basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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TO: **HEADS OF PROVINCIAL EDUCATION DEPARTMENTS**
HEADS OF PROVINCIAL CURRICULUM SECTIONS
HEADS OF PROVINCIAL EXAMINATION SECTIONS
UNIVERSITIES SOUTH AFRICA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY
UMALUSI
INDEPENDENT EXAMINATION BOARD (IEB)
NATIONAL ALLIANCE OF INDEPENDENT SCHOOLS' ASSOCIATIONS
SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE (SACAI)
INDEPENDENT SCHOOLS ASSOCIATION OF SOUTHERN AFRICA (ISASA)
SCHOOL GOVERNING BODIES (SGB) ASSOCIATIONS
NATIONAL TEACHER ORGANISATIONS

CIRCULAR S19 of 2025: RETENTION OF GRADES R-12 2023/2024 ANNUAL TEACHING PLANS INCLUDING REVISED SCHOOL BASED AND EXAMINATIONS FOR 2026 ACADEMIC YEAR

1. The Department issued Circular S33 OF 2022. The circular pertains to the Annual Teaching Plans (ATPs) for 2023/2024 Academic year.

2. The 2023 Annual Teaching Plans for grades R-12 provided guidance to the implementation of the recovery of learning. The plans were implemented from January 2023 until the date of revocation.

3. The Annual Teaching Plans were accompanied by revised School -Based Assessment and examination weightings, and other key assessment requirements for implementation.

4. Circular **S15 of 2024** was issued to reiterate retention of 2023/2024 Annual Teaching Plans, Revised weightings and requirements to the School-Based Assessment for learners in grades R-12, will continue to be implemented in 2025.

5. The purpose of this Circular, **S19 of 2025**, is to inform the provincial education departments and all stakeholders that the contents of Circular **S33 of 2022** remain applicable for 2026 with the following exclusions:

    - The Retention of the ATPs **excludes CAT and IT, Natural Sciences & Mathematics for Intermediate and Senior Phases.**
    - DG submission was approved in September on review of **CAT and IT** technologies to accommodate new trends and new peripherals. This has had an impact on the ATPs for these subjects. Subsequently, information regarding the update of CAT & IT to update technologies was communicated through **Circular S9 of 2025**.
    - For **Natural Sciences, Natural Sciences & Technology (Grades 4-9) and Mathematics (Grades 4-5 & 8-9)**, a new directive is necessary. This is to accommodate certain topics that were removed (content reduction) during Covid19, which are being brought back in preparation for the upcoming Trends in International Mathematics and Science Study happening in 2027.
    - This should not be perceived as teaching for testing, but rather to build on specific foundational knowledge necessary for competing with learners of the same grades internationally.

6. **Circular 33 of 2022** is attached for ease of reference.

7. You are kindly requested to bring the content of this Circular to the attention of all provincial and district officials, principals, teachers of both public and independent schools, and other relevant stakeholders.

8. The Annual Teaching Plans are available on the DBE website: https://www.education.gov.za

Yours sincerely

MR HM MWELI
DIRECTOR-GENERAL
DATE: 11/12/2025

2026 Annual Teaching Plan
Natural Sciences and Technology: Grade 4

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Life and Living

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2 weeks	Living and non-living things	**Living things** • there are many different kinds of living things • living plants and animals can carry out all the seven life processes - feeding, growing, reproducing, breathing, excreting, sensing, moving • some things appear not to be living (such as dried beans, dried yeast, a fertilised bird egg), but carry on 'living' given the right conditions **Non-living things** • non-living things cannot carry out **all** of the seven life processes • some things were living and are now dead: dead wood, dry leaves.	• Examples and pictures of living and non-living things, including plants, animals and bread mould • Seeds • Yeast • Pictures of hatched eggs	• Use pictures and read case studies to distinguish between living and non-living things with reasons • Use everyday life experiences and examples to describe the seven life processes • Identify the different parts of a flowering plant
2 weeks	Structure of plants and animals	**Structure of plants** • basic structure of plants: roots, stems, leaves, flowers, fruits, seeds • visible differences between plants: such as size, shape and colour of roots, stems, leaves, flowers, fruits and seeds **Structure of animals** • basic structure of animals: head, tail, body, limbs, sense organs • visible differences between animals: such as size, shape, body covering and sense organs	• Pictures/examples of different types of plant parts • Pictures of animals	• Compare the different parts of a plant (roots, stems and leaves) in terms of their size, colour and shape • Use various drawings and/or pictures to label the basic structure of flowering plants and animals • Use pictures of various animals to compare their differences and similarities
1 week	What plants need to grow	**Conditions for growth** • plants need light, water and air to grow • new plants can grow from cuttings and seeds • seeds need water and warmth to grow (germination of seeds)	• Seeds and cuttings • Rulers and measuring tape	• Do a scientific investigation to find out what seeds need to germinate and grow into new plants • Keep a diary during the investigation to record observations and the results • Predict the result of your investigation
2 weeks	Habitats of animals	**Different habitats** • a habitat is the place where a plant or animal lives • there are different kinds of habitats such as grassland, forest, river, sea **Need for a habitat** • animals need a habitat for food, water, a place to shelter, have babies and escape from dangers	• Pictures of plants and animals and their habitats	• Identify, draw and describe the habitat in your school. Your drawing should have ONLY the plants and little animals that you can see in your habitat • Identify the habitats of indigenous South African plants and animals • Compare natural and human-made animal shelters • Design and draw an animal shelter, taking into account its purpose, shape, size and materials • Evaluate the suitability of the design
2 weeks	Structures for animal shelters	**Animal shelters** • animal shelters can be natural including nests, shells, hollow trees, wasp nests or human made including dog kennels, cages, kraals, stables • animal shelters can be shell or frame structures, can have different shapes and sizes, and can be made from different materials	• Pictures and examples of animal shelters	• Compare natural and human-made animal shelters • Design and draw an animal shelter, taking into account its purpose, shape, size and materials • Evaluate the suitability of the design
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

2026 Annual Teaching Plan
Natural Sciences and Technology: Grade 4

Matter and materials

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
4 weeks	Materials around us	**Solids, liquids and gases** • solids, liquids and gases make up all the materials around us • some properties of solids, liquids and gases - solids keep their shape - liquids flow and take the shape of their container - gases, such as air, tend to spread out, have no definite shape but can be contained (like in a balloon) **Change of state** • heating and cooling (removing heat) cause solids, liquids and gases to change state - a solid first changes to a liquid (melting) when heated and then the liquid changes to a gas (evaporating) on further heating - gas first changes to a liquid (condensing) when cooled and then the liquid changes to a solid (freezing/solidifying) when cooled further **The water cycle** • water evaporates, condenses, freezes and melts in the water cycle	• Examples of materials and substances including wood, stone, plastic, fabric, water, juice, tea, air, cooking oil and cooking gas • Examples of different substances such as ice, butter, wax, ice cream and chocolate • Video clips from the internet	• Investigate and write down the properties of solids, liquids and gases • Compare the properties of solids, liquids and gases • Describe and draw the stages of the water cycle • Make a model of the water cycle
2 weeks	Solid materials	**Raw and manufactured materials** • examples of some raw materials we use to make other useful materials - sand is used to make glass - clay is used to make ceramics - coal and oil are used to make plastics, paints and fabrics - wood and fibre from plants are used to make paper - animal wool and hide are used to make fabrics and leather **Properties of materials** • raw and manufactured materials have specific properties. • These properties can include being hard or soft, stiff or flexible, strong or weak, light or heavy, waterproof or absorbent	• Examples of raw and manufactured materials to examine the properties, such as glass products, leather, ceramics, fabrics, wooden items and plastic products • Graph paper	• Explain the difference between raw and manufactured materials • Investigate materials that objects are made from • Classify materials into raw or manufactured • Investigate the properties of raw and manufactured materials, such as hard or soft, tough or fragile, stiff or flexible, strong in tension, etc. • Investigating the flexibility of a ruler. Record the results in a table and plot them on a graph • Link different materials with the purpose of the object
2 weeks	Strengthening materials	**Ways to strengthen materials** • there are different ways to strengthen materials (such as paper) to build a strong structure: - we can fold paper into hollow pillars which are circular, triangular or square - we can roll paper into long thin tubes (struts)	• Paper, wooden dowels (30 cm × 10 mm) or sticks, sticky tape and paper fasteners to make struts	• Explore different ways to strengthen paper, e.g. tubing and folding • Investigate the strongest pillar and draw a table and a bar graph of the results. Discuss the results and draw conclusions
1 week	Strong frame structures	**Struts and frame structures** • struts are joined into triangular shapes making a strong, stable structure, such as in roof trusses, bridges, cranes, pylons and skeletons (limb bones are struts) **Indigenous structures** • indigenous, traditional homes such as a Zulu hut (uguqa), Xhosa (rontabile and ungqu-phantsi) and Nama (matjieshuis) make use of a framework of struts (such as branches)	• Pictures of frame structures • Paper, wooden dowels (30 cm × 10 mm) or sticks, sticky tape and paper fasteners	• Explore ways to make a strong structure • Design and make a bridge. It must span a minimum length of 1 m. It must be able to support a load (bags of coins and books) • Identify materials used in traditional homes, e.g. Zulu hut, Xhosa rondavels, etc.
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Energy and change

Duration	Caps Topics	Core Concepts, Skills And Values	Resources To Enhance Learning	Informal Assessment
2½ weeks	Energy and energy transfer	**Energy for life** • we use energy for everything we do • we get our energy from food • energy in our food comes from the Sun (plants use the energy from the Sun to make food for themselves and for animals and people) **Energy from the Sun** • energy is transferred from the Sun, to plants, to animals in a sequence known as an energy chain/ food chain	• Pictures and examples of a selection of machines and appliances including a kettle, stove, torch, radio, iron, fan/hair dryer, car/bicycle and drum • Video clips from the internet	• Describe the transfer of energy from the Sun • Identify activities that people and animals do that require energy • Draw and explain how animals get energy for life processes from the Sun • Investigate the input and output energy of appliances, e.g. a kettle, stove, torch, radio, iron, fan/hair dryer, car/bicycle, drum, etc.
2 weeks	Energy around us	**Energy** • we are aware of energy around us, including movement, heat, light, sound energy is also stored in sources such as food, wood, coal, oil products*, natural gas • energy can be transferred from a source to where it is needed **Input and output energy** • machines and appliances need an input of energy to make them work • machines and appliances provide an output of energy (work) useful to us		
1½ weeks	Movement and energy in a system	**Movement and musical instruments** • many musical instruments (systems) use movement input energy (such as blowing, beating and plucking) to make them work • many instruments have parts that can move or vibrate • musical instruments produce sound as the main output energy	• Examples of musical instruments • Materials to make musical instruments	• Research about the various indigenous musical instruments and how they work • Investigate how musical instruments make music • Design and make your own musical instrument
2 weeks	Energy and sound	**Vibrations and sound** • musical instruments make sounds through vibrations - the sound always moves outwards from the part that is vibrating - we can feel or hear vibrations - vibrations travel through materials such as air, water, plastic, metal and wood **Making sounds** • sounds can be made loud or soft (volume) • sounds can be made high or low (pitch) **Noise pollution** • sound that is loud, unpleasant or harmful to our ears and continues for a long time, is described as noise pollution • noise pollution can cause permanent damage to hearing (hearing aids can help people who are hearing-impaired)	• Pictures of the human ear, its parts and how one hears • Examples of musical instruments made by learners • Video clips from the internet	• Investigate how different types of movement cause vibrations that cause different sounds using an elastic band • Investigate how to make sounds louder and travel further • Identify and describe sources of noise pollution • Research the health risk of exposure to loud music and explain to your peers how best to protect their hearing
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Planet Earth and Beyond

Duration	Caps Topics	Core Concepts, Skills And Values	Resources To Enhance Learning	Informal Assessment
2 weeks	Planet Earth	**Features of the Earth** • the Earth is round like a ball (sphere) and is made of rock • the main surface features of the Earth are land (rocks and soil), water and air • most of the surface of the Earth is covered with water (oceans and seas) • the land we can see is made up of continents* and islands • there is a thin layer of air surrounding the Earth • the Earth has many different habitats for living things **Earth and space** • the Earth is a planet in space • from the Earth we can see the Sun, Moon and stars	• Pictures of Earth showing its main features • Pictures of the Moon; Sun and planets • Models of the Earth, Moon and Sun • Video clips from the internet	• Describe and identify the main features of the Earth • Draw or make models of the Earth • Identify and describe the main features of the Sun • Draw or make models of the Sun • Explain how the Earth moves around the Sun • Interpret models and pictures of the Solar System
1 week	The Sun	**Our closest star** • the Sun is a star - the Sun is made of hot gas and gives out heat and light - the Sun is very big (much bigger than the Earth) - the Sun is very far away, but is the closest star to the Earth • the Sun provides heat and light to the Earth for living things		
2 weeks	The Earth and Sun	**Moving around the Sun** • the Earth moves around the Sun in a pathway called the orbit - the Sun is a star and is at the centre of the solar system** - the Earth is one of eight planets*** in the solar system **The Sun and life** • the Earth gets the right amount of light and heat from the Sun for supporting life		
2 weeks	The Moon	**Features of the Moon** • the Moon is a ball of rock in space - there is no air and water on the Moon - the Moon is smaller than the Earth - the Moon is closer to the Earth than the Sun **Phases of the Moon** • the Sun's light shines onto the surface of the Moon - we can only see that part of the Moon which the sunlight shines on - the changing pattern of sunlight on the Moon is called the phases of the moon - the pattern repeats every 29 ½ days (about a month) **Moon stories** • cultural stories about the Moon tell us about the importance of the Moon in people's lives	• Calendar for recording phases of the Moon • Cultural stories about the Moon • Video clips from the internet	• Investigate how the changing shape of light on the Moon results in different phases of the Moon • Identify the different phases of the Moon • Draw or make models of the Moon
1 week	Rocket systems	**Modelling a rocket** • people have used rockets to go into space and to travel to the Moon • a rocket is a system used to propel vehicles into space • A rocket moves by pushing exhaust gases out through its back end	• Apparatus including balloons of different sizes, straws, fishing line, hooks and measuring tape	• Make a model of a balloon rocket and test it • Investigate distances travelled by different balloon rockets • Evaluate balloon rockets
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Test			

Major Process and Design Skills

The teaching and learning of Natural Sciences and Technology involves the development of a range of process and design skills that may be used in everyday life in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The following are the cognitive and practical process and design skills that learners will be able to develop in Natural Sciences and Technology.

1. ***Accessing and recalling information*** – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework
2. ***Observing*** – noting objects, organisms and events in detail
3. ***Comparing*** – noting similarities and differences between things
4. ***Measuring*** – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume)
5. ***Sorting and classifying*** – applying criteria to sort items into a table, mind-map, key, list or other format
6. ***Identifying problems and issues*** – being able to articulate the needs and wants of people in society
7. ***Raising questions*** – being able to think of and articulate relevant questions about problems, issues and natural phenomena
8. ***Predicting*** – stating, before an investigation, what the learner thinks the results will be for that investigation
9. ***Hypothesising*** – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation that will prove or disprove the hypothesis
10. ***Planning investigations*** – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same, while other things will vary
11. ***Doing investigations*** – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results
12. ***Recording information*** – recording data from an investigation in a systematic way, which includes drawings, descriptions, tables and graphs
13. ***Interpreting information*** – explaining what the results of an activity or investigation mean (this includes reading skills)
14. ***Designing*** – showing (e.g. by drawing) how something is to be made, taking into account the design brief, specifications and constraints
15. ***Making/constructing*** – building or assembling an object using appropriate materials and tools and using skills such as measuring, cutting, folding, rolling and gluing
16. ***Evaluating and improving products*** – using criteria to assess a constructed object and then stating or carrying out ways to refine that object
17. ***Communicating*** – using written, oral, visual, graphic and other forms of communication to make information available to other people.

2026 Annual Teaching Plan
Natural Sciences and Technology: Grade 5

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Life and living

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2½ weeks	Plants and animals on Earth	**Many different plants and animals** • there are many different plants and animals living in different habitats on Earth* (South Africa has a wide variety of indigenous plants and animals and their habitats) **Inter-dependence** • plants and animals depend on each other • they also depend on the resources available (such as air, water, soil, food, and places to hide) in their own habitats **Animal types** • there are many different kinds of animals, - some do not have bones, and some have hard outer 'skins' or shells (invertebrates) • some have bones (vertebrates)	• Pictures of plants and animals	• Identify different habitats in South Africa and some of the plants and animals that we find there • Describe and compare animals without bones to animals with bones • Describe interdependence between living and non-living things • Identify the interdependence between the animals and/or plants and the non-living things in their environment • Identify common characteristics of invertebrates and vertebrates
1 week	Animal skeletons	**Skeletons of vertebrates** • a vertebrate skeleton consists of bones and joints, and is inside the body • bones are hard and form a strong frame structure • a skeleton provides support for an animal's body and protection for its organs; - skull - protects the brain - backbone with vertebrae - protects the spinal cord - ribs - protect the lungs and heart - shoulder blades, arms, legs, hip bones – for movement **Movement** • vertebrate animals can move because there are - muscles attached to the skeleton • joints between the bones*** (*In this grade, details about how muscles are attached, and the structure of joints are not required*)	• Pictures and examples of animal skeletons/bones	• Identify the different types of skeletons • Use pictures of animals to identify the five groups of vertebrates and their common characteristics • Identify and describe different bones in a vertebrate skeleton and state the functions of each bone • Label a diagram of the human skeleton • Describe how different vertebrate animals move, including humans • Design, draw, make and evaluate a skeleton. Write a paragraph about the skeleton that you built to address what worked and what did not work. Your skeleton should have the following specifications: It must be three-dimensional, it must look realistic, it must have/show the basic parts, i.e. skull, backbone and ribs, and it must be strong and rigid so that it can stand on its own
2 weeks	Skeletons as structures	**Frame and shell structures** • a vertebrate skeleton is a frame structure (*also refer to grade 4 Matter & Materials*) • some invertebrate skeletons are shell structures such as that of a crab	• Paper, drinking straws, wooden dowels or sticks (30 cm × 10 mm), sticky tape and metal paper fasteners	
1½ weeks	Food chains	**Food and feeding** • green plants make their own food** and build their branches and stems using water and carbon dioxide from the air, and energy from sunlight. (*This important process is called "photosynthesis." However no further detail is required in this grade, learners will deal with it in detail only in higher grades*). Plants use carbon dioxide from the air and release oxygen into the air • animals need food to carry out their life processes (to move, feed, grow, sense the environment, excrete, breathe and reproduce) • all animals depend on plants as their primary source of food (herbivores, carnivores and omnivores) • a food chain describes the feeding relationships between plants and animals. • a food chain - starts with a plant, (produces foods) - then follows with an animal that eats the plant - after that with an animal that eats that animal • includes the transfer of energy which flows from the plant through to the last animal in the chain	• Pictures of various plants and animals	• Describe how each living thing gets food and how energy is passed from one organism to the next • Sequence plants and animals to make up a proper food chain in which the energy is transferred from one organism to the next, with up to four organisms each, and describe their relationships • Draw a food chain using common plants and animals with at least one sentence next to, below, or above each arrow. • Classify animals according to their feeding relationships (as herbivores, omnivores, carnivores, scavengers or decomposers) • Identify predators and their prey • Explain the four stages in the life cycle of a

2 weeks	**Life cycles**	**Growth and development** • plants and animals grow and develop throughout their lives • a life cycle describes the stages and processes that take place as a plant or animal grows and develops • a life cycle describes how one generation of a plant or animal gives rise to the next generation through reproduction • death can occur at any stage of the life cycle • many animals care for their young in order for them to grow and develop	• Pictures of different stages in the development of various plants and animals	flowering plant • Describe the different stages in the life cycle of an animal
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Matter and materials

