Lesson Plan
Basic Science & Technology
Primary 5
One of the biggest challenges Nigeria faces is how to ensure that the tuition provided in schools is of good quality such that pupils’ learning outcomes improves significantly and those who complete primary school possess the requisite competences prescribed in the national curriculum. The current situation in which pupils’ mean score in English, Mathematics, and Life Skills is only 30%-40% is a matter of concern to UBEC and all stakeholders.

To improve mean scores in the core subjects requires significant changes in the way teachers plan and deliver their lessons. It means building the capacity of teachers to make the transition from teacher centred methods to activity-based learner centred approaches. The Literacy and Numeracy Lesson Plans developed by ESSPIN and adapted by the Teacher Development Programme (TDP) seek to facilitate the adoption and use of active learning approaches in our classrooms.

UBEC is delighted to collaborate with TDP to make the Lesson Plans available to schools in all parts of the country. Our expectation is that teachers will adapt and contextualise the Lesson Plans to their local situation and use them to enhance the quality of teaching and learning in the classrooms. As soon as the Lesson Plans are distributed to schools, teachers will be trained to use them as part of the UBEC-funded Teacher Professional Development programme. I must thank DFID/UKAid, ESSPIN and TDP for collaborating with us to improve the quality of teaching and learning in primary schools.

Dr Hamidu Bobboyi
Executive Secretary, Universal Basic Education Commission, Abuja.
6th March 2017
Lesson Plan
Basic Science & Technology
Primary 5
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<td>Effects of family size on nutrition</td>
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Note To The Teacher

The section in each lesson plan called “Background Information” is only for the teachers to read. This is NOT to use with the pupils. Because it is too advanced to teach your pupils. However it will help the teachers to answer some of the children’s questions.

During some activities teachers may be asked to use scissors, or other sharp instruments. Teachers should be very aware of safe practice. Pupils need to be told how to use such instrument in safe way.
# Term 1

## Basic Science

### Difficult words/terms used in this section
(Arranged in alphabetical order)

<table>
<thead>
<tr>
<th>Word/Term</th>
<th>Meaning in English</th>
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<tbody>
<tr>
<td>Constituents</td>
<td>The parts that form something</td>
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<tr>
<td>Control</td>
<td>in an experiment, an object or system that is not changed so that you can compare it with similar objects or systems that are intentionally changed</td>
</tr>
<tr>
<td>Corrode</td>
<td>a metal that slowly changes into another substance, caused by water and oxygen</td>
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<tr>
<td>Danger</td>
<td>Unpleasant things that might happen</td>
</tr>
<tr>
<td>Degradation</td>
<td>Breaking something down into a poorer quality</td>
</tr>
<tr>
<td>Environment</td>
<td>The world around in which we live and work and everything in it</td>
</tr>
<tr>
<td>Erosion</td>
<td>the fact of soil, stone, etc. being gradually damaged and removed by the waves, rain, or wind</td>
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<tr>
<td>Femur</td>
<td>Longest bone in the body found in the upper part of the leg.</td>
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<tr>
<td>Fertilization</td>
<td>When a male cell joins with a female cell and starts to grow. For example, the fusion of the male pollen cell with the female egg cell inside the ovule of a flowering plant.</td>
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<tr>
<td>Health</td>
<td>The condition of the body and the degree to which it is free from illness</td>
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<tr>
<td>Humerus</td>
<td>The long bone in the upper half of the arm.</td>
</tr>
<tr>
<td>Joint</td>
<td>A part of the body where two or more bones are connected.</td>
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<tr>
<td>Landmark</td>
<td>A place or building that is easily recognizable, especially one that you can use to judge where you are</td>
</tr>
<tr>
<td>Lava</td>
<td>Molten Rock in the form of a hot liquid.</td>
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<tr>
<td>Liquid</td>
<td>Substance that flows freely but has constant volume.</td>
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<tr>
<td>Organic</td>
<td>being or coming from living plants and animals: In Chemistry, a substance that contains carbon.</td>
</tr>
<tr>
<td>Pollination</td>
<td>Transfer of pollen grains from the anther of one plant to the stigma of another flowering plant of the same type.</td>
</tr>
<tr>
<td>Pollution</td>
<td>The process of damaging the air, water, or land with harmful substances.</td>
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<tr>
<td>Recycle</td>
<td>Producing useful materials from waste materials.</td>
</tr>
<tr>
<td>Word/Term</td>
<td>Meaning in English</td>
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</tr>
<tr>
<td>Reproduction</td>
<td>The process of producing younger ones in plants and animals.</td>
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<tr>
<td>Slippery</td>
<td>Difficult to hold because it slides easily. Could be wet or smooth etc.</td>
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<tr>
<td>Solid</td>
<td>Firm and in stable shape.</td>
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<tr>
<td>Sticky</td>
<td>Substance that stays attached to a surface it comes into contact with.</td>
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<tr>
<td>Tourist</td>
<td>Someone who is visiting a place for interest or pleasure, usually on holiday.</td>
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<tr>
<td>Waste</td>
<td>Unwanted materials and substances that are left after something has been used.</td>
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</table>
Lesson 1
Environmental Changes

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of erosion
- State two causes of erosion

Teaching aids:

- 2 buckets of water, hand fans
- soil and trays (per groups), pictures or charts showing erosion

Background knowledge:

Erosion is a common occurrence in our localities. In Nigeria, many lives and properties have been lost due to erosion problems in many communities. Common causes of erosion are rainfall, flood events, wind. Also, certain human activities like construction works and bush burning can expose the soil to erosion. A simple definition of erosion is that it is the wearing away of the earth’s surface stone and soil by water, wind and other human activities.

This wearing away of the top layer of the soil exposes infertile sub-soil, thus leading to severe loss of plant nutrients. In extreme situations, water can create big holes in the soil which are known as gullies. Gully erosion is common in areas where there is heavy rainfall like the southern part of Nigeria. In the northern part of Nigeria, where there is high wind, wind causes erosion. One common effect of high wind is the formation of sand dunes.
Step 1: Introduction

Take the pupils outside to an untarred piece of ground in your school compound.

Mark out a certain spot on the piece of soft ground. (If necessary, you may have had to dig to loosen the soil before class!)

Ask a volunteer to pour the bucket of water on the spot from a height of about 5m so that the force of the water can create a hole on the ground.

Ask pupils to observe what happens to the soil.

Show the class a tray of soil which is at an angle. Ask pupils what will happen if the water is poured onto the tray at the top. After several pupils have answered, show them what happens.

Step 2: Main activity

Place pupils in manageable groups depending on your class size (if possible, each group should have a maximum of 6 pupils).

Tell the pupils that in the last activity, they saw erosion caused by water, but now they are going to investigate another type of erosion.

Give each group some soil on a tray.

Ask each group to invent a way of making a little wind that blows over their soil. Tell them if they can control the amount of wind then this will be excellent.

They must find out how much wind is needed to move the soil a little way.

Use questions about the activity to lead the pupils to conclude that the surface of the soil was blown away by air causing erosion.

Explain that the more soil that is washed or blown away from the surface, the deeper the erosion that is caused.
Step 3: Plenary

Display the chart/posters showing types of erosions and ask pupils to describe how each type of erosion was caused (see sample images in the teacher’s note section).

Ask pupils to tell of local examples of soil erosion.

Notes/Handout for the Teacher

**TYPES OF EROSION**

- By the sea
- By the River
- By the Rainwater
- By the Wind
Lesson 2
Environmental Changes

Effects of Erosion

Learning outcome:

By the end of the lesson, pupils will be able to:
List the effects of erosion

Teaching aids:

Pictures/posters of large piece of land, flashcards with the following statements: “crops will grow”, “crops will not grow”, “the soil is good”, “the soil is bad”, “land is good for building”, and “buildings cannot be built on the land”.

Background knowledge

We experience erosion around us. Erosion can have a number of causes, but the effects are usually the same. The most visually noticeable effect is soil damage. Topsoil is very valuable, because it is nutrient-rich and feeds both seeds and plants. The flow of wind or water can remove topsoil leading to the loss of the nutrients and resources. This makes the soil poor and the crops will not grow well. Erosion also makes land unusable and in severe cases, it can cause buildings to collapse. During erosion, soil and sediments can also be washed into rivers and streams, clogging up the habitats of animals that live in the rivers and streams or nearby.
**Step 1: Introduction**

Display the charts/posters used in lesson 1 and ask the pupils to explain the meaning of erosion.

Ask pupils to mention common causes of erosion.

**Step 2: Main activity**

Together with the class, plan a local survey of erosion.

Pupils should work in groups of 6. The basis of the groups is PLACE. All pupils in the same group should live near each other.

The planning will be conducted in school. The actual survey will be conducted outside school around their homes.

Each group has to plan and draw a map of their home area. It should include whatever is within 200-500m of ONE house that they choose as the centre of their map: there might be houses, river(s), trees, fields, hills, shops, workshops. (Pupils can draw their own individual map if they wish)

Decide on a colour to use to shade in areas of soil erosion.

Remind pupils that erosion is the wearing away of the top soil.

At home, investigate the soil around the house and colour in the erosion areas on the map.

Put the picture/posters of land on the chalk board and ask pupils to think about what might happen if the land is destroyed.

Select a few pupils to share their thoughts with the class.

Give each group a flashcard.

Ask pupils to discuss how the land can be affected by erosion in their groups and share their ideas with the general class.

Pupils should choose the correct flashcards with statements that match each picture and give reasons for their choice.

Conclude the lesson by telling pupils that erosion has the following effects:

1. Erosion makes the soil poor and does not allow crops to grow well.

2. Erosion makes land unusable.

3. In severe cases, erosion can cause buildings to collapse.
Step 3: Plenary

Ask pupils to choose a partner for this session.

Ask each pair of pupils to discuss some places where they might have seen some of the effects of erosion in their local communities.

Randomly ask pairs to discuss their answers with the class.

Notes/Handout for the Teacher
Refer to pictures about erosion caused by water and wind in the ‘notes/handout for the teacher’ section of the previous lesson (you can source for more pictures from textbooks if possible).
Lesson 3
Environmental Changes

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of pollution
- List the different types of pollution

Teaching aids:

- Pieces of paper, matches, clean bottle of water and dirt from outside.

Background knowledge

Pollution is the presence in or introduction into the environment of something which has harmful or poisonous effects. This leads to the contamination of the air, water, or soil. These harmful substances introduced into the environment are called pollutants. Pollution can occur naturally, for example through volcanic eruptions, or as the result of human activities, such as the spilling of oil or disposal of household and industrial waste. The types of pollution we have are land, water, air, light and noise pollution.

Common human activities that can cause pollution include littering our environment with household waste, defecating in the rivers and streams, dumping refuse into the rivers/streams, bush burning, using petrol and diesel engines etc. Note that engines burn the fuel to produce water, carbon dioxide (a greenhouse gas), carbon monoxide (very poisonous) and little bits of soot (an irritant).

Did you know that in the next decade many of the world’s largest cities will be in Africa? But water, air and indoor pollution are killing urban residents, and the poor suffer most.
Step 1: Introduction

Show pupils the clean bottle of water. Asks pupils if they can drink this water? (pupils will likely say yes)

Ask pupils to state the reason for their answers and allow pupils time to respond (e.g. they might say it is clean, cold etc.).

Now, add a few drops of a clear liquid to the water. Tell them it might be anything – oil, sea water, goat urine, pesticide chemical - Ask pupils if they would drink it now? Most will say no.

Now put some dirt inside. Ask pupils again if they will drink the water in the bottle (pupils will likely say no).

Now ask pupils to state why they have changed their minds about drinking the water (write their answers on the chalkboard).

Explain to pupils that when water has harmful things in it, it is said to be polluted.

Explain that pollution is when we put harmful materials into our water, land, and air. Tell pupils that we will be learning about pollution in today’s lesson.

Step 2: Main activity

Tell pupils that they will be going outside to observe another type of pollution.

Lead pupils to an open space outside the classroom.

Set the pieces of paper on fire to burn (make sure pupils are at a safe distance as you demonstrate this activity).

Now ask pupils to observe that the burning paper produces smoke, and that the smoke is released into the air we breathe.

Explain that if they stay very close to the smoke, they will begin to cough as a result of the smoke polluting the air they are breathing in.

Ask pupils to suggest the name for this kind of pollution (i.e. air pollution).

If possible, start a car engine and ask pupils what is coming from the exhaust. State that the fumes are very POISONOUS. This is another example of serious air pollution.

Lead pupils back to the classroom.
Write the following statements on the chalk board and ask pupils to discuss with their partners and identify which type of pollution can be caused by each of the listed actions:

1. Burning a piece of paper or cloth outside.
2. Mixing kerosene with water in a small plastic bottle.
3. Throwing rubbish around the environment.
4. Bathing in the river.
5. Relieving oneself on the river bank or in the forest.
6. Playing very loud music.

**Answer cue:**
Answers to the conclusion & assessment activity:

1. Burning a piece of paper or cloth outside (Causes Air Pollution).
2. Mixing kerosene with water in a small plastic bottle (Causes Water Pollution).
3. Throwing rubbish around the environment (Causes Land and Air Pollution).
4. Bathing in the river (Causes Water Pollution).
5. Relieving oneself on the river bank or in the forest (causes water pollution).
6. Playing very loud music (Noise Pollution).
Lesson 4
Environmental Changes

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of water pollution
- List some of the things that pollute water.

Teaching aids:

4 containers/plastic cups of water, sand, tissue paper, any sachet of washing powder/detergent and a small sachet of Milo (chocolate drink powder).

Background knowledge

Water is everywhere around us. 70 percent of the earth surface is covered with water. Without water survival on earth will be difficult. Water can be pure or impure. When water is impure, it means that it has some other substance in it. It may still be safe to drink. However, if the other substance is harmful then the water has been contaminated and thus polluted. Pollution can happen through human activities like dumping human waste in the water, leaving dead farm animals near water, washing clothes with detergent or soap in a river or stream, emptying industrial waste into the rivers/streams, etc. Water can also be polluted when erosion carries harmful substances like pesticides and fertilizer into rivers/streams. It can also be polluted naturally when substances from the land are washed into the rivers. Polluted water is unsafe for humans, animals and plants.

Available from: https://www.google.com.ng/search?q=discarding+industrial+oil+in+Nigeria&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjTs-eR6tvRAhWL2hoKHYM_BYwQAUICCgB&biw=1242&bih=592
Ask pupils to mention 3 uses of clean water. (Expected responses: bathing, drinking, washing, cooking, etc.).

Ask pupils if they will still use the clean water for drinking, bathing, washing, cooking, etc. if they saw a cockroach or ant or very tiny animals inside it (expected answer: no).

Ask pupils to explain why they will not use that water.

Explain that pupils should not use that kind of water because it has become dirty (polluted) and can harm us.

Tell them there are a lot of things that make our water unclean and we will be learning about some in today's lesson.

Place pupils into smaller groups (preferably not more than 6 pupils per group).

Give each group 4 empty cups, bottle of clean water, some tissue paper, washing powder/detergent, sand and Milo (chocolate powder).

Ask each group to nominate a representative for their group.

Ask pupils to put some water in each of the cups.

Ask one of the pupils in the group to add washing powder to the water and let the other group members say if the water is fit for drinking?

In the second cup, ask pupils to add the tissue paper to the water and let it soak for some time.

Put sand in the third cup of water and ask the pupils again if the water with sand and tissue paper is fit for drinking. (Likely answer is no though if sand is pure and settles then water would be fit to drink).

Now ask pupils to add some Milo to the last cup of water.

Then ask if it is fit for drinking? (Likely answer yes)

Ask them to tell the difference between the cup with Milo and the ones with sand, tissue paper and washing powder/detergent.

Explain to pupils that if they drink the water with Milo, it won't harm them, but maybe become sick if they drink the water in the three other cups.

Explain to them that water pollution is said to happen when other substances are in our water.

Conclude your lesson by asking pupils to copy and complete the following notes:

1. When or are mixed with water it cannot be used for drinking. Therefore, we say that the water has been.

2. Polluted water is unsafe because it can make us.

3. Water can be polluted by dumping of human waste in water, dead- in water, washing clothes with - or - in a river or stream, putting industrial – in the river.
Ask pupils to complete the following task in their notebooks:

1. From the list of statements below, underline examples of water pollution:
   i. A child using the stream as a toilet
   ii. Oil spillage in the water.
   iii. Throwing refuse in the football field.
   iv. Putting orange juice into the stream.
   v. Person playing loud music.
   vi. Throwing refuse on the river bank.

Ask pupils to give reasons for their answers.

Provide support for the activity by going round the class to check pupils’ work.

**Answer cue:**
Answers to the conclusion & assessment activity:

1. Burning a piece of paper or cloth outside (Causes Air Pollution).
   i. A child using the stream as a toilet
   ii. Oil spillage in the water.
   iii. Throwing refuse in the football field.
   iv. Putting orange juice into the stream.
   v. Person playing loud music.
   vi. Throwing refuse on the river bank.
Lesson 5
Changes in Plants and animals

Learning outcome:
By the end of the lesson, pupils will be able to:

- Explain the meaning of air pollution.
- Mention some things that pollute the air.

Teaching aids:
Flash cards (2 or 3 sets), chalkboard, chalk, coloured pencils, paper, Basic science textbook.

Teaching aids:
Make 8 flash cards with the following inscriptions for your class activity:
“smoke from factories”, “dust from sweeping”, “smoke from wood fires”, “burning rubbish”, “car fumes”, “bus fumes” “lorries fumes” and “Cigarette smoke”.

Background knowledge

The earth is the only planet we know that has oxygen and water. Without oxygen and water, the earth would be unable to sustain life. Animal and plants need oxygen to survive. We breathe in air which contains oxygen and breathe out carbon dioxide. Air can be contaminated by the presence of harmful substances making it unhealthy for both animals and plants. The contamination of air by these harmful substances is called air pollution. Air pollution includes gases, dust, fumes or odour in harmful amounts. That is, amounts which could be harmful to the health or comfort of humans and animals or which could cause damage to plants and materials. Sources of air pollution include bush burning, burning firewood and refuse, cigarettes, cars, buses, motorcycles, lorries, fumes from industries, etc. Cars, Lorries, buses and motorcycles release carbon monoxide from their exhaust. Carbon monoxide is very harmful to humans, other animals and plants.

Soot particles are also produced during the combustion of petrol and diesel. (An average car produces approximately 2 kilograms of pollution for every 35 kilometres it travels). Air pollution causes acid rains, ozone depletion, climate change etc.

Air pollution from OKORO CHINEDU in Lagos, Nigeria
LAGOS, (CAJ News) – NIGERIA'S Minister of Environment, Laurentia Mallam, has promised to improve environmental health in the country by 50 percent by 2020. “Nigerian citizens deserve air that is clean, water that is drinkable, and land that is safe from contamination,” she said.
Ask if pupils know what smoke is? And what fumes are?

Ask them to mention different things that produce smoke and fumes (e.g. burning firewood and refuse, cars, buses, motorcycles, lorries, and cigarettes).

Tell them that all the smoke released by these different sources into the air causes a type of pollution known as 'air pollution'.

Tell pupils that we will be learning more about air pollution in today's lesson.

Ask pupils to explain the meaning of pollution (i.e. The process of damaging the air, water, or land with harmful substances.).

Exhaust emissions: Place a white sock over the exhaust pipe of a car and run the car for 5 minutes. Stand back while the engine is running. Remove the sock – use gloves as the exhaust pipe will be hot! – and turn it inside out. Discuss with the pupils what they see. How dirty would the sock be after longer periods of time?

Divide the class into smaller groups (preferably groups of maximum 6) and give each group one card from the 3 sets of flashcards you have prepared.

Give each group a flip chart paper or a large plain paper and ask them to draw a diagram of what is written on their flashcards (i.e. cars, buses, cigarettes, etc.).

Allow 10 minutes for pupils to discuss and complete their drawings.

Ask each group to write out the dangers to human health underneath the drawing of the item (e.g. - smoke from cars can cause sickness, cough, give us red eyes etc.).

Ask each group to present their poster to the entire class. Let pupils from other groups ask questions if they have any.

Collect each group’s poster and display around the classroom walls.
**Step 3: Plenary**

Draw the following table on the chalkboard and ask pupils to work with their partners to complete the table below:

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Smoke.</td>
<td></td>
</tr>
<tr>
<td>2. Dust</td>
<td></td>
</tr>
<tr>
<td>3. Fumes</td>
<td></td>
</tr>
<tr>
<td>4. Bad odour</td>
<td></td>
</tr>
</tbody>
</table>

**Answer cue:**
The answer is here for your help:

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Smoke.</td>
<td>Fires, factories</td>
</tr>
<tr>
<td>2. Dust</td>
<td>Wasteland, sweeping</td>
</tr>
<tr>
<td>3. Fumes</td>
<td>Cars, lorries, buses, planes, ships.</td>
</tr>
<tr>
<td>4. Bad odour</td>
<td>Rotting waste, industrial gases</td>
</tr>
</tbody>
</table>
Lesson 6
Environmental Changes

Learning outcome:

By the end of the lesson, pupils will be able to:

- explain the meaning of land pollution
- Mention things that can pollute the land

Background knowledge

Land pollution is the destruction of our land surfaces directly or indirectly as a result of man’s activities and use/misuse of land resources. Land pollution does not only make the land unsafe for living it destroys the beauty of our earth. Common causes of land pollution include dumping of refuse on the land, throwing chemicals on the soil, agricultural practices, mining, and discharge of industrial waste on land. Land pollution can have adverse effect on the health of animals and humans. The harmful chemicals that get into the soil and water can cause cancers, deformities, and skin problems.

Teaching aids:

The school compound.

Ask pupils the following questions:

1. What is the best place for a person to pass faeces (human waste)? (toilet)
2. When there are no toilets, where do people pass faeces? (Any empty space, bush, river, etc.)
3. What is the best place to dump rubbish? (bins)
4. Where do people dump rubbish when there are no bins?

Ask pupils what they think is meant by land pollution. Explain to pupils that the destruction of our land surfaces directly or indirectly as a result of human activities and use/misuse of land resources is known as ‘land pollution’.

Explain to them that when we do not dispose our refuse and human waste properly, we destroy the surface of our land and make it unsafe for living or growing food plants on.

Tell pupils that we will be learning more about land pollution in today’s lesson.

Take pupils for a guided walk around the school compound. They should bring pen and jotter.

Ask pupils to note down what rubbish is lying around the school compound.

Tell them that a pile of rubbish around the school compound is land pollution.

Ask pupils to sniff around the area where rubbish is piled and describe the smell in their jotters.

Ask pupils to also write about how the rubbish looks. How does it make them feel about the place?

Ask pupils to share their thoughts on what they think could happen to someone who lives next to the rubbish (i.e. they can become sick, flies will always perch on them and their food, etc.).

Point out that plastic rubbish, like bags, will lie around for a long time without rotting away.

Now lead pupils back to the classroom.

Ask pupils to discuss the following question with their partners:

What kind of things are dumped around the school compound near your home that can cause land pollution (e.g. plastic bags, glass, broken desks, tables, chalk boards, old books, etc.)?

Take answers from selected pairs and write on the board.

Explain to pupils that all items listed on the chalkboard cause land pollution.

Ask them to mention other things that can cause land pollution outside the school compound e.g. accident vehicles or cars that cannot be repaired, waste from shops, furniture that is no longer use, bits of cloth and plastic etc.

Ask pupils to pick up all the rubbish on the floor of the class and outside the class. Guide them to dispose the rubbish properly into the school’s refuse bin or waste disposal system.
Lesson 7
Environmental Changes

Learning outcome:

By the end of the lesson, pupils will be able to:
State some effects of pollution on water, air and land.

Teaching aids:

2 sets of flashcards (A and B) for each group, cotton wool, plain sheets of paper.

Flashcard content

- Smoke makes us cough
- It has bad effect on the weather
- Inhaling (breathing in) poisonous gas can cause death
- Chemical waste is harmful to humans and fish
- This has made a lot of fishermen jobless
- You can’t use it for swimming
- Flies visit faeces left in the bush
- Old vehicles, refrigerators may injure child if abandoned in play areas
- Refuse dumped at road sides can cause accidents
- Prepare another set (Set B) of flashcards with the following contents:
  - Air
  - water
  - land (make 1 set per group)
Step 1: Introduction

Ask pupils to mention the different types of pollution. (i.e. water, air, land, and noise pollution).

Tell them to mention examples of each type of pollution.

Step 2: Main activity

Air quality

Go outside. Ask pupils to use slightly damp cotton wool or soft tissue paper to gently swab different surfaces 5 times each, such as road signs, leaves on trees, classroom walls, outdoor window panes and so on. This will show how polluted the place is. Ask pupils to stick their swab to a class poster and write the place underneath.

Where are the dirtiest and cleanest places around the school?

Divide the pupils into groups (maximum of 6 pupils per group if possible).

Give a piece of paper to each group.

Draw the following table on the chalkboard and ask pupils to copy the table onto their group’s plain paper:

<table>
<thead>
<tr>
<th>Type of pollution</th>
<th>Cause of the pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air</td>
<td></td>
</tr>
<tr>
<td>2. Water</td>
<td></td>
</tr>
<tr>
<td>3. Land</td>
<td></td>
</tr>
</tbody>
</table>

Give out ‘Set A’ flashcards to each group.

Ask pupils to complete the table by matching the effect written on the flashcards to the type of pollution that produces that effect (You could do one example for them e.g. if something is unfit for drinking then it must be the effect of water pollution).

Ask pupils to discuss the answers to each item on the table within their group.

Allow ten minutes for this activity then stop the class.

Ask each group to present their results to the general class.

Write these results on the table you have drawn on the chalk board.

