LEARNER'S
RESOURCE PACK

Science BASIC 7

NATIONAL COUNCIL FOR
CURRICULUM & ASSESSMENT
OF MINISTRY OF EDUCATION

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Introduction

This learners' pack is meant to serve as a manual to help you study science in an exciting way, where you will take responsibility of your learning. Your teacher will serve as a facilitator and suggest alternatives of activities you might like to carry out. It is important that you consider the alternatives that will be made and decide which alternative you will adopt. The pack is structured such that it has hints for you (*the learner*} about how to use this pack, which you should note carefully before you proceed to use it productively; what you will need to remember to enable you start any meaningful work; what you will learn; concepts and key words you will have to note as you learn; how you will go about the activities by which you learn what needs to be learnt; and important notes you must remember. Additionally, the pack has sections as worksheets which you will respond to on a sheet of paper to be provided by you. Note you are not expected to write in this learners' pack. You may also have instructions or procedures to follow when carrying out an activity. The resources you will need to be able to carry out the activity are listed and you may have to provide them or your teacher will prompt you to get them well ahead of the time you will carry out the activity. There is assessment task which you will respond to as a way of applying the knowledge you have acquired. Then finally you have a homework which will offer you additional opportunity to use the knowledge acquired or consolidate it for meaningful learning to occur in order not to easily forget what you have learnt. Now read on and have an exciting time while doing science for fun and knowledge acquisition.

How to use this Resource Pack

Before you use this resource pack, your teacher should have either completed teaching or in the process of facilitating lessons connected to the content standard(s) and their related indicators. Read the section headed **Hints to the Learner** and understand the issues addressed. Read what is contained in the table after **Hints to the Learner** to understand essential things you need to know and note. Points you need to remember for future lessons are not exhaustive so you need to add some to that. There is a worksheet which task(s) you will be required to copy and respond to procedure for carrying out an activity has been provided to help you and the resources you will require have also been listed or pictures of them have been provided. In order to self-check your understanding of what has been learnt, you have an assessment task you will address or respond to. Finally, you will do a homework to occupy you and serve as an extended learning to understand what has been taught.

Hints to the Learner

1. **What you will learn** will depend on The strands e. g. **Diversity of Matter**, the sub-strands e. g. **materials; the content standard; the indicator** as shown in the science curriculum. It is the indicator that determines whether you have attained the content standard. A content standard may have one or more indicators so attaining the content standard depends on accomplishing the indicators under it. The activities you will carry out will be based on the exemplars which reflect the indicator(s).
2. **How you will be taught:** You will be encouraged to work on your own; in groups; or as a whole class. The learning will be enquiry-based that is, the facilitator will provoke your mind with challenging tasks where you will carry out investigations, carry out a research and present your findings. You may design models to show your understanding of what you have learnt.
3. **How you will be assessed**: Your assessment will be varied: build a portfolio for assessment, performance (e.g. while you carry out an activity or experiment and an observation checklist/manual/rubrics) will be used to assess you while you perform the activity, oral presentation, written report. Note that the teacher will ask questions as the lesson progresses and your active participation; and assess assignments at the end of the lesson,
4. **Strategies for effective learning:** The strategies you will adopt include: Spacing or spreading out learning opportunities over a period of time. So your learning will center around the indicators. You will also be engaged in retrieval of information through taking short quizzes orally or writing or both. From time to time you may be asked to summarise your notes from memory or short summary from a book; you will also be required to give concrete examples and non-examples of concepts being learnt; you will be required to describe and explain why things work so that you can understand better what you have learnt; finally, you will do dual coding to help you reinforce what you have learnt. Dual coding involves combining verbal representations of information (words) with visual representations (diagrams/pictures/videos).

Content standard	**B7.1.1.1 Recognise materials as important resources for providing human needs**
What you know already	You know that: 1. Materials are around us and they come in different shapes, textures, and sizes. 2. Materials are classified as wood, metals, plastics, rubber, and textiles.
What you will learn and the skills you will develop	You will learn the following: 1. Characteristics of materials to enable you to classify them. 2. The importance of liquids in the life of humans.
Language and vocabulary you will need to use	solid, liquid, gas, materials, resources, human needs

Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write the answers where possible in your exercise book** 1. Observe materials at home and classify them into solids, liquids and gases. 2. Talk about solids, liquids and gases to your friends. 3. Find out liquid materials you see in their school environment. **Caution: Do not touch poisonous liquids. Do not taste any liquid. Wash your hands thoroughly after a practical activity. Some liquids are inflammable. Do not send inflammable liquid close to fire.** 4. Present a report on the importance of liquids to humans. 5. Describe the need to preserve liquids for human use. 6. Discuss the functions of a named liquid to humans. 7. Discuss the functions of a named liquid to humans. 8. Find out the importance of liquids used in the community.

Things you will need to remember for future lessons	Statements of facts you need to remember in order to do well in future lessons:
	1. Materials can be classified into solids, liquids and gases. 2. Solid particles are closely packed due to low kinetic energy between the particles. 3. Liquids are also closely packed but not as much as solids. Particles have higher energy than solid particles. 4. Gas particles are scattered and they move freely. Attraction between particles is the weakest compared with liquids and solids. 5. Air is a mixture of gases. 6. The particles that form a liquid are relatively close together, but not as close together as the particles in the corresponding solid. 7. Liquids flow. Some liquids are light whiles others are thick. 8. Liquids are important to human lives; we drink water every day and use water for a lot of daily activities. Other liquids include oils such as engine oil and cooking oil. 9. Provide pictures of how liquids are used. 10. You will search the internet to look out for some more other liquids too.

Worksheet	**Copy and do the work as presented on this sheet and as you may be directed by your teacher**
	1. Examine the materials listed below: a. Water, cooking oil, wood, carbon dioxide, table, soft drink, water vapour, chair, oxygen, milk, soap, lemon juice, computer. b. In a tabular form classify the substances as solids, liquids and gases. 2. Identify three vocations that use solids, liquids and gases. 3. Put your answers on a sheet of paper
	4. Name and write four liquids that are important to humans. a. …….. b. …… c. …… d. …… 5. Write the importance of the liquids you have named in question 4. _____ _____ _____ _____ _____

Activity and Instructions	**Read the instructions and perform the following activities. Present your results in a written form** 1. Demonstrate activities to show the presence of air (gas) e.g. waving a piece of paper across the face). **NB** : Wear protective clothing during the heating activity. 2. Copy and write the name of as many liquids that you can see or find at home. a. …….. b. …….. c. …….. d. …….. e. …….. f. ……..….
Teaching Resources	Source of heat and protective clothing, water, milk, drink, cooking oil, engine oil
Assessment Task	**Copy and do the following self-assessment tasks on a sheet of paper in order to know how much you have learnt** 1. In a tabular form write two differences between a. solids and liquids b. liquids and gases c. solids and gases 2. Show with the help of a sketch the arrangement of solid, liquid and gas particles. 3. Name a liquid, solid, and a gas in your environment. Describe their importance to humans.

Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Classify materials at home as solids, liquids and gases. 2. Find out some professions that deal with solids, liquids and gases. 3. What kind of liquids do you like? Write as many liquids as you can. ....

Content standard	**B7.1.1.2 Understand the periodic table as different elements made up of metals and non-metals and noble gases arranged in an order.**
What you know already	You already know classification of materials into liquids, solids and gases.
What you will learn, Skills you will develop	You will learn about the periodic table as different elements made up of metals and non-metals and noble gases arranged in an order.
Language and vocabulary you will need to use	Metals, non-metals, noble gases, periodic table, element
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write the answers in your exercise book:** 1. You will explore your misconceptions about chemical symbols on the periodic table. 2. Know the uses of metals, non-metals and noble gases. 3. Apply new terms and definitions to the arrangement of elements in the periodic table in order of their common properties.
Things you will need to remember for future lessons	**Statements of fact you need to remember in order to do well in future lessons.** 1. The **elements** in a group have the same number of electrons in their outer orbital. 2. Those outer electrons **are** also called valence electrons. 3. They **are** the ones involved in chemical bonds with other **elements** 4. A **period** in the periodic table is a row of chemical elements. 5. All elements in a row have the same number of electron shells.

	All of the **elements** in a **period** have the same **number** of atomic orbitals. For example, every **element** in the top row (the first **period**) has one orbital for its electrons. All of the **elements** in the second row (the second **period**) have two orbitals for their electrons.
Worksheet	**Copy and do the work as presented on this sheet and as you may be directed by your teacher.** **Use the periodic table to fill in the below chart.**

Serial No.	Element	Symbol	Atomic Number (Z)	Number of protons	Number of electrons	Atomic Mass (A)	Period
1	Oxygen	O	8	8	8	16	2
2	Helium						
3	Carbon						
4	Aluminium						
5	Calcium						
6	Sodium						
7	Potassium						
8	Nitrogen						
9	Silicon						
10	Iron						
11	Hydrogen						

Activity and Instructions	**Read the instructions and perform the activities. Present your results in a written form.** i. Look at a periodic table and identify the first 20 elements and write their chemical symbols. ii. Use the periodic table to identify metals, non-metals and noble gases.
Teaching Resources	Periodic table containing the first 20 elements, word cards with names and symbols of elements

Assessment Task	**Copy and do the following self-assessment task on a sheet of paper in order to know how much you have learnt.** 1. Describe how the elements in the periodic table are arranged. 2. What is significant about the arrangement in terms of atomic number? 3. Use the periodic table to classify given elements as metals, non-metals and noble gases.
Homework Task	**Do the following homework and present your answers and findings in your exercise book.** 1. Research and make a presentation on the differences among elements in groups and those in periods specifying their characteristics. Read science books and ask others for information.

Content standard	**B7.1.2.1 Demonstrate understanding of the structure of organisms and functions of cells in a living system.**
What you should know already	You have already learnt about animal cells in your previous lessons.
What will you learn and the skills you will develop.	**You will learn by way of doing the following:** 1. Identify and describe the structure of a plant cell seen in a video or a chart. 2. State the function of each organelle in the plant cell. 3. Draw and label a plant cell. 4. Develop a model to represent a plant cell. **You should develop skills** of observing, using a magnifier to observe a plant cell, observing, drawing, moulding and labelling of a plant cell.
Language and vocabulary you will need to use	Nucleus, cytoplasm, mitochondria, vacuole, chloroplast endoplasmic reticulum, organelles and ribosomes
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write the answers in your exercise book** 1. You are expected to do an internet search on plant cell and how each organelle functions. Visit: https//biologydictionary.net>plant-… https:/www.sciencelearn.org.nz>4… http: byjus. com>biology>plant-…

Things you will need to remember for future lessons	**Statements of facts you need to remember in order to do well in future lessons** 1. Plant cells are the basic building blocks of plant life, 2. Plant cells carry out the functions necessary for survival. E.g. photosynthesis, the making of food from carbon dioxide and water using light energy, which occurs in the chloroplasts of the cell.
	3. Every organelle within a plant cell has an important role. E.g. plastids store plant products. 4. Vacuoles are water-filled, membrane bound organelles that store useful materials. 5. Mitochondria carry out cellular respiration and give the cells energy.
Worksheet	**Copy and do the work as presented on this sheet and as you may be directed by your teacher.** 1. Make a well-labelled drawing of a plant cell, state one function each of the following organelles. 2. Write the importance of cell membrane and cellulose cell wall to the plant cell. 3. The onion bulb does not contain chloroplast. Explain why? 4. Why do plants have definite fixed shape?

