NATURAL SCIENCES AND TECHNOLOGY: GRADE 6

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**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	• drawing and writing about how plants make food and the things they take in and give out during this process • comparing glucose sugar (such as glucose sweets) and starch (such as maize flour) according to their taste and colour • testing starch with iodine solution to show the colour change* • testing foods for starch including cooked rice, flour, potato, bread, oil, boiled egg, cheese**	• Glucose powder, maize flour, iodine solution, plastic droppers, examples of foods such as cooked rice, flour, potato, bread, oil, boiled egg, cheese • Video clips from the internet
Notes: * Iodine solution is used as an indicator - when dropped onto starch it turns from brown to a blue-black colour ** Many foods that come directly from plants contain starch while foods that come directly from animals do not contain starch				

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1 ½ week **(5 ¼ hours)**	**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	• sorting foods into the four different nutrient groups - carbohydrates in foods such as bread, sugar, mealie meal, potato, rice, pasta - proteins in foods such as eggs, beans, meat, fish, cheese - fats and oils in foods such as margarine, cooking oil, butter - vitamins and minerals in foods such as fresh fruits and vegetables, milk (source of calcium) • reading labels on food packaging to look for the nutrients and/or the additives in the food	• Examples of different foods representing the different food groups and food packaging.

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Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 ½ weeks (5 ¼ hours)	**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	• evaluating a given diet to determine if it contains food from all nutrient groups • finding out about a disease that could be diet related, such as tooth decay, obesity, diabetes or deficiency diseases	• Lists of different diets • Pictures and information about food-related illnesses
2 ½ weeks (8 ¾ hours)	**Food processing**	**Need for processing food** • food is processed to: - make it edible (preparing, cooking) - make it last longer (preserving) - improve its nutrient value (fermenting) • during processing many foods may lose some of their nutrients **Methods for processing food** • there are many different methods (ways) to process food	• **researching** how to process food (raw material) by combining, cooking, freezing, pickling, fermenting, drying and salting to make a product, including indigenous ways of processing of food in different communities • choosing a food and processing it in some way	• Pictures and information about how food is processed • Foods for processing

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Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**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* **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	• selecting an ecosystem on/near the school grounds for this study. Roughly measure an area of 5m x 5m square. • drawing and writing about three plants and three animals that are found there - describing the food, water, amount of sunlight and shelter available - describing the feeding relationships (food webs) - identifying the possible threats to this ecosystem and possible ways to overcome them • drawing and labelling simple food webs	• Pictures of ecosystems such as rivers, mountains, sea, rocky shore, ponds, wetlands, grasslands, forests and deserts
Notes: * Healthy ecosystems depend on sufficient biodiversity of plants, animals and their habitats				

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STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**).* • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • explain how plants make their own food (photosynthesis) • sort food into the four nutrient groups • describe a balanced diet • process food in some way • describe an ecosystem • elaborate on feeding relationships (food webs)	

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
½ week (1¾ hours)	**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	• drawing* and writing about how particles are arranged in a solid, liquid and gas	• Video clips from the internet
1 week (3½ hours)	**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	• making mixtures including: - two solids - salt and sand, sugar and tea leaves, peanuts and dried beans, different coins, mixture of different sweets - a solid and a liquid - sand and water, chalk and water, curry powder and water, grated cheese and milk - two liquids – oil and water, • drawing and writing about mixtures	• Examples of materials and substances such as: salt, sand, sugar, tea leaves, peanuts, dried beans, coins, sweets, curry powder, grated cheese, milk, oil • Video clips from the internet
Notes: * The drawings must show the same number of particles in the solid, the liquid and the gas. The particles must all be the same size.				

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2½ weeks (8¾ hours)	**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)	• **Investigating** different solids to see if they dissolve in water including: - salt, sugar (soluble substances) - sand, mealie meal, flour, maize flour, samp, curry powder, custard powder (insoluble substances) • drawing and writing about what happens to solids in solutions • **Investigating** solutions to see if we can recover the solute by: - filtering - settling - evaporating the water (crystallisation) • drawing and writing about crystallisation	• 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

Notes: * A common misconception is that sugar or salt "melts" away when added to water. Dissolving (in the case of sugar and salt in water) requires **two** materials to be mixed together.
This is different from melting (in the case of ice) which is a result of **heating one material** to change its state.

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week **(3 ½ hours)**	**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	• **Investigating, measuring and drawing graphs** of the time taken to dissolve a solute:** - in hot or cold water - when stirring/shaking or not stirring/shaking - using coarse or fine salt	• Containers, beakers, ice cream sticks for stirring, measuring spoons, hot water, salt (coarse and fine)
Notes: ** For a fair test, make sure to use a given amount of solute [for example 1 teaspoon (5 ml)], and a given amount of water [for example ½ cup (125ml)], each time				

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Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2½ weeks (8¾ hours)	**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	• reading about/visit a specific wetland • writing a brief report on the importance of wetlands including: - habitats and biodiversity - water quality **or** • writing about the impact of loss of wetlands for biodiversity and water quality	• Texts for reading about water pollution • Video clips from the internet
2½ weeks (8¾ hours)	**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	• **Investigating** how to best purify dirty water in class or/and at home* • **designing, making and evaluating** a simple system to clean dirty water, (such as a sand filter) according to specifications and constraints *(refer to **Section 2.7**) [This can be used as a possible project]*	• Sieves, filter paper, funnels, containers, kettle, water purification tablets (if possible)
Notes: * Learners should not drink this water				

GRADE 6 TERM 2				
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Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • describe solids, liquids and gases in terms of the arrangement of their particles • 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 • tell what factors affect the rate of dissolving • show an understanding of the importance of wetlands • design, make and evaluate a system to process and purify dirty water	

GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**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	• investigating how to make a simple circuit using cell/ battery, conducting wires, light bulb and design and make a switch to control the circuit • drawing simple electrical closed circuit diagrams including the symbols for cell/battery, bulb, conducting wire, switch	• Equipment such as cells/batteries, conducting wires, light bulbs and switches

GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**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	• testing different materials (such as metal paper clips, nails, wire, steel-wool, coins, plastic, glass, ceramic, cardboard, paper, wood, rubber, chalk) in an electric circuit to see if they are conductors or insulators, and recording the results on a table • Identifying where electrical insulators are used such as in plastic insulated wires, rubber gloves used by electricians, glass and ceramic insulators on power lines	• Different materials including metal paper clips, nails, wire, steel-wool, coins, plastic, glass, ceramic, cardboard, paper, wood, rubber, chalk • Different materials including plastic insulated wires, rubber gloves used by electricians, glass and ceramic
2 ½ weeks **(8 ¼ hours)**	**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	• **designing, making, evaluating and presenting** 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 cell/s, light bulb/s, buzzer/s, and switch/es *(refer to **Section 2.7**) [This can be used as a possible project]*	• Basic components for a circuit, including components such as cell/s, light bulb/s conducting wire/s, buzzer/s, and switch/es
Notes: * It is generally more difficult to produce heat using cells, but this can be explored				

GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
3 weeks (10 ½ hours)	**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 **Illegal connections** • illegal electrical connections are a danger to people because they are often unsafe **Renewable ways to generate electricity** • people are looking for renewable ways to generate electricity	• drawing and writing about to explain how fossil fuels such as coal were formed • drawing and writing to trace the 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 • examining labels (in adverts, or real electrical appliances) to find out how