pupils: Brainstorm to bring out the meaning of the term energy and assign its unit. Brainstorm to come out with the explanation for renewable and non renewable sources of energy. brainstorm and list various sources of energy and classify them as renewable or non renewable Project: Design and construct any of the following: i. Biogas Digester ii. Solar Heater iii. Wind Mill for pumping water	List four sources of energy that can be replenished.
UNIT 2 CONVERSION AND CONSERVATION OF ENERGY	5.2.1 list the various forms of energy.	Forms of energy: Potential, Kinetic, Heat, Sound, Solar, Electrical, Nuclear, Chemical and Light	List various forms of energy to include Potential, Kinetic, Heat, Sound, Solar, Electrical, Nuclear chemical and light energy,	

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UNIT 3 LIGHT ENERGY	The pupil will be able to:		Let pupils:	
	5.2.2 explain potential and kinetic energy.	Potential and Kinetic energy	Brainstorm to come out with the meaning of Potential and Kinetic energy and give examples. Discuss mathematical expressions for potential and kinetic energy and perform simple calculations using the expression.	Why has the issue of energy conservation assumed greater importance in Ghana?
	5.2.3 demonstrate how various forms of energy are transformed.	Energy transformation	Explain the energy transformation as shown by the following activities: i. Using flashlight battery to produce light in a bulb ii. Using electric iron iii. Dissolving Calcium Carbide/Calcium oxide/ pellets of sodium hydroxide in water	Give examples of devices and processes in everyday life which use energy and describe the change in the form of energy.
	5.2.4 give reasons for conserving energy.	Conserving energy	Discuss the effects of increase in human population on the demand for energy. Discuss various ways of conserving energy. Discuss the effects of using old electrical gadgets on energy conservation.	What energy change is involved in dissolving calcium carbide in water?
	5.3.1 demonstrate that light travels in a straight line.	Rectilinear propagation of light	Arrange three card boards, each with a hole in the centre so that their holes are aligned. Place a lighted candle behind the cards and observe the light through the holes. Move one of the cardboards slightly to misalign its hole to the others and observe again. Record and discuss their observations.	Name three sources of Light.
	5.3.2 describe the operation of the Pinhole Camera	Operation of the Pinhole Camera.	Observe a model of the Pinhole camera and describe how it works to form an inverted image.	Draw a diagram to show that light travels in a straight line.
	5.3.3 describe the formation of shadows	Formation of shadows	Place an opaque object between a small source of light and a screen. Record and discuss their observation. identify umbra and penumbra from the demonstration above	Project: Pupils to construct a Pinhole Camera and use the camera to take the picture of an object and compare with a picture of the object taken with a modern camera.
5.3.4 demonstrate the formation of eclipse	Formation of eclipse	Use the globe or tennis ball and flashlight to demonstrate the formation of eclipse. Note: Discuss eclipse of the Sun and that of the Moon. Annular eclipse excluded.		

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 3 LIGHT ENERGY (CONT'D)	The pupil will be able to: 5.3.5 demonstrate the reflection of light	Reflection of light	Let pupils: Arrange a light source, plane mirror and screen to demonstrate reflection of light. Identify the incident and reflected rays and draw their paths. Discuss the characteristics of images formed by a plane mirror. NOTE: Discussion should include distinction between real and virtual images. Compare reflection of light from polished flat surfaces to rough surfaces.	In groups, demonstrate that the angle of incidence is equal to the angle of reflection.
	5.3.6 demonstrate the refraction of light.	Refraction of light	Demonstrate the change in path of light as it travels from one medium to another e.g. glass and water. Explain why an object at the bottom of a pond appears closer to the surface. State some uses of reflection and refraction in real life situations e.g. in periscopes, eye glasses, cameras and telescopes.	
UNIT 4 BASIC ELECTRONICS	5.4.1 explain the term electronics.	Electronics	Discuss what electronics is.	
	5.4.2 demonstrate the behavior of discrete components in a d.c. electronic circuit.	Components in an electronic circuit: <ul style="list-style-type: none"> • LED • P-N Junction diode • Resistor • Capacitor 	Examine various types of LEDs, P-N Junction diodes, colour code resistors and capacitors. Use pictures/video clip to observe various electronic components. Draw circuit symbols of the components as listed in the content. Identify the Positive (P) region and Negative (N) region of the P-N junction diode. Connect a simple electronic circuit comprising a 3V battery made of two dry cells in series with a switch and an LED as shown below. Close the switch and observe what happens to the LED. Open the switch and observe what happens. <div style="text-align: center;">  </div>	

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 4 BASIC ELECTRONICS (CONT'D)	<p>The pupil will be able to:</p> <p>5.4.3 demonstrate the charging and discharging action of a capacitor.</p>	<p>Charging and Discharging action of a Capacitor.</p>	<p>Let pupils:</p> <p>Connect a 3V battery, a switch, P-N junction diode and an LED in series. Close the switch and observe what happens to the LED. Reverse the P-N junction diode connection. Close the switch and observe what happens.</p> <p>Explain the terms Forward Bias and Reverse Bias</p> <p>Connect a 330 Ω resistor in place of the P-N junction diode in the series circuit above. Close the switch and observe what happens to the LED.</p> <p>Replace the 330 Ω resistor with a higher resistance of 3,300 Ω . Observe what happens to the brightness of the LED.</p> <p>Replace the 3,300 Ω resistor with a capacitor. Close the switch and observe what happens to the LED. Open the switch. Let the terminals of the capacitor touch together and separate them. Close the switch again and observe what happens to the LED.</p> <p>Connect the circuit according to the schematic diagram shown below. Press the switch and observe what happens to the LED. Open the switch and observe what happens to the LED. Explain the charging and discharging action of the capacitor in the circuit.</p>  <p>Discuss the application of the charging and discharging action of the capacitor, e.g. to slowly light and darken a room in a movie theatre.</p>	<p>What are the functions of the following components in an electronic circuit?</p> <ol style="list-style-type: none"> 1. LED 2. P-N junction diode 3. Resistor 4. capacitor <p>Draw the circuit symbols of the following:</p> <ol style="list-style-type: none"> 1. P-N junction diode 2. LED 3. Capacitor.