Conclude by telling pupils that the effects of pollution can be serious for the health of both humans and animals.
Step 3: Plenary

Give each group the ‘Set B’ flashcards

Call out the following randomly and get the group to hold up the right cards

- Dumping of furniture on the road
- Putting kerosene into water
- Washing clothes in the river
- Burning rubbish
- Smoking
- Using the bush as a toilet

<table>
<thead>
<tr>
<th>Type of pollution</th>
<th>Cause of the pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air</td>
<td>Smoking cigarette</td>
</tr>
<tr>
<td></td>
<td>Burning rubbish</td>
</tr>
<tr>
<td>2. Water</td>
<td>Washing clothes in the river</td>
</tr>
<tr>
<td></td>
<td>Putting kerosene into water</td>
</tr>
<tr>
<td>3. Land</td>
<td>Dumping of furniture on the road</td>
</tr>
<tr>
<td></td>
<td>Using the bush as a toilet</td>
</tr>
</tbody>
</table>
Lesson 8
Environmental Changes

Learning outcome:

By the end of the lesson, pupils will be able to:
Mention ways of controlling air, land and water pollution.

Teaching aids:

Water, broom, flashcards (1 set per group) with the following contents:

- Fumes from cars, lorries, motorcycles
- Smoke from cigarettes
- Polluted water
- Building up of rubbish
- People using bushes as toilets
- Dumping things on the roadside

Background knowledge

Pollution result from human activities. We cannot stop all activities because we want to stop pollution but we can control pollution. Pollution control is the process of reducing or eliminating the release of pollutants (contaminants, usually human-made) into the environment.

Some ways through which we can control pollution include dumping refuse into designated dump sites, using refuse bins instead of throwing waste around, using toilets instead of defecating anyhow, avoiding smoking or smoking in designated places, avoiding pouring chemicals such as pesticides or insecticides into water. Most importantly, we should imbibe the culture of recycling.
**Step 1: Introduction**

Ask a pupil to come out and sweep the floor of the class. (the sweeping must be very brief to avoid raising to much dust)

Ask other pupils to observe what happens (there is a lot of dust)

Tell the pupil to stop sweeping.

Ask the pupils how could we reduce the dust

Take several suggestions (and try them out if possible) but then sprinkle some water to wet the floor and ask pupil to resweeps. This shows that we have a way of controlling the amount of dust that goes into the air when we sweep our surroundings.

Tell them that we be learning about how to control air, water and land pollution in today’s lesson.

**Step 2: Main activity**

Play a game of hunt the pollution

One pair of pupils plays against another

Draw a grid on a piece of paper like this:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Secretly, each pair writes in each box either

LP for Land Pollution, or

AP for Air Pollution or

WP for water pollution.

Pair 1 calls out a square, e.g. 1B or 4C or whatever.

They ask pair 2 a question about that kind of pollution – its causes and how to stop it.

If pair 2 answers the question they save the square. If they don’t then that square gets captured and crossed off.

The first pair to get 4 captures in a row wins.

Put pupils into small groups

Give each group of pupils one set of flashcards (see note/handouts section for flashcard contents).

Ask them to put them in a pile on their table.

Ask each group member to take a card and suggest a way they can prevent the pollution written on the flashcard from happening(control).

Get someone in the group to write down the answers in their exercise books.

Continue until all the cards are finished.

After about 10mins take feedback from each group

Draw the table below to record pupils’ correct responses (see answer cue for expected answers):

<table>
<thead>
<tr>
<th>S/N</th>
<th>Pollution</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fumes from cars, lorries and motorcycles</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Smoke from cigarettes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Polluted water</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Building up of rubbish</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>People using bushes as toilets</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dumping things on the roadside.</td>
<td></td>
</tr>
</tbody>
</table>

Complete the table and tell pupils that if these controls are put into place there will be less air, water and land pollution.
Ask pupils to make a list of some of the things that their school can do to reduce air, land and water pollution.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Pollution</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fumes from cars, lorries and motorcycles</td>
<td>Make sure vehicles have good engines. Don’t allow old vehicles on the road.</td>
</tr>
<tr>
<td>2</td>
<td>Smoke from cigarettes</td>
<td>Stop smoking, reduce number bought in the country, and make it very expensive to buy.</td>
</tr>
<tr>
<td>3</td>
<td>Polluted water</td>
<td>Avoid dumping refuse into streams or rivers; fine people who pour chemicals such as pesticides or insecticides into water.</td>
</tr>
<tr>
<td>4</td>
<td>Building up of rubbish</td>
<td>Use proper waste disposal systems to get rid of your waste. Use refuse bins with covers.</td>
</tr>
<tr>
<td>5</td>
<td>Using bushes as toilet</td>
<td>Human waste can be very harmful; always use toilets.</td>
</tr>
<tr>
<td>6</td>
<td>Dumping things on the roadside.</td>
<td>Always use designated waste disposal points to dispose of refuse, always tell you friends or siblings about the danger of dumping things on the roadside.</td>
</tr>
</tbody>
</table>
Lesson 29
Rocks

Learning outcome:

By the end of the lesson, pupils will be able to:

Describe the features of the 3 types of rocks.

Give examples of each type of rock.

Teaching aids:

Examples of local rock, some stones and granite/gravel, chart showing igneous, sedimentary and metamorphic rocks.

Background knowledge

Rocks and stones are naturally occurring solids made up of minerals. Rocks have been used by humans for millions of years, from early tools and weapons through to various construction materials. There are three different types of rocks, grouped on the way they form; igneous, sedimentary and metamorphic. Igneous rocks form when molten rock from inside the Earth is forced to the surface and cools. It is hard. Examples of igneous rocks include granite, basalt, gabbro, obsidian and pumice. Sedimentary rocks are formed when other rocks are broken into pieces by erosion and the small bits are carried and eventually deposited, often as layers at the bottom of lakes and oceans. Examples of sedimentary rocks include sandstone, mudstone, flint, greywacke and chalk. Metamorphic rock is formed when other types are pressed and heated to great temperatures over a long period of time. Examples of metamorphic rocks include marble, quartzite, schist, granulite and slate.

Children may not realise that the ground has a very thin layer of soil or sand with rock underneath that. The rock also lies under the sea bed.

Show a large rock. Ask pupils the following questions:

1. What is this? (Rock?)

2. Where do you find rock? Tell pupils that they are standing on rock, that their house is built on rock, that the lake and sea sits on top of rock.

3. What differences can you observe between rock and soil?

Allow many pupils to respond to these questions.

Explain that a rock is a solid, stony mass which contains minerals and other materials. Tell them we will be learning about the different types of rocks in today’s lesson.

Display a chart showing the different types of rocks on the chalkboard for pupils to see (see sample chart in the “notes/handouts for the teacher” section.

Explain that there are 3 different types of rocks and that they are classified according to the way they are formed (i.e. igneous, metamorphic and sedimentary rocks).

Tell pupils that some rocks are formed when molten magma or lava solidifies. These types of rocks are called igneous rocks. Show pupils the picture of igneous rock and their different kinds using the displayed chart.

Also explain to pupils that another type of rock is formed from particles of sand, shells, pebbles, and other fragments of material. These types of rocks are called sedimentary rocks.

Explain that metamorphic rocks are formed under the surface of the earth from the change that occurs due to extreme heat and pressure (squeezing).

Explain the individual qualities of each of these rocks to pupils (i.e. sedimentary rocks are usually soft and easy to crumble, metamorphic rocks have layers and shiny crystals, while igneous rocks look glasslike and sometimes have bubbles and holes in them).

Display the sample chart in the notes section to show pupils the different appearances of the different types of rocks.

Pupils draw and complete the following table showing examples of the different types of rocks:

<table>
<thead>
<tr>
<th>Igneous rocks</th>
<th>Metamorphic rocks</th>
<th>Sedimentary rocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granite</td>
<td>Marble</td>
<td>Conglomerate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Place pupils in small groups (preferably not more than 6 pupils per group).

Give each group two DIFFERENT rock types. Groups observe the features of the different rocks and write a description of their appearance in their notebooks.

A pupil reads out one description to the class. Other groups must say from the description whether or not they had the same type of rock.

Give feedback on each group’s descriptions – did they mention colour, close-up appearance, weight, hardness etc.
Step 3: Plenary

Take the pupils around the school compound to look out for igneous and sedimentary rock using the chart to guide you (e.g. granite, sandstone).
Lesson 30
Rocks

Properties of rocks

Learning outcome:

By the end of the lesson, pupils will be able to:

- state that rocks have useful properties
- Be able to compare the properties of sample rocks in a fair way.

Teaching aids:

Chalk, chalkboard, chart/poster of rocks, Basic Science text book.

Teacher Preparation:

Source for granites, sand stones and marbles before the lesson.

You may use the chart showing different types of rocks in lesson 29.
Step 1: Introduction

Write the following statements on the chalkboard:

1. Igneous rock
2. Sedimentary rock
3. Metamorphic rock
4. A rock formed from the solidifying of molten magma.
5. A rock that is formed from layering of small pieces.

6. A rock exposed to extreme heat and pressure over time

Display the charts on one corner of the chalkboard.

Discuss with the class which statements match up. Ask pupils to give one example of each type of rock.

Tell pupils that we will be learning about the materials that make up the different types of rocks in today's lesson.

Step 2: Main activity

Take a short walk around the school grounds, pointing out and asking the children to identify objects made from rocky materials (e.g. brick wall, concrete path).

Ask the pupils what materials these structures are made of, what properties they have and what all these materials have in common.

Point out hardness, strength, and inflexibility.

In groups, pupils will hunt for a small rock, a pretty rock, an unusual rock, and a rock with two or more colors. They will place their rocks in a paper or plastic bag as they collect them.

Back in class, pupils will perform the following tests:

Try to to scratch each of their rocks using a finger nail, a coin, and a straightened paper clip. Also, they will attempt to scratch a piece of glass with each rock. They will record their results on the table using yes or no.

Stroke each of their rocks across a concrete or bricksurface to see their rocks' streak. Streak is the color of a mineral's powder. Rocks will streak only if stroked across a surface harder than itself.

Table for results

<table>
<thead>
<tr>
<th>Rock</th>
<th>Fingernail</th>
<th>coin</th>
<th>Paper clip</th>
<th>glass</th>
<th>streak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unusual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 3: Plenary

Complete an example table on the chalkboard.

Ask pupils which of the rocks is hardest and which is softest from these (made-up) results.

Pupils should explain their reasoning for the benefit of others.
Lesson 31
Rocks

Learning outcome:

By the end of the lesson, pupils will be able to:

List some important uses of rocks

Teaching aids:

Chalkboard, chalk, Basic science text book, magazines with pictures.

Teacher Preparation

Determine the number of groups you will divide your class into based on your class size and the available teaching material.

Once decided, make the 2 sets of flashcards (see notes/handouts to the teacher’s section for the contents of the 2 sets of cards). The 2nd set of flashcards should be duplicated such that each group will have one set.

Background knowledge

Rocks have been used by humans and hominids for over 2.5 million years. The first tools were made from stone. Stone is still important in the making of many objects, such as plates, jewelry and toothpaste. Most houses are also built of materials obtained from rocks. Some of the most valuable rocks used in the manufacturing of items include graphite, slate, limestone, gypsum and pyrite. Tools are now made from metals that had been extracted from rocks. Useful rocks are mined; dug up from the ground. Materials that are obtained from mining include gold, silver, iron, coal, uranium, rock salt and potash. In addition, we take important fuels like oil, gas and coal from rock and we also use these substances as sources of important chemicals. Virtually everything in the modern world is made from oil products.

For example, all plastics and other fuels like petrol are oil products.

Step 1: Introduction

Ask pupils to name as many materials (or objects) as they know that began as rock.

Step 2: Main activity

Give a magazine with lots of pictures to each group. Each group must find and cut out 10 pictures of things that are made from materials that were once part of rock.

Put the hint cards on the teacher’s table. One child from each group can look at one hint card if they are unsure.

When groups are finished, each should hold up their pictures in turn. The rest of the class with a show of hands (or not) say whether they agree (or not) with the material being made of rock.

Once every group has held up their 10 pictures for a class vote, have pupils read out the hint cards one by one. Groups use these and the class vote to choose at least 5 of their pictures for the class poster.

Give feedback on each group’s presentation and make relevant corrections. Teacher sticks the pictures on the poster under the title… From Rock.

Draw the table below for pupils to complete:

<table>
<thead>
<tr>
<th>Made with rocks</th>
<th>Made without rocks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tell them that rocks are also used for the following purposes:

1. Building houses.
2. Constructing bridges, roads and railways.
3. Producing cement.
4. Producing paper.
5. Making insecticides
7. Making glass
8. Coating some types of chewing gums, etc.

Ask pupils to copy these uses in their exercise books.
Step 3: Plenary

Ask pupils to mention other uses of rocks apart from the examples given above (e.g. floors, drainage systems, etc.).

Notes/handouts for the teachers
Contents of the hint cards:
Cosmetics were rock, Plastics were rock, Petrol was rock, Buildings were rock, Man-made fabrics were rock, many drugs were rock, Fertilisers were rock, Glass was rock, Cement was rock (& make your own).
Lesson 32
Rocks

Rocks in Nigeria

Learning outcome:

By the end of the lesson, pupils will be able to:

Name some major landmark rocks in Nigeria.
Identify their locations.

Teaching aids:

Pictures of major landmark rocks in Nigeria; chalkboard, chalk, Basic science text book.

Teacher preparation:

Read up on some basic information about the geology and major rocks in Nigeria (where different ones are found, and what are their features).

Background Knowledge

See also http://www.onlinenigeria.com/geology/
Primary 5 Basic Science & Technology

Step 1: Introduction

Place pupils into small groups. Look at the rock types poster from lesson 29. Ask pupils how these three different types of rock were made. Tell pupils that we will be learning about some major rocks in Nigeria in today’s lesson.

Step 2: Main activity

Display the chart/picture showing the different landmark rocks in Nigeria for pupils to see (See pictures in teacher notes). Discuss the shape, location and features of each rock with pupils. Ask pupils if they have ever had any opportunity to visit any of these rocks. Tell them that these rocks are so unique that people (tourists) come from other countries just to see them.

Step 2: Main activity

Place pupils into small groups (preferably not more than 6 pupils per group). Ask pupils to carefully observe all four rocks within the next 3 mins in their groups. Ask them to discuss the pictures with group members and write down something interesting they noticed about each of the rocks on a clean sheet of paper.

Step 3: Plenary

Ask pupils to look at the chart and make a draw the diagram of any of the rocks on the chart. Collect their drawings and display around the classroom walls.

Ask each group to read out their comments. Compare what the different groups have written down and tell pupils that Olumo rock is the largest rock in Nigeria located in Abeokuta, Ogun State. Ask pupils to describe rock formations that they know about that are local. If it is safe to visit any local large rock, the class can be taken to examine the rock close up. It is likely to be cracked (by weather) and may even have smaller pieces that have fallen off. It will also have a covering of weathered rock and perhaps of living plants like lichen. You can scrape this off to show the colour and crystalline structure of the rock underneath.
Notes/handouts for the teachers

Zuma Rock, Madalla, Niger State

Shere Rock, Jos, Plateau State

Kulena Rock, Zaria, Kaduna State

Olumo Rock, Abeokuta, Ogun State
**Difficult words/terms used in this section**  
(Arranged in alphabetical order)

<table>
<thead>
<tr>
<th>Word/Term</th>
<th>Meaning in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat</td>
<td>A form of energy</td>
</tr>
<tr>
<td>Instruments</td>
<td>An indicating device or tool used for doing work</td>
</tr>
<tr>
<td>Substance</td>
<td>Material. Of definite chemical nature.</td>
</tr>
<tr>
<td>Temperature</td>
<td>The measure of hotness of an object.</td>
</tr>
<tr>
<td>Thermometer</td>
<td>An instrument for measuring temperature.</td>
</tr>
</tbody>
</table>
Lesson 1
Technical drawing

Drawing Instruments

Learning outcome:
By the end of the lesson, pupils will be able to:
- Explain the meaning of drawing
- Identify drawing instruments

Teaching aids:
- Drawing board, a complete mathematical set, pen, T-square, and paper or cardboard to draw on, a chart showing various drawing instruments.

Teacher preparation:
- Source for a chart showing the different drawing instruments or make your own using the guide in the teacher notes section.

Background knowledge
You can’t have technology without making something first. And this requires accurate designs to be drawn. It is important therefore that children are exposed to the practice of drawing early enough to enable them to develop the skills of technical drawing. Drawing is a way of making marks to represent an object. This is often on paper though there are many computer programmes that allow designers to draw on screens. Technical drawing uses tools to enhance the accuracy and aesthetics of what we draw. These tools are called instruments. Common drawing instruments are set square, French curve, divider, compass, drawing board, metre rule, T-square, protractor, pencil, sharpener, and eraser.
Primary 5 Basic Science & Technology

Step 1: Introduction

Ask pupils to draw a table and chair quickly. (Most pupils will draw a stick-like object)

Ask them to mention some of the instruments which would make their drawing more exact. (Likely answers: Ruler, Eraser, Sharpener, Pencil, Paper, etc.).

Tell them that we will be learning about technical drawing and the instruments for drawing in today’s lesson.

Step 2: Main activity

Explain to pupils that drawing is a way of representing an object on paper using pencil and other drawing instruments.

Tell them that drawing instruments are tools used in drawing.

Take each of the drawing instruments and show to the pupils.

Call the names of the drawing instruments one after another and let the pupils repeat after you. Refer to the chart as you do so.

Show the class how each instrument is used.

Put pupils into groups.

Give each group 3 different types of drawing instruments (pencil and eraser not included) and a drawing paper.

Ask each pupil to use the drawing instruments to draw a large circle with a triangle on top. Inside the large circle, add smaller circles for eyes, triangle for nose and rectangle for mouth to make a face.

Go around the class and ensure pupils are using the instruments correctly.

Collect each group’s drawings and hang them around the classroom walls.

Step 3: Plenary

Ask the class—
- What instrument was best to use to draw a circle.
- What was best to draw a triangle?
- What was best to draw a rectangle?

As they answer, ask them to identify some of the instruments in the mathematics set. Ensure that pupils are able to associate the correct name with each of the instruments shown to them (e.g. compass, protractor, divider, ruler, set square, etc.).
Notes/Handouts for the Teacher

- Set square
- French curve
- Divider
- Compass
- Protractor
- T-square
- Meter rule
- Drawing board
- Pencil
- Sharpener
- Eraser
Lesson 2
Drawing Instrument

Learning outcome:

By the end of the lesson, pupils will be able to:

- State the names and use(s) of each drawing instrument.
- Draw some objects using some of the drawing instruments

Teaching aids:

Drawing board, a complete mathematical set, pen, T-square, and drawing papers (you can cut cardboard papers to make drawing paper), the chart from lesson 1, a chart showing all drawing instruments and their uses.

Background knowledge

Each drawing instrument is designed for a specific job. The uses of each drawing instrument are given below:

- **Pencil and pen**: For making or tracing lines and curves, and for writing labels
- **Eraser**: For cleaning or rubbing off unwanted parts of a pencil drawing
- **Protractor**: For drawing accurate angles.
- **Pairs of compass**: For drawing accurate curves, circles and for measuring length.
- **Drawing board**: Hard surface for holding drawing papers steady.
- **T-Square**: For drawing horizontal lines and for supporting set squares when drawing vertical and inclined lines.
- **Set Square**: For drawing vertical lines and angles 90°, 60°, 45° and 30°
- **Ruler**: For drawing straight lines and making measurements of length etc.
- **Pair of dividers**: For dividing a straight line into sections of required length and for measuring lengths.
**Step 1: Introduction**

Show pupils the drawing instruments one after the other and ask them to identify each by their name.

Tell them that today we are going to learn how to use each of the drawing instruments properly and accurately.

**Step 2: Main activity**

Explain to pupils that each drawing instrument has its own job to do when we draw.

Show pupils the chart of the uses of each drawing instrument (Notes/ handout for teachers)

Put pupils into groups.

Give each group a set of drawing instruments and a cardboard paper.

Ask each group to make an accurate poster of all the instruments. Each pupil will draw one instrument. The group will share the actual instruments and each pupil will need to choose the right tools for his/her own job. (This task should take at least 15 minutes).

Let each group stick their poster on the chalkboard for the class to see.

**Step 3: Plenary**

Ask pupils to list in their exercise books, the names and uses of the drawing instruments that the group were given.
<table>
<thead>
<tr>
<th>Drawing Instrument</th>
<th>Use(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pencil and pen</td>
<td>For tracing straight lines and curves, and for writing labels.</td>
</tr>
<tr>
<td>Eraser</td>
<td>For cleaning or rubbing off unwanted parts of a drawing.</td>
</tr>
<tr>
<td>Protractor</td>
<td>For drawing angles.</td>
</tr>
<tr>
<td>Pairs of compass</td>
<td>For drawing curves, circles and for measuring distance.</td>
</tr>
<tr>
<td>Drawing board</td>
<td>Surface for placing drawing papers.</td>
</tr>
<tr>
<td>T-Square</td>
<td>For drawing horizontal lines and to support set squares when drawing vertical and inclined lines.</td>
</tr>
<tr>
<td>Set Square</td>
<td>For drawing vertical lines and angles 900, 600, 450 and 300</td>
</tr>
<tr>
<td>Ruler</td>
<td>For drawing straight line and making measurement</td>
</tr>
<tr>
<td>Pair of dividers</td>
<td>For dividing a straight line into sections of required length and for measuring distances</td>
</tr>
</tbody>
</table>
Information Technology

**Difficult words/terms used in this section**
(Arranged in alphabetical order)

<table>
<thead>
<tr>
<th>Word/Term</th>
<th>Meaning in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications</td>
<td>Computer programmes</td>
</tr>
<tr>
<td>Data</td>
<td>Facts or pieces of information in the form of numbers and characters.</td>
</tr>
<tr>
<td>Fluctuation</td>
<td>Irregular rising and falling in the quantity of something.</td>
</tr>
<tr>
<td>Hardware</td>
<td>The physical components of a computer</td>
</tr>
<tr>
<td>Password</td>
<td>A secret word used to access information</td>
</tr>
<tr>
<td>Software</td>
<td>Programs and other operating information used by a computer.</td>
</tr>
<tr>
<td>Ventilation</td>
<td>The provision of fresh air into a room.</td>
</tr>
</tbody>
</table>
Lesson 1

Caring for Hardware

By the end of the lesson, pupils will be able to:

Describe 3 ways of taking care of computer hardware.

Teaching aids:

Flashcards (7) (see handouts for the flashcards), markers, chalkboard, chalk, Information Technology textbook.

Teacher Preparation:

Prepare 7 large flashcards, each on half of one cardboard paper. Each half-card should have one way of caring for computer hardware written on it (see teacher notes for flashcard contents). Select seven pupils (you can do this in secret in order to intrigue the rest of the class later), to memorize the content of one card each before the lesson.

Background knowledge

Computer hardware refers to the physical components of a computer, for example keyboard, monitor, mouse, and printer, Central Processing Unit (CPU). If we take good care of our computer, then it will work for a long time. There are different ways to look after the computer. For example, don’t eat anything while you are working on the computer, don’t keep your computer in the moist temperature, keep magnets away from the computer’s hard-drive etc. System maintenance is also necessary to keep the computer up-to-date, running properly and free of computer viruses.

Drawing and further explanation available from Microsoft at http://windows.microsoft.com/en-us/windows/computer-parts#1TC=windows-7
Step 1: Introduction

Ask the Pupils to name the hardware parts of computer. (Expected answer: Keyboard, Monitor, Mouse and Central Processing Unit)

Ask pupils to describe how they take care of some electrical appliances in their homes e.g. television, radio, cooker.

Make a list of single words on the chalkboard from pupils’ responses which should include clean, cool, dry.

Tell them that today we are going to learn how to take care of the computer.

Step 2: Main activity

Call the 7 pupils to the front of the class. Ask each to guess one way of caring for a computer.

Hold up their flashcard to the class. Be amazed that the first child has ‘guessed’ the contents word for word!

Continue with the other pupils, (becoming more and more amazed each time).

Write the following title on the chalkboard and ask each pupil of the 7 in turn to shout out their way of caring for the computer. Everyone should write down the ‘way’, as shown.

Ways of taking care of computer hardware
1. Place the computer in a clean, cool and dry place
2. Clean the computer regularly
3. Do not place the computer under direct heat or sunlight
4. Do not place the computer in a wet place
5. Do not eat or drink while using the computer
6. Cover the computer when you are not using it
7. Use a surge protector or stabilizer to protect the computer from electrical fluctuation
8. Use an Uninterruptible Power Supply (UPS) to give the computer a few minutes of power in the event of power failure.

Step 3: Plenary

Write the following statements on the chalkboard and ask the pupils to answer true or false in front of each statement.

1. Store your computer indoors and away from the window. (True, False)
2. Leave the computer open and ready for use. (True, False)
3. Balance your drinks carefully on the flat top of the computer. (True, False)
Answer cue:
Answers to the conclusion & assessment activity:

Answer true or false to the following statements:

1. Store your computer indoors and away from the window. True
2. Leave the computer open and ready for use. False
3. Balance your drinks carefully on the flat top of the computer. False

Notes/handouts for the Teacher
Answers to the conclusion & assessment activity:

Notes/Handouts for the Teacher
Card 1 = "I am a computer; always place me in a clean, cool and dry place".
Card 2 = "I am a computer; clean me regularly".
Card 3 = "I am a computer; do not place me under direct heat or sunlight".
Card 4 = "I am a computer; do not place me in a wet place".
Card 5 = "I am a computer; do not eat or drink while using me".
Card 6 = "I am a computer; cover me when I am not in use".
Card 7 = "I am a computer; connect me to a stabilizer or surge protector to protect me from sudden electric power fluctuations".
Lesson 2
Care and Protection of Computers

Learning outcome:
By the end of the lesson, pupils will be able to:
- Describe 3 ways of taking care of the computer monitor.
- Demonstrate how to clean the monitor.

Teaching aids:
Charts, a computer monitor or a non-functional television set, a small piece of clean and soft cloth, an extension box, chalkboard, chalk, Information Technology textbook.

Teacher Preparation:
Prepare 2 charts; chart A should show the basic Hardware parts of a computer (i.e. mouse, monitor, CPU and keyboard), while chart B should show ways of caring for the computer monitor. If your school does not have a computer, you may source for a non-functioning television set (you could discuss this with your local television repairer).

