

Exploring God's Creation: Natural Sciences and Technology – Grade 5

(Moodle Book Title)

Introduction for the Learner

Welcome, young explorer! This year in Natural Sciences and Technology, we will embark on an exciting journey to discover the wonders of the world around us. From the smallest seed to the largest animal, from the materials we use every day to the amazing ways things grow and change, we will see the incredible detail and order in God's creation.

Science is a way of observing, asking questions, and learning about how things work. Technology is how we use that knowledge to design and make things that help us live better lives and be good stewards of the resources God has given us.

As we learn, let's remember to look for the beauty, the cleverness, and the purpose in everything. Let's be curious, ask good questions, and enjoy discovering more about the amazing world our Creator has made!

Term 1: Life, Living, and Materials

(Moodle Top-Level Chapter)

Term 1 Overview

In this first term, we will start by looking closely at what makes something alive. We'll explore the fascinating world of plants – how they grow, what they need, and why they are so important. Then, we'll marvel at the diversity of the animal kingdom, learning how animals are grouped and what they need to survive. Finally, we will investigate the different materials God has provided in creation, learning about their properties and how we use them. Get ready to observe, investigate, and be amazed!

Chapter 1: Wonderful Living Things

(Moodle Chapter)

Introduction

Look around you! You might see people, pets, trees, rocks, chairs, and many other things. Some of these things are *alive*, and some are not. How can we tell the difference? God created a world full of both living and non-living things, each with its own place and purpose. In this chapter, we'll learn how scientists identify living things.

1.1 What Makes Something Alive?

(Moodle Sub-Chapter/Section)

Scientists have observed that all living things share certain characteristics. They need to do certain things to stay alive. We can remember these using the acronym **MRS GREN**:

- **Movement:** All living things move in some way. Animals might walk, swim, or fly. Plants move too, but much more slowly – they grow towards sunlight, and their roots grow down into the soil. Even tiny living things we can't see move around!
- **Respiration:** Living things need energy to live, grow, and move. Respiration is the process of releasing energy from food. For animals, this usually means breathing in oxygen and breathing out carbon dioxide. Plants also respire, taking in and releasing gases, although they have another special process for making food (we'll learn about that soon!). God designed this amazing way for living things to get the energy they need.
- **Sensitivity:** Living things can react to changes in their surroundings (their environment). You might pull your hand away from something hot – that's sensitivity! Plants react to light, and animals react to sounds, smells, touch, and sights. This helps living things stay safe and find what they need.
- **Growth:** Living things grow bigger or change throughout their lives. A tiny seed grows into a large tree; a baby grows into an adult. Non-living things do not grow by themselves (a chair doesn't get bigger over time unless someone adds parts to it!).
- **Reproduction:** Living things can make more of their own kind. Animals have babies, and plants produce seeds or other ways to make new plants. This is how life continues, according to the patterns God established. Non-living things cannot reproduce.
- **Excretion:** Living things produce waste products that they need to get rid of. When you breathe out carbon dioxide or go to the toilet, you are excreting waste. Plants also release waste products, like oxygen during the day.
- **Nutrition:** Living things need to take in food or nutrients to get energy and materials for growth and repair. Animals eat plants

or other animals. Plants make their own food using sunlight, air, and water – a wonderful provision!

If something shows all these characteristics, we know it is living.

Activity 1.1: Living or Non-living?

- Look at the list below. Write down whether each item is 'Living' or 'Non-living'.
- For two *living* things, explain ONE of the MRS GREN characteristics you know it has.
- For two *non-living* things, explain ONE of the MRS GREN characteristics it *doesn't* have.
 - A rock
 - A pet dog
 - A book
 - A rose bush
 - A car
 - Yourself
 - A river
 - A bird

(H5P Suggestion: Drag and Drop)

- Create two boxes labelled "Living" and "Non-living". Provide images or names of various items (e.g., tree, cloud, cat, table, mushroom, sun, bacteria, water bottle). Learners drag each item to the correct box.

1.2 Observing Living Things

(Moodle Sub-Chapter/Section)

Being a good scientist means being a good observer! God has given us senses – sight, hearing, touch, smell – to explore His creation. When we observe living things, we should be careful and respectful.

- **Look closely:** What colours and shapes do you see? How does it move? Does it have different parts?
- **Listen carefully:** Does it make any sounds?
- **Touch gently (if safe!):** What does it feel like? Is it rough, smooth, soft, hard? (Always ask a grown-up before touching unfamiliar plants or animals).
- **Notice changes:** Does it grow or change over time?

Activity 1.2: Observation Station

- Find a safe spot outside (your garden, a park).
- Spend 10 minutes quietly observing one living thing (like a plant, an insect if you can see one safely, or a bird).

- Draw what you see in your workbook.
- Write down three things you observed about it using your senses. Did it show any signs of being alive (MRS GREN)?

(H5P Suggestion: Image Hotspots)

- Use a detailed picture of a garden scene. Create hotspots on different elements (e.g., a flower, a bee, a stone, a watering can). When clicked, the hotspot reveals whether the item is living or non-living and perhaps one key characteristic (e.g., clicking the bee reveals "Living - It needs nutrition (nectar)").

Chapter 2: Plants – God's Green Gifts

(Moodle Chapter)

Introduction

Plants are everywhere! From tall trees to tiny blades of grass, they cover much of the Earth. Plants are a vital part of God's creation. They provide food for humans and animals, produce the oxygen we breathe, and offer shelter and materials. Let's explore the amazing world of plants!

2.1 What Plants Need to Grow

(Moodle Sub-Chapter/Section)

Just like us, plants need certain things to live and grow healthily. God designed them to use resources from the environment He created. These main needs are:

- **Water:** Plants absorb water through their roots. Water helps transport nutrients throughout the plant and is essential for making food. God provides water through rain and rivers.
- **Light:** Most plants need sunlight to make their food through a process called photosynthesis. The leaves are usually positioned to catch as much light as possible.
- **Air:** Plants take in carbon dioxide from the air to use in photosynthesis. They also need oxygen for respiration (just like us, but they produce more oxygen than they use overall).
- **Nutrients (Food):** Plants get nutrients, like minerals, from the soil through their roots. These are like vitamins for the plant, helping it grow strong and healthy. Some plants, like those living in water, get nutrients directly from the water.
- **Space:** Plants need enough space to grow, spread their roots, and reach for sunlight without being too crowded.

Activity 2.1: Needs of a Plant

- Draw a simple picture of a plant.
- Around your drawing, draw or write labels for the five main things a plant needs to grow (Water, Light, Air, Nutrients, Space).
- Think: What might happen to a plant if it doesn't get enough sunlight? What if it doesn't get enough water?

(H5P Suggestion: Fill in the Blanks)

- Create sentences describing plant needs with missing words. E.g., "Plants absorb _____ through their roots." "Leaves use _____ to make food." "Plants get nutrients from the _____." Learners type or select the correct word (water, sunlight, soil).

2.2 Different Parts of a Plant

(Moodle Sub-Chapter/Section)

Most plants have several distinct parts, each with a special job to do. It's like a well-organised team, designed to work together!

- **Roots:** Usually grow underground.
 - *Job 1:* Anchor the plant firmly in the soil so it doesn't fall over.
 - *Job 2:* Absorb water and nutrients from the soil.
- **Stem:** Connects the roots to the leaves.
 - *Job 1:* Support the plant, holding the leaves, flowers, and fruits up towards the light.
 - *Job 2:* Transport water and nutrients from the roots up to the leaves, and transport food made in the leaves down to other parts of the plant.
- **Leaves:** Usually green and flat. They come in many shapes and sizes.
 - *Job:* Make food for the plant using sunlight, water, and carbon dioxide from the air (photosynthesis). This is where the 'magic' happens!
- **Flowers:** Often colourful and scented.
 - *Job:* Reproduction. Flowers contain the parts needed to make seeds. Their colours and scents often attract insects or birds that help with pollination (moving pollen so seeds can form). God's beautiful designs help plants multiply.
- **Fruits:** Develop after the flower has been pollinated. They protect the seeds.
 - *Job:* Protect and help spread the seeds. Animals might eat the fruit and drop the seeds elsewhere, helping new plants grow in new places.

- **Seeds:** Found inside the fruit (usually).
 - *Job:* Contain a tiny, baby plant (embryo) and stored food, ready to grow into a new plant when conditions are right.

Activity 2.2: Plant Part Scavenger Hunt

- Go outside with a grown-up. Try to find examples of different plant parts: a root (maybe from a weed you pull up carefully), a stem, a leaf, a flower, a fruit, and a seed.
- Draw each part you find (or take photos if allowed).
- Label your drawings with the name of the part and its main job.
- *Safety Note:* Do not eat any plants you find unless a knowledgeable adult tells you it is safe. Some plants are poisonous.

(H5P Suggestion: Drag and Drop Labelling)

- Provide a diagram of a plant with labels for roots, stem, leaf, flower, fruit. Learners drag the correct label to point to the corresponding part of the plant. Add descriptions of the function that appear when labelled correctly.

2.3 How Plants Make Food (Photosynthesis)

(Moodle Sub-Chapter/Section)

This is one of the most amazing processes in God's creation! Plants are like tiny food factories. They don't need to eat like animals do because they can make their own food. This process is called **photosynthesis**. 'Photo' means 'light', and 'synthesis' means 'to make'.

Here's a simple way to understand it:

1. The **roots** take up **water** from the soil.
2. The **leaves** take in **carbon dioxide** from the air through tiny holes.
3. Inside the leaves, a special green substance called **chlorophyll** (which makes leaves green) traps energy from **sunlight**.
4. Using the energy from sunlight, the plant combines the water and carbon dioxide to make a type of sugar (food) for itself.
5. As a 'waste' product, the plant releases **oxygen** into the air – the very oxygen that humans and animals need to breathe!

Equation: Sunlight Energy + Water + Carbon Dioxide → Sugar (Food) + Oxygen

Isn't it wonderful how God designed plants to provide food for themselves *and* the oxygen we need to live?

Activity 2.3: Photosynthesis Flowchart

- Create a simple flowchart in your workbook showing the steps of photosynthesis. Use boxes and arrows.
- Start with "Sunlight shines on the leaf".
- Include: Water from roots, Carbon dioxide from air, Chlorophyll traps energy, Sugar (food) made, Oxygen released.

(H5P Suggestion: Interactive Video)

- Find a simple animation video explaining photosynthesis (ensure it's accurate and appropriate). Add questions at key points using H5P Interactive Video. E.g., "What gas do plants take in from the air for photosynthesis?" (Answer: Carbon dioxide). "What substance in the leaves traps sunlight?" (Answer: Chlorophyll).

2.4 Plants We Use

(Moodle Sub-Chapter/Section)

God has blessed us with plants in countless ways. We use them for food, clothing, shelter, medicine, and much more. Being thankful for these gifts also means using them wisely (stewardship).

- **Food:** We eat different parts of plants:
 - *Roots:* Carrots, potatoes (tubers are modified stems, but often grouped here in early grades), beetroot.
 - *Stems:* Celery, sugar cane, asparagus.
 - *Leaves:* Spinach (morogo), cabbage, lettuce.
 - *Flowers:* Broccoli, cauliflower (these are flower heads).
 - *Fruits:* Apples, bananas, tomatoes, mielies (maize kernels are botanically fruits!), pumpkins.
 - *Seeds:* Beans, peas, nuts, sunflower seeds.
- **Materials:**
 - *Wood* (from stems/trunks): For building houses, furniture, paper.
 - *Cotton* (from the seed pod): For making clothes and fabrics.
 - *Fibres* (like flax for linen, sisal for rope): For cloth and rope.
- **Medicine:** Many traditional and modern medicines come from plants (e.g., aspirin originally came from willow bark, some cough mixtures use herbs).

- **Beauty and Environment:** Plants make our world beautiful, provide shade, and help keep the air clean.

Activity 2.4: Plant Parts on My Plate

- Think about the meals you ate yesterday.
- List all the plant-based foods you ate.
- Next to each food, write down which part of the plant it comes from (root, stem, leaf, flower, fruit, or seed). Sometimes it might be more than one! (e.g., a carrot soup uses roots).

(H5P Suggestion: Flashcards)

- Create flashcards with images of common foods derived from plants (e.g., apple, carrot, spinach, bread (from wheat seeds), cotton shirt). On the 'back' of the card, state the plant part (Fruit, Root, Leaf, Seed, Seed pod fibre).

Chapter 3: Animals – A Diverse Kingdom

(Moodle Chapter)

Introduction

From the mighty elephant to the tiny ant, the animal kingdom shows incredible variety and wonder. God created each animal with unique features suited to its way of life and environment. In this chapter, we will learn how scientists group animals and discover some amazing facts about different animal types.

3.1 Grouping Animals: Backbone or No Backbone?

(Moodle Sub-Chapter/Section)

One of the main ways scientists start grouping animals is by looking at whether they have a backbone (spine) inside their body.