Activity and Instructions	**Read the instructions and perform the activities. Present your results in a written form.** 1. Make a good observation of a plant cell from a video, book or a chart. a. Recall previous lesson on animal cells. b. Identify and describe the structure of a plant cell seen in a video or a chart. c. Compare the plant cell with the animal cell which was studied previously. d. Mention the organelles in the plant cell that were not found in the animal cell. 2. State the function of each organelle in the plant cell. 3. By making reference to animal cells, mention the functions of organelles in the plant cell such as the nucleus and mitochondrion. 4. By making reference to the production of food and cell sap, explain the functions of organelles such as vacuole, chloroplast.

	5. In groups look at a sample of a plant cell from different parts of a plant with a microscope, magnifier or watch a video or pictures and confirm that plants are made up of cells. Mount the strip of small piece of onion (epidermis) in iodine solution. Slowly remove the pin as you lower the cover slip so as to avoid air bubbles. Observe one cell under low and high powers of the light microscope a. Identify the nucleus, cytoplasm and the cellulose cell wall. b. Make a well-labelled drawing of a plant cell from the observation under the microscope 6. Display your group drawings of the plant cells for other group members to observe and comment. 7. You will be provided with two potted herbaceous plants. a. Place one in the sun, without adding water to the plant. b. Water the other plant which serves as a control experiment. c. Leave both potted plants in the condition for 60 minutes. d. Observe both plants after every 15 minutes and record your observation. e. What conclusions will you draw about the two plants?
Teaching Resources	Microscope, cover slip, slide, mounted needles or pins, onion bulb, iodine solution, rule, coloured pens, erasers, pens, salt solution, water potted herbaceous plants, masking tape, play dough, beads of different colours and shapes, transparent container, and empty pet bottles.

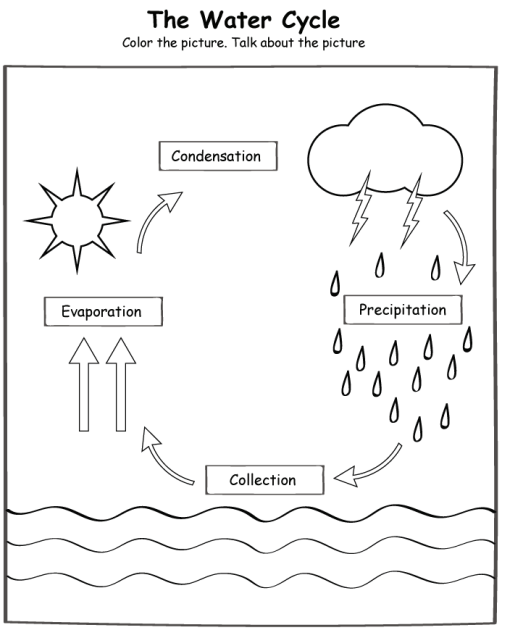
Assessment Task	**Copy and do the following self-assessment task on a sheet of paper in order to know how much you have learnt. For Section A select the most appropriate option and circle it. For Section B respond by writing no more than a page of exercise book sheet for each answer.**

SECTION A

1. In which of the following is cellulose found?
   - A. Cell membrane
   - B. Cell wall
   - C. Chloroplast
   - D. Mitochondrion
2. Which of the following structures is present in a plant cell, but absent from an animal cell?
   - A. Nucleus
   - B. Cytoplasm
   - C. Cell Wall
   - D. Cell Membrane
3. What cell organelle is responsible for release of energy?
   - A. Centrioles
   - B. Lysosome
   - C. Mitochondria
   - D. Ribosome
4. Which of the following is present in all living cells?
   - A. Cellulose
   - B. Chloroplast
   - C. Cytoplasm
   - D. Starch

	5. The statements below are about the cell membrane of an animal. Which one is **NOT** correct? A. It allows certain substances from leaving the cell. B. It is surrounded by a cellulose cell wall. C. It prevents certain substances from leaving the cell. D. It surrounds the cell. Section B 1. Draw both plant and animal cells. Identify the organelles by their names [**Hint**: visit and use a sample from this website: www.troup.org> user files>ti..PDF] 2. Match the organelles to their functions. 3. Why are the functions of :(a) chloroplast (b)nucleus (c) vacuole important to the organism? 4. Draw a labelled diagram of a plant cell, showing the following parts: cellulose cell wall, cell membrane, cytoplasm, ribosomes, mitochondrion, vacuole, chloroplast and nucleus. 5. In a form of a table, state four differences between plant and animal cells.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book** 1. Design and mould a plant cell using materials such as, play dough, cardboard, coloured pens, pencils, empty pet bottles, beads of different colours and shapes, carton boxes, styrofoam, cutters, rule, paint brush and water colour glue and water **Reference:** Visit :#plantcellmodel #schoolscienceexhition Or internet search on, how to make a plant model.

Content standard	**B7.2.1.1 Recognise that water cycle is an example of repeated patterns of change in nature and understand how it occurs.**
What you know already	You already know that: 1. Rain falls and the water evaporates from the environment. 2. Water is important for daily activities of humans. 3. Plant and animal life depend on water.
What will you learn? What skills will you develop?	**You will learn about/acquire:** 1. The importance of water cycle in nature. 2. How to illustrate water cycle with a diagram. 3. The skills of observing, drawing, etc.
Language and vocabulary you will need to use	Environment , weather, pattern, energy, repeated pattern, change in nature
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write the answers in your exercise book.** 1. Illustrate the importance of the water cycle with a diagram. 2. Use the internet to find out more about the importance of carbon cycle. 3. Create posters about the importance of the water cycle
Things you will need to remember for future lessons	**Statements of facts you need to remember in order to do well in future lessons:** 1. Stages of the water cycle: evaporation, condensation, precipitation and transpiration 2. How water on Earth cycles in different forms and in different locations, including underground and in the atmosphere.

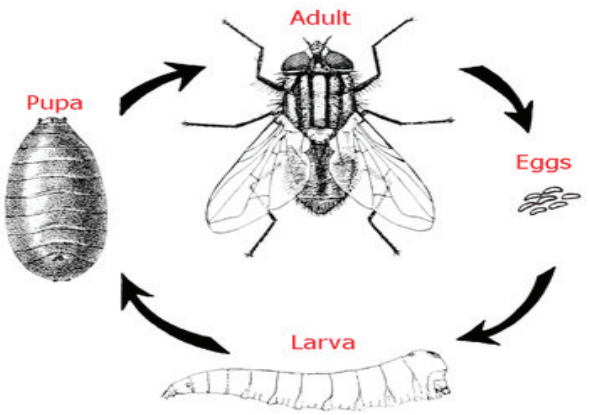
	3. The importance of the water cycle. In terms of: a. Energy source (release of energy to warm the environment); b. Carrier of nutrients; c. Improving water table; d. Regulating weather pattern; e. Provision of clean water; f. Water is a universal solvent.
Worksheet	**Copy and do the work as presented on this sheet and as you may be directed by your teacher.** Use the diagram below to answer the questions that follow.  1. Write the name of the process in the above diagram. 2. Write the stages of the process. 3. Make a verbal presentation and write about the diagram.

Activity and Instructions	**Read the instructions and perform the activities. Present your results in a written form.** 1. Conduct activities on the water cycle using inquiry–oriented questions. Think and reflect on the importance of the water cycle. In groups describe the importance of the water cycle in terms of: a) Energy source (release of energy to warm the environment); b) Carrier of nutrients; c) Improving water table; d) Regulating weather pattern; e) Provision of clean water. 2. Make models of the water cycle using cardboards and clay.
Teaching Resources	Videos, pictures, charts, drawings, models, cut-outs pictures
Assessment Task	**Copy and do the following self-assessment task on a sheet of paper in order to know how much you have learnt. For questions 1 and 2 write in the spaces provided. For question 3 Sketch and write not more than a page of your exercise book sheet.** 1. Why is the water cycle important to all life on earth? a. …… b. …… c. …… 2. What will happen if there were no water cycle? a. …… b. …… c. …… d. ……

	3. a. Sketch each stage of the water cycle. b. Write on the importance of each stage to your community.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book and produce a model of the water cycle.** 1. Investigate the importance of the water cycle to your community. 2. Create cut-out pictures of the stages of the water cycle.

Content standard	**B7.2.2.1 Demonstrate the skills of carrying out activities to show the stages of the life cycle of the housefly, effects of its activities on humans and how to reduce them**
What you know already	**You already know that:** 1. Houseflies are considered worrying organisms. 2. They feed on solid and liquid waste. 3. They transfer germs.
What will you learn? What skills will you develop?	**You will learn about:** 1. Stages of the life cycle of the house fly. 2. Activities of the housefly. 3. How to reduce the activities of the housefly in your community.
Language and vocabulary you will need to use	Nuisance, disease, menace, food poison
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write the answers in your exercise book.** 1. Describe how and what a housefly feeds on. e.g. feeding on dead animals, rotten food, manure, solid and liquid waste. 2. Discuss how the activities of the housefly affect humans in terms of: a. transfer of types of diseases (such as dysentery); b. food poisoning; c. nuisance in the environment.

Things you will need to remember for future lessons	**Statements of facts you need to remember in order to do well in future lessons** 1. Activities of the housefly affect humans in terms of: a. Transfer of types of pathogens that cause diseases (such as dysentery); b. Food poisoning; c. Nuisance in the environment 2. It is the most common fly species in houses. 3. It has developmental stages.
Worksheet	**Copy and do the work as presented on this sheet and as you may be directed by your teacher.** 1. Write about things the housefly feeds on. Think of school, home and the community. A. ..... B. ..... C. ..... D. ..... E. .....
Activity and Instructions	**Read the instructions and perform the activities. Present your results in a written form.** 1. Describe how and what a housefly feeds on. e.g. feeding on dead animals, rotten food, manure, solid and liquid waste. 2. Discuss how the activities of the housefly affect humans in terms of: a. transfer of types of diseases (such as dysentery); b. food poison. 3. Design an intervention that can reduce the effects of the activities of the housefly on humans and educate people of your community about the intervention

Teaching Resources	Pictures/videos/models/charts/drawings/cut-outs, science journals, internet of the stages of the life cycle of the house fly
Assessment Task	 **Do the following self-assessment task on a sheet of paper in order to know how much you have learnt.** 1. Use the diagram to describe the life cycle of the housefly. 2. Show how each stage affects the other. 3. Describe how the organism feeds. 4. Describe why the organism is considered as a menace on humans. 5. Show how to reduce its activities.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book** 1. Create a poster on activities of the housefly. 2. A. Design an intervention that can reduce the effects of the activities of the housefly on humans B. Educate people of your community about the intervention.

Content standard	**B7.2.3.1 Demonstrate an understanding of the different plant nutrients (organic, and inorganic fertilizers) and their application in school farming (school gardening).**
What you know already	You already know that: 1. Certain substances help plants to grow. 2. People collect waste droppings of animal wastes to help plants grow.
What will you learn? What skills will you develop?	**You will do the following by way of learning** 1. Observe all plant nutrient sources available in a community. 2. List all plant nutrient sources available and categorise them into organic and inorganic nutrient sources. 3. Applying plant nutrients to plants in your school garden.
Language and vocabulary you will need to use	Organic, inorganic, fertilizer, plan nutrient
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write the answers in your exercise book.** 1. Explain the differences between organic and inorganic plant fertilizers. 2. Compare the volumes of organic and inorganic nutrient sources required by different plants. 3. Use the internet to find out more about plant nutrient sources.
Things you will need to remember for future lessons	**Statements you have to remember to enable you cope with future lessons.** 1. Plant nutrients are classified as organic and inorganic nutrient sources. 2. All the plants need nutrients to survive and grow.