Background knowledge
Your computer’s monitor displays images on it just like television. Because you will be looking at the monitor every time you use your computer, you need to take care of it to maintain its longevity. Ways of taking care of the monitor include: use a surge protector, avoid turning your monitor on and off more than necessary etc.
**Step 1: Introduction**

Display chart A on the chalkboard.

Ask pupils to look at the chart and identify the monitor.

Ask them to mention the function of the monitor. (Expected answer: An output device which shows what we are doing in the computer).

Ask the pupils to mention another home appliance that has a screen. (Expected answer: Television).

Now place the computer monitor or non-functional television (if there is any) in a position that is visible to all the pupils.

Ask pupils how we take care of a screen.

Make a list of pupils’ responses on the chalkboard.

Tell the pupils that today we are going to learn about how to take care of the computer monitor.

**Step 2: Main activity**

Ask the pupils to observe you clean the television or monitor.

Demonstrate how to clean the monitor following the steps below:

1. Unplug the monitor/television from the socket
2. Remove the dust from the vents or holes
3. If you have a dust blower, blow the dust away from the hardware.
4. With a DRY cloth, gently wipe the screen back and forth, not in a circular motion.
5. Stress to pupils that they must not use a wet cloth on an electrical device.

Ask pupils to identify the steps you took in cleaning the television.

Make a list of pupils’ responses on the chalkboard.

Display chart B on the chalkboard

Ask pupils where dust comes from. How can the amount of dust on the monitor be lowered? (Cover)

**Step 3: Plenary**

Select a few pupils one after the order, and ask each of them to mention 1 way of taking care of the monitor.

Listen to pupils’ responses and make corrections where the need arises.
Chart A: Main parts of a computer hardware:

Make Chart B with the following content:

Ways of Taking care of the Monitor
1. Do not touch or tap the screen with pen, finger or any hard object
2. Do not rub hard when cleaning.
3. Do not use paper to clean the screen.
4. Do not stick papers on the screen.
5. Unplug the power supply before cleaning the monitor
6. Clean the screen using a clean and soft cloth.
7. Wipe the screen gently back and forth, not in a circular motion.
8. Wipe off any liquid and other stains immediately.
9. Use care when lifting or moving the monitor.
10. Do not place any objects on top of the monitor which could block the ventilation holes.
11. Periodically remove the dust from the vents or holes around the monitor.
# Health Education

## Difficult words/terms used in this section
(Arranged in alphabetical order)

<table>
<thead>
<tr>
<th>Word/Term</th>
<th>Meaning in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal</td>
<td>A deviation from the normal or usual.</td>
</tr>
<tr>
<td>Communicable</td>
<td>Transferred from one person (or animal) to another</td>
</tr>
<tr>
<td>Contaminated</td>
<td>Polluted or infected by a different material.</td>
</tr>
<tr>
<td>Deficiency</td>
<td>A lack of necessary things; incompleteness; insufficiency</td>
</tr>
<tr>
<td>Disability</td>
<td>A physical or mental difficulty that has to be overcome.</td>
</tr>
<tr>
<td>Disease</td>
<td>An unhealthy disorder, illness or ailment with distinctive symptoms.</td>
</tr>
<tr>
<td>Drug</td>
<td>A chemical substance that interacts with the operations of the body. Often used in the treatment, prevention and cure of a disease.</td>
</tr>
<tr>
<td>Flammable</td>
<td>Easily goes on fire.</td>
</tr>
<tr>
<td>Germ</td>
<td>A micro-organism which can cause disease.</td>
</tr>
<tr>
<td>Infect</td>
<td>To introduce germs into a healthy body.</td>
</tr>
<tr>
<td>Intoxicate</td>
<td>To poison</td>
</tr>
<tr>
<td>Malnourished</td>
<td>Inadequate or faulty nourishment</td>
</tr>
<tr>
<td>Nutrients</td>
<td>Food substances that are essential for healthy life and growth.</td>
</tr>
<tr>
<td>Nutrition</td>
<td>Process of nourishing or being nourished.</td>
</tr>
<tr>
<td>Signs</td>
<td>An indication.</td>
</tr>
<tr>
<td>Symptoms</td>
<td>A sign or indication of something, for example of a particular disease.</td>
</tr>
</tbody>
</table>
Lesson 1
Diseases

Learning outcome:
By the end of the lesson, pupils will be able to:
- Define disease.
- List some common diseases.

Teaching aids:
A dark nylon bag (preferably black), small strips of paper, blank flashcards, chalkboard, chalk, Health education textbook.

Background knowledge
A disease is an unhealthy disorder, illness or ailment with distinctive symptoms. A disease causes changes to the usual workings of the living thing. These changes then show up as symptoms of the disease. For instance, a raised temperature or spots or a bad cough. Some diseases are very serious and if not treated properly and in good time, could cause permanent disabilities or even death. Some examples of important diseases in Nigeria are typhoid fever, cholera, measles, chicken pox, malaria, HIV. Diseases are broadly classified into communicable and non-communicable diseases. (The table available from http://www.aho.afro.who.int/en/atlas/health-status-and-trends/2.3-burden-disease)
Step 1: Introduction

Ask pupils to share their thoughts on the meaning of disease (allow 3 responses).
Ask pupils what causes diseases.

Tell them that today we are going to learn about the meaning of disease and also name some common types of diseases.

Step 2: Main activity

Explain to pupils that a disease is an unhealthy disorder, illness or ailment with distinctive signs (called symptoms).

Give one example – the DISEASE is FLU; the SYMPTOMS are ???? (runny nose, high temperature, aches).

Give each pupil a strip of paper.
Ask each pupil to write down the name of one disease they know on their strip of paper.
Ask a pupil to read out the name of the disease they have written. Write it on the blackboard. Ask all the pupils who had that disease to put their hand up. Count them and add the number to your list.
Ask any pupil with a different disease to give its name. Add that to your list and count the hands.

Continue until all the pupils have been included.
Pupils work in groups of 6. Choose three of the diseases on your list. Together the group create three role plays. In each one, a pupil has the disease and is visiting a doctor to tell him/her about their symptoms. All the pupils should be able to take part in one of the role plays.
Go round the groups and make corrections where necessary.

Explain to pupils that whenever they or their friends/families have any of these symptoms, they should immediately go to the Doctors.
Tell them that, if diseases are not treated in good time, they could cause permanent disabilities or death.
Tell pupils to ask questions about the lesson if they have any.

Step 3: Plenary

Ask pupils to bring out their exercise books and complete the following tasks:

1. What is a disease?
2. List 5 kinds of common diseases you know.

3. What can happen when we touch an object that someone else has sneezed on?

Collect pupils’ exercise books, and review their answers, then make necessary corrections so that pupils who got some answers wrong can be corrected.
Answer cue:
Answers to the questions in the conclusion & assessment activity:

1. A disease is an unhealthy disorder, illness or ailment with distinctive symptoms.
2. Cholera, typhoid fever, tuberculosis, malaria, dysentery, HIV, etc.
3. We can get infected with a disease if they have one.
Lesson 2
Diseases

Learning outcome:
By the end of the lesson, pupils will be able to:
- Identify bacteria & viruses as major causes of diseases.
- List some ways of preventing diseases.

Teaching aids:
Chart, chalkboard, chalk, Health education textbook.

Teacher Preparation:
Source for a chart or make your own chart showing different poor hygiene practices that can spread diseases (e.g., a fly on uncovered food, someone sneezing without covering their mouth, someone drinking dirty river or well water, a mosquito feeding from an arm etc.). You may use the chart in the teacher note section as a guide.

Background knowledge
Diseases can be caused by the environment or by genetics or by pathogens (germs). Germs are so small that we cannot see them with our eyes. They can be identified with a powerful microscope. Germs include bacteria (causing diseases like sore throats, tetanus, cholera, typhoid, salmonella), viruses (causing colds, flu, measles, mumps, polio, hepatitis, AIDS), fungi (causing athletes foot, ringworm and thrush) and protozoa (causing dysentery, sleeping sickness and malaria). Germs thrive in dirty environments and can be passed from one person to another through contact and by vectors such as mosquitoes and fleas. The spread of germs can be controlled by practicing good hygiene, e.g. washing our hands before and after meals, covering our food, covering our mouth when we sneeze, reducing mosquito populations, etc.
**Step 1: Introduction**

Ask pupils to explain the meaning of disease and mention some common diseases. Ask pupils to share their experiences of either having had or seeing another having had a disease, including how the disease was treated.

Tell pupils that we will be learning about the different things that can cause diseases in today’s lesson.

**Step 2: Main activity**

Put pupils in manageable groups. Give each group a page of coloured paper (or a full page colour photo from a magazine). The group have to tear the paper into tiny tiny pieces which will represent germs. Each pupil takes a handful.

The whole class walks around the room and each time they come close to another person they put a piece of their paper on that person’s head, hair or shoulder.

After 5 minutes of this, ask pupils to sit down and by counting the pieces of paper on themselves, work out how many germs they have collected.

Explain to pupils that diseases don’t just happen; they are caused by small microorganisms which we cannot see with our eyes. Tell them that these organisms are known as “germs”. Two major kinds of germs are bacteria and viruses.

Tell pupils that each germ causes its own disease with its own signs/symptoms.

Draw the following table on the chalkboard for pupils to copy and complete in their notebooks:

<table>
<thead>
<tr>
<th>S/N</th>
<th>Common diseases</th>
<th>Disease causing germs</th>
<th>Signs/Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strep Throat (Infection of throat)</td>
<td>Bacteria</td>
<td>Sore throat and fever</td>
</tr>
<tr>
<td>2.</td>
<td>Food poisoning (infection of the intestinal tract)</td>
<td>Bacteria</td>
<td>Nausea, vomiting, and diarrhoea.</td>
</tr>
<tr>
<td>3.</td>
<td>Chicken pox (Disease of the skin)</td>
<td>Virus</td>
<td>Skin rash and fever</td>
</tr>
<tr>
<td>4.</td>
<td>Flu</td>
<td>Virus</td>
<td>Complete</td>
</tr>
<tr>
<td>5.</td>
<td>Complete</td>
<td>Virus</td>
<td>Runny and irritated nose, sneezing, sore throat, cough and general body aches.</td>
</tr>
<tr>
<td>6.</td>
<td>Whooping cough</td>
<td>Bacteria</td>
<td>Severe coughing, chest pain, coughing out blood, and headache.</td>
</tr>
<tr>
<td>7.</td>
<td>Malaria</td>
<td>Tiny animal</td>
<td>Complete</td>
</tr>
<tr>
<td>8.</td>
<td>HIV</td>
<td>Complete</td>
<td>May lead to AIDS which damages many parts of the body</td>
</tr>
</tbody>
</table>
Step 2: Main activity

Explain that germs thrive (grow well, increase) in dirty environments and can be passed from one person to another.

Place the chart on the chalkboard so that all the pupils can see.

Ask pupils to discuss in their groups what they think is happening in each picture and explain how it spreads diseases.

Let several groups come out and make a presentation on their group's ideas.

Make a list of their responses on the chalkboard.

Step 3: Plenary

Read out or write the following questions on the board and ask pupils to write down the correct answers in their exercise books:

1. We can prevent the spread of germs by;
   a) Eating food with our unwashed hands.
   b) Covering our mouth when we cough.
   c) Sharing our toothbrush.
   d) Using tissue paper to clean our dirty plate before using it to eat.

2. Answer True or false to the following questions;
   a) We should wash our hands after going to empty the bin. True/False
   b) Diseases are caused by germs. True/False
   c) Bacteria are the same as viruses. True/False
   d) We can contact diseases by drinking dirty water or eating uncovered foods. True/False
   e) The fastest means by which germs are spread is through our hands; therefore, we should wash our hands thoroughly every time we eat. True/False
Answer cue:

Answers to the questions in the plenary activity:

1. The answer is B "Covering our mouth when we cough."
   a) True
   b) True
   c) False
   d) True
   e) True
Lesson 3
Diseases

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of communicable diseases.
- Mention 3 types of communicable diseases.
- List 2 ways of preventing the spread of communicable diseases.

Teaching aids:

A ball, hand gloves, small petroleum jelly (Vaseline), green paint, soap, water and clean hand towel.

Background knowledge

Some diseases can be passed from one person (or from an animal) to another person. These are communicable diseases. They include diseases passed by sneezing, like flu and colds, passed by animals, like rabies and malaria, passed by touch, like conjunctivitis and leprosy. Non communicable diseases are caused by environment and behavior. Smoking causes lung cancer, pollutants cause many kinds of cancers and other diseases, wrong food causes heart disease and diabetes.

Ask pupils if they have ever heard of communicable diseases. (take responses)

Write the following list of diseases on the chalkboard and ask pupils to circle the diseases that can be transferred from one person to the other:


Tell pupils that we will be learning about communicable diseases in today’s lesson.

Mix a small amount of green paint with the petroleum jelly (e.g. Vaseline) and rub the mixture all over the ball. Tell the class this represents germs.

Ask 3 pupils (A, B, and C) to come to the front of the class for the activity.

Ask pupil A and pupil B to play a game of catch (throwing and catching the ball) for about 30 seconds.

Then ask pupil A and B to show the class their hands (by now their hands should be stained with the green jelly).

Ask pupil C to show the class how he/she could catch the germs from the two infected pupils.

Ask pupils A, B, and C to wash their hands thoroughly with soap and clean water.

Now, place pupils in pairs and ask them to discuss and explain what happened in the activity. Ask a few pairs to explain the activity.

Explain to the pupils that although we can see the green jelly in the activity, we cannot see germs with our eyes unless we use a powerful microscope.

Explain that when we pick up germs, they enter our bodies and cause diseases. Some (e.g., flu, chicken pox, measles, etc.) are passed from one person to the other (through touch, or sharing personal effects such as towels, toothbrushes, handkerchiefs, etc.) with the infected person.

Tell them that any disease that can be passed from one person (or animal) to another is called a “communicable disease”.

Select a few pupils and ask them to explain why the pupil’s hand did not get stained.

Tell pupils that we can prevent the spread of communicable diseases by practicing good personal hygiene.

Ask pupils to list some ways of preventing the spread of communicable diseases. Make a list of their responses on the chalkboard.
**Answer cue:**

Answers to the questions in the introduction
Circle the diseases that can be transferred from one person to the other

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>HIV/AIDS</td>
<td>2. Cholera</td>
</tr>
<tr>
<td>8.</td>
<td>Typhoid fever</td>
<td></td>
</tr>
</tbody>
</table>
Lesson 4
Diseases

Learning outcome:
By the end of the lesson, pupils will be able to:
- Explain the meaning of non-communicable diseases.
- List examples of non-communicable diseases.

Teaching aids:
Flashcard, marker pen, chalkboard, chalk, Health education textbook.

Teacher Preparation:
write in bold "cancer" on a flashcard/cardboard paper.

Background knowledge

Non-communicable diseases are those that are caused by lifestyle or environment or genetic history.

Available from https://www.tes.com/lessons/sT_InZFs9NY1k/g/non-communicable-diseases
They are not caused by infectious agents like germs.
On a flash card, write cancer* and show the pupils. Ask them if they have ever heard of cancer (what causes it? Is it transferrable from person to person through contact?)

Tell pupils that we will be learning about non-communicable diseases in today’s lesson.

Explain that non-communicable diseases cannot be passed from person to person.

Tell pupils that some of the major ways of getting non-communicable diseases are through the use of harmful substances like, tobacco, alcohol, cocaine, etc. Also through poor diet, lack of exercise and by environmental pollutants.

Tell pupils that some non-communicable diseases can also be present in the body of some people from birth.

Ask pupils to give examples of non-communicable diseases they know about (e.g., cancer, diabetes, heart disease, asthma, hypertension, etc.).

Ask pupils to make a disease prevention poster. The poster should name one non-communicable disease, name its cause and include tips on how to avoid it (e.g., cancer—tobacco—stop smoking; diabetes—sweet foods—eat healthy food, high blood pressure—lazy lifestyle—take exercise).

Collect and fix pupils’ posters and paste around the school to remind other pupils and teachers of the need to maintain good personal hygiene.

Write the following summary on the chalkboard and ask pupils to copy and complete it in their notebooks:

1. ........................................ diseases are diseases that cannot be transferred through direct or indirect contact from person to person or animal to person.

2. The following are some causes of non-communicable diseases:
   a. ........................................................................
   b. ........................................................................
   c. Prolonged exposure to environmental hazards (like gas, smoke, etc.).
   d. Abnormal conditions in the body from birth.
   e. Ulcer
   f. s........

3. Examples of non-communicable diseases are:
   a. Diabetes
   b. C........
   c. Hypertension
   d. A........
   e. Ulcer
   f. S........
Term 2

Basic Science
Lesson 9
Reproduction in Plants

Learning outcome:

By the end of the lesson, pupils will be able to:

- Identify parts of a flower
- Draw and label a flower

Teaching aids:

Flower jigsaw showing different parts of the flower.

Teacher Preparations:

Collect some flowers from the school area or from a garden. Make sure that the flowers are as large as possible. What flowers are available depends on the seasons. So it is better to do this topic when plenty of flowers are in bloom.

Background knowledge

How do plants produce their young ones? The flower is the main reproductive unit of some plants. Flowers are made of different parts. The main parts of the flower are petals, stamens, sepals, pistil/carpel and flower stalk/stem. Flowers have male and female parts. The female part of the flower is the pistil. The female part is the pistal which contains the ovary. It often supports a long style, topped by a stigma. The male part is the stamen. It has a slender filament supporting the anther. The anther is the part of the stamen where pollen is produced.
Step 1: Introduction

Ask the pupils to describe a flower that they know.

Ask them where they have seen flowers before (it is likely there might be some around the school).

Show pupils a picture of a flower or a real flower (see notes/handouts for teachers for some pictures of flowers).

Explain to pupils that flowers have different parts which do different jobs and that we will be learning about those parts in today’s lesson.

Step 2: Main activity

Explain to pupils that a flower is the part of a plant that produces seeds which will grow into new plants.

Use a real flower if possible. Name each part and remove that part and stick it to a piece of paper and write its name. The parts should be removed from the outside inwards. i.e. petals then anthers still connected to filaments, then stigma, style plus ovary (as one unit), then sepals and stem. Cut one anther open and wipe it with a tissue paper to show the pollen. Cut the ovary open to show the pupils the ovules, usually pale white.

You will have a poster of an exploded flower, as you see in the handouts.

Show the large jigsaw pieces to the children and ask them to draw the whole flower in their book from these pieces.

Put pupils into groups (maximum of 8 pupils per group if possible).

Give each group 2 flowers

Ask each group to look at the flowers and identify the main parts (e.g. petals, stamens, sepals, pistil/carpel and flower stalk/stem)

Take a flower and select a few pupils from the class to identify a part of the flower.

Check pupils’ drawings for accuracy and support them to ensure that all the parts have been labelled correctly.

Step 3: Plenary

Ask pupils to close their notebooks and name the parts shown on the diagram.

If the diagram is on the board rub out the names but if you have the diagram as a chart, cover the names and ask pupils to name its parts.
Notes/handouts for the Teacher

[Diagram of flower parts: petals, stigma, style, ovary, ovule, anther, filament, stamen, receptacle, sepal.]

[Diagram of flower parts labeled: pistil, stigma, style, ovary, ovule, petals.]
**Lesson 10**

**Reproduction of Plants**

**Learning outcome:**

By the end of the lesson, pupils will be able to:

- Explain the meaning of pollination
- Identify the male and female parts of a flower.

**Teaching aids:**

Flashcards (see notes/handouts for teacher section for flashcard contents), a chart showing parts of a flower.

**Teacher Preparations:**

Write the following words on the chalkboard before the lesson begins: bark, stamen, root, sepal, shoot, petal, leaves, flower stalk and flower stick. Get pupils to bring in some real flowers before this lesson (you should bring some flowers too).

**Background knowledge**

Every living organism produces offspring for the next generation. Plants produce seeds which grow into a new plant. The first step in making seeds in a flower is to transfer pollen from anther to stigma. This transfer is called pollination. Pollination is aided by moving animals or by wind.

Some insects (like bees) and birds fly from flower to flower collecting sweet nectar. Pollen sticks to their bodies and is carried to other flowers. There, some might be brushed onto stigmas. Sometimes the wind blows the pollen from anther to stigma.

Once on the stigma, the pollen must somehow reach the ovule to join with and fertilise it.
**Step 1: Introduction**

Ask pupils to recall the last lesson. Select pupils to take turns and identify the parts of a flower. Distribute the flowers to the pupils

Ask pupils to look closely at the inside of the flowers. (There may be some insects in there). Ask them to share their thoughts on why insects like bees go to flowers. Explain to the pupils that insects and other animals come to flowers looking for food.

**Step 2: Main activity**

Take a flower and remove the anther. With a pin, scrape some of the pollen onto a white paper. Ask pupils what the grains are. If you have a magnifying glass, let pupils see the very small grains. State that the anther is the male part of the flower that produces pollen. Ask the pupils where the main female part of the flower is. Remove the stigma and show it to all.

Select pupils to model how pollination takes place. One will represent the anther and will hold the ‘anther’ flash card. Give this pupil some pebbles – ask the class what they represent (pollen).

Place the pollen flashcard on the pebbles. Another pupil will represent the stigma and will hold the ‘stigma’ flashcard. Ask volunteers to show by role-play how pollen can move from anther to stigma. (Some must act as small animals or insects or birds, coming to the flower to feed).

Explain that the transfer of pollen grain from the anther to the stigma is known as pollination. Tell pupils that some pollen is very light. Replace the pebbles with a small amount of flour. Ask pupils how light pollen can move to the stigma now. (Demonstrate by blowing the flour from the anther’s hand to the stigma).

**Step 3: Plenary**

Write the sentences below on the chalkboard and ask the pupils to fill in the gaps with the words from the flash cards in their exercise books.

1. The main male part of the flower is called __________________________

2. The main female part of the flower is called __________________________

3. The anther contains __________________________

4. The transfer of pollen from the anther to the stigma is known as __________________________

5. Two ways that pollen is moved are
   
   a) __________________________
   
   b) __________________________
Notes/handouts for the teachers

Contents of the flashcards to be prepared for this lesson:

- Pollen
- Anther
- Stigma
- Pollination

Refer to the chart of a flower in the notes/handouts for the teacher section of the previous lesson (lesson 9).
Lesson 11
Reproduction in Plants

Learning outcome:

By the end of the lesson, pupils will be able to:
- Identify the different types of pollination
- Explain how each type of pollination occurs

Teaching aids:

Pupils, chalkboard, chalk, and plain sheets of paper.

Background knowledge

Pollination happens when pollen is transferred from anther to stigma. There are two types of pollination, self-pollination and cross-pollination. Self-pollination occurs when pollen is transferred from the anther to the stigma of the same flower, or different flowers on the same plant. Cross-pollination occurs when pollen is transferred from the anther of one flower to the stigma of a flower on a different plant.
Ask pupils to work in pairs

Write the following sentences on the chalkboard and ask pupils to discuss with their partners whether they are True or False:

1. The male part of the flower is called stigma
2. The anther contains pollen
3. The female part of the flower is called anther
4. The anther transfers pollen to the stigma

Ask some pairs to share their answers with the class. Correct wrong answers.

Tell pupils that we will be learning about the types of pollination in today’s lesson.

Review the concept of pollination with pupils by explaining that pollination is the process of moving pollen grains from the anther to the stigma of flowering plants.

Explain that it is important for plants to reproduce because all living things depend directly or indirectly on plants for food.

Now ask three pupils to volunteer for a class activity.

Explain that each volunteer will represent a flower. Label the volunteer pupils as flower ‘A’, flower ‘B’ and flower ‘C’. Flowers A and B stand in one circle that you chalk on the floor. Call this circle PLANT ONE. Flowers C and D stand in a second circle chalked on the floor. Call this PLANT TWO.

Ask pupils what the anther transfers to the stigma (pollen). Give each flower a handful of pebbles to represent pollen.

Explain to pupils that self-pollination is when the pollen is transferred from anther to stigma of flowers of the same plant. Ask for volunteers to show by using the model what happens during self-pollination.

Explain to pupils that cross-pollination is when the pollen is transferred from anther of a flower in one plant to the stigma of a flower in a different plant. Ask for volunteers to show by using the model what happens during cross-pollination.
Step 3: Plenary

Ask pupils to draw twodagrams to show self-pollination and cross pollination.

Get some of the pupils to share their drawings with the rest of the class.

Give pupils feedback on the activity, collect their drawings and display them around the classroom walls.

Answer cue:

Answers to the question in the introduction [True or False responses]:

1. The male part of the flower is called stigma (False)
2. The Anther contains pollen (True)
3. The female part of the flower is called Anther (False)
4. The Anther transfers pollen to the Stigma (False)
Lesson 12
Reproduction in Plants

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain pollination by an insect.
- Explain pollination by the wind.

Teaching aids:

A chart showing the stages of pollination by insects, flashcards (see notes/handouts for the teacher section for contents).

Teacher Preparations:

determine the number of groups you will be placing your pupils into and prepare one set of flashcards for each group. Each flashcard should contain one statement each from the list in the notes/handouts section of this lesson.

Background knowledge

Pollination happens when pollen is transferred from anther to stigma. Wind pollinated flowers are often small and do not smell nor produce sweet nectar. Grasses and many trees are often wind pollinated. The anthers are normally outside the flower head and exposed to the weather. The pollen is very light and can travel great distances in the air.

Flowers that are pollinated by animals are often brightly coloured and sweet smelling to attract insects etc. They may produce nectar which is stored deep inside the flower head, requiring the insect to brush past the anthers to get at it.

Step 1: Introduction

Ask 3 pupils to volunteer for this class activity. Let one represent the anther, another the stigma, while the third pupil represents a bee. Remind pupils that pollen is usually found in the anther of a flower. Now place a pebble (pollen) on the head of the anther. Ask pupils what the connection is between the three pupils. Now, ask the pupil representing the insect show what he/she does to pollinate the stigma. Tell them that we will be learning more about pollination in today’s lesson.