- **Vertebrates:** These are animals **with** a backbone. The backbone is made of smaller bones called vertebrae. It helps support the body and protects the spinal cord. Think about your own back – you can feel your backbone! Humans, dogs, fish, birds, snakes, and frogs are all vertebrates.
- **Invertebrates:** These are animals **without** a backbone. Most animals on Earth are actually invertebrates! They have different ways of supporting their bodies – some have shells, some have tough outer coverings (like insects), and some are soft-bodied. Examples include insects (like ants and butterflies), spiders, worms, snails, jellyfish, and crabs.

Activity 3.1: Vertebrate or Invertebrate?

- Look at the list of animals below. Decide if each one is a Vertebrate (has a backbone) or an Invertebrate (no backbone).
 - Lion
 - Earthworm
 - Shark
 - Snail
 - Eagle
 - Spider
 - Frog
 - Butterfly
 - Lizard
 - Jellyfish

(H5P Suggestion: True/False Quiz)

- Present statements like: "A cat is an invertebrate." (False). "Insects have a backbone." (False). "A fish is a vertebrate." (True). "Most animals in the world are vertebrates." (False).

3.2 Exploring Vertebrates

(Moodle Sub-Chapter/Section)

Vertebrates themselves are divided into smaller groups based on shared characteristics. Let's look at the five main groups:

- **Mammals:**
 - *Characteristics:* Usually have hair or fur; mothers feed their babies milk; warm-blooded (can keep their body temperature steady); breathe air with lungs; most give birth to live young.
 - *Examples:* Humans, dogs, cats, elephants, whales (live in water but breathe air and feed milk!), bats (fly but have fur and feed milk!). God's design allows mammals to live in many different environments.
- **Birds:**
 - *Characteristics:* Have feathers and wings (though not all fly); lay hard-shelled eggs; warm-blooded; breathe air with lungs; have beaks.
 - *Examples:* Eagles, pigeons, penguins (swim but have feathers!), ostriches (don't fly but have feathers!). Feathers are an amazing, lightweight design for flight or warmth.
- **Reptiles:**
 - *Characteristics:* Have dry, scaly skin; most lay leathery-shelled eggs; cold-blooded (their body

temperature changes with the surroundings); breathe air with lungs.

- *Examples:* Snakes, lizards, crocodiles, tortoises. Scales help protect them and stop them from drying out.
- **Amphibians:**
 - *Characteristics:* Have moist, smooth skin (usually); lay jelly-like eggs in water; start life in water breathing with gills (like tadpoles), then develop lungs to live on land as adults (though often stay near water); cold-blooded. 'Amphibian' means 'two lives'.
 - *Examples:* Frogs, toads, newts, salamanders. Their life cycle is a fascinating transformation designed by God.
- **Fish:**
 - *Characteristics:* Live in water; breathe using gills; have scales and fins; most lay eggs in water; cold-blooded.
 - *Examples:* Tilapia, sharks, goldfish, sardines. Gills are specially designed to take oxygen out of the water.

Activity 3.2: Vertebrate Match-Up

- Match the vertebrate group (Mammal, Bird, Reptile, Amphibian, Fish) to its main characteristics.
 - Group A: Has feathers, warm-blooded, lays hard eggs.
 - Group B: Lives in water, breathes with gills, has scales and fins.
 - Group C: Has dry scales, cold-blooded, breathes with lungs.
 - Group D: Has hair/fur, warm-blooded, feeds milk to young.
 - Group E: Moist skin, starts life in water with gills, adult breathes with lungs, cold-blooded.

(H5P Suggestion: Multiple Choice)

- Show a picture of an animal (e.g., a parrot). Ask: "Which vertebrate group does this animal belong to?" Options: Mammal, Bird, Reptile, Amphibian, Fish.

3.3 A Look at Invertebrates

(Moodle Sub-Chapter/Section)

Invertebrates are an incredibly diverse group! There are far too many types to cover fully, but here are some common examples:

- **Insects:** Have three body parts (head, thorax, abdomen), six legs attached to the thorax, usually have antennae, and often

have wings. They have a hard outer covering called an exoskeleton. Examples: Ants, beetles, butterflies, bees, grasshoppers.

- **Arachnids:** Have two body parts (cephalothorax and abdomen) and eight legs. Examples: Spiders, scorpions, ticks, mites. (Spiders are NOT insects!).
- **Worms:** Long, soft bodies with no legs. Examples: Earthworms (segmented body), flatworms, roundworms. Earthworms are very helpful in the soil.
- **Molluscs:** Soft-bodied animals, many of which have a hard shell for protection. Examples: Snails, slugs, mussels, octopus (has no outer shell but is a mollusc!).

God's creativity is evident in the huge variety of designs even among animals without backbones.

Activity 3.3: Insect Investigator

- (Adult supervision recommended) Carefully and safely observe an insect outside (e.g., an ant, a beetle). *Do not touch stinging insects.*
- Can you see its three body parts? Can you count six legs? Does it have antennae? Does it have wings?
- Draw the insect and try to label the parts you can see.

(H5P Suggestion: Image Sequencing)

- Show the stages of a butterfly life cycle (egg, larva/caterpillar, pupa/chrysalis, adult butterfly) out of order. Learners drag the images into the correct sequence. (Connects to life cycles, often covered alongside living things).

3.4 What Animals Need to Survive

(Moodle Sub-Chapter/Section)

Just like plants and humans, animals have basic needs that must be met for them to survive. God provides for animals through the environments, or habitats, they live in.

- **Food:** All animals need to eat to get energy. Some animals eat plants (herbivores), some eat other animals (carnivores), and some eat both (omnivores).
- **Water:** All animals need water to survive. They get it from rivers, lakes, puddles, or even from the food they eat.
- **Air (Oxygen):** Animals need oxygen to respire (release energy from food). Land animals breathe air using lungs, while fish and other aquatic animals use gills to get oxygen from the water.

- **Shelter:** Animals need a safe place to rest, hide from predators (enemies), and raise their young. This could be a burrow, a nest, a cave, or just a safe hiding spot.
- **Space:** Animals need enough space to find food, water, shelter, and mates.

Different animals are wonderfully adapted (specially designed) to find these things in their specific habitats. A fish is designed for water, a bird for the air and trees, a mole for living underground.

Activity 3.4: Habitat Needs

- Choose one animal from Activity 3.1 (e.g., Lion, Earthworm, Eagle).
- Describe where it lives (its habitat).
- Explain how its habitat provides for its needs (Food, Water, Air, Shelter, Space). Example: An earthworm lives in soil. It eats decaying matter in the soil (food), gets moisture from the soil (water), gets air through its moist skin, is sheltered underground, and finds space to burrow.

Chapter 4: Materials Around Us

(Moodle Chapter)

Introduction

Look around your home. What objects do you see? A table, a window, clothes, toys, books? All these things are made from *materials*. God filled the Earth with many different kinds of materials, some natural and some that people have learned to make. He gave us the intelligence to use these materials wisely to build, create, and solve problems. In this chapter, we'll explore different materials and their properties.

4.1 Natural vs. Man-made Materials

(Moodle Sub-Chapter/Section)

Materials can be grouped based on where they come from:

- **Natural Materials:** These come directly from plants, animals, or the ground. They occur naturally in God's creation.
 - *Examples from plants:* Wood, cotton, cork, rubber (from rubber trees), bamboo.
 - *Examples from animals:* Wool (from sheep), leather (from animal skin), silk (from silkworms), feathers.

- *Examples from the ground:* Rocks, sand, clay, metals (like iron, gold – found in the earth as ores), water, oil.
- **Man-made Materials (Manufactured Materials):** These are materials that people make, usually by changing natural materials through chemical processes or combining them.
 - *Examples:*
 - *Plastic:* Made from chemicals found in oil. Used for bottles, toys, bags.
 - *Glass:* Made by heating sand to very high temperatures. Used for windows, jars.
 - *Paper:* Made from wood fibres. Used for books, writing.
 - *Concrete:* Made by mixing cement (made from limestone and clay), sand, stones, and water. Used for building.
 - *Nylon / Polyester:* Types of plastic made into fibres for clothes, ropes.
 - *Steel:* Made mostly from iron, but stronger. Used for cars, bridges.

We have a responsibility to use God's natural resources carefully and not wastefully, and to think about the effects of making and using man-made materials (like pollution from plastic).

Activity 4.1: Material Sort

- List ten objects you can see around you right now.
- For each object, write down the main material it is made from.
- Decide if that material is Natural or Man-made.

(H5P Suggestion: Drag and Drop Sorting)

- Create two columns: "Natural Materials" and "Man-made Materials". Provide words or images (wood, plastic, glass, wool, cotton, sand, nylon, paper, rock, steel). Learners drag each item to the correct column.

4.2 Properties of Materials

(Moodle Sub-Chapter/Section)

Materials have different characteristics, called **properties**, that make them useful for different jobs. God gave materials specific properties. When we choose a material to make something, we think about its properties. Some important properties are:

- **Strength:** How well a material resists breaking or bending under force. *Strong* materials (like steel, concrete, wood) are

used for building things that need to hold weight. *Weak* materials (like paper tissue) break easily.

- **Flexibility:** How easily a material can bend without breaking. *Flexible* materials (like rubber, some plastics, fabric) can bend easily. *Stiff* or *Rigid* materials (like glass, ceramic, concrete) do not bend easily.
- **Hardness:** How well a material resists scratching or denting. *Hard* materials (like diamond, granite, steel) are difficult to scratch. *Soft* materials (like chalk, wax, wool) are easy to scratch or dent.
- **Texture:** How a material feels to the touch. It can be *smooth* (like glass), *rough* (like sandpaper), *soft* (like cotton wool), *bumpy*, *slippery*, etc.
- **Transparency:** How much light can pass through a material.
 - *Transparent:* Light passes through easily, and you can see clearly through it (like clear glass, clear plastic).
 - *Translucent:* Some light passes through, but you cannot see clearly through it (like frosted glass, tracing paper).
 - *Opaque:* No light passes through; you cannot see through it at all (like wood, metal, brick).
- **Waterproof / Absorbent:**
 - *Waterproof:* Does not let water soak through (like plastic, glass, rubber). Useful for raincoats and umbrellas.
 - *Absorbent:* Soaks up water easily (like sponge, paper towel, cotton fabric). Useful for cleaning up spills.

Activity 4.2: Describing Properties

- Find three different objects made from different materials (e.g., a wooden spoon, a plastic ruler, a glass jar).
- For each object, list its main material.
- Describe its properties using some of the words we learned (Strong/Weak, Flexible/Stiff, Hard/Soft, Smooth/Rough, Transparent/Translucent/Opaque, Waterproof/Absorbent). Explain *why* you think it has that property. Example: "Glass jar: Material is glass. Properties are stiff (doesn't bend), hard (doesn't scratch easily), smooth texture, transparent (I can see through it), waterproof (it holds water)."

(H5P Suggestion: Quiz (Question Set))

- Combine different question types about properties.
 - Multiple Choice: "Which material is best for making a window because it is transparent?" (Glass, Wood, Metal).

- Drag and Drop: Match properties (e.g., "Lets light through clearly") to terms (Transparent, Opaque, Translucent).
- Fill in the Blanks: "Rubber is useful for rain boots because it is _____. " (Waterproof).

4.3 Choosing Materials for a Purpose

(Moodle Sub-Chapter/Section)

People choose materials carefully based on their properties and the job the object needs to do. This is part of technology – using our knowledge of materials (science) to design and make useful things.

- Why is a raincoat made of plastic or specially treated fabric? *Because it needs to be waterproof and flexible.*
- Why are car tyres made of rubber? *Because rubber is strong, flexible, waterproof, and provides grip.*
- Why are windows made of glass? *Because glass is transparent, hard, and waterproof.*
- Why is a bridge made of steel and concrete? *Because these materials are very strong.*
- Why is a teddy bear made of soft fabric and stuffing? *Because it needs to be soft, cuddly, and light.*

Thinking about properties helps us understand why things are made the way they are and allows us to design new things. It shows the wisdom in using the resources God has provided effectively.

Activity 4.3: Design Challenge

- Imagine you need to design a simple container to carry water from a tap to a plant without spilling it.
- What properties would the material for your container need? (Think about strength, flexibility, waterproof/absorbent, transparency). List at least three important properties.
- Suggest one or two materials (natural or man-made) that might be suitable and explain why, based on their properties.

(H5P Suggestion: Dialog Cards)

- Present scenarios on cards. Front: "You need to make a warm winter scarf." Back: "Desirable properties: Soft, warm (insulating), flexible. Suitable materials: Wool, fleece (man-made)." Add another: Front: "You need to build a strong bookshelf." Back: "Desirable properties: Strong, stiff, hard. Suitable materials: Wood, steel."
-

End of Term 1 Reflection

Well done, young scientist! This term, we have explored the difference between living and non-living things, discovered the amazing world of plants and their parts, marvelled at the diversity of animals, and investigated the materials God has given us. We've seen order, design, and purpose everywhere we look. Keep observing the world around you with wonder and curiosity!

Okay, here is the content for Term 2, following the established structure and guidelines.