<table>
<tr><td>Worksheet</td><td>Copy and do the work as presented on this sheet and as you may be directed by your teacher.
Complete the spaces provided.
<table>
<tr><td>Compare and list plant nutrient sources and categorise them into organic and inorganic nutrient sources</td><td>Categorize the plant nutrient source into organic and inorganic sources.</td><td></td></tr>
<tr><td>1.</td><td>Organic sources</td><td>Inorganic sources</td></tr>
<tr><td>2.</td><td></td><td></td></tr>
<tr><td>3.</td><td></td><td></td></tr>
<tr><td>4.</td><td></td><td></td></tr>
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<tr><td>10.</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Activity and Instructions</td><td>Read the instructions and perform the activities. Present your results in a written form.
1. Observe different types of fertilizers from the resources available and present your observations and findings in your own words for discussion in the class.
2. Explain the differences between organic and inorganic plant fertilizers.
3. Compare the volumes of organic and inorganic nutrient source required by different plants.</td></tr>
<tr><td>Teaching Resources</td><td>Samples of organic and inorganic fertilizers, videos, charts, pictures</td></tr>
</table>

Assessment Task	**Do the following self-assessment task on a sheet of paper in order to know how much you have learnt.** 1. Distinguish between organic and inorganic plant fertilizers. 2. Write examples of organic and inorganic fertilizers. 3. Why are plant nutrients important to the growth and development of plants.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Make a list of organic plants nutrient sources. 2. Write down how plants absorb plant nutrients to promote growth and development. 3. Find out the professions that use plant nutrients in their activities.

Content standard	**B7.2.4.1 Demonstrate understanding of the differences among domestic animals such as ruminants, monogastrics and poultry (monogastric herbivore).**
What you know already	**You already know that:** 1. There are different types of animals found in your community. 2. Some animals are found at home and others in the forest. 3. Animals have different shapes, sizes and food.
What will you learn? What skills will you develop?	**You will learn about/acquire:** 1. The differences among domestic animals. 2. Show the differences and similarities among domestic animals. 3. Classify domestic animals into ruminants, monogastrics and monogastric herbivores. 4. The skill of classifying, analysing, communicating and collaborating with others to learn.
Language and vocabulary you will need to use	Domestic, ruminants, herbivore, monogastric, breeds
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and write a summary of what you have read:** 1. Read journals on domestic animals. 2. Give examples of ruminants, monogastrics, monogastric herbivores.
Things you will need to remember for future lessons	**Statements you have to remember to enable you cope with future lessons** 1. Domestic animals live with us in our communities. 2. They have different shapes, colours, sizes and ways of feeding.

<table>
<tr><td></td><td>3. Some feed on plants and animals and others feed on flesh of animals.</td></tr>
<tr><td>Worksheet</td><td>Copy and do the work as presented on this sheet and as you may be directed by your teacher.
1. Write characteristics of each of the following:
a. ruminants
b. monogastrics
c. monogastric herbivores
2. Use the characteristics to classify the animals found in your community. Fill them in the table below.
<table><tr><th>Ruminants</th><th>Monogastrics</th><th>Monogastric herbivores</th></tr><tr><td>1.</td><td></td><td></td></tr><tr><td>2.</td><td></td><td></td></tr><tr><td>3.</td><td></td><td></td></tr><tr><td>4.</td><td></td><td></td></tr><tr><td>5.</td><td></td><td></td></tr></table></td></tr>
<tr><td>Activity and Instructions</td><td>Read the instructions and perform the activities. Present your results in a written form.
1. Identify characteristics/features of domestic animals.
2. Classify domestic animals into ruminants, monogastrics (non-ruminants) and monogastric herbivores
Give examples of animals classified as ruminants, monogastrics, and monogastric herbivores
3. In pairs, research, discuss, and make a list of similarities in the nature and characteristics of ruminants, monogastrics and monogastric herbivores in Ghana and other countries.</td></tr>
<tr><td>Teaching Resources</td><td>Pictures, videos, charts, models, drawings, cut-outs</td></tr>
</table>

Assessment Task	**Do the following self-assessment task on a sheet of paper in order to know how much you have learnt** 1. Explain the following terms a. ruminants b. non-ruminants c. monogastric herbivores 2. Give examples of examples of animals classified as i). ruminants, ii). monogastrics, and iii). monogastric herbivores
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Make drawings of domestic animals and display your drawings for discussion in class. 2. Identify the features of those domestic animals. 3. Describe domestic uses of monogastric herbivores. 4. Explain what will happen if there are no animals. 5. Find out more about animals that are not ruminants.

Content standard	**B7.2.4.2 Show understanding of the usefulness of the different types of animals for domestic and commercial purposes.**
What you know already	You already know that: 1. Animals are around us. 2. Some animals are found at home and in the forest. 3. Animals give us meat, leather and fur.
What you will learn and the skills you will develop	**You will do the following by way of learning:** 1. Know about domestic and commercial uses of animals; 2. Observe different uses of different animals found in your community; 3. Match different domestic animals to their commercial uses including their by-products; 4. Develop skills in comparing, communicating, collaborating, etc. with your mates in class.
Language and vocabulary you will need to use	Ruminants, monogastric, animal waste, domestic
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and report in writing:** 1. Use pictures, videos and charts to explain the concepts of domestic use and commercial use of animals. 2. Observe different types of animals found in your community.
Things you will need to remember for future lessons	**Statements you have to remember to enable you cope with future lessons:** 1. Animals can be used for domestic and commercial purposes. 2. Safety precautions should be observed when dressing the meat of animals

Worksheet	**Copy and do the work as presented on this sheet and as you may be directed by your teacher.** **1. Copy into your exercise book and match the list of the following animals in column A against the list of animal products in column B:** **Column A** (i) hen (ii) bees (iii) silkworm (iv) civet cat (v) sheep **Column B** (a) honey (b) musk (c) egg (d) wool (e) silk (f) keratin (g) stearic acid
Activity and Instructions	**Perform the activities listed below and present your work in your exercise book** 1. List and match the different domestic animals to their commercial uses including their by-products (such as animal waste). 2. Describe domestic uses of ruminants, monogastrics and monogastric herbivores. 3. Observe and discuss different uses of different animals found in the communities.
Teaching Resources	pictures, videos, charts, models, drawings, cut-outs
Assessment Task	**Do the following self-assessment task on a sheet of paper in order to know how much you have learnt** 1. Write three uses of domestic animals 2. Describe domestic uses of; i) Ruminants ii) Monogastrics

Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book** 1. Describe domestic uses of monogastric herbivores. 2. Explain what will happen if there are no animals. 3. Find out more about animals that are not ruminants.

Content standard	**B7.3.1.1 Show understanding of the concept of food, the process of digestion and appreciate its importance in humans.**
What you should know already	You already know that you eat before you do any activity.
What will you learn? What skills will you develop?	You will learn about: 1. Food and its nutrients; 2. The importance of food to humans; 3. People who have been starved of food and people who eat every day; 4. Explain what food is and the nutrients found in food. Scientific skills you will acquire will be inquiry, observing, etc.
Language and vocabulary you will need to use	liver, gall bladder, ileum, colon, caecum, rectum, appendix and anus, digestion, absorption, enzymes, assimilation
Ways to extend your understanding	**Do an internet search on the following in order to extend your understanding of what you have learnt.** 1. Name the parts of the digestive system and state their roles in digestion of food. 2. Describe what happens to food as it moves through the various parts of the digestive system. 3. Watch videos on the human digestive system; **Reference:** Made Easy-Gastrointestinal System.
Things you will need to remember for future lessons	**Statements of facts that you need to remember in order to perform well in subsequent lessons.** 1. Digestion is the breakdown of food into smaller and smaller components which can be easily absorbed and assimilated into the body.

	2. Digestion of food begins in the mouth and ends in the small intestine. 3. The human digestive system consists of the gastrointestinal tract plus the accessory organs of digestion. 4. The main organs of the digestive systems are: the mouth, gullet, stomach, small intestine, large intestine, rectum and anus. The accessory organs of digestion are the liver and pancreas. 5. The end products of digestion of various food substances are as follows: a. Carbohydrates : glucose b. Proteins: amino acids c. Fats and oils: fatty acids and glycerol
Worksheet	**Do the following exercise as shown on this sheet as may be directed by your teacher** 1. Give three reasons why food is important to humans. 2. Identify the main classes of food and their end products. 3. Give three diseases associated with the digestive system and how to prevent them.
Activity and Instructions	**Read the following activities and carry them out and present your work in written form in your exercise book.** 1. Using think-pair-share, find out from your friends the importance of food and the effects of starvation. 2. *Watch videos and pictures of healthy people and starved people and talk about their appearance.* 3. Identify the parts of the alimentary canal in a drawing of the digestive system. 4. In groups, learners describe digestion in the mouth, stomach, duodenum and small intestine.

	5. Using peer review learning strategy, discuss your finding with your partner's findings. 6. Research and describe what happens to food e.g. a piece of boiled yam/cassava/plantain/cocoyam/ bread when it gets into the mouth, stomach, and small intestine. 7. Draw and label the digestive system in humans. 8. Individually, draw and label correctly the digestive system by looking on a displayed chart, model or drawings from books.
Teaching Resources	Charts of the digestive system, videos and models of the digestive system, cardboards, pencils, coloured pencils, play dough and rule
Assessment Task	**Do the following self-assessment task on a sheet of paper in order to know how much you have learnt.** **For Section A, copy the task and CIRCLE the most appropriate of each of the options, and for Section B write a short essay on both questions.** **Section A** 1. What is the digestive system? A. The body's blood-transporting system. B. The body's breathing system. C. The body's food-processing system. D. The body's system nerves. 2. Digestion begins in the mouth. Which of the following statement is INCORRECT? A. The digestive juices can react more easily with the food when chewed. B. The saliva changes some of the starches in the food to sugar. C. The tongue aids in the digestion of the food. D. The tongue keeps the food in place in the mouth while the food is being chewed.

3. Where does food pass through between the mouth and the stomach?

   A. The gullet

   B. The large intestine

   C. The rectum

   D. The small intestine

4. What happens when food reaches the stomach?

   A. Juices mix with the food and the stomach muscles squeeze it.

   B. Nothing. No digestion occurs in the stomach.

   C. The food is completely digested and is absorbed by tiny blood vessels in the walls of the stomach.

   D. The food moves quickly into the small intestine.

5. Where does the partly-digested food (in liquid form) go after it leaves the stomach?

   A. The appendix

   B. The gullet

   C. The large intestine

   D. The small intestine

6. How does digested food finally reach the bloodstream?

   A. It is absorbed into the blood through blood vessels.

   B. It is absorbed into the blood through the walls of the lungs.

   C. It passes from the small intestine into the large intestine, then into the blood.

   D. It passes through the gullet into the blood.

7. The digestive system processes food into usable and unusable material. The usable materials are sent to the body's cells as food. What happens to unusable materials?

   A. It goes into the large intestine to await disposal.

   B. It goes into the pancreas to await disposal.

   C. It goes into the small intestine to await disposal.

   D. It goes to the right ventricle to await disposal.

8. Digestion takes place in a long tube-like canal called the alimentary canal, or the digest tract. Food travels through these organs in the following order:

   A. Mouth, gullet, stomach, small intestine, large intestine and rectum;

   B. Mouth, oesophagus, stomach, large intestine, small intestine and rectum;

   C. Mouth, stomach, gullet, small intestine, large intestine and rectum;

   D. Mouth, stomach, oesophagus, small intestine, large intestine and rectum.

9. Which of the following does NOT manufacture digestive juices?

   A. Kidneys
   B. Liver
   C. Pancreas
   D. Stomach

10. The liver is located in the abdomen and performs many functions. Which of the following is **NOT** a function of the liver?