Step 2: Main activity

Place pupils in manageable groups (preferably not more than 6 pupils per group). Now give each group a set of the flash cards (see teacher notes/handout section for flashcard contents). Ask each group to discuss and arrange the flashcards in the right order to tell a story. (Allow 10 mins for this activity) Use the chart which has the right order to explain each stage to the pupils. Each group corrects their own work. (allow 5 minutes for this activity) Each group now makes up a similar story for wind pollination. Select several groups to tell their story of wind pollination.

Step 3: Plenary

Explain that insects are attracted to flowers because of their often bright and beautiful colours and scent. As insects touch the anther (which is the male part of the flower), the pollen sticks to their body. Ask pupils to guess what might make it stick? The insect then transfers the pollen to stigma (which is the female part of the flower) of the same flower or of another flower as it moves about. With very light pollen, it can be blown by the wind and land on another stigma.
Answer cue:
Below is the correct order in which pollination occurs:
1. Insect visits the flower and touches the anther
2. Insect collects pollen grain from the anther of the flower on part of its body
3. Insect moves about on the flower or flies to another flower
4. Pollen from insect’s body gets attached to the stigma of the flower

1. Pollen is blown from the anther by wind.
2. The pollen flies through the air.
3. The pollen lands on a stigma.

Notes/handouts for the teachers
A set of flashcard will consist of 4 cards and each card will have the following words on it:
Flashcard === Insect visits the flower and touches the anther
Flashcard === Insect collects pollen grain from the anther of the flower on part of its body
Flashcard === Insect moves about on the flower or flies to another flower
Flashcard === Pollen from insect’s body gets attached to the stigma of the flower
To form a seed, the male part of a flower must first join with the female part. Pollen contains the male part. The female egg cell is inside the ovule. When the male and female parts join, we say fertilization has taken place. Fertilization only happens after pollination, after pollen has landed on the stigma of a suitable flower of the same species. A pollen grain on the stigma grows a tiny tube (see next lesson), all the way down the style to the ovary. This pollen tube carries a male nucleus (called a gamete) to meet the female ovule.

In a process called fertilisation, the two gametes join and combine their genetic material. The fertilized cell then contains some material from each parent flower. The fertilised ovule goes on to form a seed, which has a food store for the embryo to grow into a new plant. The ovary develops into a fruit to protect the seed. Some flowers, such as avocados, have just one ovule in the ovary, therefore their fruit only has one seed. Many flowers, such as apples, have lots of ovules in the ovary and their fruit contains many seeds.
Step 1: Introduction

Revise by asking pupils the following questions:

1. What is the name of the male part of a flower? (stamen).
2. The stamen is made up of _________ and _______? (anther and filament)
3. What are the names of the female part of a flower? (ovule, ovary, style and stigma)
4. Where does the pollen grain come from? (Anther)
5. What is pollination?
6. Remind pupils that pollination is the process by which pollen grains are transferred from the Anther to the Stigma of a flowering plant.

Tell pupils that they will be learning about fertilization in today’s lesson.

Step 2: Main activity

Ask pupils if they have ever heard of the word fertilization.

Ask if anyone would like to share where they heard it and what it meant.

Explain that once pollination has taken place, it is followed by a process called “fertilization”.

Tell them that fertilization can only take place after pollination has occurred.

Give a copy of the diagram above to each group.

Ask pupils to discuss the diagram within their groups. Each group must act like a teacher. They need to write out a lesson that can be used to teach another group about plant fertilisation.

Tell pupils to point to various parts of the flower involved in the fertilization process as they teach their lesson.

Allow a few questions from other pupils about each group’s lesson and let the group respond to such questions.

Step 3: Plenary

Select few pupils to explain the difference between pollination and fertilization in flowering plants.
Lesson 14
Reproduction in Plants

Learning outcome:
By the end of the lesson, pupils will be able to:
Explain the difference between pollination and fertilization

Teaching aids:
A4 papers labelled as anther, stigma, insect, ovules, an orange wound with attached string labelled as pollen, and flashcards (see notes section for contents).

Teacher Preparations:
Determine the number of groups you would use for your activities based on your class size. Prepare enough sets of flashcards for the number of groups you have (see note/handouts for the teacher section for the contents of the flashcards). Before the lesson, also label 3 A4 papers as Anther, Stigma and Insect. Then finally, into an orange or lemon, stick the nail with the string. Wind the string around the orange and label it as Pollen.

Background knowledge
Pollination is the transfer of pollen, from the anther (male organ of the flower) to the stigma (female organ of the flower). The pollen is carried by insects and other animals, or by wind or even water.

When the pollen lands on a stigma, it grows a tube down the style to reach the ovary of the flower.

The male cell can then travel down the tube and join with the ovule. This is called fertilization.

The fertilised ovule grows into a seed.

Step 1: Introduction

Divide pupils into small groups (preferably not more than 8 pupils per group).

Give each group some seeds and ask them to discuss for two minutes and say how they think the seeds came about.

Stop the groups after the time given.

Select pupils and ask them to share their answers with the general class.

Tell pupils that in today’s lesson we will be learning about how pollination leads to fertilization which makes seeds.

Step 2: Main activity

Ask 3 volunteers to remind everyone what happens during pollination. Use the A4 labels for anther, stigma and pollen to help them to explain.

Show pupils the orange with its attached string. Tell them it represents one pollen grain.

Put the paper label for ovules on the floor. Hold the orange above it. Ask the question – how can the pollen reach the ovules down there?

Unwind the string so that it ‘grows’ down to the ovules. Tell the class that the pollen grows a tube down to the ovules.

Divide the class into small groups (preferably not more than 6 pupils per group) and give each group a set of flash cards.

Ask pupils to discuss with their group members about the differences between pollination and fertilization.

Draw a table like the one below on the chalkboard and ask the groups to sort the flashcards into the two groups.

<table>
<thead>
<tr>
<th>Pollination</th>
<th>Fertilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td></td>
</tr>
</tbody>
</table>

Complete the table using the correct responses from various groups.

Explain to pupils that pollination and fertilization are parts of the process that makes new flowering plants.

Pollination is the transfer of pollen from Anther to Stigma of a flower. Fertilization is the joining together of the male part of the pollen to the female ovules in the ovary. Let pupils copy the table into their notebooks.

Step 3: Plenary

Ask the pupils to discuss the following statements with their partners and answer True or False.

1. Fertilization takes place after pollination
2. Pollination is the making of fruit and seeds
3. Pollination happens before fertilization
4. Fertilization involves both male and female parts
5. Fertilization involves only female part
Answer cue:

<table>
<thead>
<tr>
<th>Pollination</th>
<th>Fertilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 It takes place on the stigma</td>
<td>It takes place in the ovary</td>
</tr>
<tr>
<td>2 It involves pollen and stigma</td>
<td>It involves pollen and ovules</td>
</tr>
<tr>
<td>3 The pollen is transported to the</td>
<td>The pollen grows a tube to the ovary</td>
</tr>
<tr>
<td>stigma</td>
<td></td>
</tr>
<tr>
<td>4 Pollination is followed by</td>
<td>Fertilization is followed by making seeds and</td>
</tr>
<tr>
<td>fertilization</td>
<td>fruits</td>
</tr>
</tbody>
</table>

Answers to the Conclusion & Assessment activity:

1. Fertilization takes place after pollination (True).
2. Pollination is the making of fruit and seeds (False).
3. Pollination happens before fertilization (True).
4. Fertilization involves both male and female parts (True).
5. Fertilization involves only female part (False).

Notes/handouts for the teachers

Flashcard contents: each flashcard should contain one of the following sentences below (making 8 flashcards in one set). Determine number of groups to be used based on your class size and make one set of flashcards for each group.

1. It takes place on the stigma
2. It involves pollen and stigma
3. The pollen is transported to the stigma
4. Pollination is followed by fertilization
5. It takes place in the ovary
6. It involves pollen and ovules
7. The pollen grows a tube to the ovary
8. Fertilization is followed by making seeds and fruits

You can also put a drawing on the chalkboard like this to help pupils to understand what is happening.
Learning outcome:

By the end of the lesson, pupils will be able to:
- identify features of a good environment
- identify features of a bad environment

Teaching aids:

Chalk, chalkboard, text books, and plain sheets of paper.

Background knowledge

The quality of an environment is determined by the characteristics of that environment. Environmental quality depends on different features of the natural environment such as air and water purity/pollution, noise, land quality and anything else that affects the physical and mental health of human beings. Human activities such as driving cars, playing loud music, burning bushes, felling trees, smoking, throwing waste into streams or rivers, etc., significantly impacts on the quality of the environment. Therefore, there is need to care for our environment by practicing good waste disposal, planting trees, keeping the volume of our music player down, etc.

Discuss the following questions with the class:

1. How many of you have ever been to a city? To a village? To a distant field?
2. If you close your eyes, how would you know if you were in the city or the village or the field?
3. How do these different places smell?
4. If you now open your eyes, what are the big differences between these three environments?

Explain that if an environment has lots of smoke, unclean water, noise etc., we say the quality of the environment is bad. And if the environment has clean water, less smoke, less noise, etc., we say the quality of the environment is good.

Ask pupils to work in pairs to discuss the quality of the environment they live in.

Ask the pupils to open their exercise books and draw a table with two columns. In one column, pupils will write the good features of their environment and in the other column, let them write the bad features.

Now give each pair of pupils a plain sheet of paper.

Ask them to draw a picture to show how one bad feature of their environment can be improved.

Ask a few pupils to share their drawings with the class.

Give feedback on the pupils’ presentation.

Collect pupils’ drawings and display around the class.

Give examples to pupils of poor features of a city environment and ask them how these can be improved (e.g. Heavy traffic, burning rubbish, plastic bags everywhere, rats, cockroaches, stray dogs, noise)

Give examples to pupils of poor features of a village environment and ask them how these can be improved (e.g. Chemical pollution from fertilisers, flooding, smoke from fires, stray animals, rubbish)

Explain that human, plant and animal activities affect the quality of our environment. Therefore, we need to take proper care of the environment at all times.

Ask pupils to mention some ways in which we can improve the quality of our school environment.

Provide feedback on pupils’ responses.

Conclude the lesson by allowing pupils to ask questions about the lesson.
A healthy environment refers to an environment that is free of disease causing things. The quality of the environment that people live in will determine how healthy or unhealthy they will be. For example, clean air is important because we breathe it in all the time. Clean land is important because we touch it and work with it all the time. Clean water is important for drinking, bathing, washing and watering our crops and animals. Pollution of the air, land or water in our environment will affect everyone's physical and mental health. It is important for us to take proper care of our environment if we want to live free from illness and diseases. Globally, almost a quarter of all deaths can be attributed to environmental factors.

World Health Organisation report.
Step 1: Introduction

Ask pupils to describe a healthy person.
Make a list of their correct responses on the chalkboard.

Explain to pupils that when we talk about a healthy environment, we are referring to an environment that is free of things that can cause illness or disease.

Tell pupils that in today’s lesson we will be learning about a healthy environment and its importance.

Step 2: Main activity

Pupils should work in pairs. Give each pair access to a red pen and a green pen.

Write the following list on the chalkboard:
1. Cars and bicycles
2. Rainwater and toilet flush water
3. Aircraft noise and birdsong noise
4. Fire smoke and chimney smoke
5. Plastic bags on ground and metal tins on ground
6. Rats and mosquitos

Ask pairstodiscuss the good and bad features of the environment on the list. Then copy the list on the chalkboard using a green pen to write features of a healthy environment and a red pen to write features of an unhealthy environment.

Ask some pairs to present their group’s answer to the rest of the class and to state why (e.g. cars produce poisonous fumes and make noise, bicycles are quiet and exercise our bodies).

Ask pupils to add two more green and two more red examples to their lists.

Step 3: Plenary

Using the pictures in the notes/handouts for the teacher section, select a few pupils and ask them to describe the activities going on in the different pictures.

Ask pupils to look at the pictures again and decide which are ‘green’ and which are ‘red’ and why.
Notes/handouts for the teachers
1. Cars and bicycles  2. Rainwater and toilet flush water  3. Aircraft noise and birdsong noise
4. Fire smoke and chimney smoke  5. Plastic bags on ground and metal tins on ground  6. Rats and mosquitos

Smoke going into the air

Clean air

People buying food in unclean environments

River that is kept clean

People living in unhealthy environments
(Source of pictures unknown)

People living in clean environments
(Source of pictures unknown)
Lesson 17
Environmental Quality

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of environmental degradation.
- Mention 2 disadvantages of degrading the environment.

Teaching aids:

Chalk, chalkboard, Basic Science textbooks.

Background knowledge

Environmental degradation is the damage caused to the environment by a lowering of the quality of air, water and soil or by the destruction of wildlife and ecosystems. Examples include the release of harmful substances into the environment leading to the reduction of soil quality, the depletion of the ozone layer by gases that we produce, acid rain, flooding, etc. Environmental degradation happens when we change or disturb the normal structure of the environment in undesirable ways. Some human activities such as oil spills, uncontrolled industrial works, over fishing, applying chemicals to soil, bush burning, playing loud music, dumping refuse indiscriminately, etc. have degraded the Nigerian environment.
Step 1: Introduction

Ask the pupils to mention some advantages of having a healthy environment. Now ask them to mention some things that can make the environment bad or unhealthy.

Allow a few pupils to respond to this and explain to them that the act of doing things that reduce the quality of the environment and make it look unclean or unhealthy is known as environmental degradation (write the words on the chalkboard).

Tell pupils that we will be learning about environmental degradation in today’s lesson.

Step 2: Main activity

Take the pupils on a journey around the school compound and ask them to look around to observe good and bad features of the school environment, inside and outside the school. Stop at anything that the pupils think is bad (e.g. heaps of refuse, abandoned desks and tables, smelly toilets, spoilt buildings, etc.).

Ask them:
- How does this degrade our environment?
- What will happen if it stays like this for many years?
- How can it be improved?

Take them back to the classroom. Ask pupils to mark the condition of the school compound out of 10, from what they observed.

Ask pupils how we can improve this mark. If possible, organize your pupils to do so for the next lesson.

Explain that environmental degradation happens when we change or disturb the nature of the environment in undesirable ways. Give these examples: oil spills, uncontrolled industrial works, over fishing, applying chemicals to soil, bush burning, playing loud music, dumping refuse.

Step 3: Plenary

Ask pupils to complete the following task in their exercise books:

1. Ask pupils what do they understand by environment degradation? Ask them for examples of environmental degradation?

2. Adegraded environment is unhealthy because:

   a) It reduces the quality of the soil (True/False).
   b) It is not good to look at (True/False).
   c) It makes environment unsafe for living (True/False).
Answer cue:

Answers to conclusion & assessment activity:

1. What do you understand by environmental degradation?
   Ans = Environmental degradation is the release of harmful substances into the environment leading to the reduction of soil quality, depletion of the ozone layer, acid rain, flooding, etc.

2. The degraded environment is unhealthy because of which of the following reasons:
   All of them are true.
Lesson 18
Environmental Quality

Learning outcome:

By the end of the lesson, pupils will be able to:

Explain ways of maintaining their school environment

Teaching aids:

Plain sheets of paper, chalk and chalkboard.

Background knowledge

Pupils spend a lot of their time in the school environment, therefore they need to keep the school environment clean so that they do not become unhealthy or ill at school. Also, the school environment should be a positive and pleasant place that inspires children to do well. Learning is damaged if rubbish is left around. Also a lot of waste, especially paper waste is generated in the school environment. So it is important for children to cultivate good waste management habits.

You can involve your pupils in improving their school environment by setting up an eco-team. Encourage them to become involved in a clean-up by giving a badge to everyone who takes part.

The badge.
Ask pupils to answer the following questions:

- Why should we look after our school? (Because it is important to us for learning, and also so that we work in clean and pleasant conditions).

- If we fail to care for it, what might happen? (It will become spoilt, will cost much money to repair, may make us all ill).

Explain to pupils that since they are always in the school, it is important to care for the school environment so that it will be good condition for them to learn all the time.

Tell pupils that we will be learning about maintaining the school environment in today’s lesson.

Take the class outside. Choose an open area where children play and where you can supervise.

Organise your class into groups of 6. Give each group a rubbish bag. They have 10 minutes to collect as much rubbish in their bag as they can. ONLY within the school grounds.

Give a small prize to the group that collects most rubbish.

Ask pupils who would be interested in joining an eco-team to improve the school environment.

The tasks of the Eco-Team will be to

* Carry out regular litter picks

* Promote a litter free environment to other pupils

* Monitor any litter problems in the wider community and address any problems.

Return to the classroom. Draw the table below on the chalkboard

<table>
<thead>
<tr>
<th>Problems</th>
<th>Ways of maintaining the school compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubbish all over the school</td>
<td></td>
</tr>
<tr>
<td>No toilets</td>
<td></td>
</tr>
<tr>
<td>Lots of grass</td>
<td></td>
</tr>
</tbody>
</table>

Ask each pupil to copy and complete the table by addingsolutions to the problems listed on the table.

Ask some pupils to read out their suggestions for the entire class.

Give feedback on each group’s presentation and make relevant corrections.

Select two volunteers for the eco-team pupils and ask them why they want to maintain their school compound?

Ask pupils to plan how to keep the school compound in good condition.
Lesson 19

Environmental Quality

Learning outcome:

By the end of the lesson, pupils will be able to:

- Name some materials that are used for keeping the environment healthy
- Identify when a simple test is fair

Teaching aids:

Chalkboard, chalk, a container of water, one piece of soap, 2 different types of material (polythene and cloth) – enough pieces to give one of each per group, old toothbrush or small brush (or even small twigs tied together to make a ‘broom’).

Background knowledge

To maintain a healthy environment, we need certain materials for cleaning and disinfecting the environment. Some materials maintain our environment including dusters, dust pans, napkins, soap, sponge, brooms, dust bins, cutlass, hoe, rake, etc.

In Science, we can use fair tests to compare the effectiveness of cleaning materials. A test is fair if the factors that affect the result are all the same apart from the ONE that is being tested. For example, if you want to test which soap (A or B) is best at removing stains, you could set up the following fair test.
Tell the pupils to look around their classroom and answer the following questions:

1. What will you need to keep the floor clean? (Broom)
2. What will you need to keep the dust off the table/bench? (Cloth)
3. What will you need to keep stains and germs off objects and hands? (soap)

Explain to pupils that the broom, cloth and soap are materials that help to maintain a clean environment.

Tell pupils that we will be learning about keeping our environment clean.

Ask the question...will this soap clean wood or plastic best? Ask pupils “how can we find out?”

The pupils should help you to design a fair test.

1. SAME SIZE of grease spot on a piece of wood and on a piece of plastic.
2. SAME AMOUNT OF SOAP on SAME CLOTH.
3. SAME NUMBER OF RUBS with the soapy cloth on the wood and on the plastic.
4. Compare the stains after rubbing.

Explain to pupils that they will do a fair test to find out which cloth is best for removing chalk marks from the floor.

Make a chalk mark near each group. Give them two different pieces of cloth and an old toothbrush or similar small brush.

• Allow pupils to try out their own ideas for doing a fair test.
• After 15 minutes, gather the class and discuss how their tests were made fair (same number of rubs, same surface for the chalk mark, same person doing the rubbing etc.)

• Ask pupils to copy and complete the following in their books.
• Title – which material is best for cleaning chalk marks?

We set up a ---- test. This is a diagram of it.

We kept the number of rubs the same to make the test fair.

Our result was that ------- was best at removing chalk marks from the floor.

Ask pupils to mention some tools that they use in keeping their homes clean and tidy.

Ask pupils what is used to keep grass and weeds low (hoe, rake etc.)

Explain to pupils that it is always important to use the right tools for the right tasks when cleaning.
Term 2: Basic Technology
Lesson 3
Heat and Temperature

Learning outcome:
By the end of the lesson, pupils will be able to:
Explain the difference between heat and temperature

Teaching aids:
3 identical containers. Ice water in one, lukewarm water in another, very hot water from a kettle or a stove in the third, matches and empty milk tin. Thermometer.

Background knowledge
Heat is a form of energy. In everyday language, heat and temperature are often used as if they are the same thing. They are not. When a pot of water is heated it gains energy and becomes hotter. Its temperature goes up. Heat is the cause, a rise in temperature is the effect. Temperature can be measured with a thermometer. The temperature of a substance is a measure of its hotness. When a substance is hot, the temperature is high and when the substance is less hot (cold), the temperature is lower. There are different types of thermometer for measuring temperature. Examples of some thermometer are clinical thermometer, infrared thermometer, gas thermometer, liquid-in-glass thermometer and minimum & maximum thermometer.

As a form of energy, heat can be transferred by three process, namely conduction, convection and radiation.
Ask pupils to mention the various forms of energy. (Expected answer: Chemical energy, heat energy, electrical energy, mechanical energy, sound energy, solar energy and light energy)

Ask pupils to say what they understand by heat. (Capture their answers on the chalkboard)

Remind pupils by telling them that heat is a form of energy.

Ask pupils if they have ever put a metal spoon in hot soup or hot water and then touch their mouth with the spoon. (Most of them will raise their hands)

Ask them to describe their experience. (Possible answer: the spoon felt hot in the mouth)

Ask pupils to rub their finger quickly on the desk. How does it feel? (hot)

Explain that the finger becomes hot because of heat energy.

Ask pupils how many know the difference between hot and cold? (All will put hand up)

Ask for 4 volunteers. 2 must put their finger fully into a container of ice-cold water. Ask them whether it is hot or cold? 2 must put their finger into a container of very hot water (but NOT scalding – test it first!!). Ask them whether it is hot or cold?

Fingers stay in the water for several minutes and then ask them one by one to put the finger immediately into the lukewarm water. Ask the person whether it is hot or cold? (Those in the cold will feel it to be hot; those in the hot will feel it to be cold).

Others should try by putting right hand into the cold and left hand into the hot. After a few minutes they will detect the lukewarm water as both hot and cold!

Explain to pupils that we detect hotness and coldness inaccurately. To measure how hot an object is, we use a thermometer. This tells us the temperature of the object.

Tell pupils that when a substance is hot, the temperature is high and when the substance is less hot then the temperature is lower.

Show pupils a thermometer. Demonstrate how to use it to take the temperature of the lukewarm water. State that it is neither hot nor cold but has a temperature of (20 or whatever the reading is) degrees centigrade.
Step 3: Plenary

Ask pupils to choose a partner.

Draw the following table on the chalkboard and ask pupils to discuss with their partners and complete the table with the correct word:

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of hotness of a substance</td>
<td></td>
</tr>
<tr>
<td>A type of energy</td>
<td></td>
</tr>
</tbody>
</table>

Answers for table – temperature and heat
Lesson 4
Heat and Temperature

Learning outcome:
By the end of the lesson, pupils will be able to:
Define thermometer as the instrument for measuring temperature
Identify and name different types of thermometer

Teaching aids:
A chart showing different types of thermometer, pictures of thermometer inside 2 cups of water (the thermometer clearly showing one temperature high and the other low), chalkboard, chalk, Basic science text book.
Step 1: Introduction

Ask pupils to define temperature (Expected answer: the degree of hotness of a substance)

Tell them that feeling an object with our hands to know how hot it is will not give us an accurate answer. It could also be dangerous.

Ask pupils how we can know the hotness of a substance (Some of them will say by feeling it with our hands or tongue)

Tell them that we will be learning about how to measure the temperature of an object accurately in today’s lesson.

Step 2: Main activity

Show a thermometer to the pupils. Also show a big labelled diagram of one.

Display the charts on the chalkboard.

Ask pupils to attempt to identify what they are seeing on the chart. (Some may get it right)

Now ask those who were able to identify the object on the chart where they have seen it before (Some may say in the hospital).

Explain to them that the object they are seeing on the chart are called thermometer.

Tell them that a thermometer is the standard instrument used for measuring the temperature of a body or object.

Explain to them that there are different types of thermometer.

Tell them that a thermometer has liquid inside it which expands as the temperature increases.

Show them the scale using a thermometer on the chart

Explain that the clinical thermometer is the one that hospitals use to check our body temperature.

Use the chart to show pupils that a thermometer has liquid inside it which expands as the temperature increases.

Explain to them that the temperature is read from the scale printed on the thermometer.

Show them the scale using a thermometer on the chart

Put pupils into groups.

Give each group a picture of thermometer in a liquid (see notes/handouts for the teacher section).

Ask them to look at where the red colour in each thermometer stopped and record the figure for each container.

Ask them to state which of the liquids in the two containers will be hotter.

Let each group report their findings.

Step 3: Plenary

Call some pupils to mention different types of thermometer.
Notes/Handouts for the Teacher
Chart showing different types of thermometers.

- Liquid-in-glass thermometer
- Gas thermometer
- Infrared thermometer
- Minimum & Maximum Thermometer
- Clinical thermometer

Picture showing one high and one low

A

B
Term 2: Information Technology
Lesson 3

Care and Protection of Computers

Learning outcome:
By the end of the lesson, pupils will be able to:
Describe how a password protects computer

Teaching aids:
A Mobile Phone, chalkboard, chalk, Information technology textbook.

Teacher Preparation:
Practice how to lock the phone using a password.

Background knowledge

Password is a secretword or expression used by authorized persons to gain access to an electronic device like a computer or mobile phone. It is really important to have a good password because a hacker who can guess yours can get access to all your information and programs. A strong password is amongst the most important steps you can take to protect your computer from hackers and other unwelcome users.

The Traditional Password Advice
According to the traditional advice — which is still good — a strong password is:

Has 12 Characters, Minimum: You need to choose a password that’s long enough. There’s no minimum password length everyone agrees on, but you should generally go for passwords that are a minimum of 12 to 14 characters in length. A longer password would be even better.

Includes Numbers, Symbols, Capital Letters, and Lower-Case Letters: Use a mix of different types of characters to make the password harder to crack.

Isn’t a Dictionary Word or Combination of Dictionary Words: Stay away from obvious dictionary words and combinations of dictionary words. Any word on its own is bad. Any combination of a few words, especially if they’re obvious, is also bad. For example, “house” is a terrible password. “Red house” is also very bad.