Term 2: Processing Materials and Building Structures

(Moodle Top-Level Chapter)

Term 2 Overview

Welcome back, explorers! In Term 1, we learned about living things and the different properties of materials found in God's creation. This term, we will discover how people change or *process* these materials to make them even more useful. We will investigate different ways materials can be mixed, heated, cooled, and shaped. Then, we will move on to look at *structures* – things that are built to hold a shape and support weight. We'll explore different types of structures, both natural and man-made, learn what makes them strong, and look at some clever structures built by people in South Africa using traditional knowledge and local materials. God has given humans amazing abilities to design and build – let's learn more about it!

Chapter 5: Processing Materials

(Moodle Chapter)

Introduction

Think about the materials we learned about last term – wood, rock, cotton, plastic, metal. Often, we don't use these materials exactly as we find them. We change them, combine them, or shape them to suit our needs. This changing of materials is called **processing**. God gave humans the intelligence and skill to process materials, allowing us to create everything from the food we eat to the houses we live in. Processing materials is a way we use the resources God provided to care for ourselves and others.

5.1 Ways We Process Materials

(Moodle Sub-Chapter/Section)

There are many ways to process materials. Here are a few common ones:

- **Mixing:** Combining two or more materials together.
Sometimes mixing causes a change!
 - *Example 1: Making Dough:* Mixing flour, water, yeast, and salt changes the individual ingredients into a soft, stretchy dough ready for baking.
 - *Example 2: Making Concrete:* Mixing cement powder, sand, stones, and water creates a strong material that hardens when it dries – essential for building.
 - *Example 3: Simple Chemical Reactions:* Mixing bicarbonate of soda (baking soda) and vinegar creates bubbles (carbon dioxide gas). This is a simple chemical change.
- **Heating and Cooling:** Changing the temperature of a material can change its state or properties.
 - *Heating:* Melts solids into liquids (like ice melting into water, or heating metal to shape it), cooks food (changing its texture and taste), makes water boil into steam, helps things dry faster.
 - *Cooling:* Freezes liquids into solids (like water freezing into ice, or melted wax hardening into a candle shape), helps preserve food (like in a refrigerator). God designed materials to behave predictably when heated or cooled.
- **Shaping and Moulding:** Changing the physical shape of a material without necessarily changing what it's made of.
 - *Example 1: Weaving:* Interlacing fibres (like grass, reeds, wool, or cotton threads) to create fabric, mats, or baskets. This requires skill and patience.
 - *Example 2: Kneading:* Pressing and folding dough develops its structure, making bread chewy.
 - *Example 3: Moulding:* Shaping soft materials like clay into pots or figures, or pouring liquid material like melted plastic or metal into a mould to give it a specific shape as it cools and hardens.

Activity 5.1: Observing Processing

1. **(Adult help needed for heating/cooling)** Observe water in three states:
 - Ice (solid): Describe its properties (hard, cold, shape).
 - Melt the ice (heating): Describe the liquid water (shape?, flows?).

- Carefully observe water boiling (heating further - adult only): See the steam (gas).
 - Observe water freezing back into ice (cooling): See the change back to solid.
2. Make simple playdough: Mix 2 cups of flour, 1 cup of salt, and about 1 cup of water (add water slowly until it forms a dough). Knead it well. Describe how mixing and kneading changed the ingredients. What properties does the playdough have now?

(H5P Suggestion: Drag and Drop Matching)

- Create two columns. Column 1 lists processes: "Mixing flour and water", "Heating ice", "Weaving grass", "Cooling melted wax", "Mixing cement, sand, stone, water". Column 2 lists outcomes/products: "Dough", "Liquid water", "Mat", "Solid candle shape", "Concrete". Learners match the process to the outcome.

5.2 Why Do We Process Materials?

(Moodle Sub-Chapter/Section)

Processing materials allows us to:

- **Make materials stronger or more durable:** Mixing metals can create alloys (like steel) that are stronger than pure iron. Firing clay in a hot kiln makes it hard and waterproof (pottery).
- **Create new materials with useful properties:** Processing oil creates plastics with various properties (flexible, rigid, transparent, colourful). Processing wood pulp creates paper.
- **Change materials into useful shapes:** Weaving cotton makes cloth for clothes. Moulding plastic makes bottles and toys. Shaping wood makes furniture.
- **Prepare food:** Cooking makes food safe to eat, easier to digest, and tastier. Preserving (like drying or salting) makes food last longer.
- **Combine materials to make complex objects:** A house uses processed wood, concrete, bricks, glass, plastic pipes, metal wires – all combined carefully.

By processing materials, we use our God-given creativity and skills to meet our needs and improve our lives. It's important to do this responsibly, thinking about waste and the impact on God's creation.

Activity 5.2: Processed Products

- Look around your kitchen. Find three items that involved processing materials.
- For each item:

- What is the item? (e.g., Bread)
- What natural materials did it likely start from? (e.g., Wheat grains)
- What processing steps might have been involved? (e.g., Grinding wheat into flour, mixing ingredients, kneading, baking (heating)).

(H5P Suggestion: Image Choice)

- Show an image of a natural material (e.g., a sheep). Ask: "Which of these is a processed material made from this source?" Options: Image of woolly jumper, image of grass, image of a rock. (Correct: Woolly jumper). Repeat for wood → table, sand → glass jar, etc.

5.3 Traditional Processing in South Africa

(Moodle Sub-Chapter/Section)

For generations, people in South Africa have used clever ways to process local, natural materials using traditional skills passed down through families. This knowledge is valuable and shows great ingenuity.

- **Making Clay Pots:** Clay dug from the ground (natural material) is mixed with water and sometimes sand or crushed pottery (processing: mixing). It is then shaped by hand (processing: moulding/shaping) and left to dry. Often, it is then fired in a hot fire (processing: heating) to make it hard and durable for cooking or storing water.
- **Weaving Grass Mats:** Grasses and reeds (natural materials) are harvested and often dried (processing: drying). They are then skilfully woven together by hand (processing: weaving) to create sleeping mats (like *amacansi*), floor coverings, or even parts of traditional houses. Different patterns can be created, showing artistic skill.
- **Preparing Maize Meal (Pap):** Maize/Mielies (natural material) are dried and then ground into a meal (processing: grinding). This meal is then mixed with boiling water and cooked (processing: mixing, heating) to make pap (*uphuthu* or *pap*), a staple food for many South Africans.
- **Tanning Leather:** Animal hides (natural material) are treated using traditional methods (sometimes involving plant materials or minerals, and scraping/stretching) (processing) to turn them into soft, durable leather for clothing, shields, or containers.

These traditional methods often use locally available resources sustainably and represent important cultural heritage and God-given wisdom.

Activity 5.3: Research Traditional Skills

- Ask older family members or research online/in books about one traditional South African craft or food preparation method that involves processing materials (e.g., beadwork using clay/seeds), drying fruit or meat (*biltong*).
- Describe the natural materials used and the processing steps involved.

(H5P Suggestion: Fill in the Blanks)

- Create sentences about traditional processing with missing words. E.g., "Clay pots are often _____ in a fire to make them hard." (fired/heated). "Weaving involves interlacing _____ like grass or reeds." (fibres/materials). "Maize is _____ into meal before being cooked as pap." (ground).
-

Chapter 6: Understanding Structures

(Moodle Chapter)

Introduction

What do a chair, a house, a bridge, a skeleton, and a spider's web have in common? They are all **structures**! A structure is something that is built or organised in a definite way to support a load, span a distance, or contain something. God's creation is full of amazing structures, from the intricate structure of a leaf to the strong frame of an animal's skeleton. Humans, using the abilities God gave them, also design and build structures for many purposes.

6.1 What are Structures For?

(Moodle Sub-Chapter/Section)

Structures serve different purposes:

- **Supporting:** Holding up a weight (e.g., chair legs support a person, pillars support a roof, a skeleton supports a body).
- **Spanning:** Crossing a distance or gap (e.g., a bridge spans a river, a roof spans a room, a spider web spans between branches).
- **Containing:** Holding something inside (e.g., a cup contains water, walls contain a room, a mielie silo contains maize).

- **Protecting:** Providing shelter or defence (e.g., a house protects from weather, a shell protects a snail, a fence protects a garden).

Often, a single structure serves multiple purposes (e.g., a house supports its own weight, spans rooms, contains furniture and people, and protects from the weather).

Activity 6.1: Identifying Structures and Purpose

- Look around your home or school. Identify five different structures.
- For each structure, write down its name and its main purpose(s) (Supporting, Spanning, Containing, Protecting).

6.2 Natural vs. Man-made Structures

(Moodle Sub-Chapter/Section)

We can group structures based on whether they occur naturally or are built by humans:

- **Natural Structures:** Found in nature, designed by God. They are often perfectly suited for their purpose and environment.
 - *Examples:* Trees (support branches, span space), skeletons (support bodies), bird nests (contain eggs, protect chicks), honeycomb (contain honey, strong shape), spider webs (span gaps, trap insects), seashells (protect the animal inside), mountains (natural solid structures).
- **Man-made Structures:** Designed and built by people using materials (natural or processed).
 - *Examples:* Houses, bridges, chairs, tables, bookshelves, dams, roads, pylons carrying electricity cables, fences, cars, tins, bottles.

Observing natural structures can give engineers and designers great ideas for building strong and efficient man-made structures! God's designs are often the best.

Activity 6.2: Natural or Man-made?

- Sort the following structures into two lists: 'Natural Structures' and 'Man-made Structures'.
 - Beehive
 - School building
 - Termite mound
 - Bridge over a highway
 - An eggshell

- A plastic bucket
- A bird's wing bones
- A bookshelf
- A cave
- A woven basket

(H5P Suggestion: Sorting Activity)

- Use H5P Drag and Drop with two drop zones: "Natural" and "Man-made". Provide images or words from the list above for learners to sort.

6.3 Types of Structures: Frame, Shell, Solid

(Moodle Sub-Chapter/Section)

Man-made and natural structures can often be described by how they are built:

- **Frame Structures:** Made from many separate parts (members) joined together to form a framework. The frame supports the load. Frame structures are often strong but lightweight.
 - *Examples:* Skeletons (bones joined together), roof trusses (wooden or metal beams joined), electricity pylons (metal pieces bolted together), bridges (like truss bridges), bicycles, chair frames, tents (poles forming a frame).
- **Shell Structures:** Have a solid outer surface that supports the load. They are often hollow inside. Shell structures can be very strong and use material efficiently.
 - *Examples:* Eggshells, snail shells, nuts, car bodies, airplane fuselages, domes (like in some stadiums or traditional huts), helmets, bottles, tins.
- **Solid Structures:** Made from solid material, or built up using solid pieces, relying on their own weight and strength to support loads. They are often heavy and very strong.
 - *Examples:* Brick walls, concrete dams, pyramids, statues made of stone, a pile of sandbags, a log used as a bridge.

Some structures might combine these types (e.g., a house has a frame structure for the roof, solid walls, and shell-like doors).

Activity 6.3: Frame, Shell, or Solid?

- Look at the following structures. Decide if each is MAINLY a Frame, Shell, or Solid structure.
 - A bird cage

- A brick
- An empty tin can
- A bicycle
- A large stone monument
- A skull bone
- A ladder
- A rugby ball

(H5P Suggestion: Quiz - Multiple Choice)

- Show an image of a structure (e.g., an electricity pylon). Ask: "What type of structure is this mainly?" Options: Frame, Shell, Solid. Repeat for images of an egg, a brick wall, etc.
-

Chapter 7: Making Structures Stronger

(Moodle Chapter)

Introduction

When engineers or builders create structures, they need to make sure they are strong and stable enough for their purpose. A weak bridge or a wobbly chair would be dangerous! How can we make structures strong? We can learn from the strong structures God designed in nature and apply those principles. Strength comes from the shape of the structure, the materials used, and how the parts are joined.

7.1 Strong Shapes: The Power of Triangles

(Moodle Sub-Chapter/Section)

Some shapes are naturally stronger than others in frame structures.

- Imagine making a square using four strips of cardboard joined at the corners with pins. If you push on one corner, the square easily changes shape (it collapses).
- Now, imagine making a triangle using three strips and pins. If you push on a corner, the triangle holds its shape! It is **rigid**.

Triangles are very strong shapes because their sides support each other. Adding a diagonal brace across a square or rectangle divides it into two triangles, making the whole shape much stronger and more stable. This technique is called **triangulation**.

You can see triangles used to strengthen many frame structures:

- Roof trusses (the framework holding up a roof)

- Bridges (especially truss bridges)
- Electricity pylons
- Crane arms
- Bicycle frames

Using triangles is a clever way God's geometry helps us build strong frames!

Activity 7.1: Testing Shapes

- **(You will need: Paper straws or toothpicks, sticky tape or small marshmallows/Prestik)**
 3. Make a square frame using four straws/toothpicks and join the corners. Gently push on one corner. Does it change shape easily?
 4. Make a triangle frame using three straws/toothpicks. Gently push on one corner. Does it hold its shape better?
 5. Make another square frame. Now add a diagonal straw/toothpick across it, fixing it at opposite corners. Gently push on a corner. Is it stronger than the first square? (You have used triangulation!)