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2½ weeks	Metals and non-metals	**Properties of metals** • metals are used to make things because they have certain properties • some properties of metals - shiny - hard - strong - can be hammered, shaped (malleable) and made into thin wires without breaking (ductile) - melt at high temperatures • metals are mined from the Earth* (*How and where metals are mined is covered in Social Sciences*) **Properties of non-metals** • non-metals are used to make things because they have certain properties • some properties** (*There are many different non-metals and they have a variety of different properties. Here the focus is only on two of the most general properties*) of solid non-metals - dull - can break easily (brittle)	• Examples of metal objects such as copper wire, coins, nails, cooking pots or knives and forks • Examples of non-metal objects such as a piece of chalk, a pile of sand or a piece of coal	• Revision: Grade 4: States of matter • Investigate, compare and record the properties of some metal objects (such as copper wire, coins, nails, cooking pots, knives and forks) and some non-metal objects (such as a piece of chalk, a stone, a pile of sand or a piece of coal) • Identify properties of metals (i.e., conducting electricity and conducting heat) and relate these properties to uses of metals. • Investigate ways to make old and dull metal objects shiny again • Investigate how rust occurs • Research and write about the properties and uses of metals from the home environment
2½ weeks	Uses of metals	**Other properties of metals** • metals are useful because of their special properties - metals conduct heat - some metals are magnetic and some are not - only iron rusts (some metals tarnish or become dull) **Uses of metals** • metals are used to make things such as coins, wire, jewellery, furniture, buildings and bridges, motor cars, kitchen utensils, roofs	• Magnets and objects such as coins, iron filings, nails, drawing pins, paper clips or wire	
2½ weeks	Processing materials	**Combining materials** • materials can be processed to make new materials/products, such as - mixing and setting (such as plaster of Paris (or Polyfilla) and water to make plaster) - mixing and setting (such as sand, gravel, cement and water to make concrete) - mixing (such as flour and water to make a sticky paste that can be used as glue) - mixing and cooking (such as making dough) - mixing and cooling (such as jelly powder and water to make jelly) - mixing, drying and/or firing (such as wet clay and straw to make clay bricks) • the properties of the new materials/products may be different from the properties of the materials we started with	• Materials and substances such as plaster of Paris (or Polyfilla), sand, gravel, cement, flour, ingredients to make dough, jelly powder, wet clay and straw	• Investigate reasons why we process materials • Describe, with examples, the properties of processed materials • Explain, with examples, the purpose of processing materials • Explain the difference between raw materials, natural materials and processed materials • Research the traditional processing methods that humans have been using to give materials more desirable properties
1½ weeks	Processed materials	**Properties and uses** • materials such as plaster of Paris, concrete, fabrics, ceramics and glass, plastics and paints, have their own special properties • processed materials are useful because of their special properties. They can be strong, durable, waterproof, fire resistant, have interesting colours or textures	• Clay • Pictures and examples of objects made by weaving plant material	
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Energy and change

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
3 weeks	Stored energy in fuels	**Fuels** • energy is stored in fuels (including food*) • we use fuels as sources of useful energy • everyday fuels that we use include coal, wood, petrol, paraffin, gas and candle wax • when we burn these fuels we get useful output energy such as heat and light **Burning fuels** • fuels need heat to set them alight, and air (oxygen) to keep on burning **Safety with fire** • fires can be a threat in our communities	• Examples of substances including wood, coal, candle (wax), paraffin, peanut, a biscuit • Candles and different sized glass containers • Cells (batteries), lengths of wire, light bulbs	• Compare energy from various packaging for foods collected from home • Examine various fuels including wood, coal, candle (wax), paraffin, peanut, a biscuit. Burn three different fuels from above, and compare and describe the • input energy needed to make them burn • output energy obtained from the fuel • Investigate how long a candle will burn when covered with different sized glass containers (the candles will stop burning when all the oxygen is used up) • Write and draw about fires in our communities including causes, prevention and act out what action to take during a fire [This can be used as a possible project]
3 weeks	Energy and electricity	**Cells and batteries** • energy can be stored in torch cells and batteries • a circuit is a system that transfers electrical energy to where it is needed **Mains electricity** • electricity from the power station is transferred in a circuit to our homes and back to the power station • a power station needs a source of energy • the source of energy in a power station can be a fuel such as coal** (*The focus here is on coal-fired power stations. There are also other power stations such as hydro-electric and nuclear power stations*) **Safety with electricity** • safety precautions should be taken when using electricity	• Cells (batteries), lengths of wire and light bulbs	• Investigate the source of electricity in a torch • Compare the differences between batteries and cells • Explore and explain various ways of making a complete simple circuit • Draw simple circuit diagrams with correct symbols and labels • Use diagrams to trace and explain how the electricity comes from the power station to our homes/schools, including the power station, pylons, substations, electricity boxes, wall sockets, plugs and appliances such as a TV, kettle, stove, torch, radio, iron, fan/hair dryer and computer, etc. • Use pictures and illustrations to explain safety tips for using electricity
2 weeks	Energy and movement	**Elastic and springs** • we can make things move using stretched or twisted elastic and compressed springs • when we stretch or twist elastic or compress a spring, we store energy in it • when we release the elastic or spring again, we get movement energy	• Elastic bands and compressed springs, a catapult, elastic powered aeroplanes, "jack-in-a-box"	• Explain how stored energy can be changed into movement energy using elastic bands, a compressed metal spring, etc. • Investigate the different ways in which stored energy can be changed into movement energy using elastic bands, a compressed metal spring, etc.
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Planet Earth and Beyond

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1½ weeks	Planet Earth	**The Earth moves** • the Earth travels in an orbit (pathway) around the Sun • the Earth takes about 365 days to travel once around the Sun, this is called a year • the Earth spins on its own axis • the Earth takes about 24 hours to spin once, this is called a day	• Pictures of the Earth showing its main features • Video clips • Pictures and models of the Earth, Moon, Sun and other planets • A light source such as a torch, lamp/candle	• Describe and identify the main features of the Earth • Draw or make models of the Earth • Demonstrate the Earth's movement in its orbit around the Sun • Describe the Earth's movement around its own axis • Identify the main elements (soil, air, water and sunlight) that support life on Earth • Identify and describe different soil types correctly • Explain the formation of sedimentary rock • Distinguish between body and trace fossils • Explain aspects of South Africa's fossil record
2 weeks	The surface of the Earth	**Rocks** • the surface of the Earth is called the crust, and consists of rocks (even under the oceans), and soil • soil, air, water and sunlight support life on Earth **Soil comes from rocks** • the land is made up of rocks, subsoil and topsoil • soil supports life on Earth • topsoil lies on the surface – topsoil is formed when rocks break into small grains over time **Soil types** • soil is usually a mixture of different types of soil grains in different proportions - sandy soil – has a high proportion of course sand grains - clayey soil – has a high proportion of fine grains of clay - loamy soil – has a mixture of sand, clay and other soil grains. Loamy soil also contains humus (decomposed compost) • the soil also has air, water, remains of dead organisms and very small living organisms in it • soil forms very slowly in nature – once topsoil is lost, it cannot be replaced, and thus we need to conserve it	• Samples of different types of soil • Measuring cylinders, funnels and filter paper and beakers • Seeds and rulers to measure length • Sandy soil • Clayey soil • Loamy soil • Stones • Dry plant material	
2 weeks	Sedimentary rocks	**Formation of sedimentary rock** • sedimentary rocks are formed over a very long time in the following way: - first, rocks break down into small grains - then, mud and sand is moved by wind and water - after that, mud and sand gets deposited in low lying areas - over time, new layers of mud and sand are deposited on top of existing layers - after a very long time, these layers become compacted and hardened and form sedimentary rock • sedimentary rocks always have visible layers within the rock • examples of sedimentary rock are shale, sandstone and limestone **Uses of sedimentary rock** • limestone is used to make cement • sandstone and shale are used in buildings	• Pictures and/or samples of sedimentary rock such as limestone and sandstone	
2½ weeks	Fossils	**Fossils in rock** • fossils are the remains of ancient plants and animals preserved in rock - fossils are found in some layers of sedimentary rock - fossils are evidence/a record of the history of life on Earth • there are two main types of fossils; body and trace fossils **Body and trace fossils** • body fossils form from the hard parts of plant and animal bodies including teeth, bones, shells, stems, leaves and seeds	• Pictures and/or samples of sedimentary rock • Play dough, clay, plaster of Paris and a variety of parts of plants and animals • Pictures of fossils • Information texts about South African fossils	

		• trace fossils form from traces left by animals including footprints, nests, eggs and droppings • some features of fossils resemble the features of plants and animals living today **Importance of South African fossils** • South Africa has a particularly rich fossil record of plants, animals and early humans • important fossils found in South Africa include the Coelacanth and African dinosaurs • the "*Cradle of humankind*" is one of the sites where important fossils of humankind have been found in South Africa		
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Test			

Major Process and Design Skills

The teaching and learning of Natural Sciences and Technology involves the development of a range of process and design skills that may be used in everyday life in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The following are the cognitive and practical process and design skills that learners will be able to develop in Natural Sciences and Technology.

1. ***Accessing and recalling information*** – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework
2. ***Observing*** – noting objects, organisms and events in detail
3. ***Comparing*** – noting similarities and differences between things
4. ***Measuring*** – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume)
5. ***Sorting and classifying*** – applying criteria to sort items into a table, mind-map, key, list or other format
6. ***Identifying problems and issues*** – being able to articulate the needs and wants of people in society
7. ***Raising questions*** – being able to think of and articulate relevant questions about problems, issues and natural phenomena
8. ***Predicting*** – stating, before an investigation, what the learner thinks the results will be for that investigation
9. ***Hypothesising*** – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation that will prove or disprove the hypothesis
10. ***Planning investigations*** – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same, while other things will vary
11. ***Doing investigations*** – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results
12. ***Recording information*** – recording data from an investigation in a systematic way, which includes drawings, descriptions, tables and graphs
13. ***Interpreting information*** – explaining what the results of an activity or investigation mean (this includes reading skills)
14. ***Designing*** – showing (e.g. by drawing) how something is to be made, taking into account the design brief, specifications and constraints
15. ***Making/constructing*** – building or assembling an object using appropriate materials and tools and using skills such as measuring, cutting, folding, rolling and gluing
16. ***Evaluating and improving products*** – using criteria to assess a constructed object and then stating or carrying out ways to refine that object
17. ***Communicating*** – using written, oral, visual, graphic and other forms of communication to make information available to other people.

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Life and living & Processing

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2½ weeks	Photosynthesis	**Plants and food** • plants make their own food (glucose sugar) by a process called photosynthesis • photosynthesis takes place mainly in the leaves during photosynthesis the plant uses sunlight energy, carbon dioxide (from the air) and water to make glucose sugar • plants change some of the glucose sugar into starch which they store in their leaves, stems and roots, flowers, fruits and seeds **Plants and air** • during photosynthesis the plant uses carbon dioxide from the air and gives off oxygen into the air • animals, including people, use the oxygen from the air for breathing and give out carbon dioxide which is used by plants for photosynthesis	• Glucose powder, maize flour, iodine solution and plastic droppers • Examples of foods, such as cooked rice, flour, potato, bread, oil, boiled egg and cheese • Video clips from the internet	• Explain and illustrate how plants make food • Compare glucose sugar (such as glucose sweets) and starch (such as maize flour) according to their taste and colour • Test various foods for the presence of starch with iodine solution (e.g. cooked rice, flour, potato, bread, oil, boiled egg, cheese, etc.)
2 weeks	Nutrients in food	**Food Groups** • foods can be grouped according to their functions in the body and the main nutrients they supply: - foods for energy – carbohydrates - foods for growth and repair – proteins - foods for storing energy (in the form of body fats) and providing insulation and protection for nerves and organs - fats and oils - foods for building bones and teeth, and maintaining a healthy immune system - vitamins and minerals • most natural foods contain a mixture of more than one nutrient group • most processed (manufactured) foods have added salt, sugar, preservatives, flavourings and colourings	• Examples of different foods representing the different food groups • Food packaging with information about nutrients	• Classifying food into different food groups, namely carbohydrates, proteins, fats and oils and vitamins and minerals • State reasons why each food group is important in our diet • Read labels on food packaging to look for the nutrients and/or the additives in the food • Explain whether each of the additives make these products more or less healthy to eat • Carefully study various diets to evaluate if they contain all the food groups/whether they are a balanced diet • Explain why different portions of the different food groups are necessary for a balanced diet • Discuss various diseases caused by an unhealthy diet, such as tooth decay, obesity, diabetes or deficiency diseases
1½ week	Nutrition	**Balanced diets** • a diet refers to the selection of foods we eat everyday • a balanced diet contains sufficient quantities of food from all four nutrient groups, as well as water and fibre • some diseases can be related to diet	• Pictures and information about food-related illnesses	
3 weeks	Ecosystems and food webs	**Different ecosystems** • an ecosystem is an area where living and non-living things depend on each other in many different ways • there are many different ecosystems such as rivers, mountains, sea, rocky shore, ponds, wetlands, grasslands, forests and deserts, which support different kinds of living things **Living and non-living things in ecosystems** • in an ecosystem there are certain relationships between living things (plants, animals/people, microorganisms), and non-living things (air, water, sunlight, soil) in a particular area* (*Healthy ecosystems depend on sufficient biodiversity of plants, animals and their habitats*) **Food webs** • in an ecosystem plants and animals are connected by their feeding relationships. This is called a food web • a food web consists of: - plants (producers) which produce food for themselves and animals - animals (consumers) which are herbivores, carnivores, omnivores • microorganisms (decomposers) that break down dead plant and animal matter and return nutrients to the soil	• Pictures of ecosystems such as rivers, mountains, the sea, rocky shores, ponds, wetlands, grasslands, forests and deserts	• Describe different types of ecosystems on our planet • Identify an ecosystem, describe it and draw the feeding relationships (food webs) within it • Investigate an ecosystem in or near the school grounds. Mark out the area with sticks and string using the quadrant method, ensuring that you do not damage any of the plants or animals • Study both the living and non-living things within the ecosystem • Identify the possible threats to this ecosystem and possible ways to overcome them

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1 week	Remediation, revision and consolidation
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test

Matter and materials & Processing

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	Solids, Liquids and gases	**Arrangement of particles** • all matter (solids, liquids and gases) is made up of particles • the particles are arranged differently in solids, liquids and gases - in solids the particles are closely packed in a regular pattern – spaces between the particles are small and particles vibrate in one place - in liquids the particles are closely packed in no fixed pattern – spaces between the particles are small but particles can move around each other • in gases the particles are far apart from each other –spaces between the particles are big and particles move in all directions	• Video clips from the internet	• Draw and explain how particles are arranged in a solid, liquid and gas • Identify the three states of matter in everyday life • Describe solids, liquids and gases in terms of the arrangement of their particles
1 week	Mixtures	**Mixtures of materials** • a mixture consists of at least two different substances/materials mixed together • in some mixtures, the different substances are still clearly visible after mixing • the substances in such mixtures can be separated by physical means such as sieving, filtering, hand sorting, settling and decanting	• Video clips from the internet • Examples of materials and substances, such as salt, sand, sugar, tea leaves, peanuts, dried beans, coins, sweets, curry powder, grated cheese, milk, oil	• Explain and demonstrate the different ways in which solids, liquids and gases can be combined to form mixtures • Explain and demonstrate the different ways in which mixtures can be separated, such as sieving, filtering, hand sorting, settling and decanting • Investigate different solids to see whether they dissolve in water, including salt and sugar (soluble substances) as well as sand, mealie meal, flour, maize flour, samp, curry powder and custard powder (insoluble substances) • Investigate solutions to see whether we can recover the solute by filtering or settling followed by decanting, or evaporating the water (crystallisation) • Investigate and make sugar crystals • Explain different kinds of mixtures (including solutions) • Distinguish between soluble and insoluble substances • Recover the solute from the solvent and draw and write about the process
2 week	Solutions as special mixtures	**Solutions** • solutions are also mixtures • some solutions can be made by mixing a solid and a liquid together such as sugar and water, salt and water • solutions are uniform in appearance and the solid cannot be seen after mixing **Soluble substances** • soluble solids (solutes) can dissolve* in water (solvent) • the substances in solutions cannot be separated by sieving, filtering, hand sorting, settling and decanting • some solutes can be recovered (separated) by evaporating the solvent (such as recovering salt from sea water) • when substances dissolve, solute particles become dispersed in the spaces between the solvent particles **Saturated solutions** • a solution is saturated when no more solute can dissolve in a given amount of solvent **Insoluble substances** • Some solids will not form a solution in water (insoluble solids)	• Video clips from the internet • Examples of materials and substances such as salt, sugar, sand, mealie meal, flour, maize flour, samp, curry powder, custard powder • Measuring cylinders, funnels, filter paper, beakers, evaporating dish, salt, food colouring	
1 week	Dissolving	**Rates of dissolving** • Factors that affect the rate (time taken) of dissolving - temperature of the mixture - stirring or shaking the mixture • grain size of the solute	• Glass beakers/small yoghurt tubs/clear containers, a stopwatch or clock with a second hand, thermometers, measuring spoons, ice cream sticks, salt (coarse and fine) • Video clips from the internet	• Investigate the difference between melting and dissolving • Investigate, measure and draw graphs of the time taken to dissolve a solute in hot or cold water when stirring/shaking or not, and using coarse or fine salt

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				• Tell what factors affect the rate of dissolving
2 weeks	**Mixtures and water resources**	**Water pollution** • in the environment, many things mix or dissolve in water • water can be polluted by - insoluble substances, such as oil, plastics, tyres, tins, glass, toilet waste - soluble substances such as soaps, fertilizers, insecticides, acids and other poisons - living germs from toilet waste causing water-borne illnesses such as diarrhoea **Importance of wetlands** • natural wetlands are important for removing soluble and insoluble substances from water • acting like sponges and regulating the flow of water	• Texts for reading about water pollution • Video clips from the internet • Pictures of different kinds of polluted water • Sources about, and pictures of, different wetlands	• Discuss pollution and where it comes from. • Identify three main categories of pollutants found in water and explain how you think they entered/ended up in the water. • Explain why wetlands are so important • Research the different wetlands in South Africa
2 weeks	**Processes to purify water**	**Clean water** • a clean supply of water is important for people, plants and animals water can be cleaned by processes such as sieving, filtering, settling, decanting, boiling and adding chemicals to kill germs • municipal water is cleaned before and after we use it	• Sieves, filter paper, funnels, containers, a kettle and water purification tablets (if possible)	• Design, make and evaluate a system to process and purify dirty water • Investigate how to best purify dirty water in class and/or at home
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

Energy and change & Systems and control

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
3 weeks	**Electric circuits**	**A simple circuit** • an electric circuit is a system for transferring energy • a simple circuit always has the following components: - source of energy (such as a cell/battery) - conducting material (such as wires) - device (such as a light bulb, buzzers, motors) for changing electricity into a useful output energy • a circuit is a complete, unbroken pathway for electricity • a switch can be added to break or complete the circuit pathway **Circuit diagrams** • symbols are used when drawing circuit diagrams	• Equipment such as cells/batteries, conducting wires, light bulbs and switches • Video clips PhET simulations from the internet	• Investigate different ways of making a simple circuit • Investigate, design and make a switch to control the circuit • Investigate and understand how the different components function and what symbols are used to represent them in a circuit diagram. • Draw simple closed electrical circuit diagrams using the symbols for the various components
2 weeks	**Electrical conductors and insulators**	**Conductors** • some materials conduct electricity and are called conductors - most metals, especially copper, conduct electricity **Insulators** • some materials do not conduct electricity and are called insulators • most non-metals, such as plastics, do not conduct electricity	• Cells/batteries, conducting wires, light bulbs and switches • Different materials including metal paper clips, nails, wire, steel wool, coins, plastic, glass, ceramic, cardboard, paper, wood, rubber, chalk, plastic insulated wires, rubber gloves used by electricians • Video clips and PhET simulations from the internet	• Investigate what conductors and insulators are by testing different materials (such as metal paper clips, nails, wire, steel wool, coins, plastic, glass, ceramic, cardboard, paper, wood, rubber and chalk) in an electric circuit to see if they are conductors or insulators and recording the results in a table • Identifying where electrical insulators are used, e.g.: insulating wires, rubber gloves, glass and ceramic insulators on power lines

1 week	**Systems to solve problems**	**Using electric circuits** • electric circuits are often used to solve problems that require energy, such as street lighting, alarms, electric gates, traffic lights, fans and heaters • electric circuits can also be used in models and toys	• Basic components for a circuit, including components such as cells, light bulbs, conducting wires, buzzers and switches. • Video clips and PhET simulations from the internet	• Design, make, evaluate and present a system that uses a circuit to produce movement, light, sound or heat in a structure such as: • A steady hand game, house, light house or a toy • The circuit should include components such as cells, light bulbs, buzzers and switches.
2 weeks	**Mains electricity**	**Fossil fuels and electricity** • fossil fuels were formed in the Earth's crust millions of years ago from dead plants and animals • coal, oil and natural gas are fossil fuels • in South Africa coal is mostly used as a fuel in power stations • coal was formed from fossilised plants which got their energy from the Sun originally • in a power station coal is used to boil water, the steam turns a turbine which turns a generator, which produces electricity • fossil fuels are non-renewable resources **Cost of electricity** • electricity is costly because - it requires infrastructure including coal mines, transport, power stations, pylons, substations, wiring - some electrical appliances require more electricity than others (heating appliances use the most) • the more electricity we use the more we pay and the more coal is used up • we can save energy in many ways including using energy saving light bulbs and solar water heaters **Renewable ways to generate electricity** • people are looking for renewable ways to generate electricity	• Pictures and video clips of fuels and their various uses • Pictures to show how electricity is generated in a coal- fired power station • Examples of electrical appliances • Pictures and information of renewable ways to generate electricity, including examples of wind power generators, solar power generators and hydro-electric power generators	• Explain the steps that outline the process to make electricity from coal • Use diagrams to trace and explain the flow of electrical energy in a sequence from an appliance, such as from your TV set to the coal-fired power station and back to the original source, the Sun. • Examine labels (in adverts or on real electrical appliances) to find out how much power they require in a certain time (e.g. a kettle, a radio, a TV, an iron, a hot plate, charging a cell phone, etc. (most kettles require more than 2 000 W, while a radio requires just more than 15 W) and make comparisons • Explain different ways to save electricity, from small actions to larger actions • Research and write about renewable ways to generate electricity, including in wind power generators, solar panels (photovoltaics), hydro-electric power generators, biomass and geothermal energy.
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