Doesn’t Rely on Obvious Substitutions: Don’t use common substitutions, either — for example, “H0use” isn’t strong just because you’ve replaced an o with a 0. That’s just obvious.

In this lesson we will follow a process to generate a password that people can remember but others cannot easily guess.

Instructions available from http://www.wikihow.com/Create-a-Secure-Password
Step 1: Introduction

Ask pupils: Why do people lock their houses when going out? (Likely answers: to prevent thieves from entering the house, to secure their property from being stolen or used by others)

Ask pupils to mention some of the devices that people use to lock and protect their possessions from being stolen or used by others? (Expected Answer: Padlock, Chains, etc.)

Ask them how can we prevent other people from getting into the information we have in our computer? (possible answer: By locking it)

Tell them that today we are going to learn how we can protect the information we have in our computer.

Step 2: Main activity

Explain to them that we use passwords to protect the information we have in our computers just as we use padlocks to lock our houses.

Tell them that password is a combination of characters that gives a person access to information stored on a computer.

Explain to the pupils that passwords protect our information from being stolen or used by other people.

Ask them: What do you think could happen if someone got hold of your password?

Call out the instructions for making a good password. Ask pupils to follow these instructions BUT NOT TO LET ANYBODY ELSE SEE!!!.

a) Pupils write down the second line of their favourite nursery rhyme or song. E.g. “Humpty dumpty had a great fall”

b) Use the first letter of every word at the start of your password. E.g. “hdhagf”

c) Write the name of your school in capitals e.g.” Abuja Best Primary School”

d) Add the first letters of the words in capitals “hdhagfABPS”

e) Add a space followed by two numbers for the month that you were born in e.g. “hdhagfABPS 07”. That’s a good computer password.

Ask pupils how many have protected their phone (if they have one) with a password.

Tell the class that you are going to lock (protect) the phone with a password.

Now lock the phone using an easy password (e.g. the first four digits in order).

Give back the phone to the same pupil and ask him to type 1-4.

Ask him why the phone worked (password too easy).

Now give the phone to another pupil and also give him/her a more difficult password.

Show the pupil how to put the password into the phone.

Ask another pupil to now open the phone using the password (password too difficult to guess)

Tell the pupils that with 10 possible digits for each of 4 numbers it would take 10000 tries to put in all the possible numbers to try to unlock the phone.
Step 3: Plenary

Get two pupils to explain to the class how passwords can help to protect the information stored in our computers.

Write the following statement on the chalkboard and ask the pupils to copy and complete it in their exercise books:

1. _________ is a secret word, phrase, or sequence of characters that allows one access to a computer.
   (a) Padlock
   (b) Password
   (c) Passwork
   (d) Password

2. Passwords _________ our information from being stolen or used by other people
   (a) Protect
   (b) Provoke
   (c) Perfect
   (d) Reflect

Answer cue:
Answers to the conclusion & assessment activity:

1. Password is a secret word, phrase, or sequence of characters that allows one access to a computer.
2. Passwords protects our information from being stolen or used by other people
Lesson 5
Care and Protection of Computers

Learning outcome:
By the end of the lesson, pupils will be able to:
- Define safety education.
- List 3 reasons for taking care of computer

Teaching aids:
Marker, Sheets of cardboard paper, chalkboard, chalk, Information technology textbook.

Teacher Preparation:
Write an outline of the story on the chalkboard (see teacher notes).

Background knowledge
There are many reasons why you take care of your computer to prolong the life of your PC, both hardware and software wise. It’s always a good idea to keep your computer clean. A clean computer runs faster and lasts longer.
Ask the pupils to mention some ways of taking care of the computer (Expected answers: Place the computer in a clean, cool and dry place, Clean the computer regularly, do not eat or drink while using the computer, Cover the computer when you are not using it).

Make a list on the chalkboard as the pupils mention.

Tell the pupils that we are going to be learning about reasons why we should take care of the computer in today’s lesson.

Read the story aloud. Then have different pupils read it again, telling a part of the story each until it has all been told.

Place pupils into small groups (preferably not more than 6 pupils per group).

Give each group a marker and a plain sheet of cardboard paper.

Ask pupils to discuss within their groups these questions about Mr. Umaru and his computer:

a) Did Mr. Umaru take care of his computer?
b) Why did some keys in the keyboard not work?
c) List 3 things that happened to Mr. Umaru after his tea spilled on the computer.

Ask each pupil now to write their own story about what Mr. Umaru’s tidy and careful neighbour did to take care of her computer.

Ask the pupils to bring out their exercise books and list 3 reasons why we need to take care of the computer. Ask any 3 pupils to read out their answers to the class.

Go round the class to see other pupils’ answers. Make relevant corrections.
Story: Mr. Umaru and His Computer:
Mr. Umaru is a staff member at one of the banks in Nigeria. He has a computer in his house. On most occasions, he works in the house using his personal computer. Anytime Mr. Umaru is working at home with the computer, he likes eating some snacks. According to him, he takes the food in order to stay awake. While eating biscuits and sweets, some particles usually fall onto the keyboard and he does not care to take those particles out. When he shuts the computer and leaves the place, some ants come to feed on those particles of snacks. Some of the ants carry some pieces of the food into spaces in the keyboard. Some of the ants die while still in the spaces in the keyboard. Because Mr. Umaru does not cover the computer after using it, a lot of dust settled on the keyboard and other external parts of the computer.

One day Mr. Umaru came back from work and as usual decided to do some work using the computer. The work he wanted to do was very important and urgent. When he tried to type into the computer using the keyboard, some of the keys would not work. He became angry as a result. Mr. Umaru asked his wife to make him a cup of hot tea while he was still trying to see if the keys would work. His wife brought him the cup of tea and as he was drinking, the cup of tea fell from his hand and spilled onto his computer. The computer immediately stopped working at all. He tried to switch it back on but could not as the microprocessor inside it had been damaged.

Mr. Umaru could not do the work he wanted to do. He felt so unhappy and went to bed. In the morning he woke up very sad and took the computer to a repairer who charged him money.

Outline
My Umaru has a computer that he uses at home for work and leisure. He doesn’t look after it properly.
One day he tried to do important work but it wouldn’t operate.
He then spilled tea over it.
The computer was damaged and had to be repaired, which cost him money.

Answers to the conclusion & assessment activity:
1. No, Mr. Umaru did not take good care of his computer.
2. His keyboard keys did not work because a lot of dirt had stored up under the keyboard.
   a) The computer will not switch on.
   b) Mr. Umaru could not do his work.
   c) He took his computer to the repairer who charged him money.
Term 2: **Health Education**
Lesson 5  
Diseases

Learning outcome:

By the end of the lesson, pupils will be able to:

- Define safety education.
- Explain the difference between a sign and a symptom.
- Mention the symptoms of 3 common sicknesses.

Teaching aids:

Cardboard papers, marker pens, chalkboard, chalk, Health education textbook.

Background knowledge

On a cardboard paper, write out 2 or 3 symptoms from the list provided in the teacher notes/handouts section and give to each group.
**Step 1: Introduction**

Ask pupils if they have ever heard of the words symptoms and signs. Select a few pupils to discuss the meanings of the words. Explain to pupils that symptoms are the ways by which our bodies tell us that there is something wrong with the normal working of our bodies. Tell pupils that signs on the other hand are the ways by which our bodies tell other people like, family and friends, doctors, nurses, etc. that there is something wrong with our health. Tell pupils that we will be learning about the signs and symptoms of different diseases in today’s lesson.

**Step 2: Main activity**

Put pupils into small groups and give each group a cardboard paper on which symptoms have been written. Tell pupils that symptoms are the ways by which our bodies tell other people like, family and friends, doctors, nurses, etc. that there is something wrong with our health. Ask pupils to discuss the symptoms written on their cardboard paper in their groups and make a list of 3 sicknesses/illnesses that can produce such symptoms (e.g. flu can make you have runny nose or sneeze). Allow 10 mins for pupils to think about this. Then ask each group to nominate a representative to present their work. Provide additional explanation about how the sicknesses/illnesses that pupils mention can produce the symptoms they were given. Make a list of different sicknesses/illnesses on the chalkboard and write the symptoms of each beside it. Ask pupils to copy the list into their exercise books. Explain to pupils that a sickness refers to a state of being ill or having a disease. While an illness refers to a disease condition. Tell pupils that malaria is an illness and that when we have malaria, we say we are sick. Explain that the difference between an illness and a sickness is that while an illness refers to any disease condition, a sickness refers to the state of suffering from an illness.

**Step 3: Plenary**

Ask pupils to observe the following table carefully and identify which symptoms are signs of the illnesses/sicknesses in the list.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Match the symptoms to the correct sickness/illness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signs/Symptoms</td>
</tr>
<tr>
<td>1.</td>
<td>Measles</td>
</tr>
<tr>
<td>2.</td>
<td>Flu</td>
</tr>
<tr>
<td>3.</td>
<td>Malaria</td>
</tr>
<tr>
<td>4.</td>
<td>Dysentery</td>
</tr>
<tr>
<td>5.</td>
<td>Tuberculosis</td>
</tr>
</tbody>
</table>

Allow pupils to ask any questions they might have on the lesson and provide answers.
### Answer cue:

Answer to the activity in the assessment & conclusion section:

<table>
<thead>
<tr>
<th>S/N</th>
<th>Signs/Symptoms</th>
<th>Sickness/Illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Measles</td>
<td>Fever, headache</td>
</tr>
<tr>
<td>2.</td>
<td>Flu</td>
<td>Stooling, vomiting, stomach ache</td>
</tr>
<tr>
<td>3.</td>
<td>Malaria</td>
<td>Itching, rashes</td>
</tr>
<tr>
<td>4.</td>
<td>Dysentery</td>
<td>Coughing blood, chest pain, head ache.</td>
</tr>
<tr>
<td>5.</td>
<td>Tuberculosis</td>
<td>Runny nose, sneezing</td>
</tr>
</tbody>
</table>

### Notes/handouts for the teachers

List of signs and symptoms

- Vomiting (to throw-up)
- Swelling (puffed up)
- Bleeding (loss of blood)
- Fever (high body temperature)
- Headache (pain in the head)
- Rash (irritation of the skin)
- Drowsiness (sleepy)
- Diarrhea (watery stool)
- Trouble breathing (cannot breathe well; shortness of breath)
- Congestion (your nose is full. It is hard to breathe from your nose)
- Constipation (your stool (poo) is too hard. It does not come out)
- Sneezing (a quick push of air out of your nose and mouth)
- Stomach ache (pain in your stomach)
- Backache (pain in your back)
- Runny nose (nose dripping watery)
- Cough (quick noisy push of air from mouth).
Lesson 6
Medicines

Drug Education

Learning outcome:
By the end of the lesson, pupils will be able to:
- Explain the meaning of drugs.
- Classify drugs as either naturally occurring drugs or synthetic drugs.
- List 3 examples each of naturally occurring drugs and synthetic drugs.

Teaching aids:
Cardboard papers, marker pens, chalkboard, chalk, Health education textbook.

Background knowledge
A drug is a chemical substance that interacts with the operations of the body. The interaction can be beneficial or harmful to health. Some drugs are used in the treatment, prevention and cure of a disease and are called medicines.

Pupils can be helped to understand categories by making them choose actively. Set up your room like this.
Step 1: Introduction

Place pupils in manageable group sizes and give each group a piece cardboard paper.

Ask pupils to discuss the meaning of the word ‘drug’ in their groups and write down what they think it means on a cardboard paper.

Let each group read out what they have written on their cardboard. Explain that any substance that affects the action of the body is a drug.

Tell pupils that we will be learning about the meaning and types of drugs in today’s lesson.

Step 2: Main activity

Ask pupils to talk about times when they have been unwell. Discuss what was done to help. e.g. rest, medicines.

Ask pupils what medicines or treatments they have heard about; write each one on a separate piece of paper and add to examples you have prepared in advance.

Explain that drugs can be used as medicines (to treat or prevent sicknesses). Explain that drugs are called tablets when they are in solid form and syrup when they are in liquid form.

Explain that medicines have a range of functions. Write the following on the board: TEAM A prevent illness (such as vaccinations) TEAM B ease pain (such as headache pills) TEAM C help the body fight illness (such as antibiotics) TEAM D help the body work properly or better (such as insulin, inhalers).

Stick a paper with the letter A (or write the letter) in one corner of the room, B in the second corner, C in the third and D in the fourth.

Ask one pupil to come and choose a medicine name and read it to the class. The class then vote on which corner the medicine belongs in. Repeat with the other medicines.

Tell a story about a child who, not knowing any better, decided to take some of a friend’s medicine. Ask the children to explain why taking someone else’s medicine is dangerous.

Tell pupils that a person that is trained to prepare and dispense drugs and medicine is called a “Pharmacist”. The pupils work in pairs or small groups to make up a simple scenario about how medicines could be misused, e.g. – forgetting to take a medicine – taking too much medicine in one go – taking medicines too often.

Explain to pupils that some drugs are present in natural substances (e.g., honey, garlic, ginger, coffee, etc.) and others are synthetic, meaning they are made by humans (e.g., paracetamol, chloroquine, etc.).
Ask pupils to copy and complete the following summary from the chalkboard into their notebooks:

1. Drugs are substances that affect the action of the body.

2. Drugs that are used to prevent or treat illness are called _____ (Medicines)

3. Drugs are either natural or _________. (synthetic)

4. Solid drugs are called ________ and liquid drugs are called syrup. (tablets)

5. A person that prepares and dispenses drugs is called a ______. (pharmacist)
Lesson 7
Drug Education

Learning outcome:

By the end of the lesson, pupils will be able to:

- Distinguish between drug use and drug abuse.
- List 3 commonly abused drugs

Teaching aids:

A chart showing different substances (e.g., cigarette, marijuana, paracetamol, coffee, kolanut, cough syrup, etc.), empty bottle of alcohol, markers, and cardboard papers.

Background knowledge

Drug education is not just about imparting knowledge, though that is obviously important. It must also address attitudes and skills. Many pupils will have first-hand experience of drug abuse in their neighbourhoods and the teacher should give pupils an opportunity to discuss these. Rather than tell pupils what to do, it is more effective to have them act out and practice what to do. Set the context as ‘keeping safe’. You can order a free set of materials to help you prepare: http://www.drugfreeworld.org/takeaction.html

Step 1: Introduction

Ask pupils to explain the meaning of drug
Ask them to explain why we use drugs (for medicines)
Ask pupils if they have ever heard of harmful drugs.

Explain the terms “drug use” and “drug abuse”, that ‘drug use’ involves the use of drugs for prevention or treatment of illnesses based on doctor’s prescriptions and ‘drug abuse’ occurs when people take drugs without prescription or direction from a qualified medical doctor or pharmacist.

Tell pupils that drug abuse is a bad habit which can put one’s health in serious danger.

Step 2: Main activity

Place pupils into groups of 6 or less.
Place an empty bottle of an alcoholic drink on a table in front of the classroom.
Ask each group to identify the bottle and discuss what will happen if someone drank all the liquid in the bottle. (take responses from each group)

Explain to pupils that the drink contains the drug alcohol. Alcohol is a substance that can harm the body.

Place the chart showing different substances (e.g. cigarette, marijuana, paracetamol, coffee, kolanut, cough syrup, etc.) on the board for all to see.

Ask groups to discuss how the different substances in the chart and write down ways that such substances can be used and/or abused. (Answers could be in a table showing the use and abuse of drug)

Select some groups to share their ideas with the class.

Tell pupils that abuse of alcohol will damage a person’s health. Ask pupils to list some other examples of hard drugs that can be very bad for the health (i.e., cannabis, heroin, cocaine, tobacco, Valium, etc.).

Make a list of these on the board and ask pupils to write them in their notes.

Place pupils in small groups
Give each group a marker, and a cardboard paper.

Ask each group to list 3 types of harmful drugs and answer the following questions about them:

1. What do the harmful drugs look like?
2. What do they do to the people who use them?
3. Are there other names for these drugs?
4. Where do people get these drugs?
5. What do you think about people who use hard drugs?

Explain that drug abuse includes the following practices:
1. Over-dozing on medicines
2. Excessive consumption of harmful substances like alcohol, caffeine and tobacco (cigarette).
3. Self-medication
4. Taking expired drugs
5. Taking harmful drugs like cocaine, Valium, Indian hemp, etc.

Tell pupils that we will be finding out about harmful drugs that can be abused in today’s lesson.
Step 2: Main activity

Ask each group to nominate a representative to present their work.

Provide support for pupils by giving feedback on their presentation.

Step 3: Plenary

Write the following list of statements on the board and ask pupils to sort them into good use of drugs and bad use of drugs (drug abuse);

1. Taking paracetamol as prescribed by doctor/pharmacist for pain relief.
2. Taking strong coffee to stay awake in the night so that you can study
3. Smoking tobacco to stay stimulated
4. Taking cough syrup that has been prescribed for your brother/sister.
5. Taking medicine through injection by a qualified nurse.
6. Taking food substances (like garlic, honey, lime, etc.) that have medicinal properties in moderate quantities.

Go round the class to provide support for pupils by giving feedback on their work.

Answer cue:
Answer to the activity in the assessment & conclusion section:

<table>
<thead>
<tr>
<th>Good use of drugs</th>
<th>Bad use of drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking paracetamol as prescribed by doctor/pharmacist</td>
<td>Taking strong coffee to stay awake in the night so</td>
</tr>
<tr>
<td>for pain relief</td>
<td>that you can study</td>
</tr>
<tr>
<td>Taking medicine through injection by a qualified nurse.</td>
<td>Smoking tobacco to stay stimulated</td>
</tr>
<tr>
<td>Taking food substances (like garlic, honey, lime, etc.)</td>
<td>Taking cough syrup that has been prescribed for your</td>
</tr>
<tr>
<td>that have medicinal properties in moderate quantities</td>
<td>brother/sister</td>
</tr>
</tbody>
</table>
Lesson 8
Drug Education

Learning outcome:
By the end of the lesson, pupils will be able to:
- Identify the health effects of drug abuse
- List some effects of drug abuse on the individual, family and the society

Teaching aids:
- Flash cards, markers, cardboard papers, chalkboard, chalk, Health education textbook.

Lesson preparation:
Make flashcards describing one commonly abused drug each (number of flashcards to be determined by the number of groups you intend to divide your class into based on your class size).
Step 1: Introduction

Ask pupils to share their thoughts on the meaning of drug abuse.

Explain to pupils how drug abuse hurts the people who take drugs, and also hurts the people around them, especially their families, children, unborn children and the community.

Tell pupils that in today’s lesson, we will learn about the various ways that drug abuse can affect an individual, his/her family and the society.

Step 2: Main activity

Explain to pupils that drugs are made of chemicals and different drugs have different chemical compositions which can affect the body in different ways.

Explain that the abuse of drugs affects the normal working of the brain and sometimes, this effect can be permanent.

Explain that drug abuse can sometimes cause permanent damage to the human body. Use the examples of a) how an individual’s memory loss can affect his/her family and society; b) how the need for taking drugs can lead an individual to crime (some drugs and their descriptions are listed in the teacher note section.)

Place pupils in small group sizes.

Give each group a flashcard containing one commonly abused drug, its description and health effects.

Ask pupils in their groups to discuss the flashcards given to them and then make a poster showing how the drug described on their flashcard can affect drug abusers and other people around them.

Ask each group to nominate a group representative to present their work. Collect each group’s poster and display on the classroom walls.

Compile a list of the effects of drug abuse on the individual, family and society on the chalkboard. Ask pupils to copy it into their books.

Step 3: Plenary

Write the following statements on the chalkboard and ask pupils to answer true or false.

1. Drug abuse includes taking more quantity of a medicine than the doctor/pharmacist prescribed. True/False

2. Drug abuse can lead to drug addiction and dependence. True/False

3. Hard drugs like marijuana can make an individual go mad. True/False
**Answer cue:**
Answers to the activity in the assessment & conclusion section:

1. Drug abuse includes taking more quantity of a medicine than the doctor/pharmacist prescribed. True

2. Drug abuse can lead to drug addiction and dependence. True

3. Hard drugs like marijuana can make an individual go mad. True

**Notes/handouts for the teachers**
Some commonly abused drugs and their descriptions:

- **Marijuana:** (Street name: Pot, dope, ganja, Mary Jane, weed, igbo). It looks like dried herb and is mostly smoked, eaten in food or brewed as tea and drunk by abusers. It can make a user unexplainably excited, slow down their thinking and reaction, impair coordination and increase appetite in the short term. Continuous use of marijuana can lead to more severe damage like respiratory infections, heart diseases, anxiety, panic attacks, memory loss and in some cases death!

- **Cocaine:** (Street name: coke, candy, crack, rock, snow). It looks like fine white powder and is mostly injected into the veins, smoked and sniffed through the nose. It can make a user unexplainably happy, cause high blood pressure and reduce appetite in the short term. Continuous use of cocaine can lead to more severe damage like heart attack, hyperthermia (high body temperature), stroke, slow or stopped breathing and sometimes death!

- **Steroids:** (Street name: roids, juice). They come in form of tablets, injectable liquids or creams which can be injected, swallowed or applied to the skin. It makes a user develop big muscles over time. Continuous use of steroids can cause high blood pressure, kidney damage, liver disease, baldness, breast enlargement in males and facial hair in females.

- **Heroin:** (Street name: brown sugar, skunk, dope, H, smack, thunder). It comes in the form of a fine white or brown powder, or a brown sticky paste. It can be injected, inhaled, swallowed or smoked. It causes the feelings of unexplained happiness/excitement, blocks pain, causes vomiting and drowsiness in the short term. Continuous use of heroin causes confusion, constipation, staggering, slowed or stopped breathing, coma and sometimes, death.
Lesson 9

Drug Education

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of Road safety
- Describe the dangers to health of using tobacco products.
- List some reasons why individuals drink alcohol and smoke tobacco

Teaching aids:

- Markers, cardboard papers, empty plastic bottles, 2 pupils, cotton wool, clay or chewed gum, plastic bottle with cover, a lighter or matches, 1 cigarette, chalkboard, chalk, Health education textbook.

Background knowledge

Children Smoking% using tobacco daily, 2013

5.6% of Boys

Even though fewer boys smoke on average in Nigeria than on average in middle-income countries, still 303,300 boys still smoke cigarettes each day, the sign of an ongoing and dire public health threat.

1.3% of Girls

Even though fewer girls smoke on average in Nigeria than on average in middle-income countries, still 67,000 girls still smoke cigarettes each day, the sign of an ongoing and dire public health threat.

Ask pupils if they know people who use tobacco.

Ask pupils what smoking can do to a person’s health.

Tell pupils that we will be learning about tobacco today and its effect on an individual’s health.

Place pupils in manageable group sizes.

Ask pupils to discuss in their groups what they already know about the effects of smoking cigarettes (tobacco) with their group members.

Tell pupils that we will carry out a simple activity to demonstrate the effect of smoking on an individual.

Display the materials for the activity (i.e. cotton wool, clay or chewed gum, plastic bottle with cover, a lighter or matches and one cigarette) on a table in front of the classroom (if the classroom is not properly ventilated, this activity should be done outside of the classroom).

Fill the plastic bottle with cotton wool representing an individual’s lungs cover the bottle with the cap.

Create a small hole on top of the bottle cover (just enough to contain the bottom of the cigarette).

Place the cigarette in the hole on the bottle cover and seal the base of the cigarette to the bottle cover with clay, chewed gum or any other available sealant.

Press firmly on the plastic bottle to force air out, and then light the cigarette.

Allow air to swell into the container again and continue to slowly and regularly squeeze and release the plastic bottle (simulating breathing in a human) until the cigarette is completely burnt.

Put out the cigarette. Let pupils observe the cotton wool. Open the bottle and take out the cotton wool (with tweezers or similar) and let them smell it.

Discuss the following questions with pupils:

a. What happened in the activity?

b. What has happened to the cotton wool because of the smoking? What do you think causes these changes?

c. Do you think people who smoke have lungs that look like the cotton wool? (How does that make you feel?)

Explain to pupils that smoking tobacco is a bad habit which smokers find hard to stop because tobacco contains nicotine which is highly addictive.

Explain that it also contains over 6000 other chemicals, many of them dangerous to health.
Step 3: Plenary

Ask pupils to list some reasons why they think people smoke tobacco. List should include the following:

- Peer pressure
- Media portrayal of smoking as cool
- Boredom
- Self-medication when unhappy or frustrated
- Rebellion; some people smoke to seem rebellious

Let pupils copy the list into their exercise books.

Ask pupils to write a letter to someone they care about explaining the activity they did in class today and encouraging them to quit smoking as home work to be submitted in the next class.
Lesson 20
The Human Body

Learning outcome:
By the end of the lesson, pupils will be able to:
- Identify the main parts of the human skeleton.
- Identify the different bones and joints in the human skeleton.

Teaching aids:
Chart or poster showing the human skeleton.

Teaching aids:
Get a chart/poster showing the different parts of a human skeleton or use the sample skeleton in the notes/handouts for the teacher section to draw and label your own drawing of the skeleton on a large piece of cardboard.

Background information
The human skeleton is the internal framework of the body. It is composed of 270 bones at birth – this total decreases to 206 bones by adulthood after some bones have fused together. Over half of the bones are in the hands and feet. The human skeleton is very important to the human body because it is the bony framework that provides support for the human body, aids movement and protects vital body organs such as the heart. The longest bone in the human skeleton is called “the femur” and is found in the thigh. The human skeleton is made of different bones; some examples are the skull, ribs, pelvic girdle, femur, tibia and fibula, ulna and radius, humerus, etc. These all function together which is something that children do not readily understand if the names of bones are taught on their own.

Without a skeleton, our body would have no rigid structure to keep it in shape. It would just be a big loose bag full of mixed up organs and tubes.
Step 1: Introduction

Introduce the lesson by teaching the pupils the following song:

My head, my shoulder, my knees, my toes
My head, my shoulder, my knees, my toes
My head, my shoulder, my knees, my toes
They all belong together.

If they already know it, sing it a few times touching the different parts of the body.

Tell pupils that we will be learning about the human skeleton in today’s lesson.