JUNIOR HIGH SCHOOL 1

SECTION 6: INTERACTIONS OF MATTER

General Objectives: The pupil will

1. appreciate that interactions between and within matter helps humans to better understand the environment and their role in it.
2. show understanding of ecosystems.
3. trace the interdependency of organisms in an ecosystem.
4. develop skills of managing waste in the environment.
5. show understanding of both physical chemical processes in everyday life.
6. appreciate that air is an important type of matter that can be polluted as a result human activities.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 ECOSYSTEM	<p>The pupil will be able to:</p> <p>6.1.1 explain the term ecosystem.</p> <p>6.1.2 explain the term habitat.</p> <p>6.1.3 describe how organisms adapt to their environment.</p> <p>6.1.4 describe how the energy derived from the sun is used by organisms in an ecosystem.</p> <p>6.1.5 describe the activities that disrupt the balance in the ecosystem.</p>	<p>Meaning of ecosystem</p> <p>Meaning of habitat</p> <p>Meaning of adaptation</p> <p>Adaptation of organisms to the environment</p> <p>Energy transfer in an ecosystem</p> <p>Threats to ecosystem: Earthquake, Volcanic eruption Hunting, Farming, Mining, Pollution, Pesticides and Bush burning</p>	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the term ecosystem.</p> <p>Brainstorm to bring out the meaning of habitat and give examples.</p> <p>Brainstorm to bring out the meaning of adaptation.</p> <p>Examine these organisms (Tilapia, cactus plant and weaver bird) and discuss how they are adapted to their environments. NOTE: Use only body structure modifications for discussions.</p> <p>Explain the following terms: producer, primary consumer, secondary consumer, tertiary consumer, food chain and food web as applied to energy transfer in an ecosystem.</p> <p>Demonstrate through a food chain and food web how energy from the sun is used in an ecosystem.</p> <p>Discuss how earthquake, volcanic eruptions, hunting, farming, mining, pollution, pesticides and bush burning affect the ecosystem.</p> <p>Discuss ways to maintain balance in nature.</p>	<p>What is an ecosystem?</p> <p>State two differences between an ecosystem and a habitat.</p> <p>Give reasons why a fish from the sea may not survive in a fresh water environment.</p> <p>Explain how the balance in nature can be maintained.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 AIR POLLUTION	<p>The pupil will be able to:</p> <p>6.2.1 state the names and sources of common air pollutants.</p> <p>6.2.2 List the possible harmful effects of air pollutants.</p>	<p>Air Pollutants:</p> <ul style="list-style-type: none"> ✓ Carbon monoxide ✓ Sulphur dioxide ✓ Nitrogen dioxide <p>Harmful effects of air Pollutants</p>	<p>Let pupils:</p> <p>Brainstorm to come out with the names of some common air pollutants e.g. carbon monoxide, sulphur dioxide and nitrogen dioxide.</p> <p>Discuss and come out with a list of some possible effects of air pollutants introduced into the atmosphere through human activities. Possible harmful effects include acid rain, green house effects and smoke haze from forest fires. Discuss some ways to reduce air pollution.</p>	<p>State two human activities that lead to air pollution.</p> <p>List two possible effects of air pollution.</p>
UNIT 3 PHYSICAL AND CHEMICAL CHANGE	<p>6.3.1 explain the process physical change.</p> <p>6.3.2 explain the process chemical change.</p>	<p>Physical Change</p> <p>Chemical change</p>	<p>Brainstorm to come out with the meaning of the term physical change.</p> <p>Perform the following activities to demonstrate physical change:</p> <ol style="list-style-type: none"> 1. melting and freezing of ice 2. crumpling a piece of paper 3. stretching an elastic material 4. inflating and deflating a bicycle tyre or football <p>Brainstorm to come out with the characteristics of physical change.</p> <p>Infer that a physical change does not yield any new substances.</p> <p>Brainstorm to come out with the meaning of the term chemical change. Perform the following activities to demonstrate chemical change:</p> <ol style="list-style-type: none"> 1. boiling of egg/foodstuff 2. burning a paper 3. lighting a match 4. rusting of iron <p>Brainstorm to bring out the characteristics of chemical change.</p> <p>Infer that chemical changes yield new substances.</p>	<p>Explain physical change.</p> <p>Give four examples of physical changes that take place in your environment.</p> <p>Explain chemical change</p> <p>Give four examples of chemical changes that take place in your environment.</p>

JUNIOR HIGH SCHOOL 2

SECTION 1: DIVERSITY OF MATTER

General Objectives: The pupil will

1. recognise the variety of living and non-living things in nature and their connectedness
2. understand elements, compounds and mixtures, their differences, their formation and uses.
3. be aware of the differences between metals and non metals.
4. use the knowledge of corrosion to take care of metallic objects.
5. show an awareness of the basic principles involved in some separation techniques
6. show an appreciation that water is precious resource and the need to conserve it.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 ELEMENTS, COMPOUNDS AND MIXTURES	The pupil will be able to: 1.1.1. explain the terms element, compound and mixture. 1.1.2. classify materials into elements, compounds and mixtures. 1.1.3. write the chemical symbols for the first twenty elements of the periodic table. 1.1.4. draw and label the structure of an atom.	Meaning of element, compound and mixture Classifying materials into elements, compounds and mixtures Chemical elements and their symbols e.g. Sodium - Na Calcium – Ca Potassium - K Nitrogen-N Phosphorus-P The atomic structure showing the K, L, M and N shells	Let pupils: Brainstorm to bring out the meaning of the terms element, compound and mixture Gather different materials from the environment and classify them as elements, compounds or mixtures. Write chemical symbols of the first twenty elements of the periodic table. Use models or charts to describe the structure of an atom. Draw the structures of the atoms of H, C, N, O, Ne, Na, Cl and Ca. Discuss the uses of the elements, nitrogen(N), phosphorus(P) and potassium(K) in crop production Mention the sub-atomic particles found in the atom and indicate their location in the atom. Draw the distribution of electrons (electron configuration) in the atoms of the following elements: H, C, N, O, Ne, Na, Cl and Ca. NOTE: Detailed electron configuration not required.	Classify the following materials into elements, compounds and mixtures: Water, salt, iron filings, salt water. Design a periodic table showing the first twenty elements. Draw the sodium atom and show the distribution of electrons in its shells.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION								
UNIT 1 CONT'D) ELEMENTS, COMPOUNDS AND MIXTURES UNIT 2 METALS AND NON METALS	<p>The pupil will be able to:</p> <p>1.1.5 state the electrical charges on the sub-atomic particles.</p> <p>1.1.6 describe the formation of ions.</p> <p>1.2.1 describe the characteristics of metals and non-metals.</p> <p>1.2.2 group the first twenty elements of the periodic table into metals and non-metals.</p> <p>1.2.3 outline some chemical properties of metals.</p>	<table border="1" data-bbox="705 358 1026 475"> <thead> <tr> <th><i>Particle</i></th> <th><i>Charge</i></th> </tr> </thead> <tbody> <tr> <td>Proton</td> <td>Positive (+)</td> </tr> <tr> <td>Neutron</td> <td>Neutral</td> </tr> <tr> <td>Electron</td> <td>Negative (-)</td> </tr> </tbody> </table> <p>Formation of ions</p> <p>Characteristics of metals and non-metals</p> <p>Metals and non-metals</p> <p>Chemical Properties of metals Metal + dilute acid Metal(Na) + water Metal + oxygen Metal(Ag) + water</p>	<i>Particle</i>	<i>Charge</i>	Proton	Positive (+)	Neutron	Neutral	Electron	Negative (-)	<p>Let pupils:</p> <p>State the electrical charges on the proton, neutron and electron. Explain that atoms are electrically neutral.</p> <p>Explain how atoms become negatively and positively charged.</p> <p>Discuss the characteristics of metals and non-metals under the following: conductivity, malleability, ductility, lustre, hardness, melting and boiling points.</p> <p>Classify the first twenty elements on the periodic table as metals or non-metals based on their characteristic properties. Note that Silicon occupies a region between metals and non-metals and it is called a semi-metal.</p> <p>Drop a small piece of zinc metal into a dilute solution of hydrochloric acid or vinegar and observe what happens.</p> <p>Drop a small piece of sodium metal into water and observe what happens.</p> <p>Note: This activity should be demonstrated by the teacher.</p> <p>Drop a piece of silver metal into a dilute solution of hydrochloric acid or vinegar and observe what happens. Compare your observation with that of zinc reaction above.</p> <p>Burn a piece of magnesium ribbon and observe what happens.</p> <p>Infer that metals that react with other substances are called reactive metals and those that do not easily react with other substances are called non-reactive metals.</p>	<p>List four physical properties of metals.</p> <p>Explain why non-reactive metals are preferred to reactive metals in making ornaments and jewellery.</p>
<i>Particle</i>	<i>Charge</i>											
Proton	Positive (+)											
Neutron	Neutral											
Electron	Negative (-)											