   A. Healing itself when it is damaged
   B. Manufacturing insulin
   C. Producing digestive juices
   D. Storing food

	SECTION B 1. Describe what happens to a meal of gari and beans mixed with palm oil as it travels from the mouth to the anus. 2. State the uses of the end products of digestion in the body of mammals.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book** 1. Describe how you can mould and design the digestive system using locally available materials from the environment. 2a. What is the end product of each of the following food substances: Carbohydrate, protein and fats and oils. State one use of each of the end products to humans. 2b. Give one function each of the following organs of the digestion system: i. Mouth ii. Stomach iii. Liver iv. Small intestine

Content standard	**B7.3.4.1 Demonstrate an understanding of the differences among the various farming systems: Land Rotation, Crop Rotation, Mixed Cropping, Mixed Farming, and Organic Farming**
What you should know already	You know that your school cultivates crops or rears some animals in the school garden and you can describe how the cultivation or animal rearing is done.
What will you learn? What skills will you develop?	**You will learn about:** 1. Types of farming systems in Ghana and elsewhere. 2. Characteristics of the different farming systems in Ghana. 3. Compare and contrast the characteristics of the different farming systems. 4. Classify different descriptions of farming systems. 5. Group farming systems prevailing in your community. 6. Discuss and tabulate the reasons behind the use of various farming systems. 7. Debate the merits and demerits of the farming systems.
Language and vocabulary you will need to use	Farming systems, land rotation, crop rotation, mixed cropping, mixed farming, and organic farming
Ways to extend your understanding	**In order to consolidate your understanding of the lesson you have to do the following exercise and report in writing.** 1. Search for information about farming systems in Ghana and use the information to debate the demerits and merits of farming systems.

Things you will need to remember for future lessons	**You have to remember the following facts to enable you cope with other lessons in future:** 1. Types of farming systems in Ghana are: Land Rotation, Crop Rotation, Mixed Cropping, Mixed Farming, and Organic Farming. 2. Land rotation. This is a system of farming in which a farmer cultivates a piece of land for some time and leaves it to clear a new land when the old land becomes less fertile. The farmer moves to the new land without moving his settlement. 3. Crop rotation is the practice of growing a series of dissimilar or different types of crops in the same area in sequenced seasons. 4. Mixed cropping, also known as inter-cropping or co-cultivation, is a type of agriculture that involves planting two or more of plants simultaneously in the same field. 5. Mixed farming is the cultivation of crops along with rearing of animals for meat or milk on the same farm. 6. Organic farming is defined as production of crop, animal, and other products without the use of synthetic chemical fertilizers and pesticides, transgenic species, or antibiotics and growth-enhancing steroids, or other chemicals.
Worksheet	**Do the following exercise as shown on this sheet as may be directed by your teacher.** 1. Describe **five** farming systems you have studied. 2. What are the advantages of practising each of the five farming systems?

Activity and Instructions	**Read the following activities and carry them out and present your work in a written form in your exercise book.** 1. Identify and define types of farming systems in Ghana and elsewhere. 2. Discuss the characteristics of the different farming systems in Ghana. c. 3. Compare and contrast the characteristics of the different farming systems. 4. Classify different descriptions of farming systems under land rotation, crop rotation, mixed cropping, mixed farming and organic farming. 5. Group farming systems prevailing in their community under land rotation, crop rotation, mixed cropping, mixed farming and organic farming. 6. Discuss and tabulate the reasons behind the use of various farming systems. 7. Debate the merits and demerits of the different farming systems.
Teaching Resources	Pictures, videos illustrative charts of types of farming systems
Assessment Task	**Do the following self-assessment task on a sheet of paper in order to know how much you have learnt.** a. Define five types of farming systems in Ghana. b. Compare and contrast the characteristics of the different farming systems. c. Tabulate the reasons behind the use of various farming systems in your community. d. What are the merits and demerits of the different farming systems?

Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Engage your community members to examine and discuss the differences among the various farming systems in your communities. 2. Identify the types of farming that goes on in your community and categorise them into the different farming systems in agriculture. 3. Discuss the usefulness of practising different farming systems

Content standard	**B7.4.1.1 Demonstrate understanding of forms of energy and their daily applications.**
What you know already	You have already discussed energy in the primary school.
What you will learn, and *skills* you will develop	**You will do the following by way of learning:** • List forms of energy in terms of Potential, Kinetic, Heat, Sound, Solar, Electrical, Nuclear, Chemical and Light. • Demonstrate how Potential Energy (PE) is related to Kinetic Energy (KE) (Mechanical Energy= PE+ KE). • Show how forms of energy are used in daily life. • Match forms of energy to appliances (gadgets) used daily at school, in the home and community. • Explain factors that affect potential and kinetic energy in their application in daily life. • Use mathematical expressions for both Potential energy (PE = mgh) and Kinetic energy (KE = ½ mv^2) and use the expressions to solve problems involving mechanical energy.
Language and vocabulary you will need to use	Energy, kinetic energy, potential energy, light energy, heat energy, gravitational potential energy, electrical energy, sound energy, chemical energy and nuclear energy, energy, appliance, gadget, factors
Ways to extend your understanding	**To consolidate your understanding of what you will learn you need to do the following:** 1. Describe the forms of energy and how they relate. 2. Using the mathematical expressions for both potential energy (PE = mgh) and kinetic energy (KE = ½ mv^2) solve several problems involving mechanical energy.

Things you will need to remember for future lessons	You have to remember the following facts to enable you cope with other lesson in future: **1. Mechanical Energy:** It is the energy that a body has due to its position or its states of motion. There are two forms of mechanical energy: These are potential and kinetic energy. Mechanical energy = kinetic energy (KE.) + potential energy (PE.). **2. Chemical energy** Chemical energy is energy stored in the bonds of chemical compounds (atoms and molecules). Chemical energy is released in a chemical reaction, often in the form of heat. **3. Electrical Energy** Electrical energy is the energy carried by moving electrons in an electric conductor. Other forms of energy are also converted to electrical energy. **4. Thermal energy** Thermal energy is the energy a substance or system has related to its temperature, i.e., the energy of moving or vibrating molecules. **5. Nuclear energy** Nuclear energy is the energy that is trapped inside each atom. Nuclear energy can be produced either by the fusion (combining atoms) or fission (splitting of atoms) process. The fission process is the widely used method. Uranium is the key raw material. Uranium is mined from many places around the world. **6. Factors that affect potential energy:** 1. Objects of larger masses have greater potential energy than objects of smaller masses

	2. The higher the acceleration due to gravity, the greater the potential energy and vice versa. 3. The higher the height of an object, the greater the potential energy and vice versa. **7. Factors that affect kinetic energy:** 1. The greater the mass of an object the greater the kinetic energy and vice versa. 2. The higher the velocity of the object, the greater the kinetic energy and vice versa.
Worksheet	**Do the following exercise as shown on this sheet as may be directed by your teacher** **Classify the following as a type of potential energy or kinetic energy by writing (K or P) at the end of each statement** 1. A bicyclist pedalling up a hill _____ 2. An archer with his bow drawn _____ 3. A volleyball player spiking a ball _____ 4. A baseball thrown to second base _____ 5. Walking down the street _____ 6. Sitting in the top of a tree _____
Activity and Instructions	**Follow the instructions below and perform the activity as may be directed by your teacher Present a written report.** 1. Drop objects from a height and describe how potential energy changes to kinetic energy. 2. Share your observations from the activities by using diagrams.
Teaching Resources	Pictures Showing different forms of energy, different types of objects

Assessment Task	**Do the following self-assessment task on paper in order to know how much you have learnt.** **Copy the questions in your exercise book and circle the correct option.** **1.** What type of energy does the SUN give? A. Electrical B. Mechanical C. Solar D. Sound **2.** What kind of energy do stereos have? A. Nuclear B. Mechanical C. Thermal D. Sound **3.** What type of energy do flashlights start with? A. Chemical B. Electrical C. Solar D. Sound **4.** What energy do plants have? A. Chemical B. Nuclear C. Mechanical D. Thermal **5.** What energy do you have when you eat? A. Chemical B. Kinetic C. Potential D. Sound

6. What type of energy do missiles have?

A. Chemical
B. Nuclear
C. Sound
D. Thermal

7. What energy does fire have?

A. Chemical
B. Kinetic
C. Nuclear
D. Thermal

8. Using the pedals on your bike is what type of energy?

A. Chemical
B. Nuclear
C. Mechanical
D. Radiant

9. Light bulbs show off what type of energy?

A. Chemical
B. Electrical
C. Radiant
D. Sound

10. During the day the sun gives off what?

A. Chemical
B. Radiant
C. Sound
D. Thermal

11. What are the two categories that form mechanical energy?

A. Light and Gravity
B. Light and Kinetic
C. Potential and Kinetic
D. Potential and Light

Homework Task	**Do the following homework to enable you consolidate what you have learnt:**
	1. A helicopter drops a 25 kg bag of rice from rest at a height of 120 m from the ground. a) How much initial potential energy is stored by the bag of rice? b) What is the kinetic energy of the bag of rice just before it hits the ground? 2. Three objects X, Y and Z with masses 30 kg, 55 kg and 27 kg respectively are placed on top of a building of height 35 m from the ground. State with reasons, which of the objects a. have the least potential energy? b. have the greatest potential energy? c. will have the greatest kinetic energy when rolled to fal?l

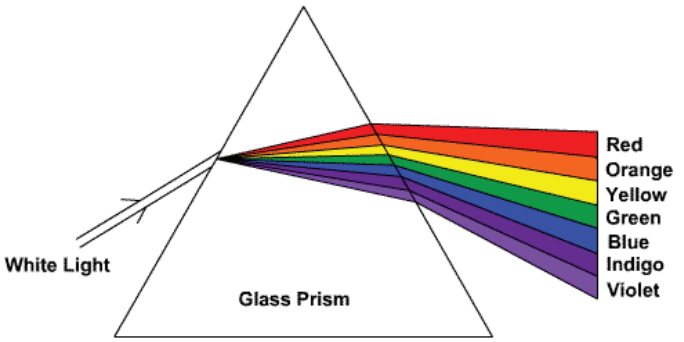
Content standard	**B7.4.1.2 Demonstrate an understanding of the concept of heat transfer and heat applications in life.**
What you know already	**You know:** 1. The difference between what is hot and what is cold. 2. When an object is heated, it becomes hot.
What you will learn, Skills you will develop	**You will do the following by way of learning:** 1. Learn about how heat is transferred in various media. 2. Learn about the application of heat in life. 3. Develop skills in critical thinking, problem solving, communication and collaboration.
Language and vocabulary you will need to use	Heat transfer, energy, appliance, gadget, factors, molecules, various media
Ways to extend your understanding	**Consolidate your understanding of the lesson by doing the exercise that follows. Present a written report.** 1. Identify places where heat transfer is occurring in your daily life activities.
Things you will need to remember for future lessons	**You must remember the following points in order to understand future lessons.** 1. Heat transfer is the method by which heat energy moves through different media. 2. There are three modes of heat transfer: conduction, convection, and radiation. a. Conduction is heat transfer through solids. b. Convection is heat transfer through liquids and gases. c. Radiation is heat transfer through empty space.