Step 2: Main activity

Ask pupils to feel their fingers. Can they feel the hard bones in there? How many bones are in each finger? (Reveal the answer by showing them a drawing). Tell pupils that bones are hard and do not bend. The 3 bones in the finger allow it to bend. There are 54 bones in the hands, allowing them to be very bendy!

Display the poster of the skeleton on the chalkboard for all pupils to see.

Explain to pupils that the human skeleton is very important to the human body because it supports the body to stand up. It also allows us to move.

Explain to pupils that the longest bone in the human skeleton is called “the femur” and is found in the thigh. Pupils can feel their own leg to find out how big the femur is.

Use the poster of the skeleton to show pupils the different bones and joints in the human skeleton (i.e. skull, ribs, pelvic girdle, femur, tibia and fibula, ulna and radius, humerus, etc.). For each one, ask pupils to find that bone in their own body.

Now ask few pupils to point to their own bones when you point to one on the poster.

Repeat until the pupils are able to associate the different names of bones to the part of the skeleton where they are found.

What the skeleton does 1. Ask pupils to feel their ribs – like a cage…what do the ribs keep safe inside their cage? (heart). Ask pupils to touch the bone that keeps their brain safe.

What the skeleton does 2. Ask pupils to find the place where their leg can bend (the knee). Explain that this is a joint. Two bones meet and can bend.

Ask pupils to point to other parts of their body where there might be joints. The proof is that that part of their body will bend (e.g. elbow, knee, wrist, toes, fingers, ankles, etc.).

Each time you name a bone or joint, tell the children what it does (e.g. humerus keeps your arm in shape and allows you to move it; ribs protect the heart and the lungs and keeps your body shape). Now, explain to pupils that some parts of the human skeleton cannot be bent (e.g. skull) because they are not joints.
Step 3: Plenary

Ask the pupils to copy and complete these sentences:

The skeleton can protect important parts of the body. One example is ---- which protects -------.

The skeleton also allows us to move. The --- joint allows us to move our ------.

In pairs, ask pupils to discuss what their backbone does and to write a sentence about it in their books. (Keeps the body up. Allows you to bend the body backwards and forwards.).
Lesson 21
The Human Body

Learning outcome:
By the end of the lesson, pupils will be able to:
identify different types of bones in the skeleton.

Teaching aids:
A clearly labelled diagram of the human skeleton, an unlabeled diagram of the human skeleton, paper strips, chalk, chalkboard, Basic science textbook.

Background knowledge
There are various types of bones in the human skeleton. Some are long, some short, others flat and some are irregular. Long bones include the major bones on the arms (i.e. humerus, radius and ulna) and the legs (i.e. femur, tibia and fibula). Long bones help to support the weight of the body and enable movement. Short bones also help to provide support and stability. Examples of short bones are carpals in the hand and metacarpal in the foot. The scapula, ribs, and sternum are also examples of flat bones.
Step 1: Introduction

Ask pupils the following questions:

1. What is the skeleton? (Expected answer: A structure made of hard bones)
2. What is the skeleton for? (Gives support to the body, protects important parts and aids movement).
3. What is a bone? (Expected answer: The hard part of the skeleton).

4. What is a joint? (Expected answer: A point in the skeleton where two bones meet). Ask pupils to show you a joint and a bone on their bodies.

Tell them that we will be learning more about the different types of bones in the skeleton in today's lesson.

Step 2: Main activity

Ask pupils to feel the bone that joins their shoulder to the elbow in their body.

Explain that this bone is called the humerus (bone of the arm).

Ask pupils to feel their lower arm bones from the elbow joint to the wrist.

Explain that there are two bones in the lower arm and these are the Ulna and Radius (point this to pupils on the poster/chart of a skeleton).

Ask the pupils where the longest bone is found on the skeleton (Thigh).

Now explain that the longest bone is the bone joining the hip to the knee and it is called the femur. The femur is in the upper leg or thigh.

In the lower leg there are two bones these are the tibia and fibula and you can feel one of the bones at the front of the leg.

Ask pupils to feel the ribs in their chest. They should be able to feel the curve at the bottom of the rib cage. (Note: Feeling each rib is more difficult).

Distribute the flashcards to pupils.

Ask the pupils to go to the unlabelled diagram of the skeleton and match the bone written on their individual cards to the part of the skeleton where that bone is found (pupils should do this in turns).

Make corrections where necessary.

Step 3: Plenary

Select pupils and ask them to identify the following bones on their body:

1. Ribs
2. Femur
3. Tibia and fibula
4. Humerus
5. Pelvic girdle
Notes/handouts for the teachers
Flashcard contents: Humerus, radius and ulna, femur, tibia and fibula, phalanges, ribs, pelvic girdle.
Lesson 22
The Human Body

Learning outcome:
By the end of the lesson, pupils will be able to:
- identify the location of different types of bones in the skeleton.

Teaching aids:
- A clearly labelled diagram of the human skeleton,
- an unlabeled diagram of the human skeleton,
- chalkboard, chalk,
- Basic science textbook.
Again, introduce the lesson by singing the song below:

My head, my shoulder, my knees, my toes

Ask pupils to stand up and do the action by touching the relevant parts of the body mentioned in the song. (Repeat a few times).

Tell pupils that we will be learning more about the different types of bones in the human skeleton in today’s lesson.

Place pupils in small groups (preferably not more than 6 pupils per group).

Draw the table below on the chalk board.

<table>
<thead>
<tr>
<th>Part of the body</th>
<th>Name of the bone found in that part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td></td>
</tr>
<tr>
<td>Upper arm</td>
<td></td>
</tr>
<tr>
<td>Lower arm</td>
<td></td>
</tr>
<tr>
<td>Upper leg (Thigh)</td>
<td></td>
</tr>
<tr>
<td>Lower leg</td>
<td></td>
</tr>
<tr>
<td>Toes</td>
<td></td>
</tr>
</tbody>
</table>

Allow about 5 mins for the groups to complete this activity.

Go around and support the groups by encouraging them to think about their answers.

Tell pupils that if a bone is broken then it has to be kept still so that the pieces can slowly grow back together.

Use a stick as a model bone. Break the stick (the bone) in half. Ask pupils how the two pieces can be kept still for weeks to let them ‘heal’.

Demonstrate how a bone splint is used to keep broken bones still while they heal.
Step 3: Plenary

Display the unlabelled diagram of a skeleton and ask pupils the following questions:

1. Touch the humerus on the diagram. (Upper arm)

2. On which part of the skeleton can we find the femur? (Thigh)

3. Touch your pelvic girdle. (Around the waist)

4. Show me your phalanges. (Fingers and toes)

5. Which bone is present in the head? (Skull)

6. Which bone is present in the chest? (Ribs)

Answer cue:
Answers to group work activity:

<table>
<thead>
<tr>
<th>Part of the body</th>
<th>Name of the bone found in that part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Skull</td>
</tr>
<tr>
<td>Chest</td>
<td>Ribs</td>
</tr>
<tr>
<td>Upper arm</td>
<td>Humerus</td>
</tr>
<tr>
<td>Lower arm</td>
<td>Radius and Ulna</td>
</tr>
<tr>
<td>Upper leg (Thigh)</td>
<td>Femur</td>
</tr>
<tr>
<td>Lower leg</td>
<td>Tibia and fibula</td>
</tr>
<tr>
<td>Toes</td>
<td>Phalanges</td>
</tr>
</tbody>
</table>

Notes/handouts for the teachers
Refer to lessons 21 and 21 for the labelled and unlabeled diagrams of a skeleton respectively
Lesson 23
The Human Body

Learning outcome:

By the end of the lesson, pupils will be able to:

identify the main types of joints in the body

Teaching aids:

A diagram or poster of the human skeleton, diagram of a ball and socket joint, diagram of a hinge joint, chalkboard, chalk.

Background knowledge

A joint is the point where two or more bones meet in the human skeleton. There are three (3) main types of joints; Fibrous joints (immoveable), Cartilaginous joints (partially moveable) and Synovial joints (freely moveable). Fibrous joints are held together only by connective tissue, e.g. the joint where the teeth are held in sockets in the jaw.

Cartilaginous joints occur where the connection between articulating bones is made up of cartilage, e.g. between vertebrae in the spine. Finally, Synovial joints have a synovial capsule surrounding the entire joint which secretes a lubricating fluid known as synovial fluid. Examples of synovial joints include, ball and socket joints found in the shoulder and hip, pivot joint found in the neck, hinge joint found in the knees and elbows, etc.

Make your own models from cardboard tubes (toilet rolls) and sellotape.
**Step 1: Introduction**

Write the following words on the chalkboard:
- Phalanges
- Fingers
- Femur
- Hand
- Humerus
- Hair
- Skull
- Radius and Ulna
- Toe
- Leg

Select pupils and ask them to come to the board and tick the words on the list that are bones.

If a pupil gets it wrong, ask another pupil to help them out until all the correct words have been completely ticked.

Tell the pupils that we will be learning about two types of joints in today's lesson (i.e. ball and socket joints and hinge joints).

**Step 2: Main activity**

It is important to show pupils what a joint looks like. Show the pupils your models. Ask a volunteer to explain how each one works.

Explain that there are 2 main types of joints found in the skeleton, namely; moveable and immoveable joints.

Explain that immoveable joints are joints where the bones stay locked together. They are found in the skull, pelvic girdle and sacrum (Show these immoveable joints to the pupils on the diagram of a skeleton).

Explain that the moveable joints are where the bones can move; four types are the ball and socket joints, the hinge joints, the pivot joints and the gliding joints.

Tell pupils that we will be looking at the ball and socket and the hinge joints only.

Show with your model how the ball and socket joint allows for multi-directional movements and rotation.

Also explain that there are only 2 ball and socket joints in the human skeleton. Ask pupils to guess where they are - they are found in the hip and shoulder. (All pupils can rotate their shoulder and rotate their hip to feel this).

Show with your model that hinge joints allow for only one-directional movement. Ask pupils to guess where they are - they are found in the knees, elbow, fingers, toes, etc. (All pupils can bend their knee back and forward but not to the side to feel this).

Allow pupils to explore the joints in their bodies to observe how other joints move.

Allow 5 minutes for this and ask pupils to share their observations about how their joints move.

Make corrections where necessary.
Step 3: Plenary

Ask pupils to complete the table below in their notebooks by identifying the type of joints found on the parts of the body listed on the table.

<table>
<thead>
<tr>
<th>Part of body</th>
<th>Type of Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger</td>
<td></td>
</tr>
<tr>
<td>Knee</td>
<td></td>
</tr>
<tr>
<td>Hip</td>
<td></td>
</tr>
<tr>
<td>Elbow</td>
<td></td>
</tr>
<tr>
<td>Shoulder</td>
<td></td>
</tr>
</tbody>
</table>

Go round the class to provide guidance to pupils as they do their work. Complete the table correctly on the chalkboard and ask pupils to make relevant corrections to their work.

Answer cue:

Answers to the conclusion & assessment activity

<table>
<thead>
<tr>
<th>Part of body</th>
<th>Type of Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger</td>
<td>Hinge joint</td>
</tr>
<tr>
<td>Knee</td>
<td>Hinge joint</td>
</tr>
<tr>
<td>Hip</td>
<td>Ball and socket joint</td>
</tr>
<tr>
<td>Elbow</td>
<td>Hinge joint</td>
</tr>
<tr>
<td>Shoulder</td>
<td>Ball and socket joint</td>
</tr>
</tbody>
</table>

Notes/handouts for the teachers

You may reuse the diagram of a skeleton in lessons 20 and 21 for this lesson in addition to the examples of joints given below:

Hinge joint

Ball and Socket joint
Lesson 24
The Human Body

Learning outcome:
By the end of the lesson, pupils will be able to:
- Describe the importance of bones in the human body
- Describe the importance of joints in the human body

Teaching aids:
Basic Science Textbook, chalkboard and chalk.

Background knowledge
The joints and bones in our bodies enable us to carry out activities such as sitting down, standing up, turning around, walking, running, etc. Bones and joints also provide structure and support for the human body. Some bones in the human body help to protect certain vital organs. For example, the skull protects the brain while the ribs protect the heart.
Ask pupils to do the following a few times:

i. Sit down,
ii. Stand up,
iii. Turn around,
iv. Walk a few steps,
v. Put their hands up and down etc.

Repeat the activity a few times

Ask pupils what we use to do these activities (joints and bones).

Tell them that we will be learning about the importance of joints and bones to the human body in today’s lesson.

Take pupils outside the classroom for a physical activity session.

Ask the pupils to do the following activities; each time they do an action they should shout out the joints they are using:

i. Bend forward and touch their toes (pelvis – ball and socket joint).
ii. Run a few steps (ankle hinge joint, knee hinge joint, pelvis joint)
iii. Jump up and down (ankle hinge joint, knee hinge joint)
iv. Swing their arms from side to side (shoulder ball and socket joint)
v. Jog on the spot and so on (same as ii)

Take the pupils back to the classroom and remind them that they are able to do these activities because they have joints and bones.

Ask pupils to imagine how the human body would be if they did not have bones or joints.

Allow a few pupils to respond to this question. Tell them they would be a big round floppy bag. Ask pupils to draw a body with bones and a body without bones.

Ask pupils to copy and complete the following summary. Bones and joints are very useful to the body because:

a) They give ------ to the body (shape)
b) They ------ the body to stand up. (support)
c) They allow the body parts to -----.(move)

Ask pupils to mention one importance of bones to the human body.

Ask them to also mention one importance of joints to the human body.

Make a list of pupils’ responses on the chalkboard
Lesson 25
Waste and Waste management

Learning outcome:
By the end of the lesson, pupils will be able to:
- Explain the meaning of waste.
- Describe how waste is produced in the environment.

Teaching aids:
- CLEAN Waste in a rubbish bag – for example Empty boxes of sugar, empty tins of milo or any drink, empty bottles of water, packet of biscuit or sweet, chalkboard and chalk.

Teaching aids:
- Source the various waste materials listed under the teaching aids.

Background knowledge
Most waste around us is created by humans, including everyone in this classroom. Waste is unwanted or unusable materials or substances. It is made in our homes, communities, factories and even in schools and industries generate a lot. There is so much waste around us and much of it could harm our health. However, much of it still has some value.

Waste management means the collection, transportation, handling and disposal or recycling of waste. A good system of waste management is key to sustaining healthy living in a pleasant environment. A poor system can result in public health hazards such as poisoning, fire outbreaks, injuries especially to children, smoke, explosion, road blockage causing accidents; pollution of land, air and water.

Look up Lagos Waste Management Authority for details on some Nigerian projects, including landfill operations. (Available from http://www.lawma.gov.ng/)
**Step 1: Introduction**

Show pupils a selection of empty food packets and tins. Ask them what they normally do with the container after eating the food in it? (most of them will likely say throw it away)

Now ask them why they throw it away. Explain that the packet they have thrown away is a type of waste. Tell them that we will be learning about waste in today’s lesson.

**Step 2: Main activity**

Open the rubbish bag and display the examples of waste products to the pupils. Ask the pupils what each object is, where it came from, and can anybody think of a use for it now?

Tell them that the empty boxes, bottles, cartons etc. have been thrown away because people no longer want them. They are waste.

Explain that waste refers to any unwanted/unusable material, substance or by-product.

Explain to pupils that every one of us create waste such as food packages, aluminium cans, worn out tires, used paper, broken bottles, etc.

Take the pupils outside on a waste hunt. The pupils can help each other to spot waste in and near the school grounds. Point out examples of solid waste (like paper) but also liquid waste (like oil and dirty water) and gas waste (like fumes from cars).

Back in class and working in pairs, each pair should make a list of 5 waste around the school. Ask each pair to read out their answers. Make a long list of pupils’ answers on the chalkboard and make necessary corrections.

**Step 3: Plenary**

Ask pupils to list 5 different kinds of waste that can be generated in a market place.

Go round the class to see pupils’ lists and make corrections where needed.
Lesson 26
Waste and Waste Management

Learning outcome:
By the end of the lesson, pupils will be able to:
Identify different types of waste

Teaching aids:
Chart/poster showing different types of waste, chalk, chalkboard and Basic Science textbook.

Background knowledge

Landfill
Scientists are able to learn some about ancient people by studying the methods for their waste disposal (in dumps and also graves). Originally, we used dumps (waste thrown on top of waste in a big open pit). This makes mountains of rubbish which attracts insects and rats etc. Now we are better to use landfills where the waste is buried. However, with rain water, toxic substances are filtered out of the rubbish and leach into the soil. Today, landfills can be lined with plastic, and sometimes clay, to prevent leakage into the surrounding soil.

Each day’s rubbish is compressed and covered with a thin layer of soil so that air and pests can’t get in to build nests, eat it or spread it — potentially spreading harmful diseases. In order to avoid an explosion or spontaneous combustion, pipes placed throughout the layers of rubbish collect the methane gas that is made inside the landfill by rotting materials. Some landfills burn the methane gas to create energy for other purposes.

Step 1: Introduction

Ask each pupil to choose a partner and discuss the different kinds of things they throw away as waste in their homes (e.g. food leftovers, furniture, cutlery, broken plates, broken bottles, etc.).

Ask each pair to mention one waste product they discussed.

Write their answers on the chalkboard.

Make sure that the list you have has objects made from a variety of materials including plastic, glass, metal etc. (cups, bottles, plates, clothes, fridges, spoons, forks and different types of food and vegetable).

Tell pupils that they are going to learn about why different kinds of waste are unhealthy in today’s lesson.

Step 2: Main activity

Ask pupils to work in pairs for the following activity:

- Look at the list on the board. Discuss which object is most and least dangerous to health if it was left in the school playground a) for one-day b) for one-week c) for one month

- Ask pupils to discuss with their partners and copy and complete the table below with the right kind of items under each column.

- Go round the class to give support to pupils by prompting them to think carefully about each heading.

- Make necessary corrections and draw the completed table on the chalkboard using pupils’ responses.

<table>
<thead>
<tr>
<th>Things that break</th>
<th>Things that go rotten</th>
<th>Things that crack or split</th>
<th>Things that tear</th>
<th>Things that rust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step 3: Plenary

Ask pupils to mention some human waste that can cause disease (e.g. faeces and urine).

How should human waste be dealt with safely?
**Answer cue:**
Sample answers to the main activity:

<table>
<thead>
<tr>
<th>Things that break</th>
<th>Things that go rotten</th>
<th>Things that crack or split</th>
<th>Things that tear</th>
<th>Things that rust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Plates</td>
<td>Cooked food</td>
<td>Plastic cup</td>
<td>Paper</td>
<td>Metal spoon</td>
</tr>
<tr>
<td>Eye glasses</td>
<td>Vegetable</td>
<td>Bucket</td>
<td>Clothes</td>
<td>Fridge</td>
</tr>
<tr>
<td>Mugs</td>
<td>Meat</td>
<td>Glass cups</td>
<td>Chair cover</td>
<td>Metal bucket</td>
</tr>
<tr>
<td>Plastic chairs</td>
<td>Fish</td>
<td>Phone screen</td>
<td>Curtains</td>
<td>Gas cylinder</td>
</tr>
</tbody>
</table>
Lesson 27
Waste and Waste Management

Learning outcome:
By the end of the lesson, pupils will be able to:
- Identify the classes of waste.
- Distinguish between proper and improper waste disposal practices.

Teaching aids:
Chalk, chalkboard, Basic science text book.

Background knowledge
When waste builds up, it will cause a lot of damage. Therefore, we need to ensure that we dispose of our waste properly. Waste disposal is the removal and recycling or safe destruction of waste. Common waste disposal methods include burning waste (incineration), burying waste (landfill) and recycling of waste. Improper ways of disposing of waste pose serious problems to our health and environment. Government spends a lot of money on waste collection and disposal.

Waste generation rates of the urban centres in this study are shown in Table 1. Waste sources are households (residential), commercial premises, markets, institutions, industries and health care facilities (as illustrated by the case of Uganda, which is similar to other EAC urban centres. Residential areas or households are the major contributor of wastes followed by markets and commercial areas respectively. Densely populated urban zones (e.g. slums) have low income households with waste generation estimated between 0.22 and 0.3kg/cap/day. Solid waste generation by the higher income households is estimated between 0.66 and 0.9 kg/cap/day on average.

<table>
<thead>
<tr>
<th>Solid waste streams</th>
<th>Contribution in weight (%)</th>
<th>Waste characteristics Comments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic (Residential)</td>
<td>52 -80</td>
<td>Major: food wastes</td>
<td>Waste quantity increasing with population increase - E-waste is emerging as significant - Wastes collection by: urban councils; private companies, NGOs and CBOs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor: paper, plastic, textiles, glass, ceramics, ashes, leather, compound wastes</td>
<td></td>
</tr>
<tr>
<td>Markets</td>
<td>4 -20</td>
<td>Major: vegetable wastes (leaves, stalks), spoiled fruits</td>
<td>Markets in all municipalities - Number increasing - Waste collection: urban councils and private collectors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor: damaged packaging materials (e.g., sacks, bags, paper, timber)</td>
<td></td>
</tr>
<tr>
<td>Commercial (excluding markets)</td>
<td>3.7-8</td>
<td>Major: packaging materials; food wastes; scrap metals</td>
<td>Shops, hotels, restaurants, offices, open pavement trading - Mobile open air traders - Increasing business - Increasing waste volumes - E-wastes has become significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor: glass, hazardous wastes (e.g. contaminated containers, batteries and cleaning textiles)</td>
<td>Waste collection: urban council and private collectors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional (e.g., Government and private-Ministries, Educational establishments, sports facilities, clubs)</td>
<td>5</td>
<td>Major: food wastes, stationery</td>
<td>- Expanding in numbers with population increase - E-wastes has become significant - Waste collection: mainly by private companies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor: packaging (e.g., cardboard, paper, plastics)</td>
<td></td>
</tr>
<tr>
<td>Industrial (manufacturing)</td>
<td>3</td>
<td>Various types depending on industry (e.g., decomposable wastes from food industries, non-degradable such as broken bottles and plastic containers)</td>
<td>Production wastes: by-products and damaged items - Broken bottles: recycled or dumped - E-wastes has become significant - Plastic: recovered, re-used, recycled or dumped - Scrap metals: recycled or dumped - Recycling plants available in the EAC</td>
</tr>
<tr>
<td>Healthcare (hospitals, clinics, drug shops)</td>
<td>1</td>
<td>Major: domestic type of wastes</td>
<td>Major hospitals treat own hazardous wastes. - Clinics dump with other wastes - Domestic: collected by private companies. E-waste is becoming significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor: hazardous (e.g., anatomical, contaminated materials, sharps)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>11-11.4</td>
<td>Examples: street sweepings, public park wastes, construction wastes</td>
<td>collected by: Urban council and private companies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 1: Introduction

Ask pupils the following questions:

1. What is waste?
2. Mention some of the things you threw away in your house yesterday (make a list of pupils’ responses on the chalkboard for use in the main activity). Prompt pupils to include some liquid wastes like spoilt milk, water from wash plates or clothes. If we don’t get rid of waste, what will happen? (Block roads, cause sickness, etc.)

Tell pupils that when waste builds up, it can cause a lot of damage. Therefore, we need to find proper ways of getting rid of waste.

Explain to pupils that the wastes we generate are of 2 kinds, namely solid and liquid waste.

Tell pupils that we will be learning about the classes of waste and how to dispose waste in today’s lesson.

Step 2: Main activity

Divide pupils into teams of three. Each time has exactly 3 minutes to list all the things that we throw away. When time is up ask teams to count up the number of words on their list. The winner is the team with most words because we have to throw just about everything away.

Ask pupils to work with their teams and sort out the different waste materials on their list into liquid and solid waste.

Allow about 5 mins for this activity.

Draw the following table on the chalkboard for pupils to complete.

<table>
<thead>
<tr>
<th>Solid Waste</th>
<th>Liquid Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leftover food</td>
<td>Spoil milk</td>
</tr>
<tr>
<td>Paper</td>
<td>Water from washing plates</td>
</tr>
</tbody>
</table>

Ask the pupils to discuss why some wastes have to go into the dustbin while we can pour others down the sink? (Likely responses: cannot go down the sink because they are too big and will block the sink, liquid cannot go into the dustbin because it will come out, etc.).

Explain to pupils that solid waste refers to any garbage, refuse or rubbish that we generate in our homes, and other places which can be thrown into a dustbin or refuse dump, e.g., empty packets, spoilt food items, broken furniture, etc.

Explain that liquid waste refers to all waste that we generate in our homes and other places which come in liquid form and cannot be thrown into the dustbin e.g., spoilt milk, leftover drinks, washing water, etc.

Liquid wastes includes sewage. It has to be treated before it can be disposed of in the river or sea. Ask pupils why.

Explain that once these wastes have been sorted, things which can decay are thrown into farmlands to fertilize the soil, things that can burn are put into incinerators and burnt, while those that cannot burn are used in landfill (filling up valleys and pits).

Tell pupils that waste can also be recycled.

Allow pupils to ask questions on any aspect of the lesson they are not clear with.

This topic is important and it might be possible to ask a local official to come to class to tell pupils what the local authority does with waste.
Step 3: Plenary

Ask pupils to complete the following activity in their note books:

1. Copy the list below and underline the liquid waste items.

   Water from washing plates
   Plastic bottles
   Rotten vegetables
   Spoilt juice
   Skin of mango
   Urine

2. Mention two proper ways of disposing solid and liquid waste in your house.

Go round the class to provide support for pupils and give feedback on their work.

Answer cue:
Answers to the conclusion and assessment activity:

1. From the list below, underline the liquid waste items.

   Water from washing plates
   Plastic bottles
   Rotten vegetables
   Spoilt juice
   Skin of mango
   Urine
Lesson 28
Waste and Waste Management

Learning outcome:
By the end of the lesson, pupils will be able to:
- State the meaning of recycling.
- Identify waste materials that can be recycled.
- State two advantages of recycling waste.

Teaching aids:
Chalk, chalkboard, Basic science text book.
Two bins with about 30 pieces of clean rubbish inside each. Have some paper, some cardboard, some metal tins, some plastic bottles, 3 or 4 bits of cloth and plastic containers.