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 (CONT'D) METALS AND NON-METALS	<p>The pupil will be able to:</p> <p>1.2.4 explain the term alloy</p> <p>1.2.5 outline the composition of some common alloys and their uses.</p> <p>1.2.6 Outline the causes of corrosion of metals.</p> <p>1.2.7 outline the effects of corrosion on metals.</p> <p>1.2.8 describe ways for preventing rusting.</p>	<p>Meaning of alloy</p> <p>Composition of alloys: Steel – iron and carbon Brass- copper and zinc Bronze- copper and tin Stainless steel - iron, carbon, chromium and nickel</p> <p>Causes of corrosion of metals Acid rain Electrolyte in old dry cells Salt solution Moisture and oxygen</p> <p>Effects of corrosion on metals</p> <p>Prevention of rusting: Oiling/ Greasing, Painting, Plating (Zinc/Chromium/tin coating).</p>	<p>Let pupils:</p> <p>Examples of reactive metals are K, Na, Zn, Ca, Fe, Mg. Examples of non-reactive metals are Ag, Au, Cu.</p> <p>Discuss and come out with the meaning of an alloy.</p> <p>Discuss the composition of some common alloys e.g. steel, stainless steel, brass and bronze. NOTE: An alloy may contain two or more metals only or a metal and a non-metal. Discuss uses of alloys stated in the content.</p> <p>Discuss the causes of corrosion of metals. E.g. Acid rain, Electrolyte in old dry cells, Salt solution, Moisture and oxygen.</p> <p>Discuss the effects of corrosion on metals.</p> <p>Perform activities to demonstrate the conditions necessary for rusting to occur.</p> <p>Discuss the effect of rusting on objects. Demonstrate how to prevent iron from rusting.</p> <p>Teacher uses concept mapping to sum up the discussions on metals and non-metals.</p>	<p>Name three metals that are:</p> <ol style="list-style-type: none"> i. reactive ii. non-reactive <p>Name four alloys and state their composition and uses.</p> <p>Explain the effects of corrosion of metals in buildings.</p> <p>Explain how rusting takes place.</p> <p>Explain how oiling prevents rusting.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 3 CHEMICAL COMPOUNDS	The pupil will be able to:		Let pupils:	
	1.3.1 explain the term compound	Chemical compound	Brainstorm to come out with the meaning of the term, compound.	
	1.3.2 write the formulae of simple binary compounds.	Formula of some simple binary compounds: NaCl, H ₂ O, MgO, CaO, CaCl ₂ , NH ₃ and CO ₂	List and discuss the composition of some simple binary compounds. Write the formula of some simple binary compounds e.g. Water, Sodium chloride, Magnesium oxide, Calcium oxide, Calcium chloride, Ammonia and Carbon dioxide.	Write the formulae of three simple compounds.
	1.3.3 write the systematic names of simple binary compounds.	Names of some simple binary compounds	Discuss the systematic names of simple binary compounds. E.g. NaCl, H ₂ O, MgO, CaO, CaCl ₂ , NH ₃ and CO ₂ .	
	1.3.4 write word equations for some simple chemical reactions.	Word equations for some simple reactions	Write word equations for some simple chemical reactions. E.g. reaction between <ul style="list-style-type: none"> ✓ Sodium and Chlorine ✓ Oxygen and Hydrogen ✓ Magnesium and Oxygen ✓ Nitrogen and Hydrogen ✓ Calcium and Oxygen ✓ Calcium and Chlorine 	
1.3.5 balance simple chemical equation.	Balancing simple chemical equations	Balance simple chemical equations. $H_2 + O_2 \rightarrow H_2O$ $N_2 + H_2 \rightarrow NH_3$ $Na + Cl_2 \rightarrow NaCl$ $Mg + O_2 \rightarrow MgO$	Balance the following simple equations: $H_2 + O_2 \rightarrow H_2O$ $Na + Cl_2 \rightarrow NaCl$	
UNIT 4 MIXTURES	1.4.1 explain the term mixture	Mixtures	Brainstorm to come out with the meaning of the term mixture.	Explain the term 'mixture'. State four examples of mixtures.
	1.4.2 classify mixtures.	Classification of mixtures	Identify classes of mixtures and give examples: Solid – solid; Solid – liquid; liquid – liquid; solid – gas; gas – liquid; gas – gas.	In which class of mixtures will you put the following? <ul style="list-style-type: none"> i. Brass ii. Smoke iii. air

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 4 (CONT'D) MIXTURES	The pupil will be able to: 1.4.3 explain the terms solute, solvent, solution . 1.4.4 prepare a mixture. 1.4.5 demonstrate some methods of separating mixtures. 1.4.6 differentiate between a mixture and a compound.	Solute, solvent and solution Preparation of mixtures Methods of separating mixtures Differences between mixtures and compounds	Let pupils: Brainstorm to bring out the meaning of the terms solute, solvent and solution. List some solvents in the home and school and discuss their uses. List some common solutes and name their appropriate solvents. Weigh 5g of common salt and add it to 250ml of water. Stir for the salt to dissolve. Discuss their observation. Weigh 5g of powdered chalk and add it to 250ml of water. Stir vigorously and allow to stand. Observe and discuss the differences between this and the previous mixture. Add some palm oil to water in a container. Shake vigorously and allow it to stand. Discuss their observation Discuss some methods for separating mixtures. Filtration, Evaporation, Magnetization, Distillation, Use of separating funnel. Differentiate between mixtures and compounds using the following: ✓ Formation ✓ Ease of separation ✓ Characteristics of components Outline some uses of mixtures in everyday life.	Differentiate between homogeneous and heterogeneous solutions. How will you separate a mixture of common salt and sand?

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 5 WATER	<p>The pupil will be able to:</p> <p>1.5.1 describe the composition and properties of water.</p> <p>1.5.2 explain the terms hard and soft water.</p> <p>1.5.3 explain the causes of hardness of water.</p> <p>1.5.4 demonstrate various ways of softening hard water.</p> <p>1.5.5 outline the health benefits of water to humans.</p> <p>1.5.6 outline the uses of water in agriculture.</p> <p>1.5.7 outline ways of conserving water in the home.</p>	<p>Composition of water</p> <p>Physical properties of water</p> <p>Hard and soft water</p> <p>Causes of hardness of water</p> <p>Softening hard water: Boiling, addition of washing soda, distillation and deionisation</p> <p>Health benefits of water to humans</p> <p>Uses of water in agriculture: Irrigation, Fish farming and Consumption by farm animals</p> <p>Water conservation</p>	<p>Let pupils:</p> <p>Brainstorm to come out with the chemical components of water.</p> <p>Describe the physical properties of water.</p> <p>Collect water from different sources and compare them in terms of appearance, odour, taste and any other characteristics.</p> <p>Compare the lathering abilities of river water, rain and well water with soap and comment on their findings. Use their observations to group the samples into hard and soft water.</p> <p>Use the findings of the activities to explain hard and soft water.</p> <p>Discuss the causes of hardness of water.</p> <p>Perform the following activities for softening hard water e.g. boiling, addition of washing soda and distilling.</p> <p>Note: Teacher to explain the deionisation process to pupils</p> <p>Discuss the health benefits of water to humans. (Reference; Regenerative Health and Nutrition Manual by MOH, pg 5)</p> <p>Discuss the uses of water in agriculture along the following lines: Irrigation, Fish farming and Consumption by farm animals</p> <p>Discuss ways of conserving water in the home.</p>	<p>Explain why it is not possible to find water which is completely pure in the environment.</p> <p>What are the chemical elements in water?</p> <p>Describe three properties of water.</p> <p>Why is it advisable to wash clothes with soft water?</p> <p>Describe how to make hard water soft.</p> <p>Outline four health benefits of water to humans.</p> <p>Give two ways in which water is important to agriculture.</p>