Planet Earth and beyond & Systems and Control

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2½ weeks	**The Solar System**	**The Sun, Planets and Asteroids** • the Sun (a star) is at the centre of our Solar System • there are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun • each planet has its own - features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons) • the planets and Asteroids take different amounts of time to revolve around the Sun* (*It is not necessary to memorize exact numbers of size of planets, number of moons, and distance from the Sun*) **Moons**	• Detailed pictures and models of the Solar System (not to scale) • Pictures of the Moon • Video clips from the internet	• Research/read information about the planets, focusing on size, distance from the Sun, average temperature, number of moons, atmosphere, and any other features • Making models of the Solar System (not to scale) considering the position in relation to the Sun and the size and features of the planets • Describe and draw the objects in our Solar System

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		• moons, including our Moon do not give out their own heat and light • our Moon can be seen from Earth because the light from the Sun shines onto its surface • on the Moon we can see craters, lighter areas which are mountains, and darker areas which are flat plains		
1½ weeks	**Movements of the Earth and planets**	**Rotation (Earth)** • in our Solar System, each planet rotates (spins) on its own axis - the planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night - during rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time **Revolution (Earth)** • all planets also revolve (travel) around the Sun in their own orbits • planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution takes 365 ¼ days. We experience this as a year	• Models and a light source such as torch, lamp or candle to demonstrate the movements of the Earth	• Demonstrate the movements (rotation and revolution) of the Earth using models and body movements • Demonstrates how daytime and night-time occur using a model of the Earth and a light source • Draw and write about the rotation of the Earth in relation to the Sun: How daytime and night- time occur
1½ weeks	**The movement of the Moon**	**Rotation (Moon)** • the Moon is spinning and one complete rotation takes about 28 days **Revolution (Moon)** • the Moon revolves around the Earth and one revolution also takes about a month (about 28 days) • together, the Earth and the Moon revolve around the Sun	• Models and a light source such as torch, lamp or candle to demonstrate the movements of the Moon	• Demonstrate the rotation and revolution of the Moon around the Earth using models and body movements • Draw and write about the rotation of the Moon in relation to the Earth and the solar system • Drawing a table of comparison between the Sun, the Earth and the Moon including shape, composition, size, movement in relation to other space objects and the ability to produce light
1 week	**Systems for looking into space**	**Telescopes** • telescopes are used to look into space and gather information • South Africa has built and uses some of the largest telescopes	• Pictures and information about telescopes	• Identify the different telescopes and how they work • Doing a case study about telescopes such as simple telescopes, SALT and SKA
1½ weeks	**Systems to explore the Moon and Mars**	**Vehicles used on the Moon** • a few people have visited the surface of the Moon and explored it using a vehicle called a Moon Rover **Vehicles used on Mars** • robots called Mars Rovers have been used to visit and explore the surface of Mars (people have not yet visited Mars)	• Pictures of the Moon and Mars Rovers • Video clips from the internet • Apparatus for building models of rovers that can move on different surfaces • Measuring tapes or metre sticks	• Describe the vehicles used to explore the Moon and Mars • Researching the key features and purposes of the Moon and Mars rovers including the components, build and systems used for energy and communications • Design, make and evaluate a model of one of the vehicles moving with wheels and axles
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

Major Process and Design Skills

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Life and Living

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	The Biosphere	**The concept of the biosphere** • the biosphere is where life exists and includes the lithosphere (soil and rocks), hydrosphere (water), and atmosphere (gases) • it also includes all living organisms, and dead organic matter • there are many different kinds of living things including plants, animals, microorganisms • all living things can carry out all the seven life processes: nutrition (feeding), growth, reproduction, respiration (energy production), excretion, sensitivity (to the environment), movement **Requirements for sustaining life** • living things need energy, gases, water, soil and favourable temperatures • living things are suited (adapted) to the environment in which they live, such as fish have fins to move easily through water	• Reference materials • Pictures and/or video clips of Earth and its biosphere • Seeds, soil and containers to grow seeds, rulers or measuring tapes	• Describe the components of Earth's biospheres and identify living organisms found in each sphere • Investigate conditions required to sustain life such as light and water for the growth of seedlings • Germinate seeds and grow the seedlings under different conditions. Observe, draw and record the stages in the life cycle by measuring the height of the plant as it grows and record observations in diagrams, tables and graphs
3½ weeks	Biodiversity	**Classification of living things** • plants, animals and microorganisms, and their habitats make up the total biodiversity of the Earth • living organisms are sorted and classified according to their shared characteristics • scientists have grouped the organisms into a classification system • the five main groups (called Kingdoms) of living organisms include Bacteria, Protista, Fungi, Plants and Animals • basic differences in processes such as movement, nutrition and reproduction, distinguishes plants from animals • Kingdoms are further subdivided into Phyla/Divisions, then Classes, then Families, then Orders, then Genera, and the smallest group is Species **Diversity of animals** • animals are classified as either vertebrates (animals with backbones) or invertebrates (animals without backbones) • vertebrates are subdivided into five classes on the basis of distinguishing characteristics: – Fish – Amphibians – Reptiles – Birds – Mammals • invertebrates are subdivided into the Phyla Arthropoda and Mollusca, on the basis of distinguishing characteristics • arthropods have a hard outer covering (exoskeleton) and jointed legs, such as Insects (locust), Arachnids (spider), Crustaceans (crab) • Molluscs are soft bodied animals such as snails *[**Note**: Classification of all of the invertebrates is not required]* **Diversity of plants** • plants are classified as plants with seeds (such as maize) or plants without seeds (such as ferns) • plants with seeds are Angiosperms (flowering plants) and Gymnosperms (cone bearing plants	• Selection of pictures, photographs or drawings of vertebrates and invertebrates • Reference materials • Selection of plants collected in and around the school property • Magnifying lenses • Live or preserved specimens	• Distinguishing characteristics of the 5 classes of vertebrates • Identify the distinguishing characteristics of the five (5) classes of vertebrates • Identify the distinguishing characteristics of the four (4) groups (classes /phyla) of invertebrates by observing and describing the land snail

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Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		such as the cycad) • plants can produce their seeds in flowers (Angiosperms) or in cones (Gymnosperms) • Angiosperms consist of two major groups, dicotyledons and monocotyledons. These groups differ with respect to their roots, stems, leaves, flowers, fruits and seeds *[**Note**: Emphasise local and other South African examples]*		
3½ weeks	Sexual Reproduction	**Sexual reproduction in Angiosperms** • seeds are produced in flowers, which are the sexual organs of Angiosperms • the components of a flower usually include: – male structures called stamens for producing pollen (containing male sex cells) – female structures called stigma (for receiving pollen), style and ovary (for producing female sex cells) – petals (for attracting pollinators) – sepals (for protecting the flower bud) • pollination and fertilisation are essential processes for flowers to produce seeds • pollination is the transfer of pollen between plants of the same species for the purpose of fertilisation • wind and water can facilitate pollination • pollination can also be aided by pollinators such as insects, birds, mammals • flowers have special adaptations to promote pollination, such as large colourful petals, scent and sweet nectar to attract insects and birds • pollinators play an important role in the production of food crops (such as maize) for humans • fertilisation is the fusion of the male and female sex cells to produce seeds • during fertilization the following happens: each mature pollen grain contains two male sex cells. When the pollen attaches to the stigma of a flower from the same species, the pollen produces a pollen tube, which grows down the neck of the style, transporting the male sex cells to the ovule. Within the embryo sac of the ovule, one male sex cell fertilizes the egg, which develops into a seed. The other male sex cell unites with two cells in the embryo sac and this results in the development of the endosperm, the starchy food that feeds the developing seed. The ovary enlarges and becomes a fruit. • the seeds are contained in fruit • fruits and seeds are dispersed in various ways **Human Reproduction** • the main purpose of reproduction is for the sperm (male sex cell) and egg (female sex cell) to combine, develop and produce a baby • puberty is the stage in the human life cycle when sexual organs mature for reproduction • humans also experience drastic physical and emotional changes during this stage • the male reproductive organs include the penis and the testis (produces sperm cells) • the female reproductive organs include the vagina, uterus, ovaries (contain egg cells/ ova) • fertilisation is a process when the sperm fuses with the egg • the uterus develops a thick layer of blood in preparation for a fertilised egg • if fertilisation does not take place, menstruation occurs. The thick layer of blood breaks down and is released through the vagina • if fertilisation takes place, the fertilised egg is embedded (implanted) in the blood lining of the uterus. This leads to pregnancy.	• A variety of plant specimens • Soil • Containers to grow plants • Seeds (such as beans and maize) • Rulers or measuring tapes	• Identify and describe the observable differences between angiosperms and gymnosperms • Identify and describe the observable differences between monocotyledons and dicotyledons • Identify, draw and describe the components of a flower • Compare the structure of a variety of flowers, how they are adapted to promote pollination and the methods of pollination • Identify different fruits and describe their methods of seed dispersal • Define the terms puberty, menstruation, fertilization, pregnancy and contraception

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Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• pregnancy can be prevented by using contraceptives such as condoms to prevent the sperm reaching the egg • condoms also prevent the transmission of HIV/AIDS and other STDs (sexually transmitted diseases), if used effectively *[**Note**: It is important that learners understand that early sexual activity can have serious consequences. Learners need to know enough about this topic to be able to make informed decisions and responsible choices]*		
1 weeks	Variation	**Variations exists within a species** • a species is a category within the classification system. Living things of the same type belong to the same species. For example, humans are one species and dogs are another species • individuals of the same species can reproduce to make more individuals of the same species • all people are human (Homo sapiens) and belong to the same species • differences between living things of the same species is called variation • variation amongst humans can be inherited. Some inherited characteristics are height and tongue-rolling		• collect information (data) about the height of learners in the class and show the results as a bar graph • record information about how many learners are able (or not) to roll their tongues
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Matter and materials

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1½ weeks	Introduction to the Periodic Table of Elements	**Arrangement of elements on the Periodic Table** • the Periodic Table of Elements is a classification system for the elements which make up matter and materials in the world *[an element is a pure substance which cannot be broken down further]* • the Periodic Table was devised by Dmitri Mendeleev in the 1860s. He arranged the elements according to their properties in a table format • the elements of the Periodic Table are arranged into three main categories; metals, semi-metals and non-metals: – metals are arranged on the left hand side of the table – non-metals are found on the far right hand side of the table – semi-metals are found in the region between metals and nonmetals • each element has its own name, symbol, atomic number and position on the Periodic Table **Some properties of metals, semi-metals and non-metals** • metals are usually shiny, ductile and malleable, solid (except mercury) and have high melting and boiling points • non-metals have a variety of different properties (depending on whether they are solids or gases) • semi-metals are solids and have some properties of metals and some properties of non-metal	• Periodic tables • Three colours of pencils/crayons	• Identify the names and symbols of the first 20 elements of the periodic table [learners need NOT memorise the atomic number of each element] • Identify metals, semi-metals, and non-metals on the periodic table of elements • Discuss the arrangement of elements in the Periodic Table of Elements
2½ weeks	Properties of Materials	**Physical properties of materials** • properties of materials determine their suitability for a particular use such as: *(refer to Grade 5 Energy & Change)* – boiling and melting points – electrical conductivity – heat conductivity • the boiling point of a substance is the *temperature* at which the liquid starts boiling (boiling is a rapid change in state from a liquid state to a gas state) • other factors (such as cost, colour and texture) are also taken into account when using materials **Impact on the environment** • the production and/or use of materials such as metals, plastics and fuels has an impact on the environment	• Selection of materials for example: Paper, cardboard, copper wire, wood, rubber, plastic, stone/clay, brick, glass, aluminium foil, wax paper, rope/string • Heat sources • Tripod stands, gauze and glass containers • Thermometers Measuring cylinders, funnels, filter paper, beakers, evaporating dish, salt, food colouring	• Measure the temperature of water as it heats up to boiling point, draw accurate line graphs, understand, and explain the results
3 weeks	Separating Mixtures	**Mixtures** • a mixture is made up of two or more substances or materials that have different physical properties. Where the properties differ, the substances can be separated **Methods of physical separation** • the physical properties of the materials in a mixture determine the separating method to be used • some methods used to separate materials include hand sorting (separating sheep wool from thorns), sieving (separating stones from sand), filtration (separating sand from water) *(refer to Grade 6 Matter & Materials)* • additional methods include – using a magnet (separating iron from sand) – evaporation (retrieving salt from sea water) – distillation (retrieving pure water from sea water). Distillation always involves boiling and	• Sieves • Filter paper • Funnel • Glass or plastic jars • Magnets • Iron or metal filings (or coins) • Sugar/salt • Heat source • Liebig condenser (if available) or test tubes, stoppers and glass and rubber tubes • Black ink	• Explain the separation processes correctly and write about how to separate and collect sand, iron filings, salt, ethanol, and water from a mixture • Design and explaining about the best ways to separate and collect all the materials from a mixture • List and explain the following methods of separation: *filtration, sieving, magnetism, evaporation, distillation & chromatography* • Discuss practical applications of each of the methods of separation in daily life and environmental contexts (e.g. recycling, water

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Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		condensation *[change from gas to a liquid]* – chromatography (separating different colour pigments from one colour pigment, such as black **Sorting and recycling materials** • it is every person's responsibility to dispose of waste in a proper way • only certain materials are suitable for recycling, such as metals, plastics and glass. Organic waste can be made into compost. Material which cannot be recycled has to be dumped • local authorities have systems for sorting and disposing of waste materials • there are negative consequences associated with poor waste management such as pollution of water, soil and the environment; health hazards and diseases; blockage of sewage and water drainage systems; waste of land used for landfills; wastage of valuable materials which could be recycled	• Koki colours • Methylated spirits • Containers, beakers, ice cream sticks for stirring, measuring spoons, hot water, salt (coarse and fine)	purification)
2 weeks	**Acids, Bases, and Neutrals**	**Tastes of substances** • the human tongue can sense four different tastes, salty, sweet, sour and bitter *[There is a survival advantage to being able to distinguish these tastes, such as selecting a ripe apple which usually tastes sweet, but discarding an unripe one which tastes sour]* *[**Note**: not all substances are safe to taste]* **Properties of acids, bases and neutrals** • acids and bases are an important group of chemicals • many foods and household chemicals can be classified as acids, bases, or neutrals depending on their properties • acids (such as lemon and other fruit juices, vinegar, tartaric acid, swimming pool acid) have the following properties – taste sour – feel rough on the skin – many are dangerous to taste or feel (are corrosive) • bases (such as bicarbonate of soda, washing powder, most soaps, bleach and household cleaners) have the following properties – taste bitter – feel slippery on the skin – many are dangerous to taste or feel (are corrosive) *[soluble bases are called alkaline/s]* • neutrals (such as pure water, salt solution, sugar solution, cooking oil) are neither acids nor bases **Acid-base indicators** • red and blue litmus paper can be used to test/indicate whether a substance is an acid, a base or a neutral – red litmus paper remains red in an acid and a neutral, but turns blue in a base – blue litmus paper remains blue in a base and a neutral, but turns red in an acid • we always use *both* red and blue litmus to test a substance	• Red litmus paper • Blue litmus paper • Glass containers • Liquids such as: tea, rooibos, coffee, milk, fruit juices, fizzy drinks • Household substances such as: vinegar, tartaric acid, lemon, antacids, shampoo, soap, bicarbonate of soda, liquid soap	• Classify several common beverages/household substances into acids or bases or neutrals using an indicator • Investigate common beverages to determine whether they are acids, bases or neutrals (such as water, tea and rooibos, coffee, milk, fruit juices, fizzy drinks) • Investigate a range of household substances (such vinegar, tartaric acid, aspirin, antacids' shampoo, soap' bicarbonate of soda, salt water, sugar water, liquid soap) to test whether they are acids, bases or neutrals. Record results on a table and draw conclusions
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Energy and change

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	Sources of Energy	**Renewable and non-renewable sources of energy** • energy is needed to make everything work, move or live • a source of energy has energy stored waiting to be used, or energy that is needed to make something happen – non-renewable sources of energy cannot be replenished once used, such as fossil fuels (coal, oil, natural gas) and nuclear fuels (such as uranium) *[Links to Planet Earth and Beyond Grade 7 term 4]* • renewable sources of energy are continually replenished, such as hydro power, wind, sunlight, biofuel (wood)	• Reference materials • Pictures and reading texts about non-renewable and renewable sources of energy • Rubber bands • Various food packaging with labels showing energy content • Scissors, paper, rulers • Candles, cans • Cells (batteries), conducting wire, motors, torch bulbs, buzzers	• Classify the energy sources as either renewable or non-renewable • Discuss the advantages of using nuclear fuels instead of fossil fuels
2 weeks	Potential & Kinetic Energy	**Potential energy** • potential energy is energy that is stored in a system, such as in a stretched rubber band, a weight balanced on the edge of a table, a cell (battery), fuel • there is also potential energy in food [all energy is measured in a unit called the joule (J)]. The energy content in foods is usually labelled on food packaging *[**Note**: definition and calculation of joules is NOT required]* **Kinetic energy** • kinetic energy is the energy that a body has when it is moving, such as when a rubber band snaps back, a weight falls off a table, wind blows, water falls, a vehicle moves, current flows through a circuit (electricity) **Potential and kinetic energy in systems** • potential and kinetic energy are involved in – mechanical systems – thermal (heating) systems – electrical systems – biological systems *[a system is a set of parts working together]* **Law of conservation of energy** • energy can neither be created nor destroyed but can be converted from one form to another • energy can be transferred in a system when different parts of the system interact with one another and cause changes *[Approach should be to provide learners with examples rather than a definition]* • energy can also be transferred from one system to another such as from an electrical system to a mechanical system in a motor		• Find the energy content in different foods, by reading the labels on food packing • Investigate energy in: – mechanical systems such as – a cricket ball hit a ball. – thermal system – such a candle heating a can of water – electrical systems – such as a cell/battery in a circuit activating a motor/buzzer/light bulb – Biological system such as a horse eats a plant
3 weeks	Heat Transfer	**Heating as a transfer of energy** • heating is a process in which energy is transferred from a hotter body to cooler body • the energy transfer continues until both bodies are at the same temperature • heat is transferred in three ways by: – conduction – convection – radiation **Conduction** • is the transfer of heat between solid objects that are in direct physical contact with each other • heat "travels" from the source of heat through the object, or from one object to another by	• Video clips from the internet to show conduction, convection and radiation • Spirit/Bunsen burner • Steel, brass, aluminium and Iron rods • Styrofoam • Wood • Plastic • Wax or Vaseline • Drawing pins	• Identifying energy transfers in mechanical systems • Investigate the energy transfers when boiling water • Investigate which surfaces absorb the most radiation • Investigate which are the best insulating material • Investigate heat conduction using various metals such as aluminium, steel, brass, iron rods and compare their rates of conduction.