(H5P Suggestion: True/False Statement)

- "A square shape is more rigid than a triangle shape in a frame structure." (False)
- "Adding a diagonal piece to a rectangle makes it stronger." (True)
- "Triangles are often used in bridge and roof designs for strength." (True)

7.2 Choosing Strong Materials

(Moodle Sub-Chapter/Section)

The strength of a structure also depends heavily on the materials it is made from. (Remember properties from Term 1!)

- Materials like **steel, concrete, strong wood, and stone** are chosen for structures that need to carry heavy loads, like bridges and tall buildings, because they have high **strength**.
- Materials like **paper or thin plastic** are **weak** and would not be suitable for supporting much weight.
- The way a material is shaped can also affect its strength. For example, a hollow tube is often stronger and stiffer than a solid rod of the same weight. Folding paper into ridges (like corrugated cardboard) makes it much stiffer and stronger than flat paper.

Choosing the right material with the right properties for the job is a key part of designing strong structures, using God's provisions wisely.

Activity 7.2: Material Strength Investigation

- **(You will need: Sheets of paper, identical books or other small weights)**
 3. Try to make a simple "bridge" by placing one flat sheet of paper between two stacks of books (about 15cm apart). How many books/weights can it hold before it collapses?
 4. Take another sheet of paper. Fold it back and forth like a fan (corrugate it). Place this folded paper bridge between the book stacks. How many books/weights can it hold now?
 5. Try rolling a sheet of paper into a tube and taping it. Stand it on its end. Can it hold more weight than the flat sheet?
- Discuss: How did changing the shape of the paper affect its strength/stiffness?

7.3 Ways to Reinforce Structures

(Moodle Sub-Chapter/Section)

Besides using triangles and strong materials, builders use other techniques to make structures stronger and more stable:

- **Triangulation:** (As discussed) Adding diagonal members to create triangles in frames.
- **Tubing and Folding:** Shaping materials into tubes or folds (like corrugated iron or cardboard) increases stiffness and strength without adding too much weight. Think about the structure of plant stems – many are hollow tubes!
- **Making the Base Wider:** Structures with a wide, heavy base are more stable and less likely to tip over. Think of a pyramid – very wide at the bottom. Chair legs often spread outwards at the bottom for stability.
- **Using Strong Joints:** How parts of a frame are joined together is very important. Joints need to be strong and prevent parts from moving or breaking apart (e.g., using bolts, welding metal, strong glue, or traditional joining techniques in woodwork).

Activity 7.3: Build a Strong Tower

- **(You will need: Paper straws/newspaper tubes/toothpicks, sticky tape/glue/marshmallows, a small weight like an apple or tin can)**

- Challenge: Work in pairs or individually. Use the materials provided to build the tallest possible free-standing tower that can support the small weight at the top.
- Think about: Using triangles, making a stable base, strong joints.
- Measure the height of your tower and test if it can hold the weight. Compare your design with others. What made the successful towers strong?

(H5P Suggestion: Drag and Drop Labelling)

- Show a diagram of a simple truss bridge. Have labels like "Triangle", "Strong Material (e.g., Steel Beam)", "Wide Support/Base", "Strong Joint". Learners drag the labels to the correct parts of the structure demonstrating these strengthening principles.

Chapter 8: Indigenous Structures in South Africa

(Moodle Chapter)

Introduction

Long before modern building materials were common, people in South Africa built amazing structures using materials they found locally – grass, wood, reeds, mud, stones. These **indigenous structures** show deep knowledge of materials, clever design techniques, and adaptation to the local environment. They are an important part of South Africa's cultural heritage and demonstrate the God-given ingenuity of people using the resources around them.

8.1 Zulu Beehive Huts (iQukwane / Indlu)

(Moodle Sub-Chapter/Section)

- **Description:** These are traditional dome-shaped dwellings. A strong, flexible framework is made by bending and tying together long, thin saplings (young trees) planted in a circle. This frame is then covered (thatched) with layers of carefully bundled grass, tied down securely with ropes made from natural fibres. The doorway is often low.
- **Structure Type:** Combines **Frame** (the wooden structure) and **Shell** (the outer thatched covering provides the shape and protection). The dome shape itself is very strong.
- **Materials:** Local wood (often wattle), grasses (like *umchiki*), natural fibre ropes. Uses processed natural materials (woven grass bundles, ropes).

- **Strengths/Features:** The dome shape sheds rain well. The thick thatch provides excellent insulation, keeping the inside cool in summer and warm in winter. Uses readily available local materials. The low doorway helped keep warmth in and unwelcome animals out. Building these required great skill passed down through generations.

8.2 Ndebele Painted Houses

(Moodle Sub-Chapter/Section)

- **Description:** Ndebele homesteads are famous for their brightly coloured geometric patterns painted on the outside walls. The houses themselves are often rectangular with flat or pitched roofs. Traditionally, walls were built from mud mixed with cow dung laid over a wooden framework, or made from sun-dried mud bricks. Today, concrete blocks and cement plaster are often used, but the tradition of painting continues.
- **Structure Type:** Mainly **Solid** structure (the walls support the roof), although traditional versions might have had a basic frame.
- **Materials:** Mud, clay, cow dung, wood (traditional); concrete blocks, cement, metal roofing sheets, paint (modern). Uses processed materials (mud mixture, bricks, cement, paint).
- **Strengths/Features:** Rectangular shapes are easy to build with blocks. The thick walls (especially traditional mud walls) provide good insulation. The painted designs are not just decorative but are an important part of Ndebele cultural identity, often done by the women with great artistic skill.

8.3 San/Khoi Temporary Shelters (e.g., Matjieshuis)

(Moodle Sub-Chapter/Section)

- **Description:** Peoples like the San and Nama Khoi traditionally led nomadic or semi-nomadic lives, moving with the seasons or animal herds. Their shelters needed to be lightweight and easy to put up and take down. A common type (*matjieshuis* in Afrikaans, used by Nama people) involves making a dome-shaped or tunnel-shaped frame from flexible green branches (like *tamarix*). This frame is covered with woven mats (*matjies*) made from reeds or rushes.
- **Structure Type:** **Frame** structure (the branches) covered by processed shell elements (the woven mats).
- **Materials:** Flexible wooden branches, reeds/rushes (like *cyperus textilis*), natural fibre cords for tying. Uses processed natural materials (woven mats).
- **Strengths/Features:** Very lightweight and portable. Uses materials readily found in their environment (especially near

rivers where reeds grow). Quick to assemble and disassemble. The mats provide shade and some protection from wind and rain (water runs off the smooth reeds). Perfectly adapted to a mobile lifestyle, showing clever use of resources.

8.4 Lessons from Indigenous Structures

(Moodle Sub-Chapter/Section)

Studying indigenous structures teaches us valuable lessons:

- **Using Local Materials:** They make wise use of resources readily available in the environment.
- **Sustainability:** Often built from natural, biodegradable materials, having less impact on the environment.
- **Climate Adaptation:** Designs are often well-suited to the local climate (e.g., insulation, rain shedding).
- **Ingenuity and Skill:** They demonstrate clever design principles (like strong shapes) and skilled craftsmanship passed down through generations.
- **Cultural Value:** Structures are often deeply connected to the culture, traditions, and identity of the people who build them.

Respecting and learning from these traditional ways of building acknowledges the wisdom and God-given abilities of different peoples.

Activity 8.4: Comparing Structures

- Create a table with three columns: Zulu Beehive Hut, Ndebele House, San/Khoi Shelter.
- Add rows for: Main Structure Type (Frame/Shell/Solid), Main Natural Materials Used, Key Feature/Advantage.
- Fill in the table based on the information in this chapter.

(H5P Suggestion: Image Hotspots)

- Use a picture collage showing the three types of indigenous structures. Create hotspots on each structure. Clicking a hotspot reveals its name and one key fact (e.g., clicking the beehive hut reveals "Zulu Beehive Hut - Dome shape made with wooden frame and grass thatch").

End of Term 2 Reflection

Fantastic work this term! We've explored how people cleverly process materials using techniques like mixing, heating, and shaping,

including valuable traditional methods. We also delved into the world of structures, learning about frames, shells, and solid forms, discovering why triangles are so strong, and appreciating the amazing designs of both natural and man-made structures, especially the ingenious indigenous buildings of South Africa. You are learning how science (understanding materials and forces) and technology (designing and building) work together, reflecting the amazing creative abilities God has given us. Keep observing, questioning, and building!

Term 3: Energy, Change, and Our Place in the Cosmos

(Moodle Top-Level Chapter)

Term 3 Overview

Welcome back, young explorers, to Term 3! This term, we dive into two incredibly exciting topics. First, we will investigate **Energy and Change**. What makes things move, light up, or get warm? We will learn about different forms of energy, how energy is stored and transferred, and how vital energy is for all living things. We will even build simple electrical circuits! It's all about understanding the power God uses to make things happen in His creation.

Second, we lift our eyes to the heavens as we explore **Planet Earth and Beyond**. We will discover our Earth's place in the vast Solar System, understand why we have day, night, and seasons, learn about our closest celestial neighbour, the Moon, and appreciate the importance of our life-giving star, the Sun. Get ready to be filled with wonder at the incredible order and majesty of God's universe!

Chapter 9: What is Energy?

(Moodle Chapter)

Introduction

Have you ever wondered what makes a car move, a light bulb shine, or allows you to run and play? The answer is **energy**! Energy is the ability to do work or cause change. Nothing happens without energy. From the smallest growing seed to the mightiest storm, energy is involved. It's like the power God uses to keep the whole universe running. In this chapter, we'll start exploring what energy is and the different forms it takes.

9.1 Energy is Everywhere

(Moodle Sub-Chapter/Section)

Energy isn't something you can usually hold in your hand, but you can see what it *does*. Look around!

- A moving car has energy of motion.
- A growing plant uses energy from sunlight.
- The Sun itself radiates huge amounts of light and heat energy.
- A ringing bell produces sound energy.
- Food gives your body energy to live and move.

Energy is needed for every action, every change, everywhere in God's creation.

9.2 Stored Energy (Potential Energy)

(Moodle Sub-Chapter/Section)

Sometimes energy is stored up, ready to be used later. This stored energy is called **potential energy**. Think of it as energy waiting to happen. Examples include:

- **Chemical Energy:** Stored in substances and released through chemical reactions.
 - Food contains chemical energy for our bodies.
 - Wood, coal, oil, and gas contain chemical energy released when burned.
 - Batteries store chemical energy that can be changed into electricity.
- **Gravitational Potential Energy:** Energy an object has because of its height above the ground. A ball held high has potential energy; if you let it go, the energy changes to movement energy as it falls. Water stored behind a dam wall has huge potential energy.
- **Elastic Potential Energy:** Energy stored in something stretched or compressed. A stretched rubber band or a wound-up spring in a toy has elastic potential energy.

God, in His wisdom, designed ways for energy to be stored so it's available when needed.

9.3 Moving Energy (Kinetic Energy)

(Moodle Sub-Chapter/Section)

When something is moving, it has **kinetic energy**. The faster it moves and the heavier it is, the more kinetic energy it has.

- A child running
- A car driving down the road

- Wind blowing (moving air)
- Water flowing in a river
- A ball flying through the air

All these are examples of kinetic energy in action.

9.4 Energy Transfer and Transformation

(Moodle Sub-Chapter/Section)

Energy doesn't just appear or disappear; it moves and changes form!

- **Energy Transfer:** Energy can move from one object or place to another.
 - Example: The wind (kinetic energy) pushes the blades of a windmill, making them turn (kinetic energy). Energy is transferred from the air to the blades.
- **Energy Transformation:** Energy can change from one form to another. This is happening all the time!
 - Example 1: Eating an apple. The stored chemical energy in the apple is transformed by your body into kinetic energy (when you move), heat energy (keeping you warm), and energy for all your body's processes.
 - Example 2: A torch. Stored chemical energy in the battery is transformed into electrical energy, which flows through the wires and is transformed into light energy and heat energy by the bulb.

God designed energy to move and change in predictable ways, allowing everything in the universe to work together.

Activity 9.1: Spot the Energy!

- Look at the picture below (or imagine a scene like a playground or a busy street).
- Identify three things that have *potential* (stored) energy. What kind of potential energy is it?
- Identify three things that have *kinetic* (moving) energy.
- Describe one example of energy *transfer* or *transformation* you can see or imagine in the scene.

(H5P Suggestion: Drag and Drop Matching)

- Create categories: "Potential Energy Examples" and "Kinetic Energy Examples". Provide items like: "Apple on a tree", "Moving bicycle", "Battery", "Flowing river", "Stretched elastic band", "Person running". Learners drag items to the correct category.
-

Chapter 10: Energy for Life

(Moodle Chapter)

Introduction

Remember MRS GREN from Term 1? All living things need energy to Move, Respire, Grow, Reproduce, and react (Sensitivity). Where does this essential energy come from? For almost all life on Earth, the journey of energy starts with the Sun, God's amazing gift of light and heat.

10.1 The Sun: Our Main Energy Source

(Moodle Sub-Chapter/Section)

The Sun, that giant star at the centre of our solar system, is the primary source of energy for our planet. It continuously radiates enormous amounts of light and heat energy out into space. A small fraction of this energy reaches Earth, and it's just the right amount to support life. Without the Sun's energy, Earth would be a dark, frozen wasteland. God placed the Sun perfectly to provide for His creation.