Worksheet	**Perform the following activities as shown on this sheet and record your observations, make a write up and as may be directed by your teacher.** 1. Observe soup boiling on fire at home. Explain why the ingredients are moving up and down in the soup. 2. Hold a metallic ladle in the soup. Explain why the temperature changes in the ladle over time. 3. Stand in a room with no windows during the daytime. Explain why the walls appear to send heat to you. 4. Observe boiling water in a pot. Add a few drops of ink or food colour to the water. Record your observations of the ink's movement.
Activity and Instructions	**Follow the instructions below and perform the activity below as may be directed by your teacher.** 1. Feel the temperature of metallic, plastic and wooden spoons. 2. Place them in hot water and feel their temperature after every 2 minutes. 3. Continue for 10 minutes and record your observations. 4. Discuss how heat is transferred in the various materials used. **Be safe!** Do not let the hot water spill over you.
Teaching Resources	Hot water, cups/containers, plastic, metallic and wooden spoons, soup, metallic ladle, pot, ink/food colour
Assessment Task	**Do the following self-assessment task on paper in order to know how much you have learnt.** 1. Explain the difference between conduction, convection and radiation, as they relate to heat transfer.

Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Why do some cooking utensils and cutlery have wooden or plastic-like handles?

Content standard	**B7.4.1.3 Demonstrate understanding of characteristics of light, such as travelling in a straight line, reflection, refraction and dispersion**
What you know already	Learners have discussed light in the primary school.
What you will learn, Skills you will develop	**You will do the following by way of learning** 1. Perform experiments to show that light travels in a straight line. Light can be reflected and refracted. 2. Know how to position a mirror to show reflection of light. 3. Perform experiment to show dispersion of light into colours.
Language and vocabulary you will need to use	Reflection, rectilinear propagation, refraction, glass prism, dispersion, spectrum
Ways to extend your understanding	**Consolidate your understanding of the lesson by doing the exercise that follows. Present a written report.** 1. Watching videos on reflection, refraction and dispersion of light. 2. Reading science journals on reflection, refraction, dispersion of light.
Things you will need to remember for future lessons	**You must remember the following points in order to understand future lessons** 1. Light travels in a straight line. 2. Light can be reflected from shiny surfaces. 3. Light traveling in straight line can bend as it moves through different media. 4. Light can be dispersed into different colours.

Worksheet	**Do the work as shown on this sheet and may be directed by your teacher**



A. Use the diagram above to answer the following questions.

a. What does the diagram represent?

b. What name is given to the object through which the light passes?

c. Describe how this phenomenon is occurring.

d. What real life applications does this represent?

B.

1. Explain why a stick standing in a half-filled bucket of water appears bent.
2. Explain why a flashlight directed onto a mirror at an angle less than 90 degrees throws the light in another direction, but at that same angle.

   a. Represent this scenario with a ray diagram to support your explanation.

3. Consider the scenario where light enters a hole in the roof. Explain why a patch of light appears at a specific point on the floor.

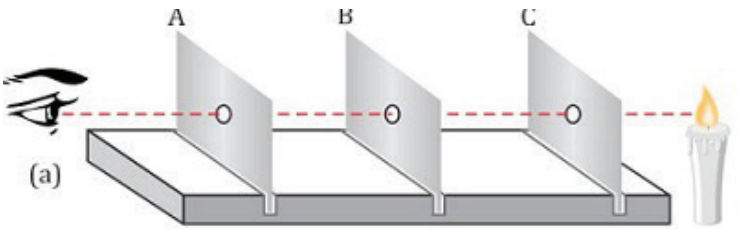
Activity and Instructions	**Follow the procedure below to perform experiment to show that light travels in a straight line**

Procedure:

Arrange the three card boards A, B, and C with a hole in their centers in a straight line by passing a string :

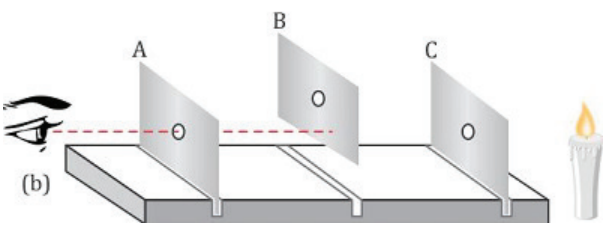
1. Through the holes, as in diagram (**a)** below.
2. Remove the string.
3. Place the source of light behind the first cardboard.
4. Observe what happens.
5. Displace the cardboard **B** slightly so that the card boards are no longer in a straight line as in diagram (**b**).
6. Observe what happens

The experiment below shows how light travels in a straight line:



In the diagram (a) above, the observer can see the candlelight through the holes made on the cardboards A, B and C.

When cardboard B is shifted, the observer can no longer see the candlelight as before. Examine the figure below.



	Discussion The light can be seen through the third cardboard when the cardboards were in line. However, on shifting one of the cardboards slightly, the light is cut off from reaching the observer behind the third cardboard. **Conclusion** This shows that light travels in a straight line.
Teaching Resources	Cardboard, source of light, string/thread, glass prism, stick, flashlight
Assessment Task	**Do the following self-assessment task on paper in order to know how much you have learnt.** 1. Describe a simple experiment to demonstrate that light travels in a straight line. 2. Draw a labelled diagram to show dispersion of light through a triangular glass prism and explain what accounts for the position of the different colours.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Explain the difference between reflection, refraction, and dispersion. 2. Use a ray diagram to show the path of light travelling from air into water.

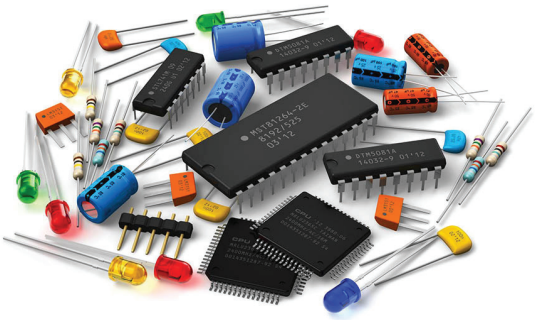
Content standard	**B7.4.2.1: Demonstrate understanding of forms of electricity, its generation and effects on the environment**
What you know already	You have already discussed energy in the primary school.
What you will learn, Skills you will develop	**You will do the following by way of learning** 1. Search for information about the nature of thermal and nuclear electricity. 2. Discuss how thermal and nuclear electricity are generated.
Language and vocabulary you will need to use	Thermal energy, nuclear energy, electricity, environment, hydro, wind power, photovoltaic, reactor
Ways to extend your understanding	**Consolidate your understanding of the lesson by doing the exercise that follows. Present a written report.** 1. Do more research by reading other science textbooks, journals and watching videos on Youtube about the nature of thermal and nuclear electricity and how they are generated.

Things you will need to remember for future lessons	**You must remember the following points in order to understand future lessons:** 1. Thermal and nuclear energy can be used to produce electricity. 2. **Thermal Energy** • Thermal energy is a form of energy that is associated with heat. • All objects are made up of tiny particles called molecules. • In cold things, like ice cubes, the molecules move very slowly. In hot things, like a hot drink, the molecules move very fast. The faster the molecules are moving inside an object, the hotter the object will be. Therefore, hot objects are objects which have high thermal energy.

	3. **How Thermal Energy is Generated** • Thermal Energy is a key source of electricity. Thermal energy can be produced from fossil fuels such as crude oil and gas. • In Ghana the Aboadze Thermal Plant uses crude oil and gas to generate electricity. **4. Nuclear Energy** • Nuclear energy is the type of energy which is produced from atoms of various elements through chemical reactions. • Scientists have learnt to capture energy from the atoms of some elements which can be used to generate electricity. **5. How Nuclear Energy is Generated** • When an atom is split a huge amount of energy is released. This energy is used to generate electricity for industries and homes. • This takes place at nuclear power plants. at the nuclear power plant, the heat from the nuclear reaction is to create steam from water which, in turn, powers electrical generators.
Worksheet	**Do the work written on this sheet as directed by your teacher:** 1. Search for information on thermal and nuclear electricity generation. 2. Draw a table to show the differences between thermal and nuclear electricity generation. 3. Write a one-page report that argues your perspective on the environmental effects of thermal and nuclear electricity generation and how to reduce them.

Activity and Instructions	**Perform the activity below as may be directed by your teacher.** 1. Create posters and leaflets to describe the negative effects of thermal and nuclear electricity generation on the environment.
Teaching Resources	Charts, diagrams, internet, youtube, science textbooks, science journals
Assessment Task	**Do the following self-assessment task on paper in order to know how much you have learnt.** 1. Briefly distinguish between nuclear and thermal energy. 2. Write any two applications of thermal energy. 3. Describe how nuclear energy is generated in your own words.
Homework Task	**Do the following homework and present your answers and findings in writing in your exercise book.** 1. Find information about the generation of thermal and nuclear electricity from teachers, books, internet, and parents (if possible). 2. Which of the two has a greater effect on the environment? Explain your answer.

Content standard	**B7.4.2.2 Demonstrate knowledge of how to assemble and explain the functions of basic electronic components and their interdependence in an electronic circuit.**
What you know already	1. Learners have seen and handled simple machines before
What you will learn, Skills you will develop	**You will learn the following:** 1. Examine electronic components such as types of LEDs, P-N Junction diodes, colour code, resistors and capacitors, and arrange them in an electronic circuit 2. Identify the Positive (P) region and Negative (N) region of the P-N junction diode and construct a simple electronic circuit comprising a 3V battery made of two dry cells in series with a switch and an LED. 3. Explain what happens when the switch in an electronic circuit is closed and opened. 4. Assemble and dismantle spoilt electronic gadgets such as Radio, TV, Mobile phones, Electronic watch and others that can be found in the home and at school and name the parts.
Language and vocabulary you will need to use	Electronic, Diode, Capacitor, Resistor, Inductor, Gadget, Light Emitting Diode
Ways to extend your understanding	**Do the following exercise to consolidate your understanding. Present a written report** 1. Explore the electronic components and engage members of your family to know more about their functions. If there are any questions from the family member, which you cannot answer, ask your teacher.

Things you will need to remember for future lessons	**Facts you need to remember for future lessons** 1. The functions of the basic electronic components: i. LEDs can produce light when current flows through them. ii. Capacitors store electric charges. iii. Diodes allow flow of current in one direction. iv. Resistors regulate flow of current. 2. Current flows in a circuit when the key is closed. Current does not flow when the key is open. 3. If one component is not functioning, it can affect the other components.
Worksheet	The activity on this worksheet should be done as directed by your teacher **1.** Identify the following components in the picture below. Draw their circuit symbols. a. Capacitor b. Resistor c. LED  2. Draw a circuit diagram which would produce light.

	3. Which components do the following circuit symbols represent? a.  b. 
Activity and Instructions	Carry out the following activities and present what you have done on paper **1.** Examine electronic components such as LEDs, P-N junction diodes, colour code resistors and capacitors. Arrange them in an electronic circuit. 2. Explain each component's function in the circuit.
Teaching Resources	Diodes, Capacitors, Resistors, Lead, Wire, Batteries
Assessment Task	**Do the following exercise to assess how much you have learnt** 1. Describe how you will assemble basic electronic components and show how each component functions in an electronic circuit. 2. Discuss how the basic electronic components depend on each other in an electronic circuit.
Homework Task	Do the following homework in your exercise book. **1.** Construct an electronic circuit to create a lantern using a plastic bottle. **2.** Produce an electronic toy using available materials.