JUNIOR HIGH SCHOOL 2

SECTION 2: CYCLES

General Objectives: The pupil will

1. recognise that there are repeated patterns of change in nature and understand how these patterns arise.
2. recognise the repeated pattern of carbon and its effects in nature.
3. recognise the interdependency of plants and animals in relation to gaseous exchange.
4. understand the concept of climate change and its effects on plants and animals.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 CARBON CYCLE	The pupil will be able to:		Let pupils:	Explain how the carbon cycle is disrupted by humans. List and describe three ways by which the carbon cycle is disrupted.
	2.1.1 describe how carbon is cycled in nature.	The Carbon Cycle	Discuss and illustrate the carbon cycle. Identify and explain the stages in the carbon cycle.	
	2.1.2 outline the importance of the carbon cycle.	Importance of the carbon cycle	Discuss the importance of the carbon cycle to humans and plants.	
UNIT 2 WEATHER, SEASON AND CLIMATE	2.1.3 describe ways the carbon cycle is disrupted.	Ways by which the carbon cycle is disrupted	Gather information from library and the internet on human activities which disrupt the carbon cycle. Discuss ways by which the activities disrupt the cycle.	Discuss ways to sustain the carbon cycle.
	2.2.1 explain the term weather.	Weather	Brainstorm to bring out the meaning of the term weather.	
	2.2.2 identify and use some weather measuring instruments.	Weather measuring instruments: Rain gauge, Thermometer, Wind vane and Anemometer	Discuss the importance of rain gauge, thermometer, wind vane and anemometer in weather forecasting. Record and keep information on the weather over a period of time through actual handling of weather instruments. Design and make a wind vane and an anemometer and demonstrate their uses.	
	2.2.3 explain the term season.	Seasons in Ghana	Brainstorm to bring out the meaning of the term season. Discuss the differences between weather and season. Discuss the wet and dry seasons of Ghana.	

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
	<p>The pupil will be able to:</p> <p>2.2.4 explain the term climate.</p>	<p>Climate</p> <p>Elements of climate: Rainfall, Sunshine, Temperature, Humidity and Wind</p>	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the term climate. Discuss the differences between season and climate.</p> <p>Identify the elements of climate, and discuss how each element affects agriculture.</p>	<p>Explain the term climate. List the elements of climate.</p>

JUNIOR HIGH SCHOOL 2

SECTION 3: SYSTEMS

General Objectives: The pupil will

1. recognise that a system is a whole, consisting of parts that work together to perform a function
2. be aware of the physiological processes in reproduction
3. be aware of the dangers of indiscriminate sex
4. appreciate that offsprings inherit certain characteristics of parents
5. be aware of the role of diffusion and osmosis in life processes
6. show an awareness of the circulatory system in humans

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 REPRODUCTION IN HUMANS	The pupil will be able to: 3.1.1 explain the term reproduction. 3.1.2 explain the functions of the parts of the reproductive system. 3.1.3 explain the term teenage pregnancy. 3.1.4 state the causes of teenage pregnancy. 3.1.5 explain the effects of teenage pregnancy.	Reproduction in Humans Functions of the parts of the male and female reproductive system of humans Teenage pregnancy Causes of teenage pregnancy Effects of teenage pregnancy	Let pupils: Brainstorm to bring out the meaning of the term reproduction. Identify the parts of the male and female reproductive system of humans using charts or models. Draw and label the male and female reproductive systems. Discuss the functions of the parts of the reproductive systems of male and female. Brainstorm to bring out the meaning of the term teenage pregnancy. Do group discussions on the causes of teenage pregnancy along these lines: peer influence, broken homes, ignorance, curiosity, poverty, lack of parental care and indiscriminate sex. Use the Future's Wheel or concept map to discuss the effects of teenage pregnancy: Ectopic pregnancy, damage to pelvic bone, under weight babies, death, increase in population, and drop out from school. Invite a Community Health Nurse to talk on teenage pregnancy, its implications and prevention.	Draw and label the female reproductive system of humans. State the functions of the parts labelled. What are some of the dangers faced by a teenage pregnant?

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 HEREDITY	The pupil will be able to:		Let pupils:	
	3.2.1 explain the term heredity.	Heredity	Brainstorm to bring out the meaning of the term heredity.	Give three reasons why offspring look like their parents.
3.2.2 mention some characteristics that can be inherited from parents.	Heritable Characteristics	Brainstorm to bring out some of the traits or characteristics that can be inherited from parents and relations e.g. height, colour and shape of nose.		
UNIT 3 DIFFUSION AND OSMOSIS	3.3.1 explain the term diffusion.	Diffusion	Brainstorm to bring out the meaning of the term diffusion..	Why does a person at one end of a room smell perfume sprayed at the other end of the room?
	3.3.2 demonstrate the process of diffusion.	The process of Diffusion	Observe and explain what happens when: 1. A drop of ink or crystals of potassium permanganate are carefully dropped to the bottom of a glass of water. 2. Perfume is sprayed in one corner of the classroom	
		Application of diffusion	Give examples of phenomena that use or involve diffusion. E.g. (1). Absorption of the end products of digestion from the alimentary canal into the blood stream. (2). Absorption of nutrient from the soil by the roots of plants.	What makes diffusion different from osmosis?
	3.3.3 explain the term osmosis.	Osmosis	Brainstorm to bring out the meaning of the term osmosis.	Give one example each of the use of diffusion and osmosis plants and animals.
	3.3.4 demonstrate the process of osmosis.	The process of osmosis	Demonstrate osmosis in living tissue (yam, unripe pawpaw) and non-living tissues (parchment paper) and comment on their observations	
	Applications of osmosis	Brainstorm to come out with examples of phenomena that use or involve osmosis. E.g. uptake of water from soil by plants' roots.	Why is a plant likely to wilt if too much fertilizer is applied to it?	
3.3.5 distinguish between diffusion and osmosis.	Differences between Diffusion and Osmosis	Discuss the similarities and differences between diffusion and osmosis.		

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 4 CIRCULATORY SYSTEM IN HUMANS	<p>The pupil will be able to:</p> <p>3.4.1 explain the concept of the circulatory system</p> <p>3.4.2 outline the functions of the parts of the circulatory system.</p> <p>3.4.3 describe the composition and functions of blood.</p> <p>3.4.4 explain how high and low blood pressure develops in the circulatory system.</p>	<p>The circulatory system.</p> <p>Parts of the circulatory system in humans</p> <p>Functions of the parts of the circulatory system in humans</p> <p>Composition and functions of blood</p> <p>Diseases of the circulatory system: High and Low blood pressure</p> <p>Prevention of blood pressure</p>	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the concept of circulatory system.</p> <p>Use charts, digital content and models to identify the parts of the circulatory system and discuss their functions.</p> <p>Draw and label the longitudinal section of the heart.</p> <p>Note: The structure of arteries, veins and capillaries should be limited to the role they play.</p> <p>Discuss the composition the blood (white and red blood cells, water, food nutrients and platelets) of human blood and their functions.</p> <p>Note: detailed treatment of each component is not required.</p> <p>Discuss the causes of blood pressure.</p> <p>Describe ways of managing blood pressure.</p>	<p>Name three components of the blood.</p> <p>State three functions of the blood.</p>