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Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		conduction • metals are conductors of heat. Some metals conduct heat better than others • good conductors are used for making things such as cooking pots • other materials prevent/slow down conduction of heat, and are called insulators of heat (such as plastics and wood). These are generally poor conductors of heat **Convection** • is the transfer of heat from one place to another by the movement of liquid or gas particles – air and water expand when heated and the particles move upwards. When cooled they move down again. This is called a convection current **Radiation** • radiation is the transfer of heat and does not require physical contact or movement of particles • the heat from the Sun travels mainly by radiation across empty space to the Earth • shiny surfaces (such as silver) are good reflectors of radiant heat and dark surfaces (such as black) absorb heat energy (*links to Light in Grade 8 and FET*) • radiation heats up dark surfaces more quickly (absorb heat) than it heats up shiny surfaces (reflect heat)	• Heat conducting tins (if available) • Wristwatch with a second hand/stopwatch • Food colouring or crystal of potassium permanganate • Glass/transparent plastic container • Candles • Shiny silver surfaces (wrapped by aluminium foil) • Matt black surfaces (painted matt black) • Thermometers • Cardboard or paper and glue	Identify variables that could affect the findings. [attach a pin to one end of each rod with Vaseline. Heat the other end of the rod in a water bath of hot water and record the time of how long it takes for the pin to fall off]. Draw a bar graph to show the results
1 week	**Insulation and Energy Saving**	**Using insulating materials** • heat can be 'lost' through conduction, convection and radiation from our bodies and objects such as electric geysers, • heat can also be gained through radiation, conduction and convection, for example in solar water heaters • people use insulating materials to help minimise heat loss in winter or heat gain in summer • insulating materials slow down heat transfer (heat loss or gain) through conduction, convection and radiation. Insulators are used: – for making things such as "cool boxes" – in the ceilings of buildings, – for clothing (such as coats, jerseys, woolly hats) and blankets • conservation of heat energy in homes and buildings can be improved by minimising heat loss in winter and heat gain in summer • many indigenous, traditional homes and technologies in South Africa are designed for our climate and to be energy efficient	• Pictures/diagrams of solar water heaters • Video clips from internet • Thermometers • Insulating materials such as Styrofoam, newspaper, plastic and glass containers, ice • Cooking pot (or container), cardboard box to make a "hotbox", insulation materials such as paper, fabric, cushions, blankets • Materials to build a model of a house • Insulating materials • Pictures or examples of tools/appliances such as electric drill, electric iron, kettle, food mixer	• Investigate different insulating materials such as Styrofoam, newspaper, plastic, glass by how well they keep hot objects (such as a cup of hot tea or prevent cold objects such as ice from heating up. Measure the temperature loss or gain and record results. Sequence the insulators from very good to poor • Discuss energy-saving strategies such as geyser blankets, ceiling insulation etc • Thermal lunchbox challenge – learners design and test a lunchbox that keeps food warm using insulating materials
1 week	**Energy Transfer to Surroundings**	**Useful and 'wasted' energy** • systems such as appliances, tools, vehicles, machines provide useful energy outputs • some energy that is transferred in a system can escape to the surrounding environment as 'wasted energy' • the output energy in a system is always less than the input energy, because some of the energy escapes to the surroundings • 'wasted' energy can escape in the form of heat and/or sound – sound is an example of 'wasted' energy in an electric drill, food processor, hair dryer • heat is an example of 'wasted' energy in a candle, lamp, engine		• Research the wasted energy from different machines and appliances such as : a car which waste about 65% of the energy from fuel in the form of heat & power station which waste about 50% of the energy from burning coal to the surrounding
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Project • Test			

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Planet Earth and beyond

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
4 weeks	Relationship of the Sun to the Earth	**Solar energy and the Earth's seasons** • the Sun radiates heat and light in all directions • the Earth receives energy from the Sun in the form of heat and light (solar energy) • the Earth spins on its axis once per day • the Earth's axis is an imaginary line that goes through the centre of the Earth from the north pole to the south pole • the Earth's axis is not vertical, it is tilted from the vertical by an angle of 23,5° • the tilt of the Earth's axis does not change as the Earth orbits around the Sun • due to the tilt of the Earth, the intensity of the solar energy (amount per unit area) that reaches different parts of the Earth changes through the year • differing intensities of solar energy reaching the southern and northern hemispheres through the year lead to the four seasons • when the solar energy falls more directly on the southern hemisphere, the solar energy is spread over a smaller area and it is summer in the southern hemisphere • when the solar energy falls obliquely (at an extreme angle) on the southern hemisphere, the solar energy is spread over a wider area and it is winter in the southern hemisphere • the length of the day also depends upon the season. In summer, days are longer than in winter. This is also caused by the tilt of the Earth's axis. **Solar energy and life on Earth** • plants absorb light from the Sun and produce energy containing food (*refer to Grade 8*) • all plants and animals depend on this process for their energy (*refer to Grade 8*) • the Sun's energy sustains all life on Earth **Stored solar energy** • dead plants and animals can eventually form coal, oil or gas (fossil fuels) after millions of years • this happens when: – the remains of dead plants and animals are covered by layers of mud and soil – the layers press down on these remains – more layers lead to increased pressure – increased pressure, over long periods of time, changes these remains into coal, oil or gas • the coal, oil and gas store energy from the Sun that was absorbed by plant s millions of years ago • humans are using this store of energy (coal, oil and gas) faster than it is being formed (non-renewable resource)	• Reference materials • Globe/ball • Torch • Pictures and video clips from the internet of the Sun and showing: – the Earth's passage around the Sun – the changing amounts of solar energy reaching different parts of the Earth through the year • Pictures and video clips from the internet of: – the Sun and • how coal, oil and gas are formed from the Sun's energy	• Investigate the direct and indirect light and its effects on temperature • Investigate what would happen if the Sun's rays are blocked from reaching Earth • Explain the flow of energy from the Sun to Earth
4 weeks	Relationship of the Moon to the Earth	**Relative positions** • the Moon revolves around the Earth in its orbit **Gravity** • gravity is the tendency of all objects to attract (pull) each other • the pull of gravity depends on how much mass each object has and how far apart they are – more massive objects exert a stronger pull than smaller objects over the same distance – for objects of the same mass, the closer they are to each other, the stronger is the pull of gravity between them	• Ball and rope or string • Video clips from the internet showing: – The Moon in orbit around the Earth – The Moon's gravity results in ocean tides on Earth – Full Moon and new Moon cause spring tides • Pictures and texts about shoreline ecosystems	• Draw a diagram which shows the flow of energy from the Sun through to the formation of fossil fuels like coal, oil and gas • Demonstrate the pull of gravity by swinging a ball attached to the rope/string in a circular motion • Use diagrams to explain the effects of the Moon's gravity on the Earth • Explain the effects of the Moon's gravity on

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• the Earth is held in its orbit around the Sun by the pull of the Sun's gravity • the Moon is held in its orbit around the Earth by the pull of the Earth's gravity • the Moon also has its own gravity **Tides** • tides are the predictable, repeated rise and fall of sea and ocean levels • tides on Earth are caused mainly by the gravity of the Moon • the gravity of the Moon pulls on the water in the seas and oceans on Earth • this pull causes the Earth to experience high and low tides in the oceans. There are usually two high tides and two low tides over a day and a night • when the Moon is aligned with (in line with) the Sun (at Full Moon and New Moon), the Sun's gravity adds to the Moon's gravity. This causes higher than usual high tides and extra-low low tides (spring tides) • tides sustain unique shoreline ecosystems between the high and low water levels *[an ecosystem is a community of living organisms and their interaction with the environment]*	• Reference materials on significant discoveries relating to astronomy	ecosystem on Earth
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

Science Process Skills

The teaching and learning of Natural Sciences involve the development of a range of process skills that may be used in everyday life, in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The following are the cognitive and practical process skills that learners will be able to develop in Natural Sciences:

1. ***Accessing and recalling information*** – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework.
2. ***Observing*** – noting in detail objects, organisms and events.
3. ***Comparing*** – noting similarities and differences between things.
4. ***Measuring*** – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume).
5. ***Sorting and classifying*** – applying criteria in order to sort items into a table, mind-map, key, list or other format.
6. ***Identifying problems and issues*** – being able to articulate the needs and wants of people in society.
7. ***Raising questions*** – being able to think of, and articulate relevant questions about problems, issues, and natural phenomena.
8. ***Predicting*** – stating, before an investigation, what you think the results will be for that particular investigation.
9. ***Hypothesising*** – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation which will prove or disprove the hypothesis.
10. ***Planning investigations*** – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same whilst other things will vary.
11. ***Doing investigations*** – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results.
12. ***Recording information*** – recording data from an investigation in a systematic way, including drawings, descriptions, tables and graphs.
13. ***Interpreting information*** – explaining what the results of an activity or investigation mean (this includes reading and understanding maps, tables, graphs). A Translation Task requires learners to make sense of information and convert the information into a different format e.g., from information captured on a table into a graph format and or written format.
14. ***Communicating*** – using written, oral, visual, graphic and other forms of communication to make information available to other people.
15. The ***Scientific Process*** is a way of investigating things about the world. Scientists use this process to find out about the world and to solve problems. The steps that make up the scientific process are not necessarily in order (sequential), and may include:

    Step 1: Identify a problem and develop a question. What is it you want to find out?

    Step 2: Form a hypothesis. A hypothesis is your idea, answer, or prediction about what will happen and why.

    Step 3: Design an activity or experiment. Do something that will help you test your idea or prediction to see if you were right.

    Step 4: Observe/note changes/reactions (e.g., through measuring), and record your observations (e.g., onto a table). What were the results of your activity or experiment? Write about what happened.

    Step 5: Make inferences about the observations recorded in the tables, graphs, drawings, photographs. Make some conclusions. What did you find out? Do your results support your hypothesis? What did you learn from this investigation?

2026 ANNUAL TEACHING PLANS: ENGLISH MATHEMATICS: GRADE 8 (TERM 1)

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
HOURS PER TOPIC	7		9		9		2	4,5	9		7
TOPICS, CONCEPTS AND SKILLS	**WHOLE NUMBERS** **Properties of whole numbers** • Revise: — The commutative; associative; distributive properties of whole numbers — 0 in terms of its additive property (identity element for addition) — 1 in terms of its multiplicative property (identity element for multiplication) • Recognize the division property of 0, whereby any number divided by 0 is undefined **Multiples and factors** • Revise: — Prime factors of numbers to at least		**INTEGERS** **Calculations with integers** • Revise addition and subtraction with integers • Multiply and divide with integers • Perform calculations involving all four operations with integers • Perform calculations involving all four operations with numbers that involve squares, cubes, square roots and cube roots of integers **Properties of integers** • Recognise and use commutative, associative and distributive properties of addition and multiplication for integers • Recognise and use additive and		**COMMON FRACTIONS** Calculations with fractions • Divide whole numbers and common fractions by common fractions • Calculate the squares, cubes, square roots and cube roots of common fractions **Calculation techniques** • Use knowledge of reciprocal relationships to divide common fractions **Percentage** • Calculate amounts if given percentage increase or decrease • Solve problems in contexts involving percentages Solving problems	**FORMAL ASSESSMENT TASK** **ASSIGNMENT:** • **Whole numbers** • **Integers** • **Common fractions**	**DECIMAL FRACTIONS** Calculations with decimal fractions • Multiplication of decimal fractions by decimal fractions not limited to one decimal place • Division of decimal fractions by decimal fractions • Calculate the squares, cubes, square roots and cube roots of decimal fractions Calculation techniques • Use knowledge of place value to estimate the number of decimal places in the result before performing calculations • Use rounding off and a calculator to check results where appropriate	**NUMERIC AND GEOMETRIC PATTERNS** Investigate and extend patterns • Revise: investigate and extend numeric and geometric patterns looking for relationships between numbers, including patterns: — Represented in physical or diagram form — Not limited to sequences involving a constant difference or ratio — Of learner's own creation — Represented in tables • Extend investigate and extend numeric and geometric patterns looking for relationships between numbers, including	**REVISION** **FORMAL ASSESSMENT TASK** **TEST: all topics**

	3-digit whole numbers — LCM and HCF of numbers to at least 3-digit whole numbers, by inspection or factorisation **Solving problems** • Solve problems involving whole numbers, including — comparing two or more quantities of the same kind (ratio) — comparing two quantities of different kinds (rate) — sharing in a given ratio where the whole is given — increasing or decreasing of a number in a given ratio • Solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as:	multiplicative inverses for integers **Solving problems** • Solve problems in contexts involving multiple operations with integers	• Solve problems in contexts involving common fractions and mixed numbers, including grouping, sharing and finding fractions of whole numbers		**Solving problems** • Solve problems in context involving decimal fractions	patterns represented algebraically • Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language	

	— profit, loss, discount and VAT — budgets — accounts — loans — simple interest — hire purchase — exchange rates						
PREREQUISITE SKILL OR PRE-KNOWLEDGE	• Multiplication of whole numbers to at least 12 × 12 • Order and compare prime numbers to at least 100 • Calculations using all four operations on whole numbers, estimating and using calculators where appropriate • Prime factors of numbers to at least 3-digit whole numbers • LCM and HCF of numbers to at least 3-digit whole numbers, by inspection or factorisation	• Count forwards and backwards in integers for any interval • Recognise, order and compare integers • Add and subtract with integers • Recognise and use commutative and associative properties of addition and multiplication for integers • Solve problems in contexts involving addition and subtraction of integers	• Addition and subtraction of fractions • Multiplication of common fractions, including mixed numbers • Converting mixed numbers to common fractions • Simplify fractions before or after calculations • Calculate the percentage of part of a whole • Calculate percentage increase or decrease of whole numbers		• Count forwards and backwards in decimals • Compare and order decimal fractions • Rounding off decimal fractions • Addition and subtraction of decimal fractions • Multiplication of decimal fractions by whole numbers and decimals • Division of decimal fractions by whole numbers • estimate the number of decimal places in the result before performing calculations	• Investigate and extend numeric and geometric patterns • Describe and justify the general rules for observed relationships between numbers in own words	

2026 ANNUAL TEACHING PLANS: ENGLISH MATHEMATICS: GRADE 8 (TERM 2)

TERM 2	2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	WEEK 12
HOURS PER TOPIC		9			13,5		9		4,5		6	7	
TOPICS, CONCEPTS AND SKILLS	FORMAL ASSESSMENT TASK INVESTIGATION Note: Administer an investigation on any ONE of the Term 2 topics before teaching it	EXPONENTS • Comparing and representing numbers in exponential form • Revise compare and represent whole numbers in exponential form • Compare and represent integers in exponential form • Compare and represent numbers in scientific notation, limited to positive exponents • Calculations using numbers in exponential form • Establish general laws of exponents, limited to: • $a^m \times a^n = a^{m+n}$ • $a^m \div a^n = a^{m-n}$ • $(a^m)^n = a^{m \times n}$ • $(a \times t)^n = a^n \times t^n$			ALGEBRAIC EXPRESSIONS Algebraic language • Recognize and interpret rules or relationships represented in symbolic form • Identify variables and constants in given formulae and/or equations • Recognize and identify conventions for writing algebraic expressions • Identify and classify like and unlike terms in algebraic expressions • Recognize and identify coefficients and exponents in algebraic expressions Expand and simplify algebraic expressions Use commutative, associative and distributive laws for rational numbers and laws of exponents to:		ALGEBRAIC EQUATIONS Equations • Set up equations to describe problem situations • Analyse and interpret equations that describe a given situation • Solve equations by inspection • Determine the numerical value of an equation by substitution. • Identify variables and constants in given formulae or equations • Use substitution in equations to generate tables of ordered pairs • Extend solving equations to include: — using additive and multiplicative inverses — using laws of exponents		FUNCTIONS AND RELATIONSHIPS Input and output values • Revise: determine input values, output values or rules for patterns and relationships using: — Flow diagrams — Tables — Formulae • Extend: determine input values, output values or rules for patterns and relationships using equations Equivalent forms • Revise: determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: — Verbally	GRAPHS Interpreting graphs • Analyse and interpret global graphs of problem situations, with a special focus on the following trends and features: — linear or non-linear — constant, increasing or decreasing • Extend the focus on features of graphs to include: — maximum or minimum — discrete or continuous Drawing graphs • Draw global graphs from given descriptions of a problem situation, identifying features listed above	REVISION FORMAL ASSESSMENT TASK TEST All Term 1 & 2 topics	

		• $a^0 = 1$ • Recognise and use the appropriate laws of operations using numbers involving exponents and square and cube roots • Perform calculations involving all four operations with numbers that involve squares, cubes, square and cube roots of integers • Calculate the squares, cubes, square and cube roots of rational numbers **Solving problems** • Solve problems in contexts involving numbers in exponential form	• add and subtract like terms in algebraic expressions • multiply integers and monomials by: — monomials — binomials — trinomials • divide the following by integers or monomials: — Monomials — Binomials — trinomials • simplify algebraic expressions involving the above operations • Determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms Determine the numerical value of algebraic expressions by substitution		— In flow diagrams — In tables — By formulae — By number sentences • Extend: determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented by equations	Use tables or ordered pairs to plot points and draw graphs on the Cartesian plane	
PREREQUISITE SKILL OR PRE-KNOWLEDGE		• Compare and represent whole numbers in exponential form: $a^b = a \times a \times a \times \ldots$ for b number of factors • Recognise and use the appropriate laws of operations with numbers involving exponents and square and cube roots	• Recognise and interpret rules or relationships represented in symbolic form Identify variables and constants in given formulae and/or equations	• Write number sentences to describe problem situations • Analyse and interpret number sentences that describe a given situation • Solve and complete number sentences by	• Determine input values, output values or rules for patterns and relationships using flow diagrams, tables and formulae	• Set up equations to describe problem situations	

		• Perform calculations involving all four operations using numbers in exponential form, limited to exponents up to 5, and square and cube roots • Solve problems in contexts involving numbers in exponential form		nspection, trial and improvement • Determine the numerical value of an expression by substitution Identify variables and constants in given formulae or equations	Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented verbally, in flow diagrams, in tables by formulae and by number sentences		

2026 ANNUAL TEACHING PLANS: ENGLISH MATHEMATICS: GRADE 8 (TERM 3)

TERM 3		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10
HOURS PER TOPIC		11,5			9		9		12		
TOPICS, CONCEPTS AND SKILLS	FORMAL ASSESSMENT TASK PROJECT Note: The project must cover a combination of topics from Term 1 to 3 and must be completed before the end of Term 3	**DATA HANDLING** **Collect data** • Pose questions relating to social, economic, and environmental issues • Select appropriate sources for the collection of data (including peers, family, newspapers, books, magazines) • Distinguish between samples and populations, and suggest appropriate samples for investigation • Design and use simple questionnaires to answer questions with multiple choice responses **Organize and summarize data** • Organize (including grouping where appropriate) and record data using — tally marks — tables — stem-and-leaf displays • Group data into intervals • Summarize data using measures of central tendency, including: — mean		**GEOMETRY OF STRAIGHT LINES** **Angle relationships** • Recognise and describe pairs of angles formed by: — Perpendicular lines — Intersecting lines — parallel lines cut by a transversal **Solving problems** • Solve geometric problems using the relationships between pairs of angles described above		**GEOMETRY OF 2D SHAPES** **Classifying 2D shapes** • Identify and write clear definitions of triangles in terms of their sides and angles, distinguishing between: — equilateral triangles — isosceles triangles — right-angled triangles **Constructions** **PROVIDE LEARNERS WITH ACCURATELY CONSTRUCTED FIGURES TO INVESTIGATE THE PROPERTIES OF TRIANGLES** Investigating properties of geometric figures • Investigate the angles in a triangle, focusing on: — The sum of the interior angles of triangles — The size of angles in an equilateral triangle — The sides and base angles of an isosceles triangle		REVISION FORMAL ASSESSMENT TASK TEST All Term 3 topics		

		— median — mode • Summarize data using measures of dispersion, including: — range — -extremes **PROBABILITY** • Consider a simple situation (with equally likely • outcomes) that can be described using probability and: — list all the possible outcomes — determine the probability of each possible outcome using the definition of probability — predict with reasons the relative frequency of the possible outcomes for a series of trials based on probability compare relative frequency with probability and explain possible differences		**Classifying 2D shapes** • Identify and write clear definitions of quadrilaterals in terms of their sides and angles, distinguishing between: — parallelogram — rectangle — square — rhombus — trapezium — kite **Constructions** **PROVIDE LEARNERS WITH ACCURATELY CONSTRUCTED FIGURES TO INVESTIGATE THE PROPERTIES OF QUADRILATERALS** Investigating properties of geometric figures • Investigate sides and angles in quadrilaterals, focusing on: — The sum of the interior angles of quadrilaterals — The sides and opposite angles of parallelograms **Solving problems** • Solve geometric problems involving unknown sides and angles in triangles and	

				quadrilaterals, using known properties and definitions **Similar and congruent 2D shapes** • Identify and describe the properties of congruent shapes • Identify and describe the properties of similar shapes **Solving problems** Solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties and definitions.	
PREREQUISITE SKILL OR PRE-KNOWLEDGE		• Critically read and interpret data represented in: words — bar graphs — double bar graphs — pie charts — histograms • Critically analyse data by answering questions related to: — data categories, including data intervals — data sources and contexts — central tendencies (mean, mode, median) — scales used on graphs • Summarize data in short paragraphs that include drawing conclusions about the data	• Definitions of: — Line segment — Ray — Straight lines — Parallel lines Perpendicular lines	• Describe, sort, name and compare triangles according to their sides and angles, focusing on: — Equilateral triangles — Isosceles triangles — Right-angled triangles • Describe, sort, name and compare quadrilaterals in terms of: — Length of sides — Parallel and perpendicular sides — Size of angles (right-angles or not) • Describe and name parts of a circle	

		making predictions based on the data • identifying sources of error and bias in the data • choosing appropriate summary statistics for the data (mean, median, mode) • Perform simple experiments where the possible outcomes are equally likely and: — list the possible outcomes based on — the conditions of the activity — determine the probability of each possible outcome using the definition of probability		• Recognise and describe similar and congruent figures by comparing: — Shape — Size	