Content standard	**B7.4.3.1. Demonstrate understanding of the principle of conservation and conversion of energy and their application in real life situations**
What you know already	You have learnt about energy and various forms of energy.
What you will learn, Skills you will develop	**You will learn the following**: 1. That the numerical value of chemical energy contained in dry cell which changes into electrical, heat and light energy will remain the same. 2. Everyday use of conversion of energy by illustration. 3. Why energy should be conserved.
Language and vocabulary you will need to use	Conversion, transformation, useable, conservation
Ways to extend your understanding	**Consolidate your understanding of the lesson by doing the exercise that follows. Present a written report.** 1. Explore many more ways to conserve energy.

Things you will need to remember for future lessons	You have to remember the following after the lesson to enable you progress in the next lessons: 1. The law of conservation of energy states that energy can neither be created nor destroyed–only converted from one form of energy to another. This means that a system always has the same amount of energy, unless it's added from the outside. 2. Energy conservation also refers to the judicious and wise use of our sources of energy and replacing them whenever possible. 3. Energy comes in different forms. These forms of energy are related. 4. Each can be converted or changed to other forms. Energy transformation refers to the change of energy from one form to another.

Worksheet

Do the work on this sheet as your teacher may direct:

I. Complete the statements below to describe energy transformation in each of the following devices.

1. In a torch, the chemical energy of the batteries is converted into _____ energy, which is converted into _____ energy and _____ energy.
2. In hydroelectric power plants, waterfalls on the turbines from a height. This, in turn, rotates the turbines and generates electricity. Hence, the _____energy of water is converted into the _____energy of the turbine, which is further converted into _____energy.
3. In a loudspeaker, _____energy is converted into _____energy.
4. In a microphone, sound_____ energy is converted into _____energy.
5. In a generator, _____energy is converted into _____energy.
6. When fuels are burnt, _____energy is converted into _____energy and _____energy.

II Copy and write five ways of conserving energy at home or school in the spaces provided.

A. _____

B. _____

C. _____

D. _____

E. _____

Activity and Instructions	**Read and follow the steps to perform each of the activity below:** **Activity 1:** 1. Put batteries in a torch. 2. Switch on the torch and observe what happens to the bulb. 3. Remove one dry cell and repeat the experiment. 4. Observe what happens and explain. **Activity 2:** 1. Turn on a radio. 2. Place your hand on the speaker and observe what happens. 3. Use the concept of energy conversion to explain your observation.
Teaching Resources	Flashlight, batteries, radio
Assessment Task	**Do the following self-assessment task on paper in order to know how much you have learnt.** **1.** Explain the law of conservation of energy with an illustration. **2.** Trace and explain the source of energy from a dry cell to the lighted bulb of a flashlight. **3.** Trace and explain the source of energy from a dry cell to a radio playing music.
Homework Task	Do the following homework and present your answers and findings in writing in your exercise book. **1.** Find information about energy conservation and energy conversion, and explain the scientific principle underlying them. 2. Engage your family and community members to collect their views on how they can conserve energy for future use.

Content standard	**B7.4.4.1 Examine the concept of motion, Newton's first law of motion, magnetic force in relation to Motion and understand their application to life**
What you know already	You know that objects are either at rest or in motion.
What you will learn, Skills you will develop	You will learn: 1. Newton's first law 2. Application of Newton's First Law of Motion around you.
Language and vocabulary you will need to use	Newton's first law, velocity, acceleration, force, reaction force, weight, unbalanced force, motion, inertia, resist motion
Ways to extend your understanding	**Consolidate your understanding of the lesson by doing the exercise that follows. Present a written report.** 1. Apply your new knowledge of Newton's first law of motion to explain movement of things that are happening in and around your environment.
Things you will need to remember for future lessons	**You must remember the following statements of fact to enable you cope with other lessons.** 1. Newton's First Law states that every object continues in a state of rest or of uniform motion in a straight line unless compelled by some external force to act otherwise.
Worksheet	**Copy and determine if the following statements are true or false. By writing T/F against each statement** A. Inertia is the tendency of an object to resist motion. B. Newton's first law of motion is also called the law of acceleration. C. If an object is at rest, inertia will keep it at rest. D. The inertia of an object is determined by its speed.

	E. The speed of an object changes only when it is acted on by an unbalanced force. F. A stationary object resists movement only because of gravity. G. The tendency of an object to resist a change in motion depends on its mass. H. If the net force acting on an object is zero, its inertia is also zero. I. When you are moving at a high rate of speed, inertia makes it hard to stop. J. Newton's first law of motion applies only to objects that are already moving.
Activity and Instructions	**Perform the following activities by following the instructions and write your observations in your exercise book.** 1. Push small and big objects in and around your classroom, or spin boiled and unboiled eggs on a flat surface. Use your observations to explain unbalanced forces and inertia. 2. Give a slight push to metallic balls, a football, round objects on smoothed surfaces e.g. cement floor, assembly ground or whichever is applicable. Use your observations to explain the application of Newton's First Law of Motion. 3. Use a magnet to attract or repel various materials available. Write your observations. Discuss the uses of magnets. 4. Suspend two bar magnets on different threads. Record your observations.
Teaching Resources	Small and big objects, eggs, balls, round objects, bar magnets, threads, metallic and non-metallic substances

Assessment Task	**Do the following self-assessment task on paper to know how much you have learnt.** i. Explain the concept of motion in terms of unbalanced forces acting on an object. ii. State Newton's First Law of Motion and explain its application to everyday life of humans. iii. State some everyday applications of magnets. iv. Explain how magnets cause motion in magnetic materials.
Homework Task	**Do this homework without consulting anybody or book for help** **Circle the letter of the correct option.** 1. Newton's first law of motion states than an object's motion will not change unless A. a force continues to be applied to the object. B. its inertia is stronger than the applied force. C. the net force acting on it is greater than zero. D. the object has no inertia. 2. Overcoming an object's inertia always requires a(n) A. large mass B. massive force C. two of the above D. unbalanced force 3. It is more difficult to start a 50-kg box sliding across the floor than a 5-kg box because the 50-kg box has greater A. inertia B. size C. velocity D. volume

4. Once an object starts moving along a clear path, it would keep moving at the same velocity if it were not for

   A. an unbalanced force.

   B. friction.

   C. inertia.

   D. two of the above

5. An object's velocity will not change unless it is acted on by a(n)

   A. net force.

   B. opposite but equal force.

   C. strong force.

   D. unbalanced force.

6. The direction of a moving object will not change if the net force acting on it is

   A. greater than zero.

   B. less than zero.

   C. two of the above.

   D. zero.

Content standard	**B7.4.4.2 Recognize some simple machines, and show understanding of their efficiency in doing work**
What you know already	You have seen and handled simple machines before
What you will learn, Skills you will develop	**You will learn by doing the following:** 1. List examples of simple machines. Name the types of levers and explain their general functions 2. Classify levers into First, Second and Third classes and demonstrate how the principles involved in each class make work easier in everyday life 3. Explain the meaning of the terms work input, work output and efficiency and show the relationships among them. 4. Explain efficiency of a machine as the ratio of work output to work input expressed as a percentage.
Language and vocabulary you will need to use	Pulley, Lever, Machine, Efficiency, Fulcrum, Force, Weight, Moments, Watts, Work Input, Work Output, Pulley , Lever
Ways to extend your understanding	**Do the following to consolidate your understanding of the lesson. Put your response into writing.** **1.** Explore to classify household tools into the various classes of levers and what efficiency of a machine means.
Things you will need to remember for future lessons	**Facts you need to remember to help you in future lessons** 1. A machine is a tool that makes work easier to carry out. It is an invention which multiplies the effect of human effort. Machine produces a mechanical advantage. Simple machines increase or change the direction of a force. 2. Simple machines can be combined to make complex machines.

Worksheet	**Copy and do the work on this sheet**  1. Look at pictures of the tools on the sheet and explain why the items in the picture are simple machines
Activity and Instructions	**Perform the following activities** 1. List examples of simple machines. 2. Name the types of levers and explain their functions. 3. Classify levers into First, Second, and Third classes and demonstrate how the principles involved in each class make work easier in everyday life. 4. Explain the terms work input, work output and efficiency. 5. Describe how the efficiency of simple machines can be improved.
Teaching Resources	Pictures of and real simple machines
Assessment Task	**Answer the following questions by circling the letter of the correct option** 1. What tool would be best to use to lift a heavy load, like a washing machine? A. Lever B. Screw C. Wedge D. Wheel and axle

2. Which of the two pulleys changes the direction of an input force ?

   A. fixed pulley

   B. movable pulley

3. Which simple machine turns a Ferris wheel?

   A. Inclined plane

   B. Pulley

   C. Wedge

   D. Wheel and axle

4. Which simple machine would stairs be an example?

   A. A lever

   B. A pulley

   C. A wedge

   D. An inclined plane

5. What class of lever does a wheelbarrow operate on?

   A. First Class lever

   B. Second class lever

   C. Third Class lever

   D. wheel and axle

6. A screw is a(n).....wrapped around a central cylinder.

   A. inclined plane

   B. lever

   C. wedge

   D. wheel and axle

7. An elevator has a pulley.

A True

B. False

	8. Which is an example of a wheel and axle? A. Flag Pole B. Hammer C Ramp D Wagon 9. Which of the following describes something simple machines CANNOT do? A. Decrease the force you put in B. Decrease the work you put in C. Increase the force you put in D. Increase the work you put in
Homework Task	**Do the following work at home to consolidate what you have learnt** 1. Explain how levers function as simple machines. 2. Find out why the efficiency of simple machines is less than 100%.

Content standard	**B7.4.5.1 Demonstrate knowledge and skills in handling and maintenance of basic and simple agricultural tools**
What you know already	Learners have seen and handled simple machines before
What you will learn, and the Skills you will develop	You will learn: 1. About the basic farm tools in agriculture. 1. The meaning and importance of handling and maintenance of agricultural tools 2. How to list and match the basic rules in handling and maintaining specific simple tools used in agriculture. 3. How the handling and maintenance of simple and basic agricultural tools are done. 4. How to observe and discuss the handling and maintenance of basic and simple agricultural tools used in farms visited in the community and write a report. 5. How to assemble agricultural tools from the community and practice handling the tools to perform simple agricultural operations. 6. How to assemble agricultural tools from the community and practice basic rules in tools maintenance. Make an album of the activity.
Language and vocabulary you will need to use	Skill, maintenance, tool, community
Ways to extend your understanding	Explore the functions and the maintenance of farm tools

Things you will need to remember for future lessons	Identification of the tools shown in the pictures below. Names of the tools are available in your community. Name the following agricultural tools used by your parents or other community members.  Why you have to maintain farm tools and equipment? Effective maintenance of farm tools and equipment?
Worksheet	**1.** Identify the simple agricultural tools in your community. **2.** Explain how these can be maintained. **3.** Give reasons for the options of maintenance you have chosen.
Activity and Instructions	**1.** Assemble agricultural tools from the community and practice basic rules in tools maintenance. Make an album of the activity.
Teaching Resources	Pictures and realia of simple agricultural tools
Assessment Task	Q1. Which of the following is used for loosening or cultivating the soil around the growing plants and putting a small amount of compost in the soil? A. Hand cultivator B. Hand fork C. Hand spoon D. Hand trowel

2. Hammer is used to draw and remove nails and to drive nails into wood.

   A. True

   B. False

3. Which one is a pair of pliers?

   A 

   B 

   C 

   D 

4. A knapsack sprayer is used for

   A. applying insecticides, herbicides and foliar fertilizers

   B. carrying harvests from the point of production to the market

   C. measuring the height of seedlings

   D. tightening and loosening knots and bolts

5. Seed trays are containers used for raising and growing

   A. flowers

   B. grass

   C. seedlings

   D. trees

6. Farm implements are accessories pulled by draft animals or mounted to machineries that are usually used in land preparation. They are usually made of iron or other metals.