Background knowledge
Recycling is a process to convert waste materials into reusable objects. This prevents potentially useful materials from being thrown away or destroyed. It also reduces the consumption of fresh raw materials and saves the environment from pollution. Recycling is part of the waste disposal hierarchy - Reduce, Reuse, Recycle. A wide variety of different materials can be recycled, including paper, plastic, glass, metal, textiles and electronic equipment.

Many countries now have recycling schemes for people to follow at home.
**Step 1: Introduction**

Ask pupils what they have to take with them when they go to buy a bottle of Coke or Fanta (not the plastic bottle) (an empty bottle of Coke or Fanta).

Ask them why the drink seller always requests empty bottles. (Allow a few pupils to respond).

Explain to pupils that it is because the bottles are reused over and over again by the Coca Cola Company.

Tell them that the process of reusing the bottles over and over again is a type of recycling.

Tell pupils that we will be learning about recycling in today’s lesson.

**Step 2: Main activity**

Explain to pupils that recycling is a way of reusing waste products. Ask pupils why this is a good thing (prevent potentially useful materials being thrown away, reduces the consumption of fresh raw materials, saves the environment from pollution, is cheaper).

Ask pupils if they know how bottles are recycled.

Allow a few minutes for pupils to respond to the question.

Explain that recycling of the bottles we use for buying mineral drinks like Fanta and Coke involves returning the empty bottle to the factory first, after which the bottles are washed and reused in the factory to bottle more of the drinks.

Ask pupils what they think would be the case if these bottles were not recycled or reused (there will be broken glass everywhere).

Ask pupils to mention other waste materials that might be recycled (clothes, glass, plastic, electronics, paper and metal).

Ask them to discuss the advantages of recycling paper with their partners.

Allow selected pairs to respond (e.g. it helps to reduce the number of trees that are cut down for manufacturing paper, keeps the environment clean, etc.).

Set up the rubbish relay outside.

1. The class work in two big teams. Each team must move the rubbish one item at a time from the starting bin and place it in the correct recycling container. (There are 4 for each team, labelled. Plastic, Metal, Paper and cardboard, Fabric.

2. Line pupils up in two teams one behind the other, stretching from their bin to the line of 4 containers.

3. Explain that the waste in their bin was all going to be sent to landfill but now they are going to race the other team to sort it into recycling containers.

4. The first person in each team picks up one piece of rubbish and passes it through their legs to the next person until the piece of rubbish reaches the last person in line.

5. The last person in line runs to their group of recycling containers and decides which container to put the piece of rubbish in.

6. The rest of the team can offer encouragement by calling out the name of the container that particular piece of rubbish should go into.

7. They return to their team and join the front of the line, pick up the next piece of rubbish and pass it through their legs until it reaches the back of the line.
Step 2: Main activity (continue)

8. Repeat the process until person has taken a turn and all items of rubbish have been put into the bins. Any item in the wrong container is put back in the team’s bin. The team with the least number of items in their rubbish bin wins the Rubbish Relay.

5 min

Step 3: Plenary

Ask pupils the following questions:

1. How can we recycle our clothes?
2. Why should we recycle things?
3. List 5 things in our homes that can be recycled.

Answer cue:
Answers to the conclusion & assessment activity:

1. How can we recycle our clothes?
   **Ans:** Wash them, iron them, and give to other people who can use them.

2. Why should we recycle things?
   **Ans:** To reduce the amount of waste generated, to care for our environment, to make things last longer.

3. List 5 things in our homes that can be recycled.
   **Ans:** Glass cups, plastic bottles, clothes we no longer used, water, and fast food containers.
Lesson 33
Acid and Bases

Learning outcome:
By the end of the lesson, pupils will be able to:

Explain the meaning of acids and bases

Give examples of acids and bases

Teaching aids:
An orange and lemon, chalkboard, chalk,
Basic science text book.

Background knowledge

The sour taste of beverages like butter milk, lemon juice and orange juice is because they contain acids. Now, think about baking soda, the same white powder that your mother uses to bake cakes for you. If you put it in your mouth, you will spit it out immediately as it is bitter in taste. If you rub its solution between your fingers, it will feel soapy. Substances like baking soda which have a bitter taste and have a soap-like texture, are known as bases. There are many strong acids and bases found in nature. Some of them are dangerous and are used as poisons by insects and animals. Some are helpful. Many plants have acids and bases in their parts like leaves, thorns, seeds, or sap. Our stomach uses hydrochloric acid to digest food and for killing harmful germs that can cause diseases. The batteries of cars and invertors contain a strong acid called sulphuric acid. Bases are used in manufacturing household cleaning products, baking soda, and as fertilizers for crops.

An indicator is a substance that is a different colour in acid and in base. It can be used to detect acids and bases.

Red cabbage juice can be used to test the pH of common household chemicals. From left to right, the colors result from lemon juice, natural red cabbage juice, ammonia, and laundry detergent. Available from Anne Helmenstine http://chemistry.about.com/cs/acidsandbases/a/aa060703a.htm

Many other common household products and garden plants can be used as pH indicators. Most plants contain pH sensitive anthocyanins, so experiment with other plants, too.
Plants You Can Use as indicators

Beets
A very basic solution will change the colour of beets or beet juice from red to purple.

‘Black’ Berries
Blackberries, black currants, and black raspberries change from red in an acidic environment to blue or violet in a basic environment.

Blueberries
Blueberries are blue but turn red as the solution becomes even more acidic.

Cherries
Cherries and their juice are red in an acidic solution, but turn blue to purple in a basic solution.

Curry Powder
Curry contains the pigment curcumin, which changes from yellow at pH 7.4 to red at pH 8.6.

Delphinium Petals
The colour changes from bluish-red in an acidic solution to violet blue in a basic solution.
Ask pupils to taste a lemon or an unripe orange.

Ask them to describe their reaction and how they felt when tasting.

Explain that lemon juice and orange juice are acids. Vitamin C is also an acid. So is sulphuric acid from a car battery. It is much too dangerous to taste!

The opposite of an acid is called a base.

Tell pupils that we will be learning about acids and bases in today’s lesson.

Pupils should work in small groups. They must first make an indicator by stirring either onion skins or red cabbage (or even tea) in hot water until the water is coloured. Use the coloured water as the indicator.

Pupils find out what colour the indicator is in lemon juice, vinegar, water and water with baking soda added. Use it to test other liquids like oil, milk and coke.

Explain that litmus paper also contains an indicator. Show pupils what colour litmus paper is with the same liquids as the pupils tested.

Explain that acids can occur naturally or can be produced in laboratories. (Examples of acids are nitric acid, hydrochloric acid (in our stomach), ascorbic acid (in lemon juice), etc.).

Now, tell pupils that bases can also occur naturally or can be produced in the laboratories like acids. Examples of bases are sodium hydroxide, potassium hydroxide, caustic soda, baking soda etc.

Ask the pupils to draw a table like the one below and write all the names of the acids and bases they have learnt today.

<table>
<thead>
<tr>
<th>Names of acids</th>
<th>Name of bases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ask pupils to write down what an indicator does.
**Answer cue:**
Answers to the main activity:

<table>
<thead>
<tr>
<th>Names of acids</th>
<th>Name of bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascorbic acid</td>
<td>Potassium hydroxide</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>Sodium Hydroxide</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>Sodium bicarbonate</td>
</tr>
<tr>
<td>Sulphuric acid</td>
<td></td>
</tr>
</tbody>
</table>
Lesson 34
Acid and Bases

Learning outcome:
By the end of the lesson, pupils will be able to:
List some properties of acids and bases

Teaching aids:
Lemons, black soap or any other soap, blue and red litmus papers, flashcards, cups, water, chalkboard, chalk, Basic science text book.

Teacher preparation:
Determine the number of groups based on your class size and divide the lemons and soaps such that each group gets a piece of each item. Prepare your flashcards using the contents listed in the teacher notes section.

Background knowledge
Some characteristics of acids are the sour taste (but it’s not safe to test that!), and the ability to react with other substances like metals. Some bases are slippery to the touch because they convert the oils of the skin into soap and they taste bitter (but again it’s not safe to test these). Acid and base cancel each other out by reacting. This is called neutralization.

Neutralisation is used in everyday life. When someone has too much acid in their stomach, they take tablets with a base to neutralize it. A bee sting is acid and can be neutralized by rubbing with a base. A wasp sting is basic and can be neutralized by rubbing with an acid like vinegar. A diver has his/her breathe neutralized by passing it through a basic filter. Chemicals are added to soils to neutralize acids.

**Step 1: Introduction**

Use flashcards, each with one name of acid or base on it.

Ask pupils to put their hands up to identify whether the name on the card is an acid or a base.

Lift the first card up and select one of the pupils who has put their hands up to say if the name on the card is an acid or a base.

Continue flashing the different cards until the contents of all the cards have been identified by the pupils.

Provide feedback on the activity and ask pupils if they observed during the activity that all the words on the flashcards that ended with ‘ic’ were acids (i.e. hydrochloric, sulphuric, etc.).

Tell pupils that in today’s lesson, we will be learning about the properties of acids and bases.

**Step 2: Main activity**

Ask pupils to share their thoughts on what we mean by the word ‘properties’.

Allow a few pupils to comment on this.

Explain to pupils that properties are features, characteristics or qualities of something. They can be used to identify it.

Give each group a piece of lemon, diluted cleaning fluid (ammonia based if possible), cup, water and red and blue litmus paper.

Tell them to choose one person in each group to record their results.

Look at the lemon juice and cleaning fluid and observe its colour and appearance. Find out what colour the blue and red litmus is in each of lemon and diluted cleaning fluid.

Explain to pupils that acids turn litmus paper red and bases turn it blue.

Write the following summary showing the properties of acids and bases on the chalkboard for pupils to copy in their science notebooks.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Properties of Acids</th>
<th>Properties of Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Turns litmus paper ------</td>
<td>Turns litmus paper ------</td>
</tr>
<tr>
<td>2.</td>
<td>Tastes ------ (e.g. limes, lemons and vinegar)</td>
<td>Tastes ------ (e.g. quinine)</td>
</tr>
<tr>
<td>3.</td>
<td>Smooth to touch</td>
<td>Slippery to touch (e.g. soaps)</td>
</tr>
<tr>
<td>4.</td>
<td>Corroses metal (i.e. makes metal rust)</td>
<td>Has no effect on metal</td>
</tr>
</tbody>
</table>
Step 3: Plenary

Ask pupils to complete the following tasks in their science notebooks:

1. __________ turns blue litmus paper red.
2. __________ turns red litmus paper blue.
3. ________________ makes metals rust.
4. _________________ is slippery to touch.
5. _________________ tastes bitter.
6. _________________ is sticky to touch.

Provide feedback and make relevant corrections.

Answer cue:
Answers to the conclusion & assessment activity:
1. Acids turn blue litmus paper red.
2. Bases turn red litmus paper blue.
3. Acids makes metals rust.
4. Bases are slippery to touch.
5. Bases taste bitter.
6. Acids are sticky to touch.
Lesson 35

Acid and Bases

Learning outcome:

By the end of the lesson, pupils will be able to:

List some uses of acids and bases

Teaching aids:

Chalkboard, chalk, Basic science textbook,

Background knowledge

Acids and bases can be found everywhere in the world around us. Lactic acid is in sour milk and in our muscles, citric acid in citrus fruits, oxalic acid in rhubarb, malic acid in apples, and tartaric acid in wine. Baking soda, antacids, and lye all contain bases. Acids and bases are also used widely in industry. Without acids, a car won’t start (sulphuric acid in car batteries) and your food might rot more quickly (food preservative in the form of citric acid).

Similarly, imagine a world without bases. Without bases, stubborn stains on your clothing won’t come off (sodium hypochlorite in bleach), you’ll have dirty mirrors (ammonium hydroxide used in glass cleaners) and even have bowel problems as laxatives can be made from magnesium hydroxide. This table from http://sachiacidbase.weebly.com/uses.html
<table>
<thead>
<tr>
<th>Acids</th>
<th>Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>acetic acid</strong></td>
<td>sodium hydroxide (caustic soda)</td>
</tr>
<tr>
<td>• vinegar (used for cooking, contains 3-6% of acetic acid)</td>
<td>• used in the manufacturing of soap</td>
</tr>
<tr>
<td>• used in pickling and in many food preparations</td>
<td>• used in petroleum-refining</td>
</tr>
<tr>
<td><strong>citric acid</strong> (lemon and orange juice)</td>
<td>• used for the making of medicines</td>
</tr>
<tr>
<td>• used in the preparation of effervescent salts</td>
<td>• used to make paper and pulp</td>
</tr>
<tr>
<td>• used as a food preservative</td>
<td>calcium hydroxide (slaked lime)</td>
</tr>
<tr>
<td><strong>nitric acid and sulphuric acid</strong></td>
<td>• used to neutralize acid in water supplies</td>
</tr>
<tr>
<td>• used in the manufacture of fertilizers, dyes, paints, drugs and explosives</td>
<td>• used in the making of bleaching powder</td>
</tr>
<tr>
<td><strong>sulphuric acid</strong></td>
<td>• used as a dressing material for acid burns</td>
</tr>
<tr>
<td>• used in batteries, especially for cars and other vehicles</td>
<td>• used as an antidote for food poisoning and in the mixture of whitewash</td>
</tr>
<tr>
<td>• used in manufacturing fertilizers such as super phosphate and ammonium sulphate</td>
<td>• if mixed with sand and water to make mortar, used in the construction of buildings and by farmers to neutralize the harmful effects of acid rain</td>
</tr>
<tr>
<td><strong>tannic acid</strong></td>
<td>ammonium hydroxide</td>
</tr>
<tr>
<td>• used in the manufacturing of ink and leather</td>
<td>• used to remove ink stains from clothes and to remove grease from window-panes</td>
</tr>
<tr>
<td><strong>hydrochloric acid</strong></td>
<td>• used in the cosmetic industry</td>
</tr>
<tr>
<td>• used to make aqua regis that dissolves noble metals such as gold and platinum</td>
<td>potassium hydroxide</td>
</tr>
<tr>
<td><strong>calcium hydroxide</strong> (slaked lime)</td>
<td>• used to make alkaline batteries</td>
</tr>
</tbody>
</table>
Tell pupils that we will be learning about the uses of acids and bases in today’s lesson.

Ask pupils to mention some properties of acids and bases based on what they learned in the previous lesson.

Ask pupils to mention the names of some acids and bases.

Tell pupils that we will be learning about the uses of acids and bases in today’s lesson.

Explain to pupils that acids and bases are very useful in our daily lives.

Tell them that without acids, we won’t have Vitamin C (ascorbic acid), our cars won’t start (sulphuric acid in car batteries) and our foods will spoil very quickly (food preservative in the form of citric acid).

Also explain to pupils that without bases, we won’t have soap to wash our clothes and bath, stubborn stains on our clothing won’t come off (sodium hypochlorite in bleach); we will have dirty mirrors (ammonium hydroxide used in glass cleaners) and even have bowel problems (laxatives can be made from magnesium hydroxide).

Give one flashcard to each group. They must draw a poster to illustrate the use of the acid or base.

Stick the posters up for all to see with the flashcard underneath, showing the name of the acid/base.

Ask pupils to write the names and uses of two bases and two acids into their science notebooks.

Step 1: Introduction

Ask pupils to mention some properties of acids and bases based on what they learned in the previous lesson.

Ask pupils to mention the names of some acids and bases.

Step 2: Main activity

Explain to pupils that acids and bases are very useful in our daily lives.

Tell them that without acids, we won’t have Vitamin C (ascorbic acid), our cars won’t start (sulphuric acid in car batteries) and our foods will spoil very quickly (food preservative in the form of citric acid).

Also explain to pupils that without bases, we won’t have soap to wash our clothes and bath, stubborn stains on our clothing won’t come off (sodium hypochlorite in bleach); we will have dirty mirrors (ammonium hydroxide used in glass cleaners) and even have bowel problems (laxatives can be made from magnesium hydroxide).

Give one flashcard to each group. They must draw a poster to illustrate the use of the acid or base.

Stick the posters up for all to see with the flashcard underneath, showing the name of the acid/base.

Ask pupils to write the names and uses of two bases and two acids into their science notebooks.

Step 3: Plenary

Ask pupils to do the following exercise in their notebooks:

1. List 3 uses of bases
2. List 3 uses of acids
Notes/handouts for the teachers

From this table, make a set of flashcards. Each one will have the name of the acid on one side and the use on the other.

<table>
<thead>
<tr>
<th>Acids</th>
<th>Uses in everyday life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid</td>
<td>Its salt is used to preserve food</td>
</tr>
<tr>
<td>Carbonic acid</td>
<td>To make carbonated drinks like, coke, sprite, lacosera, etc.</td>
</tr>
<tr>
<td>Ethanoic acid</td>
<td>A main compound of vinegar</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>To clean metals before electroplating / household cleaning / leather processing / swimming pool maintenance</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>Production of fertilizers, explosives, etching and dissolution of metals (purification and extraction of gold)</td>
</tr>
<tr>
<td>Sulphuric acid</td>
<td>To make detergent, polymer and fertilizers.</td>
</tr>
<tr>
<td>Tartaric acid</td>
<td>Manufacturing of soft drinks, provide tartness to food, as an emetic (a substance to induce vomiting).</td>
</tr>
</tbody>
</table>

Bases

<table>
<thead>
<tr>
<th>Bases</th>
<th>Uses in everyday life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>Production of fertilizers (ammonium and nitrate salts), used in the manufacture of nitric acid, neutralize the acid (in the petroleum industry) and prevent premature coagulation in natural / synthetic rubber.</td>
</tr>
<tr>
<td>Aluminum hydroxide</td>
<td>Manufacture other aluminum compound and to make gastric medicine (antacid)</td>
</tr>
<tr>
<td>Calcium hydroxide</td>
<td>To make cement, limewater, neutralize the acidity of soil and application of sewage treatment.</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>Used in the manufacturing of soaps, detergents, and cleaners.</td>
</tr>
<tr>
<td>Magnesium hydroxide</td>
<td>Suspension of magnesium hydroxide in water is used as an antacid, used as an antiperspirant (armpit deodorant), used in making toothpaste and as a non-hazardous alkali to neutralize acidic wastewater.</td>
</tr>
<tr>
<td>Potassium hydroxide</td>
<td>Used in the manufacture of liquid soap, used in dyeing and electroplating.</td>
</tr>
</tbody>
</table>
Lesson 36
Soap Making

Acid and Bases

Learning outcome:
By the end of the lesson, pupils will be able to:

- Identify local materials used in making soap.
- Mention some uses of soap.

Teaching aids:
Chalk, chalkboard, plantain ash, Basic science text book.

Teacher preparation:
Before the lesson, oven roast or sun-dry the plantain skins. Then burn them to make ash. Write the step-by-step procedure for making soap on the chalkboard (see teacher notes for steps).

Background knowledge
In everyday life we use soap to wash dishes, clean clothes, or keep our bodies presentable to nose and eye. Soap therefore has numerous applications in our daily life. One of its great values is keeping our household a far better place to live and work. However, contrary to what one may think, soap was invented not only for the purpose of personal hygiene; rather, it was invented to solve other purposes. Colourful yarns were valued very early in the history of textiles; wool as it comes from the sheep is coated with a layer of grease that interferes with the application of dyes and soap was used to remove this problem. This lesson attempts to explore the science of soap production using indigenous raw materials. Soap is made by neutralising the acids in an oil with a base like sodium hydroxide (lye) or potassium hydroxide, present in plantain ash. The process is called saponification. Raw materials used in local soap making include: plantain ash, palm oil, coco butter, shea butter etc.

Black soap is a handmade soap, known for being gentle and alleviating skin ailments, that has been used for centuries throughout Western Africa. It consists of a naturally-derived emollient combined with the nutrient-rich ashes of native African plant materials. It is used on the face, body and hair. By following these steps, you can create your own black soap with your class at school.

Instructions for making African soap available on http://www.wikihow.com/Make-Black-Soap
Step 1: Introduction

Ask pupils to mention some types of soaps they know about.

Allow a few pupils to respond.

Now ask the pupils what they use soap for.

Again allow a few more responses from pupils.

Ask pupils if they know about black soap. Tell them that black soap is a locally produced soap.

Tell pupils that we will be learning about how black soap is made in today's lesson.

Step 2: Main activity

Ask if pupils have ever seen where black soap was being made?

Ask if pupils can mention any materials used in making black soap.

Tell them to discuss in their group and make a list of the materials used in making black soap from the list of procedures on the chalkboard.

Ask each group to read out their list.

Tell pupils that we will be learning about how black soap is made in today's lesson.

Step 3: Plenary

Ask pupils if they know about black soap. Tell them that black soap is a locally produced soap.

Tell pupils that we will be learning about how black soap is made in today's lesson.

Notes/handouts for the teachers

Procedures for making black soap:
Step 1 = Collect ash from plantain or another suitable plant
Step 2 = Pour water over the ash
Step 3 = Heat the liquid in the tin on a stove
Step 4 = Spread a piece of cloth over a tin
Step 5 = Pour the ash and water onto the cloth so that the liquid dribbles into the tin.
Step 6 = Add palm oil to the hot liquid and stir with a spoon or stick
Step 7 = Allow the liquid to cool

Ask pupils to complete the following exercise in their notebooks:

1. List 5 uses of soap.
2. List 5 materials used for making black soap.
Term 3: Information Technology
Lesson 4
Care and Protection of Computers

Learning outcome:

By the end of the lesson, pupils will be able to:
Describe how antivirus protects the computer

Teaching aids:
A hand glove (a small nylon bag can also be used), Powder, a stick whose inside has been eaten up by moth or rot, chalkboard, chalk, Information technology textbook.

Background knowledge

Antivirus software are programs which can detect, prevent, protects and clean up computer from worms, Trojan horses and many other types of threats which may attempt to infect your computer system. Without anti-virus application, your computer is vulnerable to these types of attacks. There are some Anti-virus programmes that you spend extra money to pay for and there are some that are free application.

From http://www.moneysavingexpert.com/utilities/free-anti-virus-software
**Step 1: Introduction**

Show pupils the stick and ask them how strong the stick is? (Answer: some will say “strong” and some others will say “not strong”)

Give the stick to one pupil to attempt breaking it.

Ask the pupils: what did you observe? (Possible response: the stick was eaten by moth or was rotten even though it looks good outside).

Ask them what we can do to the stick in order to protect it. (Likely Answer: We can paint it or soak it some chemicals).

Tell the pupils that just like the stick, viruses can also enter our computers and make them unusable and inaccessible. Explain to them that a computer virus is a type of software that is written to harm or damage the software components of the computer.

Explain to them that viruses can also be prevented from entering into our computers just as moths or rot can be prevented from eating up the stick.

Tell pupils that our lesson today is on how to protect the computer from viruses.

**Step 2: Main activity**

Ask them to explain how germs get transferred from one person to another? (Expected answer: through body contact)

Explain to the pupils that viruses are like germs and can be transferred from one computer to another through infected devices or computer applications.

Ask 4 pupils (1-4) to come to the front of the class for an activity.

Give pupil 4 the hand-glove or the small nylon bag to wear over his/her hand.

Pour a fair amount of powder into the palm of pupil 1 and tell him to shake pupil 2.

Ask pupil 2 to shake pupil 3

Then ask pupil 3 to shake pupil 4 on the hand that has the hand-glove.

Ask pupil 4 to remove the hand-glove.

Ask pupils 1-4 to show their hands to the class.

Ask the class: how did the powder get to pupils 2 and 3? (Answer: by contact with pupil 1’s hand).

Explain that viruses travel from one computer to many other computers quickly just as the powder spread from one person to another in this activity.

Ask them why the powder did not touch pupil 4’s hand (Expected answer: Because of he wore a hand-glove).

Explain to pupils that the hand-glove worn by pupil 4 protected his hand from the stain of the powder even though he had a handshake with pupil 3 who had powder on his hand.

Tell them that we can also protect our computer from virus attack by wearing the computer a special type of software known as antivirus.

Explain to pupils that antivirus is a type of computer software that is developed to protect computers from viruses.

Show pupils antivirus software. Explain why it must be installed and then kept up-to-date.
Read out the definition of antivirus in the difficult words section and ask pupils to write it in their notebook in their own words.

Notes/handouts for the teachers

Five questions that help keep children safe online.

Five Questions to Ask

Below I’ve listed five basic questions. They should work with kids of all ages, though you can adjust the content to be age appropriate. Make sure you give your child space (physical and time) to answer you. I love having these conversations in the car—for some reason when you are both looking ahead at the road, it’s easier for your child to be open with you.

1. What are your friends doing online?
   This question directs the attention away from your child and toward the general online activities in his or her crowd. It is a good way to start, and it keeps the topic neutral and generic. You want your children to give you honest feedback, so you must reassure them you won’t punish them for their answers. Your children will likely tell you about activities such as gaming, chatting, building social networks, and even doing homework or research.

2. What are the coolest or newest websites?
   Ask your child to tell you why these sites are cool. You can also ask about the sites that aren’t popular anymore and why.

3. Would you show me your favourite sites?
   Yes, I want you to take 20 minutes out of your busy life to look at penguins sliding down a snowy hill or your child’s dreadlocked warrior avatar swinging a sword around. Ask your child about using security or privacy settings (look at the top and bottom of the screen for those areas of the site). Maybe you’ll be tempted to play along and set up your own account, but make sure you let your child know if you do. Ask your child how he or she uses the site and why these sites are favourites.

4. What do you know about cyberbullying?
   Your child may not know cyberbullying by name, but he or she knows what it looks and feels like. Talk about stories you’ve read or seen on the news regarding nasty emails, embarrassing photos, and personal information that was shared or sent around to other kids without consent. Ask about fake social network postings or cruel online quizzes about a classmate. Find out if your child has ever heard of this stuff going on. Make sure your children know cyberbullying is incredibly common, and if they haven’t seen any yet, it’s only a matter of time until they do. Make sure they know how to react when it does (don’t respond, save it, block it, and report it to Mom or Dad or some other adult).