10.2 Plants: Capturing the Sun's Energy

(Moodle Sub-Chapter/Section)

Plants have a truly amazing, God-given ability: **photosynthesis** (we learned about this in Term 1, Chapter 2). Using chlorophyll in their leaves, plants capture the Sun's light energy and use it to turn water and carbon dioxide into sugary food (stored chemical energy). Plants are called **producers** because they produce their own food using the Sun's energy. They form the base of almost all food chains on Earth.

10.3 Energy Flow Through Food Chains

(Moodle Sub-Chapter/Section)

Animals cannot make their own food, so they get energy by eating other living things. This transfer of energy from one organism to another is shown in a **food chain**.

- **Producers:** Plants that make their own food (e.g., grass).
- **Primary Consumers (Herbivores):** Animals that eat plants (e.g., a zebra eats grass).
- **Secondary Consumers (Carnivores/Omnivores):** Animals that eat herbivores (e.g., a lion eats the zebra).
- **Tertiary Consumers:** Animals that eat secondary consumers.

Energy flows from the Sun -> to the producer -> to the primary consumer -> to the secondary consumer, and so on. At each step, some energy is used by the organism for living, and some is lost as heat, so less energy is available for the next level. God designed this flow of energy to sustain life in ecosystems.

Example Food Chain: Sun -> Grass -> Impala -> Leopard

Activity 10.1: Draw a Food Chain

- Think of a South African animal (like a springbok, a baboon, or an eagle).
- Draw a simple food chain that includes this animal.
- Label the producer, primary consumer, and secondary/tertiary consumer (if applicable).
- Draw an arrow showing the direction the energy flows.

10.4 Humans Need Energy

(Moodle Sub-Chapter/Section)

Like all animals, humans need energy to live, grow, move, think, and keep warm. We get this energy from the **food** we eat. Whether we eat plants (vegetables, fruits, grains) or animals (meat, poultry, fish), the energy in our food ultimately comes from the Sun, captured by plants. Our bodies transform the stored chemical energy in food into the forms we need. Being thankful for our food is being thankful for God's provision of energy!

(H5P Suggestion: Ordering)

- Provide images/words for a food chain (e.g., Sun, Grass, Grasshopper, Frog, Eagle) out of order. Learners drag them into the correct sequence showing the flow of energy.

Chapter 11: Energy Around Us

(Moodle Chapter)

Introduction

Energy comes in many different forms that we experience every day. We've already talked about kinetic (movement) energy. Let's look closer at some other common forms: heat, light, and sound energy. Often, we see these forms when energy is being transferred or transformed.

11.1 Heat Energy

(Moodle Sub-Chapter/Section)

Heat is the energy that makes things warm or hot. We can feel it!

- **Sources:** The Sun is our main natural source. Burning fuels (wood, gas, coal) releases heat energy (chemical energy transforming into heat). Friction (rubbing things together) creates heat. Electrical appliances like stoves, heaters, and kettles transform electrical energy into heat. Our own bodies produce heat.
- **Movement:** Heat energy naturally moves from hotter objects to colder objects until they reach the same temperature.
- **Importance:** We need heat to stay warm, cook food, and keep water liquid. God designed heat transfer to warm our planet and drive weather systems.

11.2 Light Energy

(Moodle Sub-Chapter/Section)

Light is the form of energy that our eyes can detect.

- **Sources:** The Sun is our main natural source. Fire (burning fuels) produces light. Electric lights (bulbs, LEDs) transform electrical energy into light. Some animals (like fireflies) can produce their own light through chemical reactions (bioluminescence) – an amazing design!
- **Travel:** Light travels incredibly fast and in straight lines. Shadows are formed when an opaque object blocks the path of light.
- **Importance:** We need light to see the world around us. Plants need light for photosynthesis (as we learned!). God said "Let there be light!" (Genesis 1:3), and light filled His creation.

11.3 Sound Energy

(Moodle Sub-Chapter/Section)

Sound is the energy produced by vibrations. When something vibrates (moves back and forth quickly), it makes the air (or water, or solid material) around it vibrate, and these vibrations travel to our ears as sound waves.

- **Sources:** Our voices (vocal cords vibrate), musical instruments (strings, skins, or air columns vibrate), radios and speakers (cones vibrate), clapping hands, hitting a drum.
- **Travel:** Sound needs a medium (a substance like air, water, or solid) to travel through. It cannot travel through empty space (like outer space).

- **Importance:** Sound allows us to communicate (talk, listen), enjoy music, and be warned of danger (alarms, sirens).

Activity 11.1: Energy Hunt

- Walk around your home or outside for 5 minutes.
- List as many examples as you can find for each type of energy being used or produced:
 - Heat Energy
 - Light Energy
 - Sound Energy
 - Movement (Kinetic) Energy
- For one example, try to identify an energy *transformation* (e.g., "Television: Electrical energy transforms into light and sound energy").

(H5P Suggestion: Image Hotspots)

- Use a picture of a room with various activities (e.g., person watching TV, lamp on, kettle boiling, cat sleeping, window open with sunlight). Create hotspots on different items. Clicking a hotspot reveals the main energy forms associated with it (e.g., clicking the kettle: "Electrical energy transforming into Heat energy (and some Sound energy)").

Chapter 12: Simple Electrical Circuits

(Moodle Chapter)

Introduction

Electricity is a very useful form of energy! We use it to power lights, computers, TVs, stoves, and so much more. It involves the flow of tiny particles called electrons. We can build pathways called **circuits** to control the flow of electrical energy and make devices work. Learning about circuits helps us understand how to harness this powerful energy God has allowed us to discover, but we must always be careful and safe with electricity!

SAFETY FIRST! Never experiment with electricity from wall sockets – it is very dangerous! Only use batteries (cells) for your experiments, under adult supervision.

12.1 What's Needed for a Circuit?

(Moodle Sub-Chapter/Section)

To make a simple electrical device work, you need a complete pathway, or circuit. The basic parts are:

- **Energy Source:** Provides the electrical energy. Usually a **battery** or **cell** for simple circuits. (A battery is technically one or more cells). It has a positive (+) and a negative (-) terminal.
- **Conducting Wires:** Provide a path for the electricity to flow. They are usually made of metal (like copper) which lets electricity pass through easily. Wires are often covered in plastic for safety.
- **Output Device:** The component that transforms electrical energy into another form. Examples:
 - A **bulb** (transforms electrical energy into light and heat).
 - A **buzzer** (transforms electrical energy into sound).
 - A **motor** (transforms electrical energy into kinetic energy/movement).
- **Switch (Optional):** A device to easily open or close the circuit, turning the output device on or off.

12.2 Making a Simple Circuit Work

(Moodle Sub-Chapter/Section)

For electricity to flow and the output device to work, you need a **closed circuit**. This means there must be a complete, unbroken path from one terminal of the energy source (e.g., the negative terminal of a battery), through the wires and the output device, and back to the other terminal of the energy source (e.g., the positive terminal).

- If there is a gap anywhere in the circuit (like a loose wire, a broken bulb filament, or an open switch), it is an **open circuit**. Electricity cannot flow, and the device will not work.

Activity 12.1: Build a Simple Circuit

- **(You will need: 1.5V Battery/Cell, Battery holder (optional), 2 Insulated wires with ends stripped or crocodile clips, Small bulb (torch bulb), Bulb holder)**
- **Adult supervision recommended.**
 4. Connect one wire from one terminal of the battery to one connection point on the bulb holder.
 5. Connect the second wire from the other connection point on the bulb holder back to the other terminal of the battery.
 6. Does the bulb light up? You have made a closed circuit!

7. Now, carefully disconnect one of the wires. What happens to the bulb? You have made an open circuit. Reconnect it.
- *Draw your closed circuit in your workbook. Use arrows to show the path the electricity takes.*

12.3 Conductors and Insulators

(Moodle Sub-Chapter/Section)

Not all materials allow electricity to flow through them easily. God designed materials with different electrical properties.

- **Conductors:** Materials that let electrical energy pass through them easily. Most metals are good conductors (e.g., copper, aluminium, steel, gold, silver). Water with impurities is also a conductor. This is why wires are made of metal.
- **Insulators:** Materials that do *not* let electrical energy pass through them easily. They block the flow of electricity. Examples: Plastic, rubber, glass, wood (dry), air, oil.

Insulators are very important for electrical safety. The plastic coating on wires prevents the electricity from escaping and stops us from getting a shock if we touch the wire. Plugs and switches often have plastic casings.

Activity 12.2: Testing Conductors and Insulators

- **(You will need: Your simple circuit from Activity 12.1, plus various small objects to test: e.g., metal paperclip, plastic ruler, wooden pencil (test wood and graphite 'lead'), rubber eraser, coin, piece of glass (careful!), aluminium foil, fabric scrap)**
 5. Rebuild your closed circuit so the bulb is lit.
 6. Now, create a small gap in the circuit (e.g., disconnect one wire from the bulb holder).
 7. Place one of the test objects across the gap, so it touches the wire end and the bulb holder contact point.
 8. Does the bulb light up? If YES, the material is a conductor. If NO, it is an insulator.
 9. Test each object safely. Record your results in a table:
Object | Material | Conductor or Insulator?

12.4 Switches: Controlling the Flow

(Moodle Sub-Chapter/Section)

A **switch** is a convenient way to open and close a circuit without disconnecting wires. When the switch is **ON**, it closes the circuit,

allowing electricity to flow. When the switch is **OFF**, it creates a gap (opens the circuit), stopping the flow of electricity. Think of a light switch on the wall – it controls the flow of electricity to the light bulb.

(H5P Suggestion: Quiz (Question Set))

- Combine multiple choice, true/false, and fill-in-the-blanks about circuits.
 - "What provides the energy in a simple circuit?" (Battery/Cell)
 - "Materials that let electricity flow easily are called _____. " (Conductors)
 - "Plastic is a good conductor." (False)
 - "A circuit must be _____ for electricity to flow." (Closed)
 - Include a simple circuit diagram and ask learners to identify the parts (battery, wire, bulb, switch).
-

Chapter 13: Our Place in Space

(Moodle Chapter)

Introduction

When you look up at the sky on a clear night, far away from city lights, you can see thousands of twinkling stars, perhaps the Moon, and maybe even a planet! It's a glimpse into the vastness of space – the **universe**. God's creation extends far beyond our Earth, filled with wonders that declare His glory and power. Let's explore our neighbourhood in space: the Solar System.

13.1 The Universe, Galaxies, and Our Solar System

(Moodle Sub-Chapter/Section)

- The **Universe** is everything that exists – all space, time, matter, and energy. It is incredibly vast, possibly infinite.
- Within the universe are billions of **galaxies**. A galaxy is a huge collection of stars, gas, and dust held together by gravity. We live in a spiral galaxy called the **Milky Way**.
- Our **Solar System** is just a tiny part of the Milky Way galaxy. It consists of our Sun (a star), the planets that orbit it, their moons, and other smaller objects like asteroids and comets.

God's creation is immense, far bigger than we can imagine! "The heavens declare the glory of God; the skies proclaim the work of his hands." (Psalm 19:1)

13.2 The Planets of Our Solar System

(Moodle Sub-Chapter/Section)

A **planet** is a large object that orbits a star. Our Solar System has eight planets orbiting the Sun. In order from the Sun, they are:

1. **Mercury:** Smallest, closest to the Sun, very hot and cold extremes.
2. **Venus:** Similar size to Earth, very hot, thick cloudy atmosphere.
3. **Earth:** Our home! Just the right distance from the Sun, with liquid water and an atmosphere that supports life.
4. **Mars:** The "Red Planet," cold, dusty, has giant volcanoes and canyons.
5. **Jupiter:** Largest planet, a gas giant with many moons and a Great Red Spot (a huge storm).
6. **Saturn:** Gas giant famous for its beautiful rings made of ice and rock.
7. **Uranus:** Ice giant, blue-green colour, rotates on its side.
8. **Neptune:** Ice giant, deep blue colour, very windy.

Mnemonic to remember the order: My Very Educated Mother Just Served Us Noodles.

13.3 Earth: The "Just Right" Planet

(Moodle Sub-Chapter/Section)

Out of all the planets we know, Earth is unique. God designed it perfectly for life:

- **Right Distance from the Sun:** Not too hot, not too cold, allowing liquid water to exist (Goldilocks Zone).
- **Liquid Water:** Essential for all known life.
- **Protective Atmosphere:** Shields us from harmful radiation from the Sun, provides oxygen to breathe, and keeps temperatures stable.
- **Magnetic Field:** Protects the atmosphere from being stripped away by solar wind.

These finely tuned conditions make Earth a special haven for life in the vast cosmos, showing God's care and purposeful design.

Activity 13.1: Solar System Model

- Draw a picture of our Solar System. Show the Sun in the centre and the eight planets orbiting it in the correct order. Make the inner planets smaller and rocky, and the outer planets larger (gas/ice giants). Label each planet.

- Add a sentence explaining why Earth is special.