   A. True

   B. False

	Q7. Which one is a sprinkler? A  B  C  D  8. Which of the following is used for hauling and transporting growing media, fertilizers and supply? A. Hand trowel B. Seed boxes C. Sprinklers D. Wheel barrow 9. Explain why basic and simple agricultural tools need maintenance. 10. Describe how the simple agricultural tools mentioned in the question one (1) are handled.
Homework Task	1. Carry out a community survey of farmers to find out how they handle and maintain their agricultural tools.

Content standard	**B7.5.1.1 Exhibit knowledge and skill of scientific basis for management practices of types of waste in the environment**
What you know already	You already know the waste produced in your home.
What you will learn. What skills will you develop?	**You will learn the following:** 1. How to apply information from research on good management practices of waste, to make the environment clean. 2. Think critically and solve problems in group task as you share your ideas with mates. 3. Communicate and work together (collaborate) in learning groups to perform tasks. 4. Use the internet to search for more information related to common deficiency diseases of humans, causes, effects and prevention.
Language and vocabulary you will need to use	Waste Disposal, Refuse, Residue, Metal Scraps, Septic Tank Sludge, Etc.
Ways to extend your understanding	**In order to consolidate what you have learnt you have to use the knowledge to do the following and make a written presentation etc.** You will: 1. Research for information with your mates on good waste management practices and use it to carry out a project to make your environment clean. 2. Write a report for presentation on the outcome of the project carried out. 3. Discuss the types of waste generated in your community or in some communities in Ghana. 4. Discuss how to manage types of waste and explain the science underlying it.

Things you will need to remember for future lessons	**Brief statements of essential points you must remember for subsequent lessons** A. Methods of waste management practices 1. Landfill, a process of waste disposal that focuses attention on burying the waste in the land. 2. Incineration or combustion is a type disposal method in which municipal solid wastes are burned at high temperatures so as to convert them into residue and gaseous products. 3. Resource recovery is the process of taking useful discarded items for a specific next use. These discarded items are then processed to extract or recover materials and resources or convert them to energy in the form of useable heat, electricity or fuel. 4. Recycling is the process of converting waste products into new products to prevent energy usage and consumption of fresh raw materials. Recycling is the third component of Reduce, Reuse and Recycle waste hierarchy. 5. Plasma gasification is another form of waste management. Plasma is a primarily an electrically charged or a highly ionized gas.
Worksheet	**Do this work as indicated on the worksheet and as may be directed by your teacher** 1. Conduct a community survey and record how waste is generated and managed in a few households. Collect data daily for a period of at least 7 days. 2. Analyse the results to determine the most common waste management methods choices used amongst those households. 3. Use scientific reasoning to suggest improved waste management practices.

Activity and Instructions	**Read the instructions below and carry out the activities:** **Activity A** 1. Observe pictures and videos. 2. Analyse issues related to waste management practices. 3. Communicate your ideas in class presentations. 4. Make a poster to show waste management practices. **Activity B** 1. Observe your home and write the types of waste you see generated and describe how the waste could be managed.
Teaching Resources	Internet search Environmental Science Textbooks Environmental Protection Agency (EPA) websites Non - Governmental Organisations in environmental research. LCD Projector
Assessment Task	**Perform the exercise that follows to assess how much you have learnt: All your response must be written down in you exercise book** 1. Analyse the waste management practices employed in your school or community. 2. Explain the scientific basis of those practices.
Homework Task	**Copy the following in your exercise book and write your answers in the spaces provided as your homework** 1. What is waste? _____ _____

2. Where does waste come from?

3. What are some of the types of waste generated in Ghana?

4. Are there ways you can reduce your waste at home? If so, how?

1. What is waste?

5. Make a poster to show waste management practices they can adopt to keep their environment clean.

6. Write a plan to practice waste management and write a report of your practices.

Content standard	**B7.5.2.1 Demonstrate knowledge of common deficiency diseases of humans, their causes, symptoms, effects and prevention**
What you know already	You already know that we eat different foods every day and whenever we are hungry, we become weak.
What you will learn. What skills will you develop?	**You will Learn/do the following:** 1. Relationship between food nutrients and common deficiency diseases and how they affect humans. 1. Solve problems in group task as you share your ideas with mates. 2. Communicate and work together (collaborate) in learning groups to perform tasks. 3. Use the internet to search for more information related to common deficiency diseases of humans, causes, effects and prevention. 4. Observe sample foods 5. Analyse issues on food related diseases 6. Communicate your ideas in class presentations 7. Design a Pocket Guide to promote healthier choices when eating fast food. You will lay out your design in a format that could be printed as a small pamphlet.
Language and vocabulary you will need to use	Nutrients, Carbohydrates, Protein, Fatty Acids, Vitamins, Deficiency, Symptoms, Rickets, Scurvy, Kwashiorkor.
Ways to extend your understanding	**You must perform the following exercises to consolidate your understanding of what you have learnt etc.** 1. Write down the names of foods you know or eat. 2. Search and discover new information you will use to discuss and make presentations on deficiency diseases associated with lack of food nutrients such as carbohydrates, proteins, fatty acids, vitamins and others in the human body.

	3. Relate the nutrients you gain or lack, from the foods you normally eat. Put everything into writing for presentation 4. Connect prior knowledge of deficiency diseases and explain symptoms, effects and prevention of common deficiency diseases such as night blindness, rickets, scurvy, kwashiorkor and others in groups. 5. Relate the knowledge of food nutrients to everyday life to understand why people suffer from deficiency diseases.
Things you will need to remember for future lessons	**Brief statements of essential points that you must remember:** 1. Nutrients are substances in food that the body uses to function properly and provide energy or help form body tissues and are necessary for life and growth. 2. Deficiency disease is the lack of particular nutrient in the diet of humans. 3. Carbohydrates (nutrient that gives us high amounts of quick energy). 4. Fats (nutrient that gives us stored energy). 5. Proteins (nutrient that builds muscle and bones). 6. Vitamins (nutrient that helps regulate body processes) Minerals (nutrient essential to growth and metabolism) 7. Water (essential for digestion, respiration, carrying nutrients and oxygen). **The effects of lack of vitamins and mineral salts are the following**: 1. Vitamin A – Night blindness 2. Vitamin C– Scurvy 3. Calcium – Weak bones

Worksheet	**Do the work on this worksheet as your teacher may direct. Present your response in writing:** 1. Assume the role of a dietician. What advice will you give to a group of people who need education on food nutrients to avoid common deficiency diseases? Your advice should include types of food nutrients, deficiency diseases, their symptoms, effects and prevention.
Activity and Instructions	**Carry out the following activity and record your findings:** 1. Name one of your favourite meals. 2. Identify the nutrients that can be found in the meal [You may use food test, search for information from the net, people in your community, books etc.
Teaching Resources	Food Samples: Rice, Gari, Groundnuts, Beans, Fish, Water
Assessment Task	**Do the following exercise to assess how much you have learnt:** 1. Name common deficiency diseases 2. Describe the causes, symptoms and effects 3. Explain how they can be prevented

Homework Task	**Do the following task as homework and as directed by your teacher:** 1. Write the nutrients found in the food you ate at school during lunch. 2. Under each nutrient, write as many good sources of the nutrients. 3. Create a table to show your response. 4. Design a Pocket Guide to promote healthier choices when eating fast food. Lay out your design in a format that could be printed as a small pamphlet. Your goal is to select menu items that have the highest nutritional value and are appealing to teenagers.

Content standard	**B7.5.2.2 Demonstrate knowledge of the nature of selected viral, diseases of humans, their causes, symptoms, effects and management**
What you know already	You already know about the novel Corona virus disease.
What you will learn. What skills will you develop?	**You will learn the following:** 1. Viral diseases such as COVID-19, Ebola and H1N1 disease. 2. Mode of transmission of the COVID- 19, Ebola and H1N1. 3. Symptoms, effects and prevention of COVID- 19, Ebola and H1N1. 4. The role of individuals, community members and government officials in managing these diseases. 5. Develop the skills of searching for information from the internet to learn about the causes of these diseases and ways of preventing them.
Language and vocabulary you will need to use	Corona Virus, Social Distance Protocol, Sanitizer, Quarantine, Symptoms, Management, Ebola, H1N1,
Ways to extend your understanding	**In order to consolidate your understanding of what you have learnt, you must do the following:** 1. Read more about the cases of COVID -19 in different parts of the world and how countries are managing the disease. 4. Read more about the cases of corona virus in Ghana and in other regions. 5. Ways the government of Ghana is using in managing the COVID-19. 6. Read more about Ebola and H1N1 cases in other countries and how it was managed.

Things you will need to remember for future lessons	**Facts you need to remember in order to cope with future lessons:** 1. Corona viruses are a large group of viruses that are common among animals. 2. Corona virus disease is a dangerous disease with incubation period between 4-6 days. 3. Human-to-human transmission of the virus happens when someone comes into contact with the infected person's secretions. Either through a cough, sneeze or a handshake. Hence, the virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission. 4. The virus can also be transmitted by touching something an infected person has touched and then touching your mouth, nose or eyes. 5. Symptoms include, cough, fever, pneumonia, etc 6. Affected persons with severe cases of COVID-19 have difficulty in breathing which may result in death. **The following are preventive measures of COVID-19:** 1. Contact tracing of persons who have come into contact with infected persons. 2. Social distancing of persons. 3. Wash your hands with soap under running water before touching anything including your eyes, nose and mouth. 4. Clean your hands with 68% and above alcohol based sanitizer 5. Cover your mouth and nose when you cough or sneeze with a handkerchief or disposable tissue paper 6. If symptoms persist and become worse than a standard cold, see your doctor.

	Ebola 1. Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever is a severe illness in humans. 2. Fruit bats are ebola virus host. 3. It is transmitted through with the blood, secretions, organs or other bodily fluids of infected fruit bats. Or the blood or body fluids of a person who is sick, or has died from Ebola. 4. Symptoms include: Fever, sore throat, vomiting, diarrhoea, etc. **Preventive measures of Ebola include**: 1. Reducing the risk of wildlife-to-human transmission. 2. Reducing the risk of human-to-human transmission. 3. Contact tracing of persons **H1N1 Viral Disease** 1. The H1N1 virus is made of swine, human, and avian genes that metamorphosed or was transformed in pigs. 2. H1N1 virus was transmitted from animals to humans and spread quickly because humans had no immunity to it. **Symptoms include:** Fever, cough, sore throat, runny nose, diahorrea, etc **Preventive measures of H1N1include:** 1. Reducing the risk of wildlife-to-human transmission. 2. Reducing the risk of human-to-human transmission. 3. Contact tracing of persons

Worksheet	**Do the work as presented on this worksheet as your teacher may direct** 1. Investigate the causes of the following diseases: • COVID- 19 • Ebola • H1NI. 2. For each of these fatal diseases, write down the symptoms. • Write a report about ways to manage these diseases from spreading.
Activity and Instructions	**Read and carry out the following activities and present a written report on each:** 1. Find information of COVID-19, Ebola and HINI viral disease. 2. Find information of the causes, symptoms and prevention of these pandemic diseases. 3. Find out the role of individuals, community member, the government, health and public health workers in preventing and managing these diseases.
Teaching Resources	Videos, pictures, textbooks, internet, CNN news.
Assessment Task	**Do the following to assess how much you have learnt:** 1. How do people become infected with the following disease: Corona Virus (COVID-19), Ebola and H1N1? Write a sentence each as your response for the named diseases. 2. What happens to a person, body if it is infected with COVID-19? 3. Which of the body parts become affected when it is detected that a person has corona virus disease?