TERM 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10
HOURS PER TOPIC	9		4,5		8		4,5			
TOPICS, CONCEPTS AND SKILLS	**THEOREM OF PYTHAGORAS** **Develop and use the Theorem of Pythagoras** • Investigate the relationship between the lengths of the sides of a right-angled triangle to develop the Theorem of Pythagoras • Determine whether a triangle is right-angled triangle or not if the lengths of the three sides of the triangle is known • Use the Theorem of Pythagoras to calculate the missing length in a right-angled triangle, leaving irrational answers in surd form		**TRANSFORMATION GEOMETRY** **Transformations** • Recognize, describe and perform transformations with points, line segments and simple geometric figures on a co-ordinate plane, focusing on: — reflection in the x-axis or y- axis — translation within and across quadrants — reflection in the line $y = x$ — rotation around a given point • Identify what the transformation of a point is, if given the co-ordinates of its image **Enlargements and reductions** • Use proportion to describe the effect of enlargement or reduction on area and perimeter of geometric figures Investigate the co-ordinates of the vertices of figures that have been		**AREA AND PERIMETER OF 2-D SHAPES** **Area and perimeter** • Use appropriate formulae to calculate perimeter and area of: circles • Calculate the areas of polygons, to at least 2 decimal places, by decomposing them into rectangles and/or triangles • Use and describe the relationship between the radius, diameter and circumference of a circle in calculations • Use and describe the relationship between the radius and area of a circle in calculations **Calculations and solving problems** • Solve problems, with or without a calculator, involving perimeter and area of polygons and circles to at least 2 decimal places • Use and describe the meaning of the irrational number Pi (π) in calculations involving circles		**SURFACE AREA AND VOLUME OF 3-D OBJECTS** Surface area and volume • Revise: Use appropriate formulae to calculate the surface area, volume and capacity of: — cubes — rectangular prisms • Describe the interrelationship between surface area and volume of the objects mentioned above • Extend: Use appropriate formulae to calculate the surface area, volume and capacity of triangular prisms **Calculations and solving problems** • Solve problems, with or without a calculator involving surface area, volume and capacity • Use and convert between appropriate SI units, including: — mm2 ↔ cm2 ↔ m2 ↔ km2 — mm3 ↔ *cm*3 ↔ *m*3	**REVISION** **FORMAL ASSESSMENT TASK** **TEST: Term 1-4 topics**		

		enlarged or reduced by a given scale factor	• Use and convert between appropriate SI units, including: $mm^2 \leftrightarrow cm^2 \leftrightarrow m^2 \leftrightarrow km^2$	— *ml* (*cm3*) ↔ *l* ↔ *kl*	
PREREQUISITE SKILL OR PRE-KNOWLEDGE	• Recognize, describe and perform translations, reflections and rotations with geometric figures and shapes on squared paper • Identify and draw lines of symmetry in geometric figures Enlargements and reductions • Draw enlargements and reductions of geometric figures on squared paper and compare them in terms of shape and size	Area and perimeter • Calculate the perimeter of regular and irregular polygons • Use appropriate formulae to calculate perimeter and area of: — squares — rectangles — triangles **Calculations and solving problems** • Solve problems involving perimeter and area of polygons • Calculate to at least 1 decimal place • Use and convert between appropriate SI units, including: — *mm2* ↔ *cm2* — $cm^2 \leftrightarrow m^2$	Identify and describe right angled triangles Squares and square roots of whole numbers	Surface area and volume • Use appropriate formulae to calculate the surface area, volume and capacity of: — *cubes* — *rectangular* prisms • Describe the interrelationship between surface area and volume of the objects mentioned above **Calculations and solving problems** • Solve problems involving surface area, volume and capacity • Use and convert between appropriate SI units, including: — $mm^2 \leftrightarrow cm^2$ — $cm^2 \leftrightarrow m^2$ — $mm^3 \leftrightarrow cm^3$ — $cm^3 \leftrightarrow m^3$ • Use equivalence between units when solving problems: — *1 cm3* ↔ *1 ml* — $1\ m^3 \leftrightarrow 1\ kl$	

2026 Annual Teaching Plan
Natural Sciences: Grade 8

basic education
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Life and living

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2 weeks	**Photosynthesis and Respiration**	**Photosynthesis** • interactions and interdependence in an ecosystem are driven by the need for energy to sustain life • the Sun is the important source providing this energy in the form of light and heat • plants use carbon dioxide (from the air), water (from the soil) and energy from the Sun in a series of chemical reactions to produce glucose (food). This process is called *photosynthesis* • oxygen gas is released into the air as a by-product $\text{carbon dioxide + water} \xrightarrow[\text{sunlight}]{\text{chlorophyll}} \text{glucose + oxygen}$ *[No further details are required]* • plants change glucose into starch, cellulose and other chemical compounds to enable processes such as growth and reproduction **Respiration** • food contains energy (potential energy). This energy can be released from food by a series of chemical reactions. This process is called respiration • respiration (in all living organisms) is the process by which energy is released from food in a series of chemical reactions $\text{glucose + oxygen} \longrightarrow \text{energy + carbon dioxide + water}$ *[No further details are required]*	• Reference materials • A variety of leaves • Heat source/spirit or Bunsen burners • Glass containers/test tubes • Ethanol/methylated spirits • Iodine solution • White surfaces • Slaked lime (to make lime water) • Drinking straws	• Explain the requirements and products of photosynthesis • Investigate which leaves photosynthesise • Test if human breath contains carbon dioxide • Identify and explain requirements and products of respiration • Compare photosynthesis and respiration
5 weeks	**Interactions and Interdependence within the Environment**	**Introduction to ecology** • ecology is the study of interactions of organisms with one another and with the physical and chemical environment • scientists usually classify the study of ecological interactions into four levels; populations, communities, ecosystem and the biosphere **Ecosystems** • all ecosystems combined make up the biosphere • an ecosystem consists of an ecological community that includes all living organisms (biotic) such as plants and animals, together with the non-living (abiotic) environment such as temperature, wind, water, interacting as a system • the size of an ecosystem is not specifically defined and it usually encompasses a specific, limited area (although it can encompass the entire planet) • ecosystems are defined by the network of interactions among organisms, and between organisms and their environment • survival of individual organisms and populations depends on the its ability to cope with changes (adapt) in its habitat (the place where an organism lives) or in the ecosystem **Feeding relationships** • plants are *producers*. They make their own food • animals are *consumers*. They obtain food from plants either directly (such as herbivores) or indirectly (such as carnivores) • *herbivores:* feed on plant material (for example cows, horses) • *carnivores:* feed on other animals (living or dead). The group includes: - those that hunt other animals (*prey*) are *predators* (for example leopards)	• Pictures of different ecosystems (large and small) showing the living and non-living components • Thermometers • Hand lenses • String (for making quadrats) • Rulers/meter sticks • Sieves • Field guides for identifying plants and animals • Pictures of different local/South African organisms • Video clips • Pictures of plants and animals in different ecosystems, such as forests, oceans, deserts	• Evaluate disruptions to an ecosystem; giving causes, effects and solutions • Identify the type of interaction between organisms within an ecosystem • Identifying a food chain or food web in an ecosystem in or near the school grounds • Draw food chains and food webs (linking names with arrows) in different ecosystems • Draw and analysing energy pyramids • Describe how the different organisms are adapted to live in their specific environments • Include practical work • Extra time used for AFL reinforcement of concepts

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		- those that eat dead animals are *scavengers* (for example hyenas, vultures) - insectivores feed mainly on insects and other smaller invertebrates such as worms (for example earthworms) • *omnivores:* feed on plants and animals (for example humans) • *decomposers*: breakdown (decompose) the remains of dead plants and animals. They recycle important nutrients in the environment (for example bacteria, fungi, earthworms) **Energy flow: Food chains and food webs** • plants (and algae) play an important role in the ecosystem, as they capture energy from the Sun by the process of photosynthesis • this energy is passed along a food chain from producers to consumers; decomposers are the last link in this transfer of energy and release energy as heat to the environment • each stage of a food chain is called a trophic level • energy transfer and energy loss occur at each trophic level • interlinked food chains together form food webs **Balance in an ecosystem** • an ecosystem can only accommodate as many organisms as its resources (food, water and shelter) can carry, and it will fail if it does not remain in balance • this balance can be disrupted by natural and human factors - natural factors include extreme changes in patterns of weather and climate, such as floods, drought, extreme and sudden changes in temperatures - human factors include removing organisms from the ecosystem (such as poaching), human induced pollution • these factors can contribute to an imbalance in an ecosystem, seriously impacting on its components and altering its nature **Adaptations** • adaptation is the change in the structural, functional and behavioural characteristics of an organism • adaptation allows the organism to survive as it adapts to changing conditions within the environment • organisms that are unable to adapt to changes within the environment die out (become extinct) **Conservation of the ecosystem** • environmentalists and others work towards managing ecosystems, such as control of alien vegetation and preservation of wetlands • individuals can contribute to conservation in various ways, such as appropriate waste disposal (including recycling, reusing)		
2 weeks	**Micro-organisms**	**Types of micro-organisms** • micro-organisms are living things • they are too small to see with the naked eye *[they can only be seen under a microscope]* • there is a variety of micro-organisms, including Viruses, Bacteria, Protista and Fungi **Harmful micro-organisms** • some micro-organisms cause diseases, such as TB (caused by bacteria), AIDS (caused by HI virus), malaria (caused by a protest) • disease causing organisms are found almost everywhere, such as at ATMs, handrails of staircases and toilets • waterborne diseases (such as cholera and diarrhoea) account for many child deaths	• Hand lenses, or bio-viewers	• Research various infectious disease caused by viruses, bacteria, protists or fungi using sources from the library, the internet and interviews with healthcare professionals, with focus on; causes, symptoms and treatment. Write a report, prepare a poster or oral presentation. • Research various useful microorganism used in, e.g., food and food-making processes, water treatment, biotechnology research to produce alternative, renewable energy, for example, biogas and biofuels, the development of various medicines, for

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• effective methods of preventing the spread of diseases caused by micro-organisms include washing hands and sterilising • modern scientists such as Louis Pasteur play an important role in identifying and developing cures for some diseases **Useful micro-organisms** • some micro-organisms play an essential role in ecosystems, such as decomposing dead plant and animal matter, thereby recycling nutrients in the soil • some micro-organisms are used by people for making certain foods (such as yoghurt) and medicines (such as penicillin)		example, antibiotics • Investigating the growth of yeast under different conditions, e.g., different amounts of sugar, different temperatures, etc. • Research all the scientists who made contributions in the study of various types of microorganisms
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Matter and materials

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	Introduction to the Periodic Table of Element	**Arrangement of elements on the Periodic Table** • the Periodic Table of Elements is a classification system for the elements which make up matter and materials in the world *[an element is a pure substance which cannot be broken down further]* • the Periodic Table was devised by Dmitri Mendeleev in the 1860s. He arranged the elements according to their properties in a table format • the elements of the Periodic Table are arranged into three main categories; metals, semi-metals and non-metals: - metals are arranged on the left-hand side of the table - non-metals are found on the far-right hand side of the table - semi-metals are found in the region between metals and nonmetals • each element has its own name, symbol, atomic number and position on the Periodic Table **Some properties of metals, semi-metals and non-metals** • metals are usually shiny, ductile and malleable, solid (except mercury) and have high melting and boiling points • non-metals have a variety of different properties (depending on whether they are solids or gases) • semi-metals are solids and have some properties of metals and some properties of non-metals	• Different colours of pencil / crayons • Posters, e.g., the periodic table, video players, laptops/tablets/smart phones • Laboratory Equipment and materials: Paper/plastic cups (of identical size), heat source (such as Bunsen burner or spirit lamp), matches, tripod stands, gauze wire mats, safety goggles, tongs/ pliers, ball and ring apparatus, cell/ battery, conducting wires, metal plates (electrodes), balloons, soccer ball, bicycle tyre, hand pump, small ceramic/glass dish (heat resistant) test tubes, test tube racks, measuring cylinder/large glass jar, glass containers, beakers/glass jars, evaporating dishes, wireless temperature sensor, wireless pressure sensor • Chemicals and materials: Ether, Copper (II) chloride, Potassium permanganate • Perishables and or household substances: White vinegar, water, sand, flour, oil, plastic beads or dried lentils or dried peas, or plasticine or modelling clay or playdough, paper plates, glue, sponge, polystyrene, wooden and metal blocks of the same size, tins, foil pie dishes	• Identify the names and symbols of the first 20 elements of the periodic table [learners need NOT memorise the atomic number of each element] • Identify metals, semi-metals, and non-metals on the periodic table of elements • Use beads or dried lentils or dried peas to make a 3-dimensional model of an atom • Show the atoms which make up molecules (such as O_2, H_2, N_2, H_2O, CO_2) • Draw diagrams to represent particles in a solid, a liquid and a gas, and explain them in terms of arrangement, movement, forces and spacing using the particle model of matter • Draw a table comparing the particles of gases, liquids, and solids • Do an investigation to determine whether it is possible to decompose copper chloride using electrical energy • Investigate if particles diffuse (mix) faster when they are in the liquid state or in the gaseous state • Investigate what happens when we heat and then cool candle wax • Compare objects with same volume but with different mass (by hand) in terms of their density, such as sponge, polystyrene, wooden and metal blocks of the same size • Compare the densities of different states of the same material, a solid, a liquid or a gas • Investigate which material has the highest density; sand, flour, water, or air
2 weeks	Atoms	**Atoms – building blocks of matter** • all matter is made up of tiny particles called atoms • an element is made up of atoms of the same kind. For example, all the atoms of an element, such as copper, are identical • an element is a substance that cannot be broken down into two or more substances by chemical means (An element cannot be changed into another element by means of a chemical reaction) • atoms of one element differ from the atoms of all other elements • all known elements are listed on the Periodic Table of the Elements **Sub-atomic particles** • atoms are made up of smaller sub-atomic particles (protons, neutrons and electrons) • the central region of the atom is called the nucleus • the nucleus is made up of positively charged particles called protons and neutral particles called neutrons • negatively charged particles called electrons move around the nucleus • atoms are neutral because the number of negatively charged particles (electrons) is equal to the number of positively charged particles (protons) **Pure substances** • elements and compounds are pure substances **Elements** • an element is a material that consists of atoms of only one kind, such as hydrogen (H), oxygen (O), carbon (C), sodium (Na) and chlorine (Cl) • all known elements are listed on the Periodic Table of Elements. They are limited in number and are the building blocks of millions of compounds • some elements on the Periodic Table of Elements form diatomic molecules for example		

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		hydrogen (H_2), nitrogen (N_2), oxygen (O_2), chlorine (Cl_2). These are called molecules of elements • sometimes atoms react together chemically to form molecules of compounds (such as H_2O, CO_2) **Compounds** • a compound is a material that consists of atoms of two or more different elements chemically bonded together, such as water (H_2O), carbon dioxide (CO_2), salt (NaCl) • the atoms in a given compound are always combined/bonded in a fixed ratio such as, in water, where the ratio is always two hydrogen atoms (H_2) to one oxygen atom (O) • a chemical bond is the force that holds atoms together • compounds [such as water (H_2O), carbon dioxide (CO_2), salt (NaCl)] are formed by chemical reactions • compounds can be broken down in a decomposition reaction into other compounds or their original elements by heating or electrolysis. For example, electrolysis decomposes water (H_2O) to form hydrogen (H_2) and oxygen (O_2) **Mixtures of elements and compounds** • elements and compounds are often found mixed together, such as in air, sea water, rocks, and in living things • mixtures are separated by physical means; compounds can be separated by chemical means		
5 weeks	**Particle Model of Matter**	**The concept of the particle model of matter** • atoms and molecules are referred to as particles in the particle model of matter • the particle model of matter is a scientific theory used to explain that all matter (solids, liquids and gases) is made up of particles • these particles are too small to see (in a drop of water there would be many billions of water particles) • the spaces between the particles are empty [**Note:** *these spaces do not contain air, they contain nothing*] • scientists have evidence that suggests that the particles are arranged differently in a solid, liquid and a gas - in a **solid**, the particles ✓ are closely packed in a regular arrangement ✓ do not move around but vibrate against each other ✓ have strong forces holding them together ✓ have small spaces between them - in a **liquid**, the particles ✓ are loosely arranged but still quite close together ✓ can move quite fast and slide past each other ✓ have weaker forces between them ✓ have small spaces between them - in a **gas**, the particles ✓ have no particular arrangement ✓ move very fast ✓ have extremely weak forces between them ✓ have very big spaces between them compared to solids and liquids • diffusion is a process in which particles in liquids and gases move (separate and spread) from a highly-concentrated area to an area with a lower concentration of those particles		

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• diffusion is faster in gases compared to liquids *[the concept of diffusion also applies in Life & Living, see Respiratory System Grade 9]* **Change of state** • heating and cooling can cause a material to change state • the solid material first changes to a liquid (melting) when heated, and then it changes to a gas (evaporating or boiling) on further heating • the gas first changes to a liquid (condensing) when cooled, and then it changes to a solid (freezing or solidifying) when cooled further • as a solid material is heated, the movement of the particles increases which enables them to move past each other and form a liquid • the particles move much further apart from each other when the material changes from the liquid to the gas state **Density, mass and volume** • the density of a material describes the amount of mass in a given volume of that material **Density and states of matter** • in general, gases are less dense than liquids and liquids are less dense than solids *[water is an exception as ice is less dense than water and therefore it floats]* **Density of different materials** • some materials have low density and some have high density. For example a loaf of bread has a lower density than a clay brick of the same size • the individual particles making up one material may have different masses compared to the individual particles making up another material. In addition, there are spaces between the particles • the density of a material will depend on the kind of particles it is made up of and the size of the spaces between them • a material which has lower density will float on a liquid which has higher density, for example oil (lower density) will float on water (higher density) **Expansion and contraction of materials** • solids, liquids and gases tend to expand when heated and contract when cooled • particles of liquids and gases are in a state of constant motion • as a material is heated, the movement of the particles increases and they move further apart, therefore the material expands • as a material is cooled, the movement of the particles decreases and they move closer together, therefore the material contracts • when a material expands or contracts, the size and number of particles does not change. Instead, it is only the *spaces* between the particles that get bigger or smaller - during expansion, the spaces between the particles get bigger - during contraction, the spaces between the particles get smaller **Pressure** • a gas exerts a pressure because of the collisions of the particles with each other and against the sides of the container • pumping more gas into a container increases the number of gas particles in the container. This increases the number of collisions and therefore increases the pressure *[**Note:** heating also increases the pressure by giving the particles more energy, making them move faster, and collide with greater force. We do not have to deal with this aspect of pressure in this grade]*		
1 week	**Chemical**	**Reactants and products**		

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
	Reactions	• substances can react with each other to form products with different chemical properties • in a chemical reaction, the substances that react with one another are called the *reactants* • in a chemical reaction, the substances that are produced are called the *products* of the reaction • in reactions, re-arrangement of the atoms takes place, to form different products • during a chemical reaction, chemical bonds (a bond is a force that holds atoms together) of the reactants break and new bonds form to produce the products • indigenous knowledge includes some examples of useful chemical reactions such as fermentation in brewing [which produces carbon dioxide and ethanol (alcohol)] *[The concept of chemical reactions is developed in Grade 9]*		
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

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Energy and change

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	Static Electricity	**Friction and static electricity** • friction (rubbing) between certain materials (such as plastic, perspex, glass, nylon, wool, silk) transfers electrons between the atoms of the two materials being rubbed together • the electrons move from one material causing a positive charge on its surface, and causing a negative charge on the surface of the other material *[It is only the electrons that are transferred, protons and neutrons do not move]* • objects/materials with same/like charges repel each other • objects/materials with opposite/unlike charges attract each other • a discharge of the electrons causes the sparks or shock of static electricity, especially when the air is dry	• Reference materials • Video clips from the internet • Plastic or perspex rods or rulers • Pieces of wool/nylon/silk fabric • Small pieces of paper	• Observe what happens and describe in terms of same or opposite charge on the materials when: - Rubbing a plastic or perspex ruler with a piece of wool or nylon or silk fabric • Bringing the ruler close to small pieces of tissue paper or sawdust
2½ weeks	Energy Transfer in Electrical Systems	**Circuits and current electricity** • a circuit is a system for transferring electrical energy • a closed circuit is needed to make a device work, such as making a bulb light up (*refer to Grade 6 Energy & Change*) • a circuit is a complete conducting pathway for electricity and has a number of components connected together: • from one terminal at the source of energy (cell/battery); along conducting material (wires); through the device (filaments of incandescent bulbs); and back to the other terminal of the source of energy (cell/battery) **Components of a circuit** • conducting wires are usually made of metal and carry electricity over a short or long distance • switches provide a convenient way of controlling electrical circuits • cells/batteries are chemical systems that are sources of energy - cells store chemical substances (potential energy) - when the circuit is completed, the chemicals react together to produce an electric current - an electric current is the flow of charges (kinetic energy) along a conductor • **resistors** are made of materials that resist/oppose the flow of electrical current in a circuit - resistors in a circuit have an influence on the amount of electric current flowing in that circuit - some resistors (including bulb filaments, heating wires, elements in kettles/heaters/geysers/stoves) can heat up to provide useful output energy ✓ a light bulb such as a torch bulb, contains a resistance wire called a filament. The filament heats up to be white hot when connected in a circuit. The resistance wire is connected to two contact points - the one end to the screw part (casing) and the other end to the solder knob at the bottom. The two contacts are separated by an insulator **Effects of an electric current** • a current can heat a resistance wire (such as a bulb filament) - an electrical current transfers energy to the particles in a bulb filament, producing light that the filament emits - circuits can overheat if a short circuit occurs: ✓ **fuses** are special wires which break the circuit when they overheat and melt. These are safety devices that reduce the danger when using electricity ✓ **a short circuit** can occur when an electric current takes the path of lowest resistance, for example when a conductor is connected directly to both terminals of a cell/battery	• Electrical circuit diagrams • Cells/batteries • Circuit boards • Torch bulbs • Switches • Resistors (steel wool or nichrome wire) • Copper wires • Steel wires • Copper (II) chloride • Magnetic compasses • Other (available) input and output devices	• Draw and interpreting an electrical circuit diagram and the symbols used in it • Investigate the heating effect of a current by using a resistance wire (such as a strand of steel-wool/nichrome wire) • Investigate the current strength at all points in a series circuit • Investigate the magnetic effect of a current in a wire bent into a coil • Investigate electrolysis of copper (II) chloride solution