5. When you’ve been online, have you ever seen anything weird or that made you feel uncomfortable?
   This is an opportunity to discuss cyberbullying, accidental browsing discoveries such as porn or racist sites, or even something weird involving a friend or peer in the neighbourhood. The idea is to make sure your child knows he or she can come to you and not be punished when something bad happens online. Experiencing something bad is almost inevitable when your child is active on the Internet. Make sure your child knows it is okay to go to you for help and you won’t overreact.

From http://uk.norton.com/the-talk/article
Lesson 6
Care and Protection of Computers

Why use Antivirus and Password

Learning outcome:

By the end of the lesson, pupils will be able to:

List 2 reasons for Antivirus in our computer.

List 2 reasons for using password in our computer.

Teaching aids:

Marker, cardboard paper, flashcards, chalkboard, chalk, Information technology textbook.

Teacher Preparation:

make enough of the 6 flashcards (each containing one function on an antivirus or a password – see teacher notes for contents) to give one to each pair. Write only one function of either antivirus or password on each of the flashcards. Do not indicate whether the function is that of password or antivirus.

Background knowledge

The benefits of using anti-virus protection and password on your computer are very great. Antivirus programs are only effective if they are up to date.
**Step 1: Introduction**

Ask the pupils to state what they understand by computer virus. (Expected answer: virus is software that was written to harm or damage computer)

Ask them to tell you what we can use to prevent virus from entering into our computer. (Expected answer: Antivirus)

Ask pupils to tell you the meaning of password. (Answer: a secret word or phrase that protects our data and can keep others from accessing our computer)

Tell the pupils that we are going to learn more about the reasons why we should protect our computer with antivirus and password in today's lesson.

**Step 2: Main activity**

On the chalkboard, draw a two-column table, one column for antivirus and the other for password.

Put pupils into pairs.

Give each pair a flashcard (the flashcards are 6 in number)

Tell them that each of the flashcards contains a function of either antivirus or password.

Ask each group to discuss and agree on whether the function on their flashcard is for password or antivirus.

Ask pupils to make up a little role play that shows why the instruction on their flashcard is important.

Have several groups volunteer to show their role play?

Now ask one pupil from each group to come out and paste the flashcard where it belongs on the table until you have all 6.

Ask the class if the function was properly placed or not. (If the placement was wrong, call another volunteer to come and place properly).

Repeat the process until all the groups have pasted their flashcards.

**Step 3: Plenary**

Ask the pupils to read through the functions of antivirus and write down 2 reasons why we need to protect our computer using antivirus in their exercise books.

Ask the pupils to read through the functions of password and write down 2 reasons why we need to protect our computer using passwords.
Functions of Antivirus and Password

<table>
<thead>
<tr>
<th>Antivirus</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protects our computer from virus attack</td>
<td>Protects the information we have in the computer from being stolen</td>
</tr>
<tr>
<td>Detects and removes virus from our computer</td>
<td>Prevents other people from having access to the information we have in our computer</td>
</tr>
<tr>
<td>Prevents damage of the information we have in our computer</td>
<td>Prevents the information on our computer from being corrupted by virus in the flash drives of people whose devices we cannot trust.</td>
</tr>
</tbody>
</table>
Term 3: Health Education
Lesson 5
Drug Education

Learning outcome:
By the end of the lesson, pupils will be able to:
- Explain the meaning of herbal medicines.
- Identify NAFDAC approved herbal medicines.

Teaching aids:
Different brands of some empty sachets of water (commonly called pure water), chalkboard, chalk, Health education textbook.
**Step 1: Introduction**

Place pupils in manageable group sizes.

Ask pupils to discuss the meaning of herbal medicines in their groups.

Give each group an empty sachet of water (commonly called pure water). Get different brands of sachet water.

Ask pupils to work in their groups and search for the NAFDAC number on the sachet given to their group and write out the number on a sheet of paper.

**Step 2: Main activity**

Explain to pupils that Herbal medicines are taken from plants and have healing powers as well as other human health benefits. Such medicines contain either raw or processed ingredients from one or more plants found in the particular area where they are prepared. In some traditions, materials of dead animal origin may also be used.

Ask pupils to mention some plants that are used as medicines in their communities. Let them explain how such medicines are prepared and what illnesses they treat.

Write their responses on the chalkboard.

Explain to pupils that NAFDAC is an abbreviation for National Agency for Food, and Drug Administration and Control. They ensure the quality and safety of drugs including herbal medicinal products.

Also explain to pupils that NAFDAC certified herbal medicines usually have a unique number which proves that it is either ‘registered’ or ‘listed’ with NAFDAC.

Explain that herbal medicines that are ‘listed’ with NAFDAC are those which NAFDAC is aware of but has not clinically tested them to certify that they do what the manufacturers claim they do. Those that are ‘registered’ are the ones that NAFDAC has clinically tested and certified to do what their manufacturers claim they do.

Explain to pupils that when they check the NAFDAC number of any herbal medicine, they can easily tell if the medicine is listed or registered. The NAFDAC numbers of “listed” herbal medicines will end with the letter “L”, while registered one will end in numbers.

Tell pupils that herbal medicines that are made for us at home by parents, family members or local medicine men/women are not subject to NAFDAC regulations. NAFDAC regulations are only concerned with herbal medicines that are commercially produced, stored for long periods and distributed to areas other than where they are produced. Unregulated medicines could be dangerous to a person’s health.

Select few pupils to mention some examples of commercially sold herbal medicines (e.g., yoyo bitters, forever living products, etc.) in your communities.
Write the following questions on the chalkboard and ask the pupils to write in their exercise books;

i. What is the difference between a “listed” herbal medicine and a “registered” herbal medicine?

Answer cue:
Answers to the activity in the assessment & conclusion section:

Answer the following questions:

i. What is the difference between a “listed” herbal medicine and a “registered” herbal medicine?
Ans: A listed herbal medicine is one that NAFDAC is aware of but have not clinically tested to certify that they do what the manufacturers claim they do while those that are registered are those that NAFDAC has clinically tested and certified to do what their manufacturers claim they do.

ii. How can you identify a “listed” herbal medicine from its NAFDAC number?
Ans: Their NAFDAC number ends with the letter “L”.

iii. What is the full meaning of NAFDAC?
Ans: National Agency for Food and Drug Administration and Control.
Lesson 11
Nutrition

Learning outcome:

By the end of the lesson, pupils will be able to:

- Explain the meaning of nutrition.
- Explain the meaning of food nutrients.
- Mention 3 examples of food nutrients.

Teaching aids:

Blank flashcards, cardboard papers or plain sheets of paper, marker pens, chalkboard, chalk, Health education textbook.

Background knowledge

Nutrition is a life process. All living things must have food and water to stay alive. Humans and most animals go to look for nutrients in food and eat what they find. Green plants make their own food. The useful parts of a food are called nutrients. If you want to live well as a human being, you must have good food which has all the essential nutrients.

There are different kinds of nutrients inside foods and each will do a different job inside our body. A balanced diet of fats, carbohydrates, proteins, minerals and vitamins, fibre and water is needed for good health. The poster shows by the size of the ‘slice’ of plate how much of each type of food we ought to eat. For example, the small size of the ‘sweet’ slice shows that a person should only eat a little of those. The body also needs water every day.
**Step 1: Introduction**

Put the pupils into manageable group sizes.

Give each group a blank flashcard.

Write the following questions on the chalkboard and ask pupils to discuss in their groups and write their answers on their blank flashcard;

- Why do we eat food?
- What will happen to us if we don't eat food for 3 days, 3 weeks, 3 months?

Ask each group's representative to present their work.

Discuss each group's answers with the general class and provide feedback.

Tell pupils that in today's lesson, we will be learning about the meaning of nutrition and food nutrients.

**Step 2: Main activity**

Have a class discussion. It would be possible to use the poster with these questions on the back. Questions for discussion with the pupils:

1. What food do you like on this plate? Pick 6 favourite foods to make a good meal.

2. Why do we eat food? The plate is divided into slices. What is slice number 1 called? What foods are in slice number 1? (Repeat with two other slices).

3. Which slice is the smallest? Which is the largest?

4. The smallest slice is 'sweet things'. What would happen if you made that your largest slice every day for a year?

5. Why are some slices bigger than others?

6. What would happen if you stopped drinking water for a month?

Explain to pupils that we do not only eat food so that we can have energy to do work but that eating food in the right proportion also helps us to maintain good health.

Tell pupils that the way we take our food and how our body uses it, is called nutrition.

Explain to pupils that each food we eat has specific food substances that have benefits for our bodies and these food substances are called "food nutrients". Tell them that some foods have nutrients that help to build our muscles; some give us energy, while some others help us grow strong bones and teeth.

Tell pupils that the foods we eat are generally classified into six groups according to the nutrients they provide. The six groups are; carbohydrates, proteins, fats and oils, vitamins, mineral salts and water. (water is not included as one of the classes of food).

Place pupils in manageable group sizes.

Ask them to discuss in their groups and copy and complete the table.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Carbohydrates</th>
<th>Proteins</th>
<th>Fats and oils</th>
<th>Vitamins &amp; minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cake</td>
<td></td>
<td></td>
<td>Orange</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Write the following questions in their exercise books:

1. The foods we eat are generally classified into ________ groups.
2. What are food nutrients?
3. List the different food nutrients we get from food.

Collect pupils’ books for review and provide feedback on their work.

Make all necessary corrections on the chalkboard for the benefit of all pupils.

Answer cue:
Answers to the activity in the assessment & conclusion section:
1. The foods we eat are generally classified into 5 groups.
2. What are food nutrients?
   Ans: These are food substances found in the foods we eat which have specific benefits for our bodies.
3. List the different food nutrients we get from food.
   Ans: Carbohydrates, proteins, fats and oils, vitamins and minerals, water.
Lesson 12
Nutrition

Learning outcome:

By the end of the lesson, pupils will be able to:

- List 3 sources of each food nutrient.
- Group foods according to the nutrients they provide.

Teaching aids:

Cardboard papers, marker pens, chalkboard, chalk, Health education textbook.

Background knowledge

The amount of food that a human needs depends on their age, body size, the work they do, lifestyle and even climate. A balanced diet contains the right amounts of all the necessary types of nutrients to ensure the body avoids dietary disorder.

<table>
<thead>
<tr>
<th>Food type</th>
<th>Too much can lead to</th>
<th>Too little can lead to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>Weak muscles, flabbiness</td>
<td></td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>Obesity, heart disease</td>
<td>Body wasting, tiredness</td>
</tr>
<tr>
<td>Fats and oil</td>
<td>Obesity, heart disease</td>
<td>Heart disease, wasting</td>
</tr>
<tr>
<td>Vitamins &amp; minerals</td>
<td>Obesity, heart disease</td>
<td>Breakdown of functions</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>Dehydration</td>
</tr>
</tbody>
</table>
Tell pupils that you must eat all the food nutrients in the right proportions. This is called a “balanced diet”.

Ask pupils to bring out a clean sheet of paper and write down what did they eat yesterday.

Ask pupils to put hand up (each time) if they did eat some Protein; Carbohydrate; Vitamins and Minerals; Fats and oils.

If they are unsure what their food contains, make corrections where necessary.

Tell pupils that we will be learning about the different parts of a balanced diet in today’s lesson.

Write a different food nutrient protein, carbohydrate etc.) on top of 4 cardboard papers. Repeat again (and perhaps again) until you have enough papers for the number of groups you want.

Place pupils into 4, 8 or 12 groups and give each group a cardboard paper and a marker pen.

Ask pupils to discuss and write down a long list of foods that provide the nutrient written on their cardboard paper.

Ask each group to nominate a representative to present their work.

Provide feedback and make corrections where pupils are wrong.

Collect their cardboard papers and display on the classroom wall.

Now ask pupils to copy the table below (that you draw on the chalkboard) in their exercises book.

Ask them to draw lines to match the food nutrients to their correct source or food group (as shown in the example).

Provide support to pupils by going round the class to review their work and give feedback.

Tell pupils that a balanced diet will contain the right amount of each of the important nutrients.

Ask pupils to choose a partner.

Tell them to work with their partner and create a balanced meal plan (food time-table) for one week to show their parents/guardians at home.
### Answer cue:
Answers to the activity in the Main activity section:

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Food/Nutrient group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs</td>
<td>Fats and oils</td>
</tr>
<tr>
<td>Carrot</td>
<td>Mineral Salt</td>
</tr>
<tr>
<td>Yam</td>
<td>Vitamins</td>
</tr>
<tr>
<td>Butter</td>
<td>Water</td>
</tr>
<tr>
<td>Cooking salt</td>
<td>Protein</td>
</tr>
<tr>
<td>Drinking water</td>
<td>Carbohydrates</td>
</tr>
</tbody>
</table>
Lesson 13
Nutrition

Learning outcome:
By the end of the lesson, pupils will be able to:
Explain the main functions of the various food nutrients in the body

Teaching aids:
Strips of cardboard papers, chalkboard, chalk, marker pens, Health education textbook.
Step 1: Introduction

Ask pupils what kind of food and how much of it do these people eat?
Olympic runner, boxer, professional footballer, baby, teacher, young pupil, old pupil.

Explain to pupils that people who do heavy work need to eat foods to provide them with energy and to build strong muscles.

Tell pupils that we will learn about the functions of the different types of food nutrients that our body gets from the food we eat.

Step 2: Main activity

Place pupils into manageable group sizes.

Divide the chalkboard into two halves and write food nutrients on one side, then functions on the other side.

Under the functions’ side of the board, write the following functions of food nutrients;

1. Foods that give us energy (Carbohydrates).
2. Foods for growth and tissue repair (Proteins).
3. Serves as a solvent and transporter of food nutrients around the body (Water).
4. Foods that protect our body (Vitamins and Mineral salts).
5. Foods that give us energy and protect the delicate parts of our body (Fats and oils).

On the strips of cardboard paper that you have already cut out, write the different food nutrients and give 1 strip to each group.

Explain that some food nutrients perform similar functions in the body (i.e. vitamins and mineral salts) and as such there are only 5 functions listed on the board.

Ask pupils to discuss in their groups and agree on which function the nutrient on their strip performs in the body.

Each group should take their strip and place it on the other side of the board opposite the function of the nutrient they have been given.

Provide feedback on the activity and allow pupils to ask questions about the lesson.

Read the first section of the summary below (Carbohydrates) aloud twice. Ask pupils then to write it in their own words in their exercise books. Repeat with the next section.

**Carbohydrates:** these food nutrients are mostly found in grains. They provide our body with most of the energy we need to do work. Without carbohydrates in our foods, our body will not function properly. They are found in foods such as breads, rice, yam, potatoes, cereals, etc.

**Proteins:** these food nutrients are mainly responsible for the building and repair of our body tissues. When we eat foods that have proteins, our body breaks down the protein into amino acids. There are 9 essential amino acids which must be provided by the food we eat as they cannot be produced in our bodies. Foods that contain proteins include; meat, fish, milk, beans, eggs, groundnut, etc.

**Fats and oils:** these are food nutrients that help us to grow well, provide some amount of energy for our bodies, and helps our bodies to absorb fat-soluble vitamins such as vitamins A, D, E and K. Fats and oils are found in foods like fish, groundnuts, butter, palm oil, vegetable oil, etc.
Vitamins: these are food nutrients that provide structure to blood vessels, bones, teeth and muscles. There are different kinds of vitamins such as Vitamin A, B, C, D, E, K, etc. Each of these vitamins helps our bodies in different ways. Vitamins are found in oranges, lemons, peppers, vegetables, cucumber, watermelon, apples, etc.

Mineral salts: These are nutrients which help to maintain the normal functioning of our cells. They are usually required by the body in smaller quantities. Examples of mineral salts are sodium, calcium, and potassium. Mineral salts can be found in some fruits, dairy products and vegetables like bananas, potatoes and tomatoes, milk, cheese, yoghurt, etc.

Water: this is a nutrient that helps to maintain the normal functioning of the body systems and transports nutrients to our body’s cells. Water also helps the body to remove waste products from the body. Apart from the table water we drink, some foods we eat also contain some water, e.g., tea/coffee, soups, watermelon, pineapple, etc.

Step 3: Plenary

Write the following questions on the chalkboard and ask the pupils to answer them in their exercise books;

1. Which nutrient gives energy?
2. List 5 energy-giving foods you eat in your house.
3. Which nutrient helps to repair our tissues?
4. List 5 foods that help to repair our tissues.
5. Is water a food nutrient? What is its function in the body?

Review pupils’ responses and provide feedback.

Answer cue:
Answers to the questions:
1. Which nutrient gives energy?
   Ans: Carbohydrates (or fats/oils)
2. List 5 energy-giving foods you eat in your house.
   Ans: This should include rice, yam, potatoes, cassava flour (garri), rice flour (tuwo), etc.
3. Which nutrient helps to repair our tissues?
   Ans: Proteins
4. List 5 foods that help to repair our tissues.
   Ans: beans, groundnut, fish, eggs, and bean pudding (moimoi).
5. Is water a food nutrient? What is its function in the body?
   Ans: Water is a food nutrient. It helps to maintain the normal functioning of the body systems and transports nutrients to our body’s cells. Water also helps the body to remove waste products from the body.
Lesson 14

Nutrition

Learning outcome:
By the end of the lesson, pupils will be able to:
- Give reasons why food nutrients are important for the body.
- Give possible outcomes of not eating a balanced diet.

Teaching aids:
Charts, different food items (rice, beans, groundnut etc.), chalkboard, chalk, Health education textbook.

Teacher Preparation:
Prepare 2 sets of charts for this lesson. In the first chart, you should have different food items e.g. rice, beans, groundnuts, fruits, etc. (you may draw these items in a cardboard where there are no ready-made charts). The second chart should show people suffering from malnutrition (which includes effects of hunger and obesity).

Background knowledge

**Step 1: Introduction**

Place pupils in manageable group sizes
Place the chart showing malnutrition on the wall for all to see.
Ask pupils to discuss in their groups what has happened to the people on the chart.
Ask them what could have caused them to be this way.
Tell pupils that we will be learning about malnutrition in today’s lesson.

**Step 2: Main activity**

Place the picture/chart showing different food items on the chalkboard using a cello tape for pupils to see.
Display the different food items on a table in front of the classroom.
Ask pupils to say the general name for the items on the table (i.e. food).
Ask pupils why we eat a balanced diet (i.e. so that we can have energy, grow, be healthy and strong).
Explain to pupils that our body needs these nutrients in the right quantity, otherwise we will not get the benefits of energy, growth, good health and strength that we need.
The wrong amount of nutrients can make us unhealthy.
Play the true and false game. The teacher reads out a statement. If the pupil thinks it’s true he/she goes to the left wall of the classroom, if he/she thinks its false, go to the right wall of the classroom.

1. Food nutrients help to maintain the proper functioning of our body systems. True/False (T)
2. When we eat balanced diets, we reduce the chances of becoming sick because our body will have enough nutrients to fight things that cause illnesses in the body. (T)
3. Eating vitamins and carbohydrates till our stomach is full is good. (F)
4. Some nutrients give us energy. True/False
5. Eat as much carbohydrate as you can to be healthy (F)
6. Obese people are as healthy as people of normal weight (F)
7. Malnutrition means not eating enough food. (F)
8. A child who does not have enough food will be a small adult (T)
9. A person would be healthy by eating beef and drinking water (F)
10. You can survive several weeks without drinking water, providing it’s not too hot. (F)
Pupils copy this definition of malnutrition – Malnutrition is incorrect nutrition, which can mean eating too much or too little of one of the important nutrients for a healthy body.

Tell pupils that if we take insufficient food nutrients, our body will become malnourished and we can become overweight or wasted or sick with kwashiorkor, rickets, scurvy or pellagra.

Ask pupils if they have ever seen a person sick with any of these diseases.

Explain that the only way to be healthy is to eat a balanced diet.

Allow pupils ask questions on the lesson and discuss the answers with the general class.
Lesson 15
Nutrition

Learning outcome:

By the end of the lesson, pupils will be able to:

- List 4 common nutritional deficiency diseases (i.e. scurvy, rickets, pellagra, and kwashiorkor).
- Describe any 2 characteristics of a person suffering from these nutritional deficiency diseases.

Teaching aids:

- Picture showing some nutritional deficiency diseases (i.e. scurvy, rickets, pellagra and kwashiorkor), flash cards on which the profile of some deficiency diseases are written (see in teacher notes section).

Background knowledge
Ask pupils if they have ever heard of the term “nutritional deficiency”. What does it mean?

Show them the pictures of people suffering from different nutritional deficiencies like kwashiorkor, pellagra, rickets, and scurvy.

Ask pupils if they have seen anybody in their community that has any of the signs shown in the picture.

Tell pupils that they will be learning about nutritional deficiency diseases and their characteristics in today’s lesson.

Place pupils into groups and give each group one flashcard showing the profile of a nutritional deficiency disease. (Some examples are in the teacher notes section).

Give each group a marker pen and a cardboard paper.

Ask pupils to study their flashcards and draw a poster and/or make up a role play to teach about the symptoms of the nutritional deficiency disease that has been described in their flashcards.

Ask each group to nominate representative(s) to teach the class about the disease in their flashcards using their poster/role play (they should show how it is caused, its characteristics and ways of preventing it).

Collect any posters and hang on the classroom walls.

Explain to pupils that lack of essential nutrients in our diet is called “nutritional deficiency”.

Explain to them that prolonged deficiency of nutrients in the food we eat leads to nutritional deficiency diseases.

Tell pupils that some nutritional deficiency diseases include goitre, marasmus, kwashiorkor, rickets, scurvy and pellagra, beriberi, anaemia, night blindness, etc.

Explain that in order to avoid any of these diseases, we must ensure that our diet consists of all the different food nutrients.

Write the following table on the chalkboard and ask pupils to copy and complete it in their notebooks;

<table>
<thead>
<tr>
<th>S/N</th>
<th>Nutritional deficiency disease</th>
<th>Causes</th>
<th>Signs/Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Protein deficiency</td>
<td></td>
<td>Protruding belly, tiny legs, bulging and eyes.</td>
</tr>
<tr>
<td>2.</td>
<td>Iodine deficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Marasmus</td>
<td>Protein and energy deficiency</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Rickets</td>
<td>Vitamin D deficiency</td>
<td>Swollen and bleeding gums, loose teeth, severe skin bleeding, dry and scaly skin.</td>
</tr>
<tr>
<td>5.</td>
<td>Scurvy</td>
<td></td>
<td>Swollen tongue and body, hair loss, weakness, aggression, and confusion.</td>
</tr>
<tr>
<td>6.</td>
<td>Pellagra</td>
<td></td>
<td>Swollen lower leg, rapid heartbeat, mental confusion, paralysis, and involuntary eye movement.</td>
</tr>
<tr>
<td>7.</td>
<td>Vitamin B1 (Thiamine) deficiency</td>
<td></td>
<td>Sleeplessness, dizziness, tiredness and weakness, low appetite, leg cramps, pale skin, and rapid heartbeat.</td>
</tr>
</tbody>
</table>

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Step 2: Main activity (Continued)

Explain that in order to avoid any of these diseases, we must ensure that our diet consists of all the different food nutrients.

Step 3: Plenary

Ask pupils to write a list of the food they have eaten in the past five (5) days.

Ask them to suggest how to improve the foods to make sure it contains all the food nutrients required for the proper functioning of the body.

Ask pupils to discuss their write-ups/suggestion with their parents/guardians when they get home.
Lesson 13
Nutrition

Learning outcome:
By the end of the lesson, pupils will be able to:
Mention 3 ways in which family size can affect the nutrition of the family.

Teaching aids:
2 fruits (preferably oranges or apples), knife, cardboard papers, marker pens, chalkboard, chalk, Health education textbook, a chart showing small and large families (see sample in the note/handout for teacher session).
Step 1: Introduction

Ask each pupil to choose a partner. Ask each pair to discuss what they think will happen to the nutrition of a large family when the parents don’t have enough money.

Select a few pairs to share their answers with the class.

Tell pupils that we will learn about the effects of family size on nutrition in today’s lesson.

Step 2: Main activity

Call out 12 pupils for the activity and divide them into two groups. One group should have 4 pupils while the other should have 8 pupils.

Explain to the pupils that the two groups of pupils represent 2 families (one is a family of 4 – father, mother and 2 children while the other is a family of 8 – father, mother and 6 children).

Explain to pupils that the parents of the two families are earning the same salary (which is represented by the orange or apple).

Hold one orange (or any other fruit) up for all to see and cut into 4 equal parts, then share for the family of four.

Then hold the second orange up and cut into 8 equal parts, then share for the family of 8.

Ask pupils to observe the size of the orange that gets to each person in both the family of 4 and the family of 8.

Then discuss the following questions with the pupils;

1. What did you observe from the activity?

2. What is the difference between the orange given to the members of the family of 4 and that given to the members of the family of 8?

Explain to pupils that when a family is large, and the income is small, the little resources they have will be over-stretched. And when this happens, the parents of that family will not be able to provide all the foods that contain the essential nutrients required by the body for proper functioning.

Place pupils into manageable group sizes and give each group a plain sheet of paper and a marker pen.

Ask each group to think about the class activity and write down 2 ways in which the size of a family can affect their nutrition.

Ask each group to present their work to the general class by choosing a member of the group to represent them.

Make a list of the different ways that family size can affect nutrition on the chalkboard based on pupils’ responses.

Ask pupils to copy the list in their exercise books.
Explain to pupils that when a family increases in number, the quantity of food that is available to each member of that family decreases unless there is also an increase in the family’s income.

Explain that increase in family size can also affect the quality of a family’s nutrition. This is because when the family is too large, parents may become unable to afford some foods that provide essential nutrients such as fruits and vegetables. Tell them also that when members of large families do not get sufficient nutrients over a long period of time, they can easily become sick.

In the same vein, it is easier for a smaller family to get good nutrition since the available food is shared by a small number of people. This also means that people in smaller families are less likely to fall ill due to nutritional deficiency.

Display the chart and ask pupils to discuss what will happen to the nutrition in both families shown on the chart.