(H5P Suggestion: Drag and Drop Ordering)

- Provide names or images of the 8 planets. Learners drag them into the correct order starting from the Sun.
-

Chapter 14: The Earth's Movements

(Moodle Chapter)

Introduction

Our planet Earth may seem still beneath our feet, but it is actually moving through space in two main ways. These movements, **rotation** and **revolution**, were set in motion by God and create the regular cycles of day and night, and the changing seasons that govern life on Earth.

14.1 Rotation: Day and Night

(Moodle Sub-Chapter/Section)

Earth spins around an imaginary line passing through its North and South Poles. This line is called the **axis**, and the spinning movement is called **rotation**.

- Earth completes one full rotation every **24 hours**.
- As Earth rotates, different parts of the planet face towards the Sun, experiencing **daylight**.
- The parts facing away from the Sun are in darkness, experiencing **night**.

This regular cycle of day and night, established by God, provides time for activity and rest for living things.

Activity 14.1: Model Day and Night

- **(You will need: A ball (to represent Earth), a torch or lamp (to represent the Sun), a sticker or marker)**
- In a darkened room, place a sticker on one side of the ball.
- Shine the torch onto the ball. The side facing the torch is in daylight; the side facing away is in night.
- Slowly spin (rotate) the ball on its axis. Watch the sticker move from light (day) into darkness (night) and back again.
- Explain how this model shows what causes day and night on Earth.

14.2 Revolution: The Year

(Moodle Sub-Chapter/Section)

As well as rotating, Earth also travels in a path, called an **orbit**, around the Sun. This movement around the Sun is called **revolution**.

- Earth completes one full revolution around the Sun in about **365 days**. This is what we call one **year**.
- The Earth's orbit is not a perfect circle, but slightly elliptical (oval-shaped).

14.3 The Tilt Causes Seasons

(Moodle Sub-Chapter/Section)

Why do we have different seasons (summer, autumn, winter, spring)? It's not mainly because Earth is closer or further from the Sun. It's because Earth's **axis is tilted** (by about 23.5 degrees) relative to its orbit around the Sun.

- Because of this tilt, as Earth revolves around the Sun, different parts of the Earth receive the Sun's rays more directly at different times of the year.
- **Summer in the Southern Hemisphere (like South Africa):** Our part of the Earth is tilted *towards* the Sun. We receive more direct sunlight, the rays are concentrated, and days are longer. This makes it warmer.
- **Winter in the Southern Hemisphere:** Our part of the Earth is tilted *away* from the Sun. We receive sunlight at more of an angle, the rays are spread out, and days are shorter. This makes it cooler.
- **Spring and Autumn:** Occur when neither hemisphere is tilted significantly towards or away from the Sun.

God's faithful design includes this tilt, creating the seasons which bring variety and are essential for agriculture and ecosystems.

Activity 14.2: Season Explainer

- Draw two simple diagrams of the Earth orbiting the Sun.
- In the first diagram, show the Southern Hemisphere tilted *towards* the Sun. Label it "Summer in South Africa". Explain why it's warmer.
- In the second diagram, show the Southern Hemisphere tilted *away* from the Sun. Label it "Winter in South Africa". Explain why it's cooler.

(H5P Suggestion: True/False Quiz)

- "Earth spinning on its axis causes the seasons." (False - it causes day/night)
 - "Earth takes about 24 hours to revolve around the Sun." (False - it takes 365 days)
 - "The tilt of Earth's axis is the main reason for the seasons." (True)
 - "When it is summer in South Africa, the Southern Hemisphere is tilted towards the Sun." (True)
-

Chapter 15: The Moon, Our Neighbour

(Moodle Chapter)

Introduction

After the Sun, the brightest object in our sky is the **Moon**. It has fascinated people for centuries. The Moon is Earth's only natural **satellite**, meaning it orbits our planet. It doesn't produce its own light but shines by reflecting sunlight. God placed the Moon in the heavens to govern the night (Genesis 1:16) and its regular cycle is a beautiful feature of creation.

15.1 The Moon's Movement

(Moodle Sub-Chapter/Section)

The Moon travels in an orbit around the Earth. It takes about **27.3 days** to complete one orbit, but because the Earth is also moving around the Sun, the time from one Full Moon to the next (the cycle of phases we see) is about **29.5 days**. This is roughly one **month** (the word 'month' comes from 'Moon').

15.2 Phases of the Moon

(Moodle Sub-Chapter/Section)

Why does the Moon seem to change shape throughout the month? It's because we see different amounts of the Moon's sunlit half as it orbits the Earth. The Moon itself is always a sphere, half lit by the Sun. The changing shapes we see are called the **phases of the Moon**.

The main phases are:

1. **New Moon:** The Moon is between Earth and the Sun. The sunlit side faces away from us, so we can hardly see the Moon.

2. **Waxing Crescent:** As the Moon moves in its orbit, we start to see a thin sliver of the sunlit side. "Waxing" means growing bigger.
3. **First Quarter:** We see exactly half of the sunlit side (looks like a half-circle).
4. **Waxing Gibbous:** We see more than half of the sunlit side.
5. **Full Moon:** The Earth is between the Sun and Moon. We see the entire sunlit side of the Moon.
6. **Waning Gibbous:** After the Full Moon, the lit portion we see starts to shrink. "Waning" means getting smaller.
7. **Third Quarter (or Last Quarter):** We again see half of the sunlit side, but it's the opposite half from the First Quarter.
8. **Waning Crescent:** We see only a thin sliver before the Moon becomes 'new' again.

This predictable cycle is another example of the orderliness God built into His creation.

Activity 15.1: Moon Phase Diary

- Over the next month (or two weeks), try to observe the Moon each clear night (with a grown-up if needed).
- Draw the shape you see in a diary or calendar.
- Label the phase if you can (e.g., Crescent, Half, Gibbous, Full).
- Notice how the shape changes predictably over time.

(H5P Suggestion: Image Sequencing)

- Provide images of the main Moon phases (New, Crescent, First Quarter, Gibbous, Full, Third Quarter) out of order. Learners drag the images into the correct sequence as they appear during a month.

15.3 The Moon's Surface

(Moodle Sub-Chapter/Section)

If you look closely at the Moon (especially with binoculars or a telescope, but some features are visible with just eyes), you can see light and dark areas.

- **Craters:** Round pits covering much of the surface, formed by impacts from asteroids and meteorites long ago.
- **Maria ('Seas'):** Large, dark, flat plains. Early astronomers mistakenly thought they were seas, hence the name ('Maria' is Latin for 'seas'). They are actually ancient solidified lava flows.
- **Highlands:** Lighter-coloured, rougher areas, including mountains.

Humans, using their God-given intelligence and curiosity, have even visited the Moon (starting with the Apollo missions in 1969), walking on its surface and bringing back rock samples.

Chapter 16: The Sun, Our Star

(Moodle Chapter)

Introduction

The Sun is the undisputed king of our Solar System. It's not a planet or a moon; it's a **star** – a gigantic ball of extremely hot gases (mostly hydrogen and helium) that produces its own light and heat through nuclear reactions deep inside its core. All the planets, including Earth, revolve around this magnificent celestial body created by God.

16.1 The Sun's Vital Importance

(Moodle Sub-Chapter/Section)

Life on Earth depends entirely on the Sun. Its energy provides:

- **Light:** Allowing us to see and enabling plants to perform photosynthesis (the base of the food chain).
- **Heat:** Keeping Earth's temperature suitable for life and preventing water from freezing solid everywhere.
- **Energy for Weather:** The Sun's heating of the atmosphere and oceans drives winds, ocean currents, and the water cycle (evaporation, rain).

Without the Sun's constant, steady output of energy – perfectly balanced by God's design – Earth would be a dead planet. "His faithfulness continues through all generations; you established the earth, and it endures." (Psalm 119:90)

16.2 The Sun is a Star

(Moodle Sub-Chapter/Section)

The Sun seems huge and unique to us, but it's actually a fairly average-sized star compared to others in the universe. The stars we see twinkling at night are incredibly distant suns, many much larger and brighter than our own. They look tiny only because they are so far away. Our Sun is special to us because it's close enough to warm and light our world.

16.3 Sun Safety

(Moodle Sub-Chapter/Section)

While the Sun's energy is essential, it is also very powerful and can be harmful if we are not careful.

- **Never look directly at the Sun:** Its intense light can permanently damage your eyes very quickly. Even sunglasses don't make it safe to stare at the Sun.
- **Protect your skin:** The Sun emits ultraviolet (UV) radiation, which can cause sunburn and long-term skin damage. Especially in sunny South Africa, it's important to:
 - Wear sunscreen (sunblock) with a high SPF (Sun Protection Factor).
 - Wear a hat that shades your face, neck, and ears.
 - Wear protective clothing.
 - Try to stay in the shade during the hottest parts of the day (usually between 10 am and 3 pm).

Using God's gift of sunlight wisely includes protecting the bodies He has given us.

Activity 16.1: Make a Sundial

- **(You will need: A paper plate, a straw or straight stick (gnomon), a pencil, sticky tape or Prestik, a sunny day, a watch or clock)**
 6. Find a flat, sunny spot outside where the sundial won't be disturbed.
 7. Push the straw/stick through the centre of the paper plate so it stands straight up. Secure it with tape/Prestik underneath.
 8. Place the plate on the ground. The straw will cast a shadow.
 9. At the start of an hour (e.g., 9:00 am), carefully mark where the shadow falls on the edge of the plate and write the time.
 10. Repeat every hour for several hours.
 11. Observe how the shadow moves as the Sun appears to move across the sky (due to Earth's rotation). You have made a simple clock that uses God's predictable movement of the Earth!

(H5P Suggestion: Flashcards)

- Create flashcards for key Term 3 vocabulary: Energy, Potential Energy, Kinetic Energy, Conductor, Insulator, Circuit, Rotation, Revolution, Axis, Orbit, Planet, Star, Moon, Solar System, Galaxy, Universe, Photosynthesis, Food Chain, Phases of the Moon. Include simple definitions or images.
-

End of Term 3 Reflection

What an incredible journey this term! We've explored the invisible but powerful world of energy – how it's stored, transferred, transformed, and used by living things and our technologies. We built circuits and saw electricity in action. Then, we zoomed out to see our amazing planet Earth, spinning and orbiting in the vast, orderly universe God created, governed by the Sun and accompanied by the Moon. You've learned about cycles, systems, and the fundamental forces that shape our world and the cosmos. Continue to look at the world with wonder, recognising the power and wisdom of the Creator in everything from a tiny electrical spark to a giant star!

Term 4: Design Challenges and Earth's History

(Moodle Top-Level Chapter)

Term 4 Overview

Welcome to our final term of Grade 5 Natural Sciences and Technology! This term, we put our knowledge into practice with **Processing Skills and Design**. You'll learn the steps engineers and designers use to solve problems and create useful things, applying what you've learned about materials, structures, and energy. We will also look at practical processing by learning how food can be preserved to last longer – a vital skill for good stewardship. You will get the chance to tackle your own design-and-make project!

Then, we take a fascinating journey into the past by studying **Fossils**. We'll discover what fossils are, how they form over long periods, and what these amazing clues, buried in rock layers, can tell us about the history of life on God's Earth. We are especially blessed in South Africa with many important fossil sites, giving us a unique window into the creatures and environments of long ago. Let's finish the year with creativity and discovery!

Chapter 17: The Design Process

(Moodle Chapter)

Introduction

Throughout this year, you've learned so much about the natural world and how things work – materials, structures, energy, living things. Technology is about using this scientific knowledge to solve problems, meet needs, and make life better. God gave humans amazing creativity and intelligence to design and make things. To do

this well, designers and engineers often follow a set of steps called the **Design Process**. Let's learn these steps!

17.1 Step 1: Investigate

(Moodle Sub-Chapter/Section)

Before you can solve a problem, you need to understand it properly.

- **Identify the Need or Problem:** What needs to be done? What problem needs solving? (e.g., "We need a way to carry water," "I need a stronger bookshelf," "This toy keeps breaking").
- **Who is it for?** Who will use the product or solution?
- **What must it do?** What are the requirements or specifications? (e.g., "Must hold 1 litre of water," "Must hold 10 heavy books," "Must be easy for a child to use"). What are the limitations? (e.g., cost, materials available, size).
- **Research:** Look at existing solutions. How do they work? What are their good and bad points? Gather information and ideas.

17.2 Step 2: Design

(Moodle Sub-Chapter/Section)

Now it's time to get creative and plan your solution!

- **Brainstorm Ideas:** Think of different ways to solve the problem. Don't worry about being perfect at first, just get ideas down.
- **Develop Ideas:** Choose one or two promising ideas. Draw clear sketches or diagrams. Label the parts. Think about the details: What materials will you use (linking back to properties!)? How will the parts fit together? How will it work?
- **Choose the Best Design:** Select the design that seems most likely to meet the requirements, considering materials, cost, ease of making, and safety.
- **Plan:** List the materials and tools you will need. Write down the steps you will follow to make it. Think about safety rules for each step.

17.3 Step 3: Make

(Moodle Sub-Chapter/Section)

This is the hands-on part – building your design!