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• a current causes a magnetic field (such as in electromagnets) - an electric current can be used for making temporary magnets known as electromagnets. Moving charges (current) in a conductor (such as a wire), cause a magnetic field around it • an electric current can cause a chemical reaction in a solution, this process is called electrolysis - water can be broken down by electrolysis to produce oxygen and hydrogen gas • copper(II) chloride solution can be broken down to copper metal and chlorine gas. Copper is deposited on one electrode (cathode) and chlorine gas is formed as bubbles at the other electrode (anode)		
2 weeks	**Series and Parallel Circuits**	**Series circuits** • a series circuit provides only one pathway for the current passing through it. The current is the same everywhere in the circuit but every time a resistor is added in series, the overall current in the circuit decreases **Parallel circuits** • a parallel circuit provides two or more pathways for the current passing through it, but the overall current increases when more resistors are added in parallel	• Cells/batteries • Circuit boards • Torch bulbs • Switches • Resistors (various conducting wires, steel wool or nichrome wires) • Copper wires • Steel wires	• Investigate the heating effect of a current by using a resistance wire (such as a strand of steel-wool/nichrome wire) • Investigate which metals offer the most resistance • Investigate the magnetic effect of a current in a wire bent into a coil • Investigate the effects of connecting more resistors into the series and parallel circuits. • Investigate how different metals conduct electricity differently
2½ weeks	**Visible Light**	**Radiation of light** • light is emitted from luminous objects such as the Sun and light bulbs, and is transferred by radiation • light travels in straight lines • light travels through empty space at a speed of 300 000 kilometres per second (the distance from the Sun to Earth is 150 million kilometres) (*refer to Grade 7 Energy and Change*) **Spectrum of visible light** • white light consists of a spectrum (range) of different frequencies and wavelengths - violet, indigo, blue, green, yellow, orange, red. All these colours make up the spectrum of visible light [***Note**: NO further detail on wavelengths and frequencies is required at this level*] • a rainbow is seen when light falls on water droplets in the air and is refracted and dispersed into the different colours (violet, indigo, blue, green, yellow, orange, red) seen in the rainbow • the light at the violet, indigo, blue range of the spectrum has the highest frequency (shortest wavelength) and orange and red light has the lowest frequency (longest wavelength) **Opaque and transparent substances** • light cannot pass through opaque surfaces (such as metal, clay, bricks, wall paint, cardboard), therefore it is either absorbed or reflected • opaque substances cast shadows on the side facing away from the light source • light passes through transparent substances (such as glass, clear plastic, cellophane, clean water), therefore some of the light is absorbed, some is reflected, but most passes through **Absorption of light** • light can be absorbed by surfaces of some materials • light is absorbed differently by different materials	• Video clips from the internet about the electromagnetic spectrum • Pinhole camera (if available), or tinfoil (to make a pinhole camera) • Cardboard box (shoe box) • Tissue paper • Glue • Pin • Light source • Triangular prism • Cut-out cardboard shapes • Mirror • Aluminium foil • Parallel sided prism • Cardboard with a narrow slit or glass • Pencil or ruler • Clear container with water	• Investigate the relationship between the angles of incidence and reflection • Investigate if light change direction when it passes through a glass block • Investigate the refraction of light as it enters water • Draw diagrams to show how shadows are cast by opaque objects • Draw a ray diagram to show the change in direction of light rays at a smooth reflector (such as a mirror) • Draw a ray diagram to show the changes in direction of light rays reflected off a rough surface (such as crumpled aluminium foil) • Draw a ray diagram of a triangular prism and a magnifying glass (lens) to show dispersing and focusing of light • Make colour spinning wheels

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• a material has colour because it absorbs some of the colours in the spectrum (some of the frequencies) and reflects other colours • the frequencies that are absorbed do not reach the eye - a red object (such as a wall painted red) reflects the frequencies we see as red and absorbs other frequencies/colours such as violet, indigo, blue, green - a black object (such as a black pot) absorbs all of the frequencies/colours and therefore looks black [*links to absorption of heat by matt black surfaces: Grade 7*] - a white object (such as white paper) reflects all of the frequencies/colours and therefore looks white [*links to reflection of heat by shiny silver or white surface Grade 7*] **Reflection of light** • light is reflected off most surfaces, including mirrors • light can change its direction when it is reflected • in reflection, the angle of incidence and the angle of reflection are equal • the angles of incidence and reflection are measured from the normal which is a line perpendicular to the surface *[actual measurement of angles not included here]* • on smooth surfaces, all light is reflected in the same direction • on rough surfaces, reflected light is scattered **Seeing light** • the frequencies/colours that are reflected enter the eye • specialised receptor cells in the eye's retina are stimulated by specific frequencies (colours) • in the eye, light energy is converted to electrical nerve impulses • impulses travel to the brain and the brain interprets them as our perceptions of light • the frequencies/colours of light that are absorbed by the surface of an object do not reach the eye **Refraction of light** • light can be refracted by transparent substances • light can change its direction when it is refracted • light entering a transparent medium (such as glass, water, perspex) at an angle, changes direction towards the normal in that medium • light travelling out of the medium (back into the air) changes direction away from the normal • a triangular prism is able to refract and disperse white light into the colours observed in a rainbow • a lens is able to refract and focus light		
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Project • Test			

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Planet Earth and beyond

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
3 weeks	The Solar System	**The Sun** • the Sun is like all other stars – it produces large amounts of heat and light continuously • the energy in our Sun comes from powerful nuclear reactions during which hydrogen gas changes into helium gas • Table of facts about the Solar System **Objects around the Sun** • a variety of objects orbit the Sun - eight planets and their moons, rocky asteroids, outer dwarf planets and many distant icy and dusty objects in the Kuiper Belt and Oort Cloud, at the edge of the Solar System • all the planets and other objects in the Solar System have their own special features including size, distance from the Sun, number of moons known, composition, surface temperature, time it takes for one orbit around the Sun • comets from the Oort Cloud come close to the Sun from time to time • the Solar System looks like a flat disc or plate. The Sun spins (rotates) at the centre and the planets and all other objects orbit around it in the same direction • gravity is the force that keeps all these objects in their stable, predictable orbits around the Sun **Earth's position in the Solar System** • the Earth is the third planet from the Sun • the Earth is the only planet that is known to support life • the conditions that support life on Earth include: - temperature: Earth's distance from the Sun provides the ideal temperature range - water is a liquid, gas or solid in Earth's temperature range - sunlight provides the energy in the food chain • oxygen: early life forms and algae produced enough oxygen for the evolution of more sophisticated life forms	• Reference materials • Video clips from the internet showing: - surface of the Sun - movement of the planets around the Sun - meteors, asteroids, comets • Table of facts about the Solar System	• Constructing a model of the Solar System showing relative distances of the planets from the Earth and relative sizes of planets • Interpreting a table of facts about the Solar System • Comparing and writing about the conditions on other planets in our Solar System including their special features • Presenting a fact sheet about any object found in our Solar System • Writing about why the conditions on Earth are ideal for life • Demonstrating the shape of the Milky Way Galaxy with a spiral shape • Drawing spiral arms to represent the Milky Way Galaxy and placing our Solar System in the outer edges of the spiral to show our location in the galaxy
3 weeks	Beyond the Solar System	**The Milky Way Galaxy** • our Solar System is in the Milky Way Galaxy • a galaxy is a collection of stars held together by their mutual gravity • our Sun is only one of billions of stars in the Milky Way Galaxy • the Milky Way Galaxy is in the shape of a spiral with many arms • our Sun is located towards the edge of the Milky Way Galaxy in one of the spiral arms • from the Earth, looking towards the centre of the Milky Way Galaxy, we see a hazy path of light across the sky • ancient Greeks described it as spilled milk **Our nearest star** • the Sun is the nearest star to Earth • the star called *Alpha Centauri* is the nearest easily visible star to the Sun (it is the brighter of the two Pointers of the Southern Cross constellation) • *Alpha Centauri* is 4,2 light years away from our Solar System **Light years, light hours and light minutes** • people use light years to measure distances to stars and other objects beyond the Solar System • a light year is the distance that light travels in one year		

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		• one light year is equal to about 10 trillion kilometres (km) • *Alpha Centauri* is 42 trillion km away • a light hour is the distance that light travels in one hour • our Solar System has a diameter of about 13 light hours • a light minute is the distance that light travels in one minute • the Earth is about 8 light minutes away from the Sun **Beyond the Milky Way Galaxy** • our Milky Way Galaxy is only one of billions of galaxies scattered across the Universe • the size of the observable Universe is estimated to be about 28 billion light years • galaxies have various shapes and sizes		
2 weeks	**Looking into Space**	**Early viewing of space** • people can see planets and stars in the night sky • stars can be arranged into visible constellations • different cultures have identified and named certain constellations • some constellations have stories linked to them **Telescopes** • people can see more details in the sky when they use a telescope • a telescope forms an image of the object and magnifies it (makes it look bigger) • there are different types of telescopes including: - optical telescopes receive light and focus it by refraction (using lenses) or reflection (using mirrors) such as SALT (Southern Africa Large Telescope), and the Hubble Space telescope - radio telescopes receive radio waves and focus them by reflection (typically using a metal receiving dish) such as the SKA (Square Kilometre Array) • good conditions for looking into space include cloudless skies with limited light and air pollution • South Africa has many locations that meet these requirements		
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Test			

Science Process Skills

The teaching and learning of Natural Sciences involve the development of a range of process skills that may be used in everyday life, in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The following are the cognitive and practical process skills that learners will be able to develop in Natural Sciences:

1. ***Accessing and recalling information*** – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework.
2. ***Observing*** – noting in detail objects, organisms and events.
3. ***Comparing*** – noting similarities and differences between things.
4. ***Measuring*** – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume).
5. ***Sorting and classifying*** – applying criteria in order to sort items into a table, mind-map, key, list or other format.
6. ***Identifying problems and issues*** – being able to articulate the needs and wants of people in society.
7. ***Raising questions*** – being able to think of, and articulate relevant questions about problems, issues, and natural phenomena.
8. ***Predicting*** – stating, before an investigation, what you think the results will be for that particular investigation.
9. ***Hypothesising*** – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation which will prove or disprove the hypothesis.
10. ***Planning investigations*** – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same whilst other things will vary.
11. ***Doing investigations*** – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results.
12. ***Recording information*** – recording data from an investigation in a systematic way, including drawings, descriptions, tables and graphs.
13. ***Interpreting information*** – explaining what the results of an activity or investigation mean (this includes reading and understanding maps, tables, graphs). A Translation Task requires learners to make sense of information and convert the information into a different format e.g., from information captured on a table into a graph format and or written format.
14. ***Communicating*** – using written, oral, visual, graphic and other forms of communication to make information available to other people.
15. The ***Scientific Process*** is a way of investigating things about the world. Scientists use this process to find out about the world and to solve problems. The steps that make up the scientific process are not necessarily in order (sequential), and may include:

    Step 1: Identify a problem and develop a question. What is it you want to find out?

    Step 2: Form a hypothesis. A hypothesis is your idea, answer, or prediction about what will happen and why.

    Step 3: Design an activity or experiment. Do something that will help you test your idea or prediction to see if you were right.

    Step 4: Observe/note changes/reactions (e.g., through measuring), and record your observations (e.g., onto a table). What were the results of your activity or experiment? Write about what happened.

    Step 5: Make inferences about the observations recorded in the tables, graphs, drawings, photographs. Make some conclusions. What did you find out? Do your results support your hypothesis? What did you learn from this investigation?

2026 ANNUAL TEACHING PLANS: ENGLISH MATHEMATICS: GRADE 9 (TERM 1)

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
HOURS PER TOPIC	7		4,5	9		2	7	4,5	4,5	9	
TOPICS, CONCEPTS AND SKILLS	**WHOLE NUMBERS** **Properties of numbers** • Describe the real number system by recognising, defining and distinguishing properties of: — natural numbers — whole numbers — integers — rational numbers — irrational numbers **Multiples and factors** • Use prime factorisation of numbers to find LCM and HCF **Solving problems**		**INTEGERS** **Calculations with integers** • Revise: — perform calculations involving all four operations with integers — perform calculations involving all four operations with numbers that involve the squares, cubes, square roots and cube roots of integers **Properties of integers** • Revise: — Commutative, associative and distributive	**EXPONENTS** **Comparing and representing numbers in exponential form** • Revise compare and represent: — integers in exponential form — numbers in scientific notation • Extend scientific notation to include negative exponents **Calculations using numbers in exponential form** • Revise the following general laws of exponents:		**FORMAL ASSESSMENT TASK** **ASSIGNMENT** • Whole numbers • Integers • Exponents	**NUMERIC AND GEOMETRIC PATTERNS:** **Investigate and extend patterns** • Investigate and extend numeric and geometric patterns looking for relationships between numbers including patterns: — represented in physical or diagram form, — not limited to sequences involving a constant difference or ratio, — of learner's own creation, — represented in tables, — *represented* algebraically	**FUNCTIONS AND RELATIONSHIPS** **Input and output values** • Determine input values, output values or rules for patterns and relationships using: — flow diagrams — tables — formulae — equations **Equivalent forms** • Determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented: — verbally — in flow diagrams	**ALGEBRAIC EXPRESSIONS** **Algebraic language** • Revise the following: — Recognize and identify conventions for writing algebraic expressions — Identify and classify like and unlike terms in algebraic expressions — Recognize and identify coefficients and exponents in algebraic expressions — Recognize and differentiate between monomials,	**REVISION** **FORMAL ASSESSMENT TASK** **TEST: All topics**	

	• Solve problems in contexts involving — ratio and rate — direct and indirect proportion • Solve problems that involve whole numbers, percentages and decimal fractions in financial contexts such as: — profit, loss, discount and VAT — budgets — accounts — loans — Simple interest — hire purchase — exchange rates — commission — rentals — compound interest	properties of addition and multiplication for integers — additive and multiplicative inverses for integers **Solving problems** • Solve problems in contexts involving multiple operations with integers	— $a^m \times a^n = a^{m+n}$ — $a^m \div a^n = a^{m-n}$, if $m>n$ — $(a^m)^n = a^{m \times n}$ — $(a \times t)^n = a^n \times t^n$ — $a^0 = 1$ • Extend the general laws of exponents to include: — integer exponents: $a^{-m} = \frac{1}{a^m}$ • Perform calculations involving all four operations using numbers in exponential form, using laws of exponents **Solving problems** • Solve problems in contexts involving numbers in exponential form, including scientific notation		• Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language	— in tables — by formulae — by equations — by graphs on a Cartesian plane	binomials and trinomials	

PREREQUISITE SKILL OR PRE-KNOWLEDGE	• The commutative; associative; distributive properties of whole numbers • 0 in terms of its additive property (identity element for addition) • 1 in terms of its multiplicative property (identify element for • multiplication) • Recognise the division property of 0, whereby any number divided by 0 is undefined	• Perform calculations involving all four operations with numbers that involve squares, cubes, square roots and cube roots of integers • Calculate the squares, cubes, square roots and cube roots of rational numbers	• Laws of exponents • Compare and represent integers in exponential form • Compare and represent numbers in scientific notation, limited to positive exponents		• Determine input values, output values and rules for patterns given in input-output diagrams • Determine equivalence of different descriptions of the same relationship or rule presented verbally, in a flow diagram, by a number sentence.	• Determine input values, output values or rules for patterns and relationships • Determine, interpret and justify equivalence of different descriptions of the same relationship or rule	recognize and interpret rules or relationships represented in symbolic form -- identify variables and constants in given formulae and/or equations • Recognize and identify conventions for writing algebraic expressions • Identify and classify like and unlike terms in algebraic expressions • Recognize and identify coefficients and exponents in algebraic expressions	

2026 ANNUAL TEACHING PLANS: ENGLISH MATHEMATICS: GRADE 9 (TERM 2)

TERM 2	2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	WEEK 12
HOURS PER TOPIC		11,5			9			9		9		8	
TOPICS, CONCEPTS AND SKILLS	**FORMAL ASSESSMENT TASK** **INVESTIGATION** **Note: Administer an investigation on any ONE of the Term 2 topics before teaching it**	**ALGEBRAIC EXPRESSIONS** **Expand and simplify algebraic expressions.** • Revise the following: using the commutative, associative and distributive laws for rational numbers and laws of exponents to: — add and subtract like terms in algebraic expressions. — multiply integers and monomials by: monomials, binomials, trinomials — divide the following by integers or monomials: monomials, binomials, trinomials — simplify algebraic expressions involving the above operations — determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms **N.B. ENSURE THAT COMMON FRACTIONS AND DECIMAL FRACTIONS ARE PART OF CALCULATIONS**			**ALGEBRAIC EQUATIONS** **Equations** • Revise the following done in Grade 8: — set up equations to describe problem situations — analyse and interpret equations that describe a given situation — solve equations by inspection — using additive and multiplicative inverses — using laws of exponents — determine the numerical value of an expression by substitution. — use substitution in equations to generate tables of ordered pairs • Extend solving equations to include: — using factorisation — equations of the form: a product of factors = 0			**GRAPHS** **Interpreting graphs** • Revise the following done in Grade 8: — analyse and interpret global graphs of problem situations, with a special focus on the following trends and features: ✓ linear or non-linear ✓ constant, increasing or decreasing ✓ maximum or minimum ✓ discrete or continuous • Extend the focus on features of graphs with special focus on the following features of **linear graphs**: — x-intercept and y-intercept — Gradient		**GEOMETRY OF STRAIGHT LINES** **Angle relationships** • Revise and write clear descriptions of the relationship between angles formed by: — perpendicular lines — intersecting lines — parallel lines cut by a transversal **Solving problems** • Solve geometric problems using the relationships between pairs of angles described above		**REVISION** **FORMAL ASSESSMENT TASK** **TEST** All Term 1 & 2 topics	

		WITH EXPRESSIONS (Page 122 and 123 of CAPS) • Extend the above algebraic manipulations to include: — multiply integers and monomials by polynomials, — divide polynomials by integers or monomials, — the product of two binomials, — the square of a binomial • Determine the numerical value of algebraic expressions by substitution **Factorize algebraic expressions** • Factorize algebraic expressions that involve: — common factors — difference of two squares — trinomials of the form: ✓ $x^2 + bx + c$ ✓ $ax^2 + bx + c$, where *a* is a common factor. • Simplify algebraic expressions that involve the above factorisation processes. • Simplify algebraic fractions using factorisation		**Drawing graphs** • Revise the following done in Grade 8: — draw global graphs from given descriptions of a problem situation, identifying features listed above. — Use tables of ordered pairs to plot points and draw graphs on the Cartesian plane — Extend drawing of graphs with special focus on: — drawing linear graphs from given equations • Extend the above with special focus on: — drawing linear graphs from given equations — determining equations from given **linear graphs.**		

PREREQUISITE SKILL OR PRE-KNOWLEDGE		• Common and decimal fractions • Algebraic language • Factors and multiples • Expand and simply algebraic expressions • Substitution • Determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms	• Write number sentences to describe problem situations • Analyse and interpret number sentences that describe a given situation • Solve and complete sentences by: — inspection — trial and improvement • Identify variables and constants in given formulae or equations • Use substitution in equations to generate tables of ordered pairs • Extend solving equations to include: — using additive and multiplicative inverses	• Analyse and interpret global graphs of problem situations, with a special focus on the following trends and features: — linear or non-linear — constant, increasing or decreasing — maximum or minimum — discrete or continuous • Draw global graphs from given descriptions of a problem situation, identifying features listed above • Use tables or ordered pairs to plot points and draw graphs on the Cartesian plane	• Perpendicular lines • Intersecting lines • Parallel lines cut by a transversal • Solve geometric problems using the relationships between pairs of angles described above	

2026 ANNUAL TEACHING PLANS: ENGLISH MATHEMATICS: GRADE 9 (TERM 3)

TERM 3		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10
HOURS PER TOPIC		9		4,5		10,5			4,5	4,5	3
TOPICS, CONCEPTS AND SKILLS	FORMAL ASSESSMENT TASK PROJECT Note: The project must cover a combination of topics from Term 1 to 3 and must be completed before the end of Term 3	**GEOMETRY OF 2D SHAPES** **Classifying 2D shapes** • Revise properties and definitions of triangles in terms of their sides and angles, distinguishing between: — equilateral triangles — isosceles triangles — right-angled triangles • Revise and write clear definitions of quadrilaterals in terms of their sides, angles and diagonals, distinguishing between: — parallelogram — rectangle — square — rhombus — trapezium — kite **Similar and congruent triangles** • Through investigation, establish the minimum conditions for congruent triangles		**AREA AND PERIMETER** • Use appropriate formulae and conversions between SI units, to solve problems and calculate perimeter and area of: — polygons — circles • Investigate how doubling any or all of the dimensions of a 2D figure affects its perimeter and its area		**COLLECT, ORGANIZE AND SUMMARIZE DATA** **Collect data** • Pose questions relating to social, economic, and environmental issues • Select and justify appropriate sources for the collection of data • Distinguish between samples and populations, and suggest appropriate samples for investigation • Select and justify appropriate methods for collecting data **Organize and summarize data** • Organize numerical data in different ways in order to summarize by determining: — measures of central tendency — measures of dispersion, including extremes and outliers • Organize data according to more than one criteria **REPRESENT DATA** **Represent data** • Draw a variety of graphs by hand/technology to display and interpret data including: — bar graphs and double bar graphs		**PROBABILITY** • Consider situations with equally probable outcomes, and: — determine probabilities for compound events using two-way tables and tree diagrams — determine the probability for outcomes of events and predict their relative frequency in simple experiments — compare relative frequency with probability and explain possible differences	**REVISION** **FORMAL ASSESSMENT TASKS** **TEST:** **All Term 3 topics**	