Homework Task	**The following are tasks you will do as homework as your teacher may direct.** 1. Write down the viral diseases that are pandemic in nature. **2**. Write the name of the viral disease that is epidemic in nature. **3** Describe the symptoms, effects and prevention of COVID-19), Ebola, and H1N1 diseases and write why they are declared pandemic and epidemic? **Project Work**: **1**. Design a viral response health guide to promote healthier living free of viral infections from person to person, community to community and from country to country.

Content standard	**B7.5.3.1 Realise how careers in science can improve life of humans and research about Ghanaian and internationally recognized scientists and science educators and model after them.**
What you know already	You already know some of the careers in science.
What you will learn. What skills will you develop?	**You will learn the following:** 1. You will discover and explain how careers in science can improve human conditions and relate these careers to the work of great national and international scientists and science educators.
Language and vocabulary you will need to use	Pharmacist, Pilot, Electrical Engineer, Research Scientist, Biologist (Ecologist, Zoologist, Botanist, Entomologist, Etiologist, etc.) Chemistry (Forensic Scientist, Geochemist, Hazardous Waste Chemist, Material Scientist). Physics (Laser Engineer, Systems Analyst, Software Engineer).
Ways to extend your understanding	**In order to extend your understanding of what you have learnt do the following:** 1. Write the type of career you wish to take up in future. 2. Describe the various careers in science and relate them to the work of national scientist E.g. Prof. Ibok Nsa Oduro, Prof. Francis Allotey, Professor Ewurama Addy, and Science Educationists: Professor Anamuah-Mensah, Professor Theophilus Ossei-Anto, Professor Christian Anthony-Krueger and others. 3. Describe various careers in science and relate them to the work of international scientists: Albert Einstein, Alexander Fleming, Charles Darwin, Paul Ratnei, Stephen Hawkins etc through group presentations.

	4. Explain the impact of science, technology and innovation in homes, schools, communities and the universe and research for information to build portfolios. 5. Identify the science and technology careers that Ghana must focus on and explain your reasons. 6. Some careers in science are medicine, pharmacy, teaching, etc. You can become a Meteorologist, Astronomer, Electrician, Hydrologist, Food Technologist, Pilot, Climate Change Analyst, Environmental Scientist, etc. Search for more careers using the internet. 7. Relate the lesson to everyday life to understand why Ghana should focus on specific science and technology careers.
Things you will need to remember for future lessons	**Facts you need to remember in order to cope with future lessons:** A. Diverse careers exist with the science field ranging from medicine, engineering, etc. B. The following is a list of some national scientists / science educators and their works: 1. Professor (Mrs.) Ibok Oduro is a Professor of Postharvest Technology at the Department of Food Science and Technology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. 2. Professor I. Oduro has over 20 years of practical and theoretical experience in food processing, postharvest management, value addition, product development, and sensory analysis. 3. Professor Anamuah-Mensah is an excellent researcher and has published widely in the area of learning, teacher education and indigenous knowledge systems.

	4. Professor Jophus Anamuah-Mensah is the Executive Chair of the Teacher Education in Sub-Saharan Africa (TESSA), a programme that has, in collaboration with Open University of UK and over 100 African educators, produced free study units that are improving classroom practice across thirteen different countries. 5. Professor Christian Anthony Kruger is a science educator who has lectured at the Department of Science Education, University of Cape Coast is the Science Panel Chair leading the development of the Standards-Based Science Curriculum for both the Primary, Junior and Senior High School in Ghana. 6. He is also being engaged in a lot of international consultancies and also supervises research projects related to science education (Effectiveness of 3E and 5E conventional approaches of teaching on student achievement in high school biology). 7. Use the net to search for the work of international scientists. 8. The impact of Science and Technology is great. Scientist have developed a lot of products ranging from medicine, cars, electronic products, etc.
Worksheet	**Do the work as shown on the worksheet as your teacher may direct:** 1. Investigate information about a national or international personality in science or science education. Write a one-page report about their work and achievements.

Activity and Instructions	**Read the activities listed below, carry them out and write a report on each of them:** 1. Investigate the impact of science, technology and innovation in your homes, schools, and communities. 2. Build a portfolio of a number of the renowned national and international personalities in science-related fields. 3. Discuss any science-related careers that you are interested to pursue in the future.
Teaching Resources	Videos, pictures, textbooks, internet
Assessment Task	**Carry out the task below by way of assessing how much you have learnt in the lesson:** 1. Mention the names of science or science-related programs and describe how these careers can improve the lives of humans 2. Identify a Ghanaian or international personality in any of these careers in science and science education. Describe their contributions to development and explain why you want to model after them.
Homework Task	**Do the following homework as your teacher may direct.** 1. Name and write five science related careers you can identify in your community. 2. Write the impact of the careers you have named to your community. 3. Design a Career Brochure to showcase five more careers that you think Ghana can focus on to improve science, technology and innovation.

Content standard	**B7.5.4.1 Demonstrate understanding of sustainable energy choices and their impact on the environment**
What you know already	You have already seen solar panels from textbooks.
What you will learn. What skills will you develop?	**The following are what you will do by way of learning:** 1. You will search for information on ways sustainable energy choices and scientific ideas are used to protect the environment. 2. You will: i. Think critically and solve problems in group task as you share your ideas with mates. ii. Communicate and work together (collaborate) in learning groups to perform tasks. iii. Use the internet to search for more information related to energy choices, green house effects, climate change, etc. **Subject-specific skills you will develop are:** i. Observing pictures and videos. ii. Communicating your ideas in class presentations. iii. Designing a project on your own.
Language and vocabulary you will need to use	Green House Effect, Climate Change, Carbon Dioxide, Weather, Climate, Adaptation, Mitigation, Sustainable Energy, Environment, Scientific Process,
Ways to extend your understanding	**Carry out the following exercise to extend your understanding of what you have learnt:** You should: 1. Describe how people use sustainable energy choices and scientific ideas to protect the environment in a group discussion.

	2. Analyse the greenhouse effects and climate change on the environment and show how their effects can be minimized, by using the internet and other relevant learning resources. 3. Explain concepts such as weather and climate and relate to the current changes in weather. 4. Connect prior knowledge on sustainable energy choices to discuss on "greenhouse effect and me", to show linkages to the roles you need to play to sustain the environment.

Things you will need to remember for future lessons	**Brief statements of essential points that you must remember** 1. To make good energy choices there are three options you must consider a. Keep Ghana Self-Reliant and Stable. b. Take Local Responsibility for Clean Energy. c. Find Ways to Use Less Energy. 2. The major greenhouse gases are water vapour, carbon dioxide (CO_2), methane (CH_4), chlorofluorocarbons (CFCs) and hydrogenated chlorofluorocarbons (HCFCs), tropospheric ozone (O_3), and nitrous oxide (N_2O). 3. The term climate change refers to significant changes in average weather patterns (i.e precipitation, temperature, wind and other indicators) that persist within a climate system, caused directly or indirectly by human activities. 4. Adaptation involves modifying our decisions, activities and ways of thinking to adjust to a changing climate. 5. Mitigation aims to reduce the causes of climate change. It is designed to reduce greenhouse gas emissions at the source or to support "sinks" that absorb or eliminate greenhouse gases. 6. Use the net to search for information on greenhouse effect, climate change, climate and weather for more ideas.
Worksheet	**Do the work as shown on this sheet and as may be directed by your teacher:** 1. Explain some of the causes of climate change. 2. How would you advise the people in your community to adopt sustainable energy use? Write your response in the form of a letter to the District Chief Executive (DCE).

Activity and Instructions	**Carry out the following activities to consolidate your understanding of the lesson:** 1. Conduct a community survey on energy choices amongst a few households. Record the energy choices of each household visited. 2. Analyse the results to determine the most common energy choices used amongst those households. 3. Use scientific reasoning to suggest energy-saving methods for protecting the environment.
Teaching Resources	Videos, Pictures, Textbooks, Internet, Local Materials for Projects (Plastic Bottles, Etc.)
Assessment Task	**Do the Task below to assess how much you have understood what you have learnt:** 1. Describe the type of energy you will prefer to use in daily life. Give reasons for that energy choice by considering its impact on the environment.
Homework Task	**Do the following as homework** A. Explain the following terms: 1. Sustainable energy choice 2. Green house effects 3. Climate change B. Design a project to show how energy can be locally sustained through the use of scientific processes to protect the environment.

Content standard	**B7.5.5.1 Demonstrate understanding of different plants and animals found in different land forms and how they survive**
What you know already	You have already seen different plants and animals before in your communities.
What you will learn. What skills will you develop?	You will demonstrate understanding of different plants and animals found in different land forms and how they survive You will explain the nature of associations that exist among plants and animals in different landforms and their mechanisms for survival You will: 1 think critically and solve problems in group task as you share your ideas with mates. 2. communicate and work together (collaborate) in learning groups to perform tasks. 3. use the internet to search for more information related to plants and animals in different land forms and the associations they exhibit. **Subject-specific skills:** You will: 1. observe pictures and videos. 2. communicate your ideas in class presentations.
Language and vocabulary you will need to use	Fox, Lion, Tiger, Snake, Deer, Grey Wolf, Predators, Adaptation, Ecosystem, Mutualism, Habitat, Commensalism, Parasitism, Landform, Symbiosis
Ways to extend your understanding	**Your understanding will be enhanced if you do the following:** You should: 1. Identify different types of plants and animals found in different landforms using the internet.

	2. Describe the characteristics that enable different types of plants and animals to survive in different landforms and have learners search for information to find out more about plants living in diverse land forms. 3. Describe the nature of associations such as mutualism, parasitism, commensalism among plants and animals. 4. Explain the effects of the associations and then carry out a research for information about the different ways that different plants and animals survive in the landforms in which they are found.
Things you will need to remember for future lessons	**In order for you to cope with future lessons you should remember the following facts:** 1. Many animals have developed specific structures of the body adapted for survival in a certain environment. Among the structures are the following: a. webbed feet b. sharp teeth c. large beaks, d. wings 2. Parasitism is a feeding association in which one organism (parasite) lives on or in another organism, the host, causing it some harm, and it is structurally adapted to this way of life. 3. Symbiosis is an interaction between two different organisms living in close physical association, typically to the advantage of both. 4. Mutualism is interaction between organisms of two different species in which each organism benefits from the interaction in some way. 5. Tropical regions contain incredible divers species of both plants and animals.

Worksheet	**Do this work as shown on this sheet as your teacher may direct** • Describe any three characteristics of animals found in forest landforms. • Identify an ecosystem in your environment. Determine the associations that exist between plants and animals in it. • Sketch the ecosystem and show how the organisms survive there.
Activity and Instructions	**Carry out the following activities as your teacher may direct:** • Use the internet and science books to identify different types of plants and animals found in different landforms. • Observe the activities that go on among organisms found in different landforms, taking note of the interactions among elements (plants, animals, human beings, etc.)
Teaching Resources	Pictures of plants and animals, videos, textbooks, internet
Assessment Task	**Address the task that follows by way of assessing your knowledge on what you have learnt** 1. Describe structural and behavioural characteristics of plants and animals that enable them to survive in their landform.
Homework Task	**Do this work as homework** How do animals and plants associate in different landforms? _____ _____ _____ _____