- **Gather Materials and Tools:** Collect everything you need according to your plan.

- **Follow Your Plan:** Build your product step-by-step. Measure carefully. Join parts securely.
- **Safety First!** Always follow safety rules, especially when using tools (like scissors, glue guns – ask for adult help). Wear safety gear if needed (like goggles).
- **Adapt if Necessary:** Sometimes things don't go exactly as planned. You might need to make small changes to your design as you build. Keep a note of any changes you make and why. Using God-given skills involves care and precision.

17.4 Step 4: Evaluate

(Moodle Sub-Chapter/Section)

Once you've built your product, you need to check how well it works.

- **Test Your Product:** Does it do what it was designed to do? Test it against the requirements you listed in the 'Investigate' step. (e.g., Does the bridge hold the weight? Does the alarm buzz? Does the container hold the objects?).
- **Identify Strengths and Weaknesses:** What works well? What doesn't work so well? Is it strong enough? Is it safe? Is it easy to use? Does it look good?
- **Suggest Improvements:** How could you make it better next time? What changes would you make to the design or materials? Learning from evaluation is key to better designs.

17.5 Step 5: Communicate

(Moodle Sub-Chapter/Section)

The final step is to share your work with others.

- **Present Your Project:** Show your product. Explain the problem you were solving. Show your design drawings. Explain how you made it.
- **Share Your Evaluation:** Explain how you tested it and what you found out. Talk about its strengths and weaknesses, and how you might improve it.
- **Methods:** You could make a poster, write a short report with drawings, or give a verbal presentation.

Activity 17.1: Practise the Process (Thought Exercise)

- **Problem:** Your pencils keep rolling off your desk.
- **Investigate:** Why is this a problem? Who is it for? What must the solution do? (e.g., keep 3-4 pencils from rolling, be small enough for the desk, be easy to make).

- **Design:** Quickly sketch two different ideas for a simple pencil holder using common materials (e.g., cardboard tube, modelling clay, folded paper). Choose one.
- **Make (Imagine):** What steps would you follow? What tools would you need?
- **Evaluate (Imagine):** How would you test it? What might be a weakness?
- **Communicate (Imagine):** How would you explain your idea?

(H5P Suggestion: Ordering Activity)

- Provide the five steps of the Design Process (Investigate, Design, Make, Evaluate, Communicate) as text boxes. Learners drag them into the correct order.

Chapter 18: Processing Food for Preservation

(Moodle Chapter)

Introduction

Food is one of God's essential gifts for sustaining life. However, fresh food like fruits, vegetables, meat, and milk doesn't last very long before it starts to spoil. Spoilage is often caused by tiny living things called **microbes** (like bacteria, yeasts, and moulds) that grow on the food. **Food preservation** involves processing food in ways that stop or slow down the growth of these microbes, making the food last much longer. This is a wise practice that helps us be good stewards of God's provision by preventing waste.

18.1 Why Preserve Food?

(Moodle Sub-Chapter/Section)

People preserve food for several important reasons:

- **To Prevent Waste:** Especially after a harvest when there is a lot of fresh food available at once.
- **To Store Food for Later Use:** Having preserved food means you have something to eat when fresh food is not available (e.g., during winter or drought).
- **To Allow Transportation:** Preserved foods can often be transported over long distances without spoiling.
- **To Add Variety:** Preserved foods like jams, pickles, and dried fruits add different tastes and textures to our meals.
- **For Emergencies:** Having a store of preserved food can be helpful in unexpected situations.

18.2 Common Methods of Food Preservation

(Moodle Sub-Chapter/Section)

Different preservation methods work by changing the conditions that microbes need to grow (usually water, suitable temperature, and food source). Here are some common methods:

- **Drying (Dehydration):** Removing most of the water from the food. Microbes cannot grow without enough water.
 - *Examples:* Dried fruit (raisins, apricots), dried vegetables, powdered milk, *biltong* and *droëwors* (dried meat – a South African specialty!), dried fish (*bokkoms*). Sun-drying uses the Sun's energy, while ovens or special dehydrators can also be used.
- **Salting / Sugaring:** Adding large amounts of salt or sugar draws water out of the food through a process called osmosis, and also makes it difficult for microbes to survive.
 - *Examples:* Salted fish or meat, jams and preserves (high sugar content).
- **Cooling / Freezing:** Low temperatures slow down the growth and activity of microbes significantly. Freezing stops their growth almost completely (but doesn't always kill them).
 - *Examples:* Storing food in a refrigerator (cooling) or freezer (freezing).
- **Pickling:** Preserving food in an acidic liquid, usually vinegar. The acid prevents most microbes from growing. Spices are often added for flavour.
 - *Examples:* Pickled onions, pickled cucumbers (gherkins), *atchar* (South African pickle often made with mangoes and vegetables).
- **Heating (Canning / Bottling):** Heating food to a high temperature kills most microbes. Sealing the food in airtight containers (cans or jars) while it's still hot prevents new microbes from getting in.
 - *Examples:* Canned fruits, vegetables, fish, meat; bottled jams and sauces.

Many traditional methods, developed over generations, use combinations of these techniques, showing great wisdom in using natural resources like the sun, salt, and smoke.

Activity 18.1: Preservation Hunt

- Look in your kitchen cupboards, refrigerator, and freezer (with permission!).
- Find five different food items that have been preserved.

- For each item, write down its name and the likely method(s) used to preserve it (e.g., "Strawberry Jam - Sugaring, Heating/Bottling", "Biltong - Salting, Drying").

(H5P Suggestion: Drag and Drop Matching)

- Create two columns. Column 1 lists Preservation Methods (Drying, Salting, Freezing, Pickling, Canning). Column 2 lists Examples (Raisins, Jam, Frozen Peas, Gherkins, Canned Tuna). Learners match the method to a suitable example.
-

Chapter 19: Design and Make Project

(Moodle Chapter)

Introduction

Now it's your turn to be the designer and maker! In this chapter, you will choose a project, follow the Design Process steps we learned about, and use the knowledge and skills you've gained throughout the year about materials, structures, energy, and processing. Remember to work carefully and safely, and be proud of using your God-given creativity!

19.1 Choose Your Project Brief

(Moodle Sub-Chapter/Section)

Your teacher or parent will help you choose or define a project brief. Here are some examples:

- **Brief A: The Strong Bridge:** Design and make a model bridge using only paper straws (e.g., 20) and sticky tape (e.g., 1 metre). It must span a gap of 30 cm and be able to support a weight of 100g (e.g., a small tin or apple) in the middle for at least 10 seconds without collapsing.
- **Brief B: The Door Alarm:** Design and make a simple electrical circuit that makes a buzzer sound when a model 'door' (e.g., made of cardboard) is opened. You can use 1 battery, connecting wires, 1 buzzer, and materials like cardboard, paper clips, drawing pins, and tape to create the switch mechanism triggered by the door.
- **Brief C: The Woven Container:** Design and make a small container (e.g., to hold pens or beads) using weaving techniques. You can use strips of paper, card, thin plastic, or natural materials like reeds or long grass (if available and prepared safely). The container should stand up on its own and have a base.

19.2 Apply the Design Process

(Moodle Sub-Chapter/Section)

Use your workbook or separate sheets to document your work for each step:

1. **Investigate:** Write down the brief you chose. What must your product do? What are the limitations (materials, size)? Look for ideas online or in books (with permission).
2. **Design:** Draw at least two different ideas. Choose the best one and explain why. Draw a clear, labelled diagram of your final design. List the exact materials and tools you will need. Write down the steps you plan to follow. Include safety precautions.
3. **Make:** Follow your plan carefully and safely. Ask for help if needed, especially with cutting or tricky parts. Take photos or make notes if you change anything from your plan.
4. **Evaluate:** Test your finished product against the requirements in the brief. Does it work? How well? Record the results (e.g., Did the bridge hold the weight? Did the alarm buzz? Does the container hold things?). What are its strengths? What are its weaknesses? How could you improve it if you made it again?
5. **Communicate:** Prepare to show and explain your project. You could make a poster including your drawings, photos, and evaluation notes, or simply present your product and explain the process.

Activity 19.1: Carry out your Design Project!

- Work through the five steps of the Design Process for your chosen brief. Document everything as you go. Have fun creating!

(H5P Suggestion: Documentation Tool (if available on Moodle))

- Although not a standard H5P type, Moodle's 'Assignment' or 'Wiki' could be used for learners to upload drawings, photos, and text documenting their design process. Or, create a simple H5P 'Documentation' activity using 'Fill in the Blanks' or 'Essay' type questions for each step of the process.

Chapter 20: What are Fossils?

(Moodle Chapter)

Introduction

Imagine digging in your garden and finding a rock with the perfect shape of a leaf or a shell inside! You might have found a **fossil**. Fossils are like clues left behind by plants and animals that lived long, long ago. They are the **preserved remains** (like bones or shells) or **traces** (like footprints) of ancient life, usually found embedded in rock. Studying fossils, a science called palaeontology, helps us piece together the amazing history of life on God's Earth.

20.1 Types of Fossils

(Moodle Sub-Chapter/Section)

There are two main kinds of fossils:

- **Body Fossils:** These are fossils formed from the actual body parts of an organism. The original material is often changed or replaced by minerals over time, turning it into rock, but it keeps the shape of the original part.
 - *Examples:* Fossilised bones and teeth (like dinosaur bones), fossilised shells (like ammonites or ancient sea snails), petrified wood (where minerals have replaced wood fibres), insects trapped in amber (hardened tree resin).
- **Trace Fossils (Ichnofossils):** These fossils are not parts of the organism itself, but evidence of its activities when it was alive. They show us how ancient creatures moved or behaved.
 - *Examples:* Fossilised footprints or trackways (showing how an animal walked), fossilised burrows (tunnels dug by animals), fossilised nests or eggs, coprolites (fossilised dung/droppings), impressions left by leaves or skin.

20.2 What Usually Doesn't Fossilise?

(Moodle Sub-Chapter/Section)

The soft parts of organisms, like skin, muscles, feathers, leaves, and internal organs, decay (rot away) very quickly after death. Therefore, it's very rare for these soft parts to become fossilised. Body fossils are usually only formed from the hard parts, like bones, teeth, shells, and wood.

Activity 20.1: Fossil or Not?

- Look at the list below. Decide if each item is likely to become a Body Fossil, a Trace Fossil, or probably Not Fossilise.
 - A dinosaur tooth
 - A jellyfish body

- A pathway of dinosaur footprints
- A buried worm tunnel
- A bird's feather
- An ammonite shell
- A fallen autumn leaf on the pavement
- An insect perfectly preserved inside amber

(H5P Suggestion: Image Choice)

- Show images (e.g., a fossil bone, a fossil footprint, a fresh flower, a drawing of muscles). Ask: "Which of these is a Body Fossil?", "Which is a Trace Fossil?", "Which is unlikely to fossilise?".

Chapter 21: How Fossils Form

(Moodle Chapter)

Introduction

Becoming a fossil is actually a very rare event! Most plants and animals that have ever lived did not become fossils. Special conditions are needed for remains to be preserved over the vast amount of time needed for fossils to form. The most common way fossils form involves burial in sediment that eventually turns into rock.

21.1 Fossil Formation in Sedimentary Rock

(Moodle Sub-Chapter/Section)

Sedimentary rocks (like sandstone, shale, limestone) are formed from layers of sediment (mud, sand, silt, pebbles, or shell fragments) that build up over time, often under water (in seas, lakes, or rivers), and eventually harden into rock. This process provides the ideal conditions for many fossils to form:

1. **Death and Quick Burial:** An organism dies. Its remains must be buried quickly by sediment. This protects the remains from being eaten by scavengers, broken up by weather, or decaying completely in the open air. Burial often happens when sediments carried by water settle over the remains.
2. **Sediment Accumulation and Decay:** More layers of sediment pile on top. The pressure increases. The soft parts of the organism decay, usually leaving only the hard parts (bones, shells, teeth, wood).
3. **Mineral Replacement (Petrification) or Mould/Cast Formation:** Over very long periods, water containing dissolved minerals seeps through the sediment layers.

- **Petrification:** The minerals in the water slowly replace the original material of the hard parts, bit by bit, creating a rock-like copy of the organism. Petrified wood is a good example.
 - **Mould:** Sometimes, the original hard part dissolves away completely after the surrounding sediment has hardened, leaving behind a hollow space shaped exactly like the organism. This hollow space is called a **mould**.
 - **Cast:** If this mould later gets filled up with other minerals or sediment that hardens, it forms a **cast**, which is a solid copy of the shape of the original organism.
 - **Impression:** Thin objects like leaves or feathers can leave an imprint, called an **impression**, in soft sediment that then hardens.
4. **Uplift and Exposure:** Much later, geological forces might lift the layers of sedimentary rock above sea level. Erosion by wind, water, or ice can then wear away the overlying rock layers, eventually exposing the fossil at the surface where it can be discovered.