		• Through investigation, establish the minimum conditions for similar triangles **Solving problems** • Solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent and similar triangles.		— histograms with given and own intervals — pie charts — broken-line graphs — scatter plots **INTERPRET, ANALYSE, AND REPORT DATA** **Interpret data** • Critically read and interpret data represented in a variety of ways. • Critically compare two sets of data related to the same issue. **Analyse data** • Critically analyse data by answering questions related to: — -data collection methods — -summary of data — -sources of error and bias in the data **Report data** • Summarize data in short paragraphs that include — drawing conclusions about the data — making predictions based on the data — making comparisons between two sets of data — identifying sources of error and bias in the data — choosing appropriate summary statistics for the data (mean, median, mode, range) — the role of extremes and outliers in the data		

PREREQUISITE SKILL OR PRE-KNOWLEDGE		• Identify and write clear definitions of triangles in terms of their sides and angles, distinguishing between equilateral triangles, isosceles triangles and right-angled triangles • Identify and write clear definitions of quadrilaterals in terms of their sides and angles, distinguishing between parallelogram, rectangle, square, rhombus, trapezium and kite	• Use appropriate formulae to calculate perimeter and area of: — squares — rectangles — triangles — circles • Calculate the areas of polygons, to at least • 2 decimal places, by decomposing them into rectangles and/or triangles	• Design and use simple questionnaires to answer questions with multiple choice responses • Organize (including grouping where appropriate) and record data using tally marks, tables and stem-and-leaf displays • Group data into intervals • Draw a variety of graphs by hand/technology to display and interpret data including: — bar graphs and double bar graphs — histograms with given and own intervals — pie charts — broken-line graphs	• Consider a simple situation (with equally likely outcomes) that can be described using probability and: — list all the possible outcomes — determine the probability of each possible outcome using the definition of probability	

TERM 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10
HOURS PER TOPIC	4,5		4,5	9		4,5	4,5	4,5	4,5	3
TOPICS, CONCEPTS AND SKILLS	**GEOMETRY OF 3-D OBJECTS** **Classifying 3-D objects** • Revise properties and definitions of the 5 Platonic solids in terms of the shape and number of faces, the number of vertices and the number of edges. • Recognise and describe the properties of: — Spheres — Cylinders **Building 3-D models** • Use nets to make models of geometric solids, including: — Cubes — Prisms — Pyramids — Cylinders		**SURFACE AREA AND VOLUME OF 3-D OBJECTS** • Use appropriate formulae and conversions between SI units to solve problems and calculate the surface area, volume and capacity of: — cubes — rectangular prisms — triangular prisms — cylinders Investigate how doubling any or all the dimensions of right prisms and cylinders affects their volume	**TRANSFORMATION GEOMETRY** **Transformations** • Recognize, describe and perform transformations with points, line segments and simple geometric figures on a co-ordinate plane, focusing on: — reflection in the x-axis or y- axis — translation within and across quadrants — reflection in the line $y = x$ — rotation around a given point • Identify what the transformation of a point is, if given the co-ordinates of its image **Enlargements and reductions** • Use proportion to describe the effect of enlargement or reduction on area and perimeter of geometric figures • Investigate the co-ordinates of the vertices of figures that have been enlarged or reduced by a given scale factor		**REVISION**			**FORMAL ASSESSMENT TASK** **TEST: Term 1-4 topics**	
PREREQUISITE SKILL OR PRE-KNOWLEDGE	• Describe, name and compare the 5 Platonic solids in terms of the shape and number of faces, the		• Use of appropriate formulae to calculate the surface area, volume and capacity of cubes and rectangular prisms	• Translations, reflections, rotations enlargements and reductions with geometric figures and shapes on grid paper						

	number of vertices and the number of edges • Usie nets to create models of geometric solids, including cubes, prisms and pyramids	• Describe the interrelationship between surface area and volume of the objects mentioned above • Use and convert between appropriate SI units, including: — $mm^2 \leftrightarrow cm^2 \leftrightarrow m^2 \leftrightarrow km^2$ — $mm^3 \leftrightarrow cm^3 \leftrightarrow m^3$ — ml (cm^3) $\leftrightarrow$ *l* $\leftrightarrow$ *kl*			

2026 Annual Teaching Plan
Natural Sciences: Grade 9

basic education
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Life and living

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2 weeks	**Cells as basic units of life**	**Cell structure** • the cell is the basic structural and functional unit of all living organisms. Cells can be seen under a microscope (they are microscopic) • plant and animal cells have a cell membrane, cytoplasm, nucleus, and organelles such as mitochondria, vacuoles and chloroplasts - the *cell membrane* encloses the contents of the cell. It allows specific substances to pass into and out of the cell - the *cytoplasm* is the jelly-like medium in which many chemical reactions take place - the *nucleus* contains DNA ✓ the nucleus is enclosed by a nuclear membrane (in plants and animals) ✓ DNA contains inherited characteristics, such as whether eyes are blue or brown ✓ DNA is unique to each person; this variation accounts for differences within species - *Mitochondria* are responsible for respiration to release energy from food **Differences between plant and animal cells** • plant cells differ from animal cells - plant and animal cells are enclosed by a cell membrane, and plant cells also have rigid cellulose cell walls to provide support for the plant - plant cells also contain organelles such as large vacuoles and chloroplasts. Chloroplasts contain *chlorophyll* to absorb light energy for photosynthesis (*refer to Grade 8 Life & Living*). Vacuoles in plant cells have several functions including support and storage (*Vacuoles in animal cells are small and temporary or absent*) **Cells in tissues, organs and systems** • cells come in many different shapes and sizes • cells are adapted to perform specific functions, such as muscle cells which are specialised to contract and enable movement • microscopic organisms such as bacteria, consist of a single cell. Macroscopic organisms such as humans, consist of large numbers of cells • a group of cells performing a specific function form a tissue, a group of tissues make up an organ, and organs working together in groups form systems, systems make up an organism • stem cells are cells that have the ability to divide and develop into many different cell types [*No detail required*] • Cells in tissues, organs and systems	• Video clips, laptops, tablets, smart phones, • **Lab equipment**: Basic light microscope(s) scalpels or knives, dissecting needles, forceps, microscope slides, coverslips, droppers, Petri dishes • **Perishables**: Onions, tissue paper or filter paper, distilled water, iodine solution • 3-Dimensional (3D) model of a cell, and/or pictures • Micrographs of plant and animal cells	• Draw and label a generalised plant and animal cell • Research and write about the history of the discovery of the light and electron microscopes • Tabulate the differences between plant and animal cells • Prepare and examine slides of plant and animal cells such as onion cells, cheek cells • Draw and label a few cells from each observation
1 week	**Overview of Systems in the Human Body**	*[**Note:** The intention of this topic is to provide learners with an overview of the structure and functions of organs and systems in the human body]* **Body systems** • the human body consists of several integrated systems working together including the following • **musculoskeletal system:** muscles produce body movement. The skeleton protects the body, provides support and enables movement - the main processes include contraction and relaxation of muscles, locomotion and movement - the main components include the muscles, bones, cartilage, tendons, ligaments • **excretory system:** removes waste from the blood and regulates the body's fluids - the main processes include filtration, absorption, diffusion, excretion - the main components include the kidneys, bladder, ureters • **nervous system:** receives and helps the body respond to stimuli - the main processes include hearing, seeing, feeling, tasting, smelling, sending and receiving impulses, regulating temperature	• Models or charts of different body systems • Video clips, laptops/smart phones or tablets, data bundle	• Create a poster of clearly labelled and distinguished (by colour) musculoskeletal, excretory, nervous systems within a single human body.

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		- the main components include the brain, spinal cord, nerves, ears, nose, eyes, skin, tongue		
2 weeks	**Systems in the Human Body:** • **Blood Circulatory System** • **Respiratory System**	• **blood circulatory system:** brings nutrients and oxygen to cells and removes waste products - the main processes include circulating blood between heart and lungs, and circulating blood between the heart and the rest of the body - the main components include the heart, blood vessels (arteries, veins, capillaries), blood health issues include high blood pressure, heart attacks, strokes • **respiratory system:** is responsible for supplying oxygen to the body and for removing carbon dioxide - the main processes include breathing (inhalation and exhalation), gaseous exchange (diffusion) and respiration - the main components include the nose and mouth, trachea and other air passageways, lungs, blood - health issues include asthma, lung cancer, bronchitis, asbestosis **Breathing, gaseous exchange, blood circulation and respiration** • oxygen is *inhaled* in a process called breathing • in the lungs gases are exchanged (*gaseous exchange*) between the alveoli and the surrounding capillaries by the process of *diffusion* • oxygenated blood is transported (*circulation*) from the lungs to the left side of the heart where it is pumped under high pressure to the body through the arteries *[arteries transport oxygenated blood, except for the pulmonary arteries]* • arteries subdivide to form capillaries which are in close contact with the body cells. Here, *gaseous exchange* occurs and oxygen moves into the cells by the process of *diffusion* • in the mitochondria of the cells, oxygen is combined with food in the process of *respiration* and energy is released for other body processes • carbon dioxide (by-product of *respiration*), diffuses from the cells into the capillaries for excretion, and is transported (*circulation*) in the blood to the right side of the heart by veins *[veins transport deoxygenated blood, except for the pulmonary veins]* • the heart pumps the deoxygenated blood (contains carbon dioxide), to the lungs where it is, where it diffuses into the air that is *exhaled* out of the body	• Sheep/pig heart and lungs • Stopwatch/cell phone (for timing) • Posters and models or charts of torso, heart, kidney, digestive system, lungs, etc. • Video clips, laptops/smartphones or tablets, data bundle	• Measure and compare heart rates before and after exercise. Draw a bar graph of the results. Make deductions of the findings • Create a poster with a flow chart to show the sequence of the stages from **inhaling air** to **exhaling air**. 1. Indicate what happens with gases in each of the organs that form the respiratory system. 2. Indicate what happens with each of the following gases during **inhalation** and **exhalation**: - nitrogen - oxygen - water vapour - carbon dioxide
2 weeks	**Human Reproduction System**	• **reproductive system:** produces sex cells for the purpose of continuation of the species - the main processes include growth, cell division, maturation, copulation, ejaculation, ovulation, menstruation, fertilisation, implantation - the main components include testes, ovaries, uterus - health issues include infertility, foetal alcohol syndrome, STDs **Purpose and puberty** • the main purpose of reproduction is for the gametes (male and female sex cells) to combine for the continuation of the species • puberty is the stage in the human life cycle when sexual organs mature for reproduction. This process is initiated when the pituitary gland releases hormones into the blood stream, triggering the testes and ovaries to release sex hormones (testosterone and oestrogen) • testosterone (from the testes) and oestrogen (from the ovaries) cause secondary sexual characteristics such as menstruation, breast development, pubic hair, facial hair, deepening of the male voice **Reproductive organs** • the male reproductive organs include the penis, sperm duct (*vas deferens*), testes (produces sperm cells), scrotum, urethra • the female reproductive organs include the vagina, uterus, ovaries (contain egg cells/ ova), oviducts (Fallopian tubes)	• Posters and models or charts of torso and reproductive organs	• Label diagrams and explain processes involved in human reproductive system • Draw a flow chart to show the sequence of the stages in human reproduction • Research and writing about the effects of alcohol, smoking and drug abuse on the foetus [*Relate this to the role of the placenta*] • Debate and discuss issues such as abortion, infertility, surrogacy, contraception, population control

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		Stages of reproduction • once a month, one of the ovaries releases a ripe egg in a process called *ovulation* • in preparation for a fertilised egg, the uterus develops a thick layer of blood • if fertilisation does not take place, *menstruation* occurs • menstruation is the breakdown of the thick layer of blood in the uterus, which is released through the vagina • the menstrual cycle is usually a 28 day cycle • during *copulation*, the erect penis is inserted into the vagina and semen is released (*ejaculation*) • *fertilisation* is the fusion of the sperm and egg, producing a zygote • if fertilisation takes place, the fertilised egg is implanted in the blood layer in the uterus, and pregnancy results • the developing embryo/foetus is attached to the uterus wall by the placenta which plays a vital role in feeding and removing waste from the foetus • the stage of pregnancy in humans (gestation) is about 40 weeks • pregnancy can be prevented by using contraceptives such as condoms to prevent the sperm reaching the egg • condoms also prevent the transmission of HIV/AIDS and other STDs (sexually transmitted diseases), if used effectively		
2 weeks	**Digestive System**	• **digestive system:** breaks down food into dissolved nutrients that can be absorbed into the blood stream and transported to cells throughout the body - the main processes include ingestion, digestion absorption and egestion - the main components include the mouth, oesophagus, stomach, intestines, liver - health issues include ulcers, *anorexia nervosa*, diarrhoea, liver cirrhosis **Healthy diet** • a healthy diet (eating plan) requires different components including proteins, carbohydrates, fats and oils, vitamins and minerals, fibre and water • disorders of the digestive system can be related to inappropriate eating plans **The alimentary canal and digestion** • the alimentary canal is composed of the mouth, oesophagus, stomach, small intestine, large intestine, rectum and anus • digestion is the breakdown of food into a usable dissolved form There are two types of digestion: - mechanical digestion involves the physical breaking, crushing and mashing of food - chemical digestion involves the mixing food with digestive enzymes and hydrochloric acid *[no detail of the enzymes required]* • the structure of each part of the alimentary canal is adapted to its function *[no detail required]*	• Pictures of eating disorders • Video clips • Samples of food • Iodine solution • White paper • Ethanol (pure alcohol)	• Investigate to test for the presence of starch, fats and oils in food • Discuss a variety of unhealthy dietary components such as additives, and the harmful effects of some diets such as eating too much fast food and diets developed for weight loss
1 week	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Practical task/investigation • Test			

Matter and Materials

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	Compounds	**Briefly review and revise** concepts dealt with in Grade 8, focusing on compounds **The Periodic Table** *[**Note:** use the Periodic Table of Elements as a reference tool in the topics that follow]* • the elements can be classified into metals, non-metals and semi metals • the elements found in groups (vertical columns) have similar chemical properties • each element on the Periodic Table (in its own block) has an atomic number (smaller number), mass number (larger number), name and symbol • a formula/e is ratio of the symbols of the elements and number of atoms for each symbol in a compound **Names of compounds** • many compounds are named according to their elements, such as sodium chloride (table salt) which is made of the elements sodium and chlorine. But others have common names such as water and ammonia • some compounds have names such as carbon monoxide (CO), carbon dioxide (CO_2), sulfur trioxide (SO_3). In these compounds: - ***mono***xide- tells us that ***one*** oxygen atom has combined with the carbon atom - ***di***oxide- tells us that ***two*** oxygen atoms have combined with the carbon atom - ***tri***oxide- tells us that ***three*** oxygen atoms have combined with the sulfur atom	• Posters, e.g. the Periodic Table, Video clips, laptops/tablets/smart phones • **Laboratory equipment and materials:** Heat source (such as Bunsen burner or spirit lamp), matches, safety goggles, tongs/pliers, test tubes, test tube racks, glass containers, beakers/glass jars, evaporating tins, dropper, clamp, retort stand, iron filings, wireless carbon dioxide gas sensor, wireless temperature sensor, wireless pressure sensor, pH sensor • **Chemicals and materials:** Universal indicator, bromothymol blue or phenolphthalein, magnesium ribbon, magnesium oxide powder, sodium hydroxide, hydrochloric acid, steel wool, dish • **Perishables** and/or household substances: Vinegar, tartaric acid, lemon, soap, bicarbonate of soda, liquid soap, tea, rooibos, coffee, milk, fruit juices, fizzy drinks, plastic beads, beans, plasticine or playdough, red cabbage, red onion, turmeric	• Distinguish between pure substances and mixtures • Distinguish between elements and compounds • Identify the relevant elements, mentioned in the reactions studied, on the Periodic Table of Elements • Make models of compounds using beads, beans, or plasticine or playdough. • Write the names and the formulae (chemical symbols) of ALL the substances for every studied reaction. Write their balanced equations • Describe the neutralisation of an acid with a base using pH • Investigate a selection of household substances (such as water, tea and rooibos, coffee, milk, fruit juices, vinegar, tartaric acid, washing powder, bicarbonate of soda, salt water) to test whether they are acids, bases or neutrals using universal indicator and at least one other indicator (such as red cabbage water, red onion water, turmeric water, bromothymol blue, phenolphthalein). Record results (colour change) on a table and draw conclusions (acid, base or neutral) • Informal practical task/investigation based on teacher demonstrations
1 week	Chemical Reactions	**Chemical equations to represent reactions** • chemical reactions can be represented with models • chemical reactions are usually represented with symbols such as in chemical equations: For example: $C + O_2 \longrightarrow CO_2$ $2H_2 + O_2 \longrightarrow 2H_2O$ • the subscript number indicates the number of atoms of an element found in the formula • the numbers in front of the compounds indicate the ratio in which the molecules react. For example two molecules of hydrogen react with one molecule of oxygen to form water, therefore the ratio is 2:1 (H:O) • no atoms are lost or gained in the reaction, they are simply rearranged **Balanced equations** • chemical equations must be written as balanced chemical equations. The total number and type of atoms of the reactants is the same as in the products. The above equations are therefore balanced in the following way: $4Fe + 3O_2 \longrightarrow 2Fe_2O_3$ (brown rusty coating) $2Mg + O_2 \longrightarrow 2MgO$ (white powder) • another example is copper reacting with oxygen to form copper oxide. This is a very slow reaction - *word equation*: *copper + oxygen* $\longrightarrow$ *copper oxide* - *chemical equation*: $2Cu + O_2 \longrightarrow 2CuO$ *[Learners are not required to write the formulae/symbols for other word equations]* ***Note:*** Grade 9 learners must write the names and the formulae (chemical symbols) of ALL the substances for every reaction that follows. *They must also identify the relevant elements, mentioned in the reactions, on the Periodic Table of Elements*		

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Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2 weeks	Reaction of Metals with Oxygen	**The general reaction of metals with oxygen** • some metals react with oxygen during burning (combustion) • when a metal reacts with oxygen, a metal oxide is formed as a product. The general equation for this type of reaction is always: *metal + oxygen* ⟶ *metal oxide* **Reaction of iron with oxygen** • when the metal iron is burnt in air (which contains oxygen), the reaction forms iron oxide as a product - word equation: iron + oxygen iron oxide - chemical equation: $Fe + O_2 \longrightarrow Fe_2O_3$ **Reaction of magnesium with oxygen** • when the metal magnesium is burnt in air (which contains oxygen), the reaction forms magnesium oxide as a product - word equation: magnesium + oxygen magnesium oxide - chemical equation: $Mg + O_2 \longrightarrow MgO$ **Formation of rust** • rusting is a slow chemical reaction of iron metal, with oxygen and moisture (water) to form a complex compound part of which is iron oxide. • rust (a form of corrosion) only occurs at the surface of the iron exposed to the air • steel (which consists mostly of iron) is an essential material in modern construction. Equipment and structures can rust, and weaken **Ways to prevent rusting** • iron and steel can be painted to keep away moisture and oxygen • iron and steel can be coated with a thin layer of chromium or zinc (metals which do not rust) This is done by an electroplating technique which is a form of electrolysis		
1 week	Reactions of Non-Metals with Oxygen	**The general reaction of non-metals with oxygen** • non-metals react with oxygen to form non-metal oxides • when any non-metal is burnt in excess oxygen, the general equation is always: non-metal + oxygen non-metal oxide **Reaction of carbon with oxygen** • when the non-metal carbon is burnt in oxygen, carbon dioxide is produced - word equation: *carbon + oxygen* ⟶ *carbon dioxide* - chemical equation: $C + O_2 \longrightarrow CO_2$ **Reaction of sulfur with oxygen** • another example is sulfur reacting with oxygen to form sulfur dioxide - word equation: sulfur + oxygen ⟶ sulfur dioxide • chemical equation: $S + O_2 \longrightarrow SO_2$		
1 week	Acids & Bases, and Ph Value	**The concept of pH value** • pH is a measure of how acidic or basic a substance is. The pH scale ranges from 1 to 14 • acids have a pH in the range of 1 to 7. Strong acids have very low pH values • bases have a pH in the range of 7 to 14. Strong bases have very high pH values • a neutral substance has a pH of 7 • we use chemical indicators (such as universal indicator, litmus paper, red cabbage water, red onion water, turmeric water, bromothymol blue, phenolphthalein) to tell us whether a substance is an acid, base or neutral • universal indicator has the ability to indicate the full range of pH values on the pH scale by colour		