JUNIOR HIGH SCHOOL 2

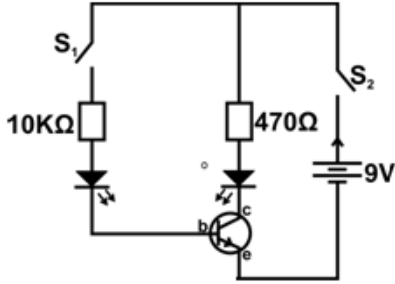
SECTION 4: ENERGY

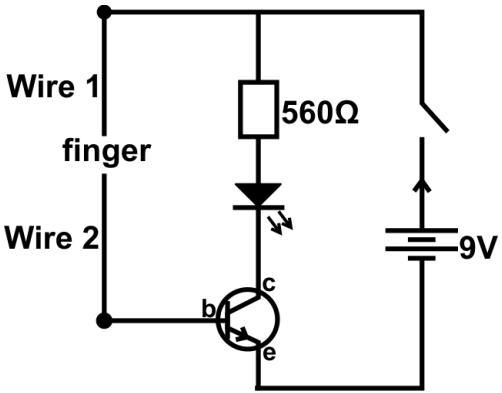
General Objectives: The pupil will

1. recognise that energy has a source, can be transformed into various forms
2. recognise the Sun as the primary source of energy.
3. recognise food as the main source of energy to living organisms.
4. be aware of the uses of electrical energy.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 PHOTOSYNTHESIS	The pupil will be able to: 4.1.1 explain the term photosynthesis. 4.1.2 outline the factors necessary for photosynthesis and give the functions of each factor. 4.1.3 state the importance of photosynthesis to plants and animals.	Photosynthesis Factors necessary for photosynthesis: sunlight, water ,chlorophyll and carbon dioxide Importance of photosynthesis to plants and animals	Let pupils: Discuss and come out with the meaning of the term photosynthesis. List and discuss the factors necessary for photosynthesis. Work in groups to perform simple experiment to show that light is necessary for photosynthesis by testing for the presence of starch in a leaf. Outline various ways in which photosynthesis is important to both plants and animals.	Explain how energy from the sun converts water and carbon dioxide into food for the plant. Explain how the raw materials get to the leaf for photosynthesis. State the factors and the raw materials for photosynthesis.
UNIT 2 FOOD AND NUTRITION	4.2.1 classify food items based on their nutrients. 4.2.2 state the importance of food nutrients. 4.2.3 test for sugar, and fats and oil.	Classification of different food items based on their nutritive value Importance of food nutrients Testing for sugar and fats and oil	Bring different food items and classify them as follows: ✓ carbohydrates ✓ protein ✓ fat and oil ✓ vitamins and minerals Discuss the importance of food nutrients to the body. Perform simple tests for the presence of sugar and fats and oil in food samples. Note: you can use sugar strips to test for sugar. This test is the test for sugar in urine (diabetic condition)	Make a chart to show the different groups of food substances Give reasons for adding iodated salt to food.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
<p>UNIT 2</p> <p>FOOD AND NUTRITION (CONT'D)</p> <p>UNIT 3</p> <p>ELECTRICAL ENERGY</p>	<p>The pupil will be able to:</p> <p>4.2.4 describe a balanced diet and state its importance.</p> <p>4.3.1 describe ways of generating electrical energy.</p> <p>4.3.2 explain the terms electric current, potential difference and resistance.</p> <p>4.3.3 demonstrate the flow of current using a simple electrical circuit.</p>	<p>Balanced diet and its importance</p> <p>Sources of electrical energy: Hydro-, windmills, solar cells, fuel cells, voltaic cells(dry cells and accumulators) and thermal power</p> <p>Electric current, potential difference (voltage) and resistance</p> <p>Simple electrical circuit</p> <p>Ammeter, Voltmeter and Ohmmeter</p>	<p>Let pupils:</p> <p>Explain a balanced diet and balanced ration. Give examples of balanced diet and differentiate it from unbalanced diet. Bring animal feed ingredients to class and prepare a balanced ration for feeding poultry.</p> <p>Explain malnutrition and discuss some of the effects such as deficiency diseases.</p> <p>Discuss sources of electrical energy.</p> <p>Discuss the terms electric current, potential difference and resistance as applied to electric circuits and assign appropriate units. Use the relationship $V=IR$ to perform simple calculations.</p> <p>Explain the term electrical circuit. Use batteries, switch, bulbs, resistors and connecting wires to set up simple electrical circuits. Observe the effect on the bulb when there is increase in the number of batteries or when the number of bulbs is increased.</p> <p>Investigate the effect of varying resistance on the current in the circuit by arranging resistors in series and in parallel.</p> <p>Draw circuit diagrams for series and parallel connections.</p> <p>Note: Calculations involving effective resistance of resistors in series and parallel is not required</p> <p>Demonstrate skills in the use of the instruments (ammeter, voltmeter or ohmmeter) for measuring current, voltage and resistance.</p>	<p>State four effects of malnutrition humans.</p> <p>State the components of a balanced broiler ration.</p> <p>State four sources of electrical energy.</p> <p>Explain why parallel circuits are widely used in household while series circuits are not.</p> <p>Project: In groups, pupils design and build an alarm electrical circuit and display for class discussion</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 3 ELECTRICAL ENERGY (CONT'D)	<p>The pupil will be able to:</p> <p>4.3.4 wire an electric plug and explain the use of a fuse in electrical appliances.</p> <p>4.3.5 explain ways of conserving electrical energy.</p>	<p>Wiring a plug and uses of fuse</p> <p>Ways of conserving electrical energy</p>	<p>Let pupils:</p> <p>Demonstrate how to wire a plug.</p> <p>Note: Usually brown wire is the live wire, Blue wire is the neutral wire and Green and Yellow wire is the Earth wire.</p> <p>Discuss the use of fuses in electrical circuits.</p> <p>Discuss how electricity is wasted in the home and industry. Discuss ways of conserving electricity.</p>	<p>What is the importance of fuse in electrical appliances?</p>
UNIT 4 BASIC ELECTRONICS	<p>4.3.1 describe the composition and types of transistors.</p> <p>4.3.2 describe the characteristics of transistors.</p>	<p>Composition of transistors Emitters, Base and Collector</p> <p>Types of transistors: NPN, PNP.</p> <p>Characteristics of transistors ➤ Saturation region for switching action</p>	<p>Identify the two P-N junctions of a transistor. Identify also the Emitter lead(e), Base lead(b) and Collector lead(c).</p> <p>Identify the types of transistors</p> <p>Investigate how a transistor is turned on and off as a switch by carrying out the following activity. Connect the circuit as in Fig.1. Open switch S_1 and close switch S_2. Observe what happens to the LED in the Collector-emitter section of the circuit. Close S_1 and observe what happens to the two LEDs. Make inferences from their observation. Note: A small current must flow through the base to turn on the transistor</p> <p>Figure 1</p> 	<p>Draw symbols for NPN and PNP transistors.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 4 BASIC ELECTRONICS (CONT'D)	The pupil will be able to:	<ul style="list-style-type: none"> ➤ Active region for amplification action 	<p>Let pupils:</p> <p>Connect the circuit as in Fig 2 with Base -Emitter junction forward biased and base Collector junction reversed biased with a gap between wire1 and wire2. Close the switch and observe what happens to the LED. Use the left finger to hold the tip of wire1 with right fingers holding wire 2 to close the gap between the two wires and observe what happens to the LED.</p> <p>Repeat the activity by connecting a 100k Ω resistor in series with an LED in the gap between wire 1 and wire 2</p> <p>Note that a small current (input signal) flowing through a very high resistor such as the human body in the emitter-base section can be amplified by the transistor to light an LED (output signal)</p> <p>Figure 2</p> 	