21.2 Other Ways Fossils Can Form

(Moodle Sub-Chapter/Section)

Less commonly, fossils can form in other ways:

- **Freezing:** In very cold regions, entire bodies of animals (like woolly mammoths) can be preserved in ice or frozen ground for thousands of years, sometimes with skin, hair, and even muscles intact.
- **Trapping in Amber:** Insects, spiders, seeds, or small lizards can get trapped in sticky tree resin. If this resin hardens over time into **amber**, the trapped organism can be preserved almost perfectly inside.
- **Tar Pits:** Animals could get stuck in natural pools of thick tar, and their bones could be preserved in the tar.

Activity 21.1: Fossil Formation Storyboard

- Draw a series of 4 simple pictures in boxes to show the main steps of how a fossil bone might form in sedimentary rock (Death/Burial, Sediment Accumulation/Decay, Mineral Replacement, Exposure).
- Write a short sentence under each picture explaining the step.

(H5P Suggestion: Drag and Drop Labelling)

- Provide a simplified diagram showing the stages of fossil formation (buried fish skeleton, layers accumulating, mineral replacement, fossil exposed). Provide labels: "Quick Burial", "Sediment Layers", "Mineral Replacement", "Erosion Exposes Fossil". Learners drag labels to the correct stage.
-

Chapter 22: What Fossils Tell Us

(Moodle Chapter)

Introduction

Fossils are like pages in Earth's history book, written in stone. By carefully studying fossils, scientists (palaeontologists) can learn amazing things about the past. However, interpreting these clues requires careful thought, as the 'book' is incomplete and sometimes difficult to read. Fossils provide glimpses into the wonderful variety of God's creation throughout history.

22.1 Evidence of Past Life Forms

(Moodle Sub-Chapter/Section)

Fossils provide direct evidence that life on Earth was different in the past.

- They show us what ancient plants and animals looked like (from body fossils).
- They reveal creatures that are now extinct (no longer living), such as dinosaurs, trilobites (ancient sea creatures), ammonites (shelled squid relatives), and giant ferns. This shows the incredible creativity of God, who designed life forms suited for different times and conditions.
- They show how organisms lived (from trace fossils like footprints, nests, or burrows).

22.2 Clues about Past Environments

(Moodle Sub-Chapter/Section)

The type of fossil found, and the type of rock it's in, can tell us what the environment was like when the organism lived.

- Finding fossils of marine animals (like fish, ammonites, corals) in rocks far inland, even on mountains, tells us that area must have been covered by sea in the distant past. God's creation is dynamic, and land and sea levels have changed over time.

- Finding fossils of plants like ferns and cycads suggests the climate was likely warm and damp.
- The type of sedimentary rock itself gives clues (e.g., sandstone often forms in deserts or beaches, shale forms in calm water like deep lakes or seas).

22.3 Clues about Changes Over Time

(Moodle Sub-Chapter/Section)

Different layers of sedimentary rock represent different periods of time (usually, lower layers are older than upper layers). By comparing the types of fossils found in different layers, scientists can see patterns of change in life forms and environments over Earth's history. (Note: This book focuses on observing the evidence in the layers, acknowledging change, without detailing specific evolutionary theories or timescales which can be complex and debated).

22.4 An Incomplete Record

(Moodle Sub-Chapter/Section)

It's important to remember that the fossil record is **incomplete**. Only a tiny fraction of living things ever became fossils, and only a tiny fraction of those fossils have been discovered by humans. There are many gaps in our knowledge. Scientific understanding of Earth's history and past life develops and sometimes changes as new fossil evidence is found and interpreted. Studying fossils involves both careful observation and thoughtful interpretation of God's ancient world.

Activity 22.1: Fossil Detective

- Imagine you found the following fossils together in one rock layer in the Karoo:
 - Fossil bones of a Lystrosaurus (a pig-sized mammal-like reptile known to eat plants).
 - Fossilised leaves resembling Glossopteris (an ancient plant with tongue-shaped leaves).
 - Fossilised ripple marks in the surrounding sandstone.
- What could these fossils tell you about:
 - The types of creatures that lived there?
 - The types of plants that grew there?
 - The possible environment? (Ripple marks often form in shallow water).

(H5P Suggestion: Quiz (Multiple Choice))

- "What can fossil footprints tell us?" (How an animal moved).

- "Finding a fossil fish on a mountaintop suggests..." (The area was once under water).
 - "Are fossils of every living thing that ever existed found?" (No, the record is incomplete).
-

Chapter 23: Fossils in South Africa

(Moodle Chapter)

Introduction

South Africa is a world-famous treasure chest for fossils! Our country has rocks containing fossils from many different periods of Earth's history, giving us incredible insights into the ancient past of our land and the creatures God placed here long ago. Protecting these fossil sites is very important for science and for our national heritage.

23.1 The Karoo Supergroup: A Window on Ancient Continents

(Moodle Sub-Chapter/Section)

A huge area of South Africa is covered by rocks of the Karoo Supergroup, formed over a vast period of geological time. These rocks contain abundant fossils, especially:

- **Mammal-like Reptiles (Therapsids):** These fascinating creatures lived long before the dinosaurs. They show a mix of features found in reptiles and mammals, providing clues about the history of these groups. Many different types have been found in the Karoo, from small insect-eaters to large predators and hippo-sized herbivores like *Lystrosaurus*.
- **Glossopteris Flora:** Fossil leaves of the ancient *Glossopteris* plant are very common in Karoo rocks, suggesting these plants dominated the landscape back then.
- **Early Dinosaurs:** Some of the earliest known dinosaur fossils have also been found in the upper layers of the Karoo rocks.

23.2 The Cradle of Humankind: Exploring Human Origins

(Moodle Sub-Chapter/Section)

Located near Johannesburg and Pretoria in Gauteng, this area is a UNESCO World Heritage Site. It contains a network of limestone caves (like Sterkfontein, Swartkrans, Malapa) that have yielded incredibly important fossils of **hominids**. Hominids are members of the biological family that includes modern humans and our extinct close relatives or ancestors.

- Fossils found here include famous examples like "Mrs Ples" and "Little Foot" (*Australopithecus africanus* and other species), as well as early members of our own genus, *Homo*.
- These fossils help scientists study the physical development and history of the human lineage. As Christians studying God's creation, we can marvel at the evidence of past forms while holding fast to the truth that humans are uniquely created in God's image with special abilities and responsibilities. Studying these fossils requires careful scientific work and interpretation.

23.3 West Coast Fossil Park: A Recent Snapshot

(Moodle Sub-Chapter/Section)

Near Langebaanweg on the West Coast, this park protects fossils from a much more recent time (around 5 million years ago) compared to the Karoo or Cradle fossils.

- An ancient river system trapped and preserved the bones of hundreds of different animals.
- Fossils include extinct relatives of animals we know today, like short-necked giraffes (*sivatheres*), three-toed horses (*hipparions*), giant pigs, sabre-toothed cats, and Africa's only known fossil bear (*Agriotherium africanum*).
- These fossils show us that the environment and wildlife of the West Coast were very different millions of years ago than they are today.

23.4 Protecting Our Fossil Heritage

(Moodle Sub-Chapter/Section)

Fossils are a non-renewable resource – once they are destroyed, they are gone forever. In South Africa, fossils are protected by law (the National Heritage Resources Act).

- It is illegal to collect, damage, or sell most fossils without a permit from the South African Heritage Resources Agency (SAHRA).
- If you find something you think might be a fossil, the best thing to do is to leave it where it is, take photos, record the location accurately, and report it to a museum (like the Ditsong National Museum of Natural History in Pretoria, the Iziko South African Museum in Cape Town, or the National Museum in Bloemfontein) or a university Geology or Palaeontology department.

By protecting our fossils, we preserve clues about God's incredible creation history for future generations to study and appreciate.

Activity 23.1: Map South Africa's Fossil Treasures

- On a simple outline map of South Africa, mark the approximate locations of:
 - The Karoo Supergroup (a large area in the interior)
 - The Cradle of Humankind (Gauteng)
 - The West Coast Fossil Park (Western Cape)
- Write one key type of fossil found at each location next to your mark.

(H5P Suggestion: Quiz (Multiple Choice/True/False))

- "Which area in SA is famous for mammal-like reptile fossils?" (Karoo Supergroup)
 - "The Cradle of Humankind is known for dinosaur fossils." (False - Hominid fossils)
 - "It is okay to collect any fossils you find in South Africa." (False)
 - "West Coast Fossil Park shows animals that lived around 5 million years ago." (True)
-

End of Term 4 and Year-End Reflection

Congratulations, dedicated explorer! You have reached the end of Grade 5 Natural Sciences and Technology. This term, you practiced thinking like a designer, using the Design Process to plan and create, and learned about the wise stewardship involved in preserving food. You also journeyed deep into Earth's past, discovering the fascinating world of fossils and how they give us clues about the history of life, including South Africa's rich fossil heritage.

Over this past year, you have investigated living things, explored materials and structures, experimented with energy and electricity, looked up at the planets and stars, and dug into the past through fossils. We hope you have seen the wonder, order, and intricate design woven throughout God's creation. Keep asking questions, keep observing carefully, keep using your God-given creativity responsibly, and never stop marvelling at the incredible world around you and the universe beyond! Well done on completing Grade 5!

Term 2: Multiple Choice Questions

Chapter 5: Processing Materials

5.1 Ways We Process Materials

1. What is "processing" materials primarily about? A. Finding new materials in nature. B. Changing materials to make them more useful. C. Throwing away old materials.
2. Mixing flour, water, yeast, and salt to make dough is an example of: A. Heating B. Combining and Mixing C. Cooling
3. When liquid water turns into ice in a freezer, this change is caused by: A. Heating B. Mixing C. Cooling
4. Weaving grass fibres together to create a mat is a form of: A. Shaping B. Melting C. Chemical change

5.2 Why Do We Process Materials? 5. A key reason people process materials is to: A. Make them less useful. B. Create new materials with useful properties or shapes. C. Hide them from others.

6. Firing clay in a hot kiln (oven) makes pottery: A. Softer and weaker. B. Harder and more waterproof. C. Lighter and able to float.

5.3 Traditional Processing in South Africa 7. Traditionally, how are clay pots made strong and durable after being shaped? A. By sun-drying them only. B. By firing them in a hot fire. C. By painting them with special mud.

8. The staple food 'pap' in South Africa is traditionally made by grinding and then cooking: A. Wheat grains B. Maize (Mielies) C. Grass seeds

Chapter 6: Understanding Structures

6.1 What are Structures For? 9. The main purpose of a roof on a house is to: A. Support the ground underneath. B. Span the rooms and protect from weather. C. Contain animals.

10. A bookshelf is designed primarily to: A. Support books. B. Span a river. C. Protect from the sun.

6.2 Natural vs. Man-made Structures 11. Which of the following is an example of a natural structure? A. A car B. A bird's nest C. A skyscraper

12. A brick wall is an example of a: A. Natural structure B. Man-made structure C. Living structure

6.3 Types of Structures: Frame, Shell, Solid 13. An electricity pylon, made of many steel pieces joined together, is an example of a: A. Shell structure B. Solid structure C. Frame structure

14. An empty snail shell or an eggshell is best described as a: A. Frame structure B. Shell structure C. Solid structure

15. A dam wall made of thick, solid concrete is an example of a: A. Frame structure B. Shell structure C. Solid structure

Chapter 7: Making Structures Stronger

7.1 Strong Shapes: The Power of Triangles 16. In frame structures, which shape is known for being very strong and rigid? A. A square B. A circle C. A triangle

17. Why are triangles often used in the construction of bridges and roof trusses? A. Because they look nice. B. Because they are easy to make from any material. C. Because they are very strong and stable.

7.2 Choosing Strong Materials 18. If you wanted to build a model tower that needed to be very strong, which material would be a poor choice? A. Steel rods B. Thick wooden sticks C. Wet tissue paper

19. Folding paper into ridges (like corrugated cardboard) makes it: A. Weaker and more flexible. B. Stiffer and stronger. C. Heavier and softer.

7.3 Ways to Reinforce Structures 20. Adding a diagonal piece to a rectangular frame to make it stronger is called: A. Folding B. Triangulation C. Widening

21. To make a tall, thin structure more stable and less likely to fall over, you should: A. Make its base narrower. B. Make its base wider. C. Make it taller.

Chapter 8: Indigenous Structures in South Africa

8.1 Zulu Beehive Huts (iQukwane / Indlu) 22. Zulu beehive huts (Indlu) are typically made using: A. A wooden frame covered with thatched grass. B. Solid mud bricks and a flat roof. C. Metal sheets and concrete.

8.2 Ndebele Painted Houses 23. What is a very distinctive feature of traditional Ndebele houses? A. They are usually built on stilts over water. B. They are covered in brightly coloured geometric patterns. C. They are circular with a central fireplace.

8.3 San/Khoi Temporary Shelters (e.g., Matjieshuis) 24. The *matjieshuis* (a traditional San/Khoi shelter) was designed to be: A. A permanent, heavy structure for large families. B. A tall tower for spotting animals. C. Lightweight and portable for a nomadic lifestyle.

8.4 Lessons from Indigenous Structures 25. A key lesson we learn from studying indigenous structures is their: A. Reliance on expensive, imported building materials. B. Frequent use of complex machinery for construction. C. Clever use of local materials and adaptation to the environment.

[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]