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		changes - acids change the colour of universal indicator towards the yellow, orange and red colours - bases change the colour of universal indicator towards the blue and purple colours • neutral substances (pH 7), change the colour of universal indicator to green		
1 week	Reactions of Acids with Bases: Part I	**Neutralisation and pH** • acids and bases react together, we call this a neutralisation reaction • a base reacts with an acid, to make it less acidic/neutral • an acid reacts with a base, to make it less basic/neutral • acids commonly used in the laboratory include sulphuric acid (H2SO4) and hydrochloric acid (HCl) • after reacting an acid and a base together, the resultant pH will vary based on the strength of the acid and base reactants • non-metal oxides tend to be acidic (low pH) • bases (high pH) include metal oxides, metal hydroxides, metal carbonates		
1 week	Reactions of Acids with Bases: Part II	**The general reaction of an acid with a metal oxide (base)** • when metals react with *oxygen*, they tend to form oxides which are bases *(see reactions of metals with oxygen)* • when any acid reacts with a metal oxide, the products formed are *a salt* and *water*. The type of salt formed will depend on the specific acid and metal oxide used in that reaction • the general equation is always: *acid + metal* ⟶ *oxide salt + water* *Example*: - word equation: hydrochloric acid + magnesium oxide magnesium chloride + water - balanced chemical equation: $2HCl + MgO \longrightarrow MgCl_2 + H_2O$ **Applications** • burning wood and fossil fuels releases carbon dioxide and sulfur dioxide into the atmosphere. These combine with water in the atmosphere to produce acid rain • limestone ($CaCO_3$) is used in agriculture to make soil less acidic		
2 weeks	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)		• Practical task/investigation • Test		

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Energy and change

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
2 weeks	Forces	**Types of forces** • a force is a push or pull (or twist) exerted upon an object • force is measured in units called newtons (N) • forces that two objects exert on each other always act in pairs • a force can change the shape, direction and speed of an object • all forces acting on objects can be placed into two broad groups: - contact forces - field forces **Contact forces** • a contact force (including friction, tension, compression) results when two bodies are in contact (touch) with each other **Field forces (non-contact forces)** • field forces result from action-at-a-distance between two bodies • common examples of field forces include gravitational, magnetic and electrostatic forces - **Gravitational force:** gravity is the force of attraction (pull) that objects/bodies have on one another due to their masses. For example the attraction of Sun and planets, Earth and Moon, Earth and objects on the surface (people and things) ✓ objects with greater mass have more gravitational pull on each other ✓ force decreases as distance between the objects increases *(refer to Grade 7 Planet Earth & Beyond)* ✓ force of gravity is measured in newtons (N) ✓ the weight of an object is the gravitational force exerted on it by the Earth (or the Moon, or another planet). It is also measured in newtons (N) o the mass of the object stays the same no matter where it is determined o however, the weight of an object will change when weighed in different places with different gravitational force such as on Earth compared to the Moon • **Magnetic force:** magnets attract magnetic substances including iron, steel, cobalt, nickel - all magnets have two ends/poles (north & south) ✓ opposite poles attract and like poles repel each other (magnetism is the push or pull force) ✓ just like a bar magnet, the Earth has a magnetic field (north and south poles) • **Electrostatic force:** When certain materials are rubbed together, they can acquire an electrostatic charge as a result of the loss or gain of electrons ***[Note**: only the electrons are transferred, protons cannot move]* - during rubbing, the electrons move from one material causing a positive charge on its surface, and causing a negative charge on the surface of the other material - objects which have like charge (+ and + or - and -) repel (push) each other and those with unlike charge (+ and -) attract (pull) each other *(refer to Gr 8 Energy & Change)* - charged objects in an electrostatic system possess potential energy. The energy comes from the work done during rubbing - a thunder cloud becomes charged by the rubbing together of air and water particles moving past each other in the atmosphere ✓ a lightning strike occurs when there is a massive discharge (release of charge) between the thunder cloud and the ground. Lightning is a giant spark of electricity • safety precautions should be considered during thunder and lightning storms	• **Laboratory equipment:** Wireless light sensor, and wireless temperature sensor, wireless pressure sensor, wireless voltage and current sensors, bar magnets, metal paper clips, spring balance, triple beam balance or electronic scale, iron, aluminium, steel, glass rod, PVC rod, plastic ruler, curved watch glasses, Perspex rods, Van de Graaff generator • **Materials:** Wooden or metal blocks (sponge or piece of foam, balls of the same volume, different masses (one set per pair), wooden blocks with different known masses or mass pieces, wooden block with a hook, calculator, hammer, feathers, two balls of the same mass, different volumes (one set per pair) • **Perishables:** Balloons, putty or play dough, graph paper, plastic, piece of knitted fabric (wool), cloth (wool or nylon) • Video clips, laptops/tablets/smart phones	• Explain and demonstrate the two broad groups of forces • Demonstrate and explain the similarities and differences between gravitational, magnetic and electrostatic forces • Make a table of the differences between mass and weight • Give the scientific explanation of how lightning occurs • Construct the circuit with the cell, the ammeter, 1 bulb and the switch in series. Draw a circuit diagram • Investigate the effect of the number of cells connected in series on current and potential difference. Write a hypothesis for this investigation. Record the readings on the ammeter and voltmeter in the table and draw a graph of the results. Draw conclusions and make deductions about the findings • Investigate the relationship between the potential difference across the battery and the potential difference across the resistors in a series circuit; - how the length of a conductor affects the resistance; - the current and potential difference in a circuit when adding cells in parallel; - the current strength when adding resistors in parallel circuits; - the relationship between the potential difference across the battery; and - the potential difference across the resistors in a parallel circuit • Identify series and parallel circuits in electrical wiring in homes, cars and toys. Draw the plan for wiring a house. Draw series and parallel circuit diagrams • Identify fuses, circuit breakers, earthing and Earth leakage systems in real circuits, or on circuit diagrams • Measure voltages across resistors and the current through them accurately • Explain advantages and disadvantages for series and parallel circuits • Draw and interpret various circuit diagrams • Distinguish between series and parallel
½ week	Electric Cells as Energy	**Electric cells** • a cell is a system in which certain chemical reactions can cause the flow of electricity through an	• **Laboratory equipment:** Wireless light sensor, wireless temperature sensor,	

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
	Systems	external circuit • cells are a source of electricity • a battery is a group of cells that are connected together	wireless pressure sensor, wireless voltage and current sensors, ammeters, 250 ml beakers, copper electrode, zinc electrode, crocodile clips, • **Materials:** Zinc strips, nails,, copper strips or coins, LED bulbs, insulated copper conducting wires, copper sulphate, zinc sulphate, sodium sulphate, a U tube (this can be made from a plastic tube which is bent) or filter paper soaked in the salt bridge solution, graphite rod or graphite pencil, torches, light bulbs, batteries (AA), 1,5 V cells, metre rulers • **Perishables:** Lemons (or potatoes), salt (sodium chloride), cotton wool • Video clips, laptops/tablets/smart phones	circuits in the wiring of the home, cars and toys and explain the differences • Describe the national energy supply grid and the impact of electricity generation on the environment • Practise how to connect 3-pin plugs
1½ weeks	**Resistance**	**Uses of resistors** • conductors (even good conductors) heat up when current passes through them: some energy is 'lost'/'wasted' as heat. All conductors have some resistance • a resistor is a conducting material selected to control the current or to provide useful energy transfer, such as in bulbs, rheostats, motors, light sensitive diodes, light emitting diodes **Factors that affect resistance in a circuit** • type of material: different conducting materials have different resistance to an electric current • thickness of the conductor: thinner wires have more resistance than thicker wires • length of the conductor: longer wires have more resistance than shorter wires • temperature of the conductor: generally hotter conductors (metals) have higher resistance than colder conductors		
2 weeks	**Series and Parallel Circuits**	**Series circuits** • when ***cells*** are connected together in series, the total voltage is the sum of the voltages (potential differences) of individual cells • ***resistors*** can be connected in series in a circuit • the total voltage across the battery is the same as the sum of the voltages across each of the resistors - a resistor with higher resistance will have higher voltage across it - a resistor with lower resistance will have a lower voltage across it • the current is the same when measured at any point in a given series circuit • the total current *decreases* with each resistor added in series to the circuit **Parallel circuits** • when ***cells*** (of same voltage) are connected in parallel, the voltage across them is the same as for one cell. • ***resistors*** can be connected in parallel in a circuit • the voltage is the same across each resistor connected in parallel • The total current through the battery is the same as the sum of the currents through the resistors • the total current in the circuit *increases* with each resistor added in parallel • the lighting system in our homes is usually connected in parallel. If one light bulb fuses (filament breaks), the rest of the lights remain on because they are each connected in their own parallel pathway, to the mains circuit • resistors are manufactured to have accurate resistances to control current • for two circuits with the same total voltage: - the current will be bigger in a circuit with low resistance - the current will be smaller in a circuit with high resistance		
½ week	**Safety with Electricity**	**Safety practices** • parallel connections can cause overload on mains circuits • circuit breakers, fuses and earth leakage systems are used as safety devices • many appliances have a 3-pin plug as a safety device to connect to the main circuit • the 3-pin plug has a live wire, neutral wire and an earth wire - the earth wire is connected to the metal case of the appliance, such as in a kettle. The earth wire is connected via the wall plug to an earth cable in the ground - the earth cable has almost zero resistance, so if the metal casing of an appliance becomes		

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
		charged due to a fault, the charge is safely discharged to the ground • illegal connections to the ESKOM mains supply can be dangerous, and are regarded as energy theft		
1 week	Energy and the National Electricity Grid	**Electricity generation** • a power station is a system for generating electricity • most power stations in South Africa use coal as a fuel to boil water • the steam from the water turns a turbine which turns a generator, which produces electricity • there are other alternative sources of energy besides coal, the internet that can be used to drive turbines and generators including wind, falling water (hydroelectric), sun-heated steam, nuclear fission, waves in the sea **Nuclear power in South Africa** • a nuclear power station such as Koeberg in the Cape, uses • radioactive fuel, the radioactivity produces heat by nuclear fission. The heat is then used to boil water to produce steam • the steam from the water turns a turbine which turns a generator, that produces electricity. The electricity is then channelled into the national electricity grid • spent nuclear fuel (nuclear waste) is still radioactive and remains so for many hundreds of years, therefore it needs to be properly disposed of so it is not a danger to life for years to come **National electricity grid** • the national grid is a network of interacting parts (a system): change in one part of the grid affects other parts of the grid - power stations feed electrical energy into the national grid at high voltages - power lines carry electricity at high voltages - transformers step down the voltage for local distributors and consumers: 15% of energy is wasted due to heating of transmission lines and transformer *[No details are* required *of alternating current or step-down transformers]* • power surges and grid overload can disrupt the power supply		
1½ week	Cost of Electrical Power	**The cost of power consumption** • electrical power is the rate of electrical energy supply • electrical power is measured in units called watts (W) or kilowatts (kW) *[one watt of power is equal to one joule of energy supplied in a second (I watt = 1 joule per second)]* • consumers pay for the quantity of power they use - quantity of electrical power used is measured in kWh (kilowatt hours) - the cost to the consumer is calculated in the following way: *cost = power rating of the appliance × the number of hours it was used × the unit price of electricity* • the energy consumption of different appliances (such as incandescent and compact fluorescent lamps) varies • there are also alternative appliances/systems such as solar heating panels for heating water		
1 week	Remediation, revision and consolidation			
SBA (FORMAL ASSESSMENT)	• Project • Test			

Planet Earth and beyond

Duration	CAPS Topics	Core Concepts, Skills and Values	Resources to Enhance Learning	Informal Assessment
1 week	The Earth as a System	**Spheres of the Earth** • the Earth can be understood as a complex system where all the parts (called spheres) interact with each other • four spheres interact on or near the surface of the Earth: - the lithosphere consists of solid rock and soil - the hydrosphere consists of water in all its forms - the atmosphere is a layer of gases around the Earth • the biosphere consists of all living plants and animals and their interactions with rocks, soil, air and water	• Laboratory equipment and materials, e.g. wireless light sensor, wireless temperature sensor, wireless CO2 sensor • Video clips, laptops/tablets/smart phones	• Writing to explain the interaction between the sphere's lithosphere, hydrosphere, atmosphere, biosphere • Worksheet (translation task) on the lithosphere • Writing and make labelled drawings to explain the rock cycle • Making a model to show the greenhouse effect • Investigating and reporting on the impact of global warming • Reading about how metal is extracted from ore • Investigating/demonstrating how lead is extracted from ore by heating lead oxide on a carbon block • Illustrating physical separation processes used in mining (hand sorting or sifting stones from sand) • Researching and writing about a mining activity in South Africa Sequencing, explaining and presenting an information poster on the birth, life and death of stars
1½ weeks	Lithosphere	**Lithosphere** • the Earth consists of four concentric layers called the inner core, outer core, mantle and crust *(link to Grade 7 Social Sciences)* • the lithosphere (*'lith'* means *'rock'*) has three layers: the solid outermost part of the mantle, the crust and the soil • different combinations of elements and compounds form minerals such as copper, gold and hematite (iron oxide) in the crust **The rock cycle** • the rock cycle is the natural continuous process in which rocks form, are broken down and re-form over long periods of time • there are three rock types: igneous, sedimentary and metamorphic rocks • the rock cycle can be explained in the following steps: - molten rock from the mantle (magma) pushes up through the crust - pools of magma cool down slowly in the crust to form igneous rocks, like granite - some magma escapes to the surface as a volcano - this magma cools down rapidly to form igneous rocks, like pumice stone - rocks on the surface of the Earth are weathered by heat, cold, wind and water to form smaller particles - wind and water transport these particles to flood plains and the sea by erosion - the particles are laid down as sediments - the sediments are covered by more layers **The rock cycle** – explained in steps • the pressure of many layers turns the lower layers into sedimentary rock like sandstone • hot magma heats the surrounding rock and changes its chemical structure to form metamorphic rock like slate from shale or marble from limestone • some rock is pushed below the crust, melts and becomes magma again		
1½ weeks	Mining of Mineral Resources	**Extracting ores** • people extract valuable minerals from the lithosphere • rock that contains high concentrations of a valuable mineral is called an ore • the ore is removed from the crust by mining • some minerals can be used in their natural form such as sand, potash, diamonds **Refining minerals** • some other minerals require a chemical or physical process to extract the required material such as iron from iron-ore (chemical) or gold from gold-ore (physical) • knowledge of iron and copper extraction is thousands of years old		

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		- iron ore was heated with charcoal to make lumps of iron - South African archaeological sites in KwaZulu Natal and Limpopo provide evidence for this • modern processes mix coke (a form of carbon made from coal) and other metals with iron to produce steel **Mining in South Africa** • there is large scale mining activity in South Africa • this activity has significant environmental impacts such as - creation of mine dumps - pollution of water resources - damage to places with high tourist or cultural heritage value • loss of farming and wild life environments		
1½ weeks	Atmosphere	**Atmosphere** • the atmosphere is the mixture of gases held around the Earth by gravity • this mixture is known as air and consists of nitrogen (78%), oxygen (21%), carbon dioxide (less than 1%), and other gases, including water vapour (1%) • the density of the gas particles decreases as the distance from the Earth increases (the further away from the Earth, the thinner the air) • the atmosphere has four layers: troposphere, stratosphere, mesosphere, thermosphere • each layer has a different temperature gradient • temperature gradient is how much the temperature changes with height above sea level (altitude) **Troposphere** • this layer extends from sea level to about 10 km above the surface of the Earth • it contains more than 70% of the mass of the atmosphere (particles closest together) and it has the greatest density • the temperature decreases as the distance from the surface increases (the further away from the Earth, the colder the air) • weather occurs in this layer • all animals and plants live in this layer **Stratosphere** • this layer extends from about 10 km to about 50 km above the Earth's surface • the air in the stratosphere is very thin compared to the air in the troposphere • some aeroplanes fly as high as the stratosphere • the stratosphere includes a band of ozone gas (O_3) which absorbs ultraviolet radiation from the Sun • this absorption of ultraviolet radiation increases the temperature of the stratosphere – as a result, the further away from the Earth, the warmer the air becomes • too much ultraviolet radiation interferes with life on Earth (human health, photosynthesis, life cycles and sizes of populations of species) **Mesosphere** • this layer extends from about 50 – 80 km above the Earth's surface • the air is extremely thin and very cold • there is still enough air in this layer to burn up small rocks and dust entering from space • burning rocks are visible from the Earth and known as 'shooting stars' **Thermosphere** • this layer starts above 80 km from the Earth (the thermosphere slowly diminishes at about 350		

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		km and space begins after that. Satellites orbit much further away) • the International Space Station (ISS), where astronauts work in space orbits the Earth at a height of about 370 km • the lowest part of the thermosphere absorbs ultraviolet radiation and dangerous X-rays from the Sun • it also reflects radio waves back to Earth for TV and radio broadcasts **The greenhouse effect** • the greenhouse effect is a natural phenomenon – it warms the atmosphere sufficiently to sustain life • greenhouse gases trap the ultraviolet radiation which then warms the air closest to the surface of the Earth (like inside a greenhouse) • the most common greenhouse gases are carbon dioxide, water vapour and methane • an increase in greenhouse gases leads to global warming • global warming is an increase in the average temperature of the atmosphere • global warming is a potentially life threatening problem on Earth. It can lead to: - climate change - rising sea levels - food shortages • mass extinctions		
½ week	**Birth, Life and Death of Star**	**The birth of a star** • stars exist for a finite period of time • stars form inside huge clouds of gas and dust called *nebulae*, far out in space • these *nebulae* (huge amounts of dust and gas) are pulled together by gravity and slowly collapse • as they contract they heat up • once the temperature is high enough a nuclear fusion reaction begins, that changes hydrogen to helium • this reaction radiates large amounts of energy into space **Life of a star** • stars change in their appearance over billions of years • stars that look blue are hotter and usually younger than stars that appear red • our Sun is about half way through its life cycle – it is a medium-sized yellow star with a lifespan of about 9 billion years • for most of their life, stars change hydrogen to helium • later, towards the end of their life, stars like the Sun will swell up to form a 'red giant' **Death of a star** • at some point the nuclear reaction runs out of fuel • for stars like the Sun, the core of the star contracts to become a 'white dwarf' • for stars like the Sun, the outer gases of the star are ejected into space, where they form an expanding cloud around the white dwarf called a *planetary nebula* • *planetary nebulae* are lit up by their central white dwarf star and are beautiful objects to observe		
3 weeks	**Remediation, revision and consolidation**			
SBA (FORMAL ASSESSMENT)	• Test			

Science Process Skills

The teaching and learning of Natural Sciences involve the development of a range of process skills that may be used in everyday life, in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The following are the cognitive and practical process skills that learners will be able to develop in Natural Sciences:

1. ***Accessing and recalling information*** – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework.
2. ***Observing*** – noting in detail objects, organisms and events.
3. ***Comparing*** – noting similarities and differences between things.
4. ***Measuring*** – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume).
5. ***Sorting and classifying*** – applying criteria in order to sort items into a table, mind-map, key, list or other format.
6. ***Identifying problems and issues*** – being able to articulate the needs and wants of people in society.
7. ***Raising questions*** – being able to think of, and articulate relevant questions about problems, issues, and natural phenomena.
8. ***Predicting*** – stating, before an investigation, what you think the results will be for that particular investigation.
9. ***Hypothesising*** – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation which will prove or disprove the hypothesis.
10. ***Planning investigations*** – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same whilst other things will vary.
11. ***Doing investigations*** – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results.
12. ***Recording information*** – recording data from an investigation in a systematic way, including drawings, descriptions, tables and graphs.
13. ***Interpreting information*** – explaining what the results of an activity or investigation mean (this includes reading and understanding maps, tables, graphs). A Translation Task requires learners to make sense of information and convert the information into a different format e.g., from information captured on a table into a graph format and or written format.
14. ***Communicating*** – using written, oral, visual, graphic and other forms of communication to make information available to other people.
15. The ***Scientific Process*** is a way of investigating things about the world. Scientists use this process to find out about the world and to solve problems. The steps that make up the scientific process are not necessarily in order (sequential), and may include:

    Step 1: Identify a problem and develop a question. What is it you want to find out?

    Step 2: Form a hypothesis. A hypothesis is your idea, answer, or prediction about what will happen and why.

    Step 3: Design an activity or experiment. Do something that will help you test your idea or prediction to see if you were right.

    Step 4: Observe/note changes/reactions (e.g., through measuring), and record your observations (e.g., onto a table). What were the results of your activity or experiment? Write about what happened.

    Step 5: Make inferences about the observations recorded in the tables, graphs, drawings, photographs. Make some conclusions. What did you find out? Do your results support your hypothesis? What did you learn from this investigation?