JUNIOR HIGH SCHOOL 2

SECTION 5: INTERACTIONS OF MATTER

General Objectives: The pupil will

1. appreciate that interactions between and within matter helps humans to better understand the environment and their role in it.
2. recognise common pests, parasites and diseases of plants and animals.
3. show understanding of the negative effects of pests, parasites and diseases.
4. develop skills in preventing and controlling pests, parasites and diseases.
5. recognise basic principles underlying the operation of basic machines.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 INFECTIOUS DISEASES OF HUMANS AND PLANTS	The pupil will be able to:		Let pupils:	
	5.1.1 explain the term infectious disease.	Infectious disease	Discuss and come out with the meaning of the term Infectious disease.	In a tabular form give the causative organism, mode of transmission, control and prevention of the following diseases: Influenza, Chicken Pox and HIV/AIDS. Make a poster with a message to stop the spread of HIV/AIDS.
	5.1.2 identify common infectious diseases .	Common Infectious diseases: Tuberculosis (T.B.), Chicken Pox, Cerebrospinal Meningitis (CSM), HIV/AIDS, Buruli Ulcer, Typhoid, Cholera, Influenza, Hepatitis, Yellow fever, Black Pod, and Swollen shoot	Name some common infectious diseases in Ghana.	
5.1.3. describe the causes, mode of transmission, prevention and control of some common diseases of humans, animals and crops.	Causes, symptoms, mode of transmission, prevention and control of common infectious diseases	Tabulate the causative organisms, symptoms, methods of spread, prevention and control of the following infectious diseases: Tuberculosis (T.B.), HIV/AIDS, Buruli Ulcer, Cerebrospinal Meningitis (CSM), Influenza, Black Pod, Hepatitis, Yellow fever, Cholera, Typhoid, Chicken pox and Swollen shoot.		

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 PESTS AND PARASITES	The pupils will be able to: 5.2.1 differentiate between pests and parasites and give examples. 5.2.2 outline methods of controlling pests and parasites.	Meaning and identification of pests and parasites Control of pests and parasites; Pesticides, Biological: -use of resistant breeds, Cultural: - good sanitation Physical: - hand picking Integrated pest management	Let pupils: Brainstorm to bring out the meaning of pests and parasites, give examples and differentiate between them. Parasites: tick, lice, tapeworm, mistletoe and dodder Pest: tsetsefly, house fly, aphid and locust. Detailed treatment of each pest and parasite not required. Brainstorm to bring out how pest and parasites are controlled. NOTE: Invite a Resource Persons (Agric Officer or health personnel) to give a talk on pests and parasites of humans, farm animals and crops.	State two effects each of parasites and pest on humans. State at least four control methods of pests and parasites.
UNIT 3 FORCE AND PRESSURE	5.3.1 explain what is meant by the term force 5.3.2 describe the different types of force. 5.3.3 demonstrate the effect of force on objects. 5.3.4 measure force using a forcemeter.	Force Types of force ✓ Gravitational ✓ Elastic ✓ Frictional ✓ Magnetic ✓ Electrostatic Effect of force on objects: ➤ Motion ➤ Direction ➤ Shape Measurement of force	Brainstorm to bring out the meaning of the term force and assign its unit. Perform the following activities to demonstrate types of forces: i. drop small objects e.g. pieces of chalk, pebbles to the ground ii. throw the same objects up in the air iii. drag objects on rough and smooth surfaces iv. stretch a rubber band v. bring the ends of two magnets near each other vi. pass a comb vigorously through dry hair and quickly touch a very small piece of paper with it Discuss their observations of the activities above. Identify the types of force involved in the activities. Demonstrate the effect of different types of force on objects. Predict changes in movement of a body as a result of application of a force in a straight line. Demonstrate how to measure force(e.g. weight) using a forcemeter	Give four examples of different forces. Explain the effects of different types of force.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 3 FORCE AND PRESSURE (CONT'D)	<p>The pupil will be able to:</p> <p>5.3.5 outline the effect of friction on objects.</p> <p>5.3.6 define pressure and demonstrate its effects in solids.</p> <p>5.3.7 demonstrate that pressure acts equally in all directions in fluids.</p> <p>5.3.8 demonstrate that pressure in fluids increases with depth.</p> <p>5.3.9 outline some uses of pressure in fluids.</p>	<p>Friction</p> <p>Pressure</p> <p>Demonstration of directions of pressure in fluids</p> <p>Demonstration of relationship between fluid pressure and depth</p> <p>Uses of pressure in fluids</p>	<p>Let pupils:</p> <p>Demonstrate the effect of friction on objects. Discuss the advantages and disadvantages of friction.</p> <p>Brainstorm to bring out the meaning of pressure. Demonstrate the effect of pressure exerted by solid on surfaces in contact.</p> <p>Punch holes around the lower section of an empty Milo tin or any suitable container. Fill the tin with water. Record and discuss their observation. NOTE: Water springs to equal distances from the tin at a given depth in a fluid. Pressure acts equally in all directions</p> <p>Punch three holes along one side of an empty tin at different heights. Fill the tin with water. Record their observations and discuss.</p> <p>Discuss uses of fluid pressure in: water pumps, car brakes, pump on dugout wells, syringes for injections, siphon, drinking straw and enema bulb.</p>	<p>Define pressure.</p> <p>Draw a diagram to show that pressure in a fluid increases with depth.</p> <p>PROJECT In groups, design a water pump and present their plans and drawings to the class for discussion.</p>
UNIT 4 MACHINES	<p>5.4.1 explain the term machine.</p> <p>5.4.2 give examples of simple machines.</p>	<p>Machines</p> <p>Examples of simple machines: Levers, inclined plane, gears, wheel and axle, screw.</p>	<p>Brainstorm to bring out the meaning of the term machine.</p> <p>Give examples of simple machines.</p>	<p>List five examples of simple machines used in: i. Homes ii. Workplaces, and iii. Farms</p> <p>List five different types of machines and state their uses.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 4 MACHINES (CONT'D)	<p>The pupil will be able to:</p> <p>5.4.3 describe the types of levers and the principles involved in their use.</p> <p>5.4.4 explain the terms work, energy and power.</p> <p>5.4.5 explain Work Input, Work Output and Efficiency' as they apply to machines.</p> <p>5.4.6 explain the terms compound/complex machines.</p> <p>5.4.7 outline how to care for machines.</p>	<p>Types of levers</p> <p>Classification of levers First Class, Second class and Third class levers</p> <p>Work, energy and power</p> <p>Work Input Work Output and Efficiency</p> <p>Compound/Complex machines: Tractor, car, sewing machine, mist blower</p> <p>Caring for machines</p>	<p>Let pupils:</p> <p>Give explanation of the term lever.</p> <p>Group levers into the three classes.</p> <p>Use the lever to demonstrate the principles involved in making work easier.</p> <p>Brainstorm to bring out the meaning of the terms work, energy and power and show the relationship among them.</p> <p>Pull or push an object horizontally on a floor through a distance and use this activity to explain work, energy and power.</p> <p>Discuss the efficiency of a machine as the ratio of work output to work input expressed as a percentage.</p> <p>Discuss and come out with the meaning of the terms compound/complex machines. List examples of compound/complex machines.</p> <p>Discuss how to care for machines: Washing, oiling, keeping them dry and regular servicing.</p>	<p>Give two examples of each of the three classes of levers.</p> <p>Explain why 'efficiency' of a machine is not 100%.</p>

JUNIOR HIGH SCHOOL 3

SECTION 1: DIVERSITY OF MATTER

General Objectives: The pupil will

1. recognise variety of living and non-living things in nature and their connectedness
2. understand the concept of acids bases and their application in everyday life.
3. develop skills in soil and water conservation.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 ACIDS AND BASES	The pupil will be able to:		Let pupils:	
	1.1.1 explain the terms acid and base.	Acids and Bases	Brainstorm to bring out the meaning of the terms acid and base	Classify the following substances as acids or bases: Unripe lemon, aspirin, liquid in car battery, vinegar, salt-petre, wood ash and bicarbonate of soda. When you have indigestion, milk of magnesia is often recommended. Explain
	1.1.2 distinguish between an acid and a base.	Differences between an acid and a base.	Take two pieces of blue litmus paper. Dip one into an acid and the other into a base solution. Repeat the activity using red litmus paper. Comment on your observation.	
	1.1.3 classify substances as acids or bases.	Classification of substances into acids and bases.	Bring different substances from home such as unripe orange, lemon, aspirin, vinegar, wood ash, and bicarbonate of soda. Dissolve where solid. Dip litmus papers into each of the substances brought. Record their observations. Classify the substances as acidic or basic. NOTE: Moistened litmus paper should be used for solid substances.	
1.1.4 predict the product formed when an acid reacts with a base.	Acid -Base reactions (Neutralization)	Perform neutralization reaction by mixing the same volume (20ml) of 1M solution of dilute hydrochloric acid and 1M solution of dilute sodium hydroxide. Dip litmus paper (red and blue) into the resultant solution. Comment on your observation. Evaporate the product from the reaction to obtain Sodium Chloride crystals (common salt).		

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 SOIL AND WATER CONSERVATION	<p>The pupil will be able to:</p> <p>1.2.1 explain the factors which lead to the depletion of soil resources.</p> <p>1.2.2 outline the methods of restoring depleted soil.</p> <p>1.2.3 explain the term water conservation.</p> <p>1.2.4 outline the practices that destroy water bodies.</p> <p>1.2.5 outline methods for conserving water bodies.</p>	<p>Soil resources Water Nutrient(macro and micro) Air</p> <p>Methods of restoring soil resources: ✓ Mulching, ✓ use of fertilizer(organic and inorganic)</p> <p>Water conservation</p> <p>Destruction of water bodies</p> <p>Conservation of water bodies</p>	<p>Let pupils:</p> <p>Brainstorm to list soil resources such as water, air and nutrients. Macro nutrients: N, P, K, S, Mg and Ca Micro nutrients: Fe, Mn, Cu and Mb</p> <p>Brainstorm to bring out the factors that lead to the depletion of soil resources. For example, erosion, burning and leaching. Note: Detail treatment of erosion not required</p> <p>Discuss each of the methods of restoring soil resources as stated in the content.</p> <p>Brainstorm to bring out the meaning of the term water conservation.</p> <p>Discuss the practices that destroy water bodies:</p> <ul style="list-style-type: none"> ➤ Clearing forest along river banks ➤ Galamsey ➤ Use of chemicals for fishing ➤ Dumping of solid and liquid waste into water bodies <p>Discuss the method of conservation of water bodies: Forestation, education on effects of galamsey activities, education on defaecation into water bodies.</p>	<p>List two causes of soil resource depletion.</p> <p>State three methods of controlling soil erosion.</p> <p>State three functions each of Nitrogen, Phosphorus and Potassium in plants.</p>

JUNIOR HIGH SCHOOL 3

SECTION 2: CYCLES

General Objectives: The pupil will

1. recognise that there are repeated patterns of change in nature and understand how these patterns arise.
2. recognise the developmental stages in some pests.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 LIFE CYCLE OF A MOSQUITO	The pupil will be able to: 2.1.1 outline the stages in the life cycle of mosquito. 2.1.2 state that the female Anopheles mosquito is the vector of the parasite that causes malaria. 2.1.3 outline methods of controlling mosquitoes.	Life cycle of mosquito Female Anopheles mosquito as the vector of the parasite that causes malaria Methods of controlling mosquitoes i. Environmental control ii. Chemical control iii. Biological control:	Let pupils: Using an experiment, discuss the developmental stages of the mosquito from the egg to full grown mosquito. (Refer to P6 integrated science, pg 27). Sketch and label the life cycle of mosquito. Note: Teacher to use digital content where available. Discuss how the female Anopheles mosquito transmits the malaria parasite. Demonstrate the various methods of controlling mosquito, e.g. using insecticide sprays, pouring oil into mosquito breeding grounds. Note: Insecticide sprays are poisonous.	Draw and label the life cycle of the mosquito. Describe how you would use the knowledge of the life cycle of mosquito control it.

JUNIOR HIGH SCHOOL 3

SECTION 3: SYSTEMS

General Objectives: The pupil will

1. recognise that a system is a whole, consisting of parts that work together to perform a function
2. gain an understanding of the motion of bodies in the solar system.
3. develop understanding of the digestive system of humans.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 THE SOLAR SYSTEM	<p>The pupil will be able to:</p> <p>3.1.1. describe the components of the solar system.</p> <p>3.1.2 explain what a star is.</p> <p>3.1.3 list the planets of the solar system.</p> <p>3.1.4 describe what the Sun, Moon and Earth are composed of.</p>	<p>Components of the solar system</p> <p>Star and Galaxy</p> <p>The Planets in the Solar System: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune</p> <p>Composition of the Sun, Moon and Earth</p>	<p>Let pupils:</p> <p>Use charts and digital content to describe the various components of the solar system. (Visit Ghana Planetarium to observe the celestial bodies)</p> <p>Brainstorm to explain the following terms: Star, Galaxy, and the Milky way</p> <p>Outline the relationship between the Sun and the Earth in the galaxy.</p> <p>List the planets of the solar system in the correct order by their distances from the Sun.</p> <p>NOTE: Pluto is no longer classified as a classical Planet in the solar system. (Source: IAU)</p> <p>Project: Construct the solar system using beads and strings</p> <p>Discuss the composition of the Sun, Moon and Earth. For example, the Earth is made up of rocks, water and air.</p>	<p>What is the solar system?</p> <p>List all planets of the solar system.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 THE SOLAR SYSTEM (CONT'D)	<p>The pupil will be able to:</p> <p>3.1.4 explain the term satellite.</p> <p>3.1.5 distinguish between natural and artificial satellites.</p> <p>3.1.6 state the uses of artificial satellites.</p>	<p>Meaning of satellite</p> <p>Differences between natural and artificial satellites.</p> <p>Uses of Artificial Satellites: For communication, meteorological studies, and exploration</p>	<p>Let pupils:</p> <p>Brainstorm to bring out the meaning of the term satellite. Construct an object to go round a bigger object to show the concept of a satellite.</p> <p>discuss the differences between natural and artificial satellites NOTE: The Moon is a satellite of the Earth while the Earth is a satellite of the Sun</p> <p>Discuss the uses of artificial satellites in communication, meteorological studies, and exploration.</p>	<p>Give two examples of natural satellites.</p> <p>State three uses of artificial satellites.</p>
UNIT 2 DENTITION IN HUMANS	<p>3.2.1 identify parts of a tooth.</p> <p>3.2.2 identify the different types of teeth in humans and state their functions.</p> <p>3.2.3 explain the causes of tooth decay, gum diseases and the formation of plaque and how to prevent them.</p>	<p>Parts of the tooth: Crown, Neck, Root</p> <p>Types of teeth</p> <p>Functions of the different types of teeth:</p> <p>Causes of tooth decay and gum diseases</p> <p>Prevention of tooth decay</p>	<p>Use models, charts and digital content to study the external parts (Crown, Neck, root) of a human tooth.</p> <p>Mention the different types of teeth in humans. Note: The dental formula is not required.</p> <p>Discuss the functions of the different types of human teeth.</p> <p>Explain the causes of tooth decay, gum disease and the formation of plaque.</p> <p>Discuss ways of preventing tooth decay.</p>	<p>Mention the different types of teeth and give their functions.</p> <p>Outline causes of tooth decay and describe how to prevent it.</p>
UNIT 3 DIGESTION IN HUMANS	<p>3.3.1 explain what is meant by digestion.</p>	<p>Digestion</p>	<p>Brainstorm to bring out the meaning of the term digestion Explain why a digestive system is necessary in humans.</p>	

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 3 DIGESTION IN HUMANS (CONT'D)	<p>The pupil will be able to:</p> <p>3.3.2 identify the parts of the digestive system in human and state their functions.</p> <p>3.3.3 describe the changes that occur to different food substances as they pass through the alimentary canal.</p> <p>3.3.4 describe what happens to the end products of digestion in humans.</p> <p>3.3.5 describe how undigested food substances are eliminated from the body.</p>	<p>Parts of the digestive system in humans</p> <p>Functions of the parts of the digestive system in humans</p> <p>Digestion of food substances</p> <p>Absorption of end products of digestion</p> <p>Uses of end-products of Digestion</p> <p>Egestion of undigested food</p>	<p>Let pupils:</p> <p>Review topics on digestion in humans from Primary 6. Observe and identify the parts of the alimentary canal of humans from models and charts.</p> <p>Draw and label the digestive systems of humans</p> <p>Describe briefly how the different parts of a digestive system help in the digestion of food.</p> <p>Discuss the process of digestion in humans. Discuss the changes that occur to different types of food substances (carbohydrates, proteins, fats and oils) as they pass through the regions of the alimentary canal.</p> <p>NOTE: The term “enzyme” should be introduced. Only general names of digestive enzymes e.g. salivary amylases, lipases, proteases are required.</p> <p>Mention the end products of digestion.</p> <p>Explain that the end products of digestion are absorbed into the blood stream. Detailed treatment of absorption not required.</p> <p>Discuss how the end-products of digestion are used in the body.</p> <p>NOTE: Functions of the liver should be limited to the secretion of bile.</p> <p>Discuss how undigested food substances are removed from the body. Note: Teacher to outline the linkage among digestion, circulation and respiratory systems.</p>	<p>Explain the changes that take place when a meal of kenkey and fried fish passes through the alimentary canal.</p> <p>What are the end products of digestion of protein and starch?</p> <p>State one role the liver plays in digestion.</p>

JUNIOR HIGH SCHOOL 3

SECTION 4: ENERGY

General Objectives: The pupil will

1. recognise that energy has a source and can be transformed into various forms
2. show an awareness of the uses of heat as a form of energy.
3. recognise the changes in the state of matter.
4. be aware of the uses of magnet as a source of energy
5. understand the mechanics and use of transistors in charging and discharging a capacitor.

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 HEAT ENERGY	<p>The pupil will be able to:</p> <p>4.1.1 Explain the terms heat and temperature.</p> <p>4.1.2 demonstrate the modes of heat transfer.</p>	<p>Temperature and Heat</p> <p>Modes of heat transfer: Conduction, Convection and Radiation</p>	<p>Let pupils :</p> <p>Brainstorm to bring out the meaning of temperature and heat. State the differences between them.</p> <p>Demonstrate conduction by putting one end of a piece of metal in fire and observe by holding the other end of the metal from time to time. Record and explain your observations.</p> <p>Demonstrate convection by dropping crystals of potassium permanganate in warm water and observe movement of coloured column.</p> <p>Demonstrate radiation by placing their hands close to a source of heat.</p> <p>Discuss the application of conduction, convection and radiation as used in the Thermos Flask.</p> <p>NOTE: Heat from the Sun (solar energy) is transmitted to the Earth through radiation.</p>	<p>Explain how heat from the Sun is transmitted to the Earth.</p>

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 BASIC ELECTRONICS	<p>The pupil will be able to:</p> <p>4.2.1 Demonstrate the use of a transistor to slowly charge and discharge a capacitor.</p>	<p>Using a transistor to slowly charge and discharge a capacitor</p>	<p>Let pupils :</p> <p>Connect the circuit as shown. Close the switch and observe what happens to the LED. Open the switch and observe what happens to the LED.</p> <p>Discuss what happens to the capacitor when the switch is closed and when it is opened.</p> <div data-bbox="1060 576 1648 933" style="text-align: center;"> </div> <p>Replace the 100kΩ resistor and the 470Ω resistor with different values and observe what happens to the charging and discharging rate of the capacitor.</p> <p>Discuss the application of a capacitor in an electronic circuit, e.g. in a camera flash.</p>	<p>What is the importance of a capacitor in an electric circuit?</p>

JUNIOR HIGH SCHOOL 3

SECTION 5: INTERACTIONS OF MATTER

General Objectives: The pupil will

1. appreciate that interactions between and within matter helps humans to better understand the environment and their role in it
2. be aware of the uses of magnets
3. be aware of the influence of science and technology on the development of society.
4. recognise the impact of science related industries on society

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 1 MAGNETISM	The pupil will be able to: 5.1.1 describe the properties of magnets. 5.1.2 explain the term magnetic field. 5.1.3 demonstrate the magnetic field around a bar magnet. 5.1.4 demonstrate methods of making magnets. 5.1.5 outline the uses of magnets.	Properties of magnets Magnetic field Demonstrating Magnetic field Methods of making magnets; Induction, Stroking and Use of electricity. Uses of magnets	Let pupils : Review magnetic and non magnetic materials from Upper Primary syllabus. Discuss the properties of magnets Brainstorm to come out with the meaning of the magnetic field Place a paper on top of a bar magnet and sprinkle iron filings on top of the paper. Tap the paper gently and record what happens. Draw the magnetic field of a bar magnet. Demonstrate methods of making magnets by induction, stroking, and use of electricity. Note: Mention that permanent magnets are made from steel and temporary magnets from iron Brainstorm to bring out the uses of magnets	Describe how to make a magnet by the induction and stroking methods

UNIT	SPECIFIC OBJECTIVES	CONTENT	TEACHING AND LEARNING ACTIVITIES	EVALUATION
UNIT 2 SCIENCE RELATED INDUSTRIES	<p>The pupil will be able to:</p> <p>5.2.1 identify science related businesses in their locality</p> <p>5.2.2 describe the scientific concepts and principles on which the industries are based</p>	<p>Science related businesses:</p> <ul style="list-style-type: none"> ➤ Blacksmithing ➤ Gari Processing ➤ Soap making ➤ Salt making ➤ Kenkey production ➤ Vegetable crop production ➤ Biogas production ➤ Fish smoking <p>The science in Blacksmithing, Gari making, Soap making, Salt making, Kenkey production, Vegetable crop production and Biogas production</p>	<p>Let pupils:</p> <p>Brainstorm to bring out a list of Science related industries in their locality.</p> <p>List the raw materials used in these industries.</p> <p>Identify the scientific concepts and principles underlying the operation of these industries e.g. kenkey making (fermentation), salt making (evaporation)</p>	<p>Name two small-scale industries and outline the scientific concepts or principles underlying them</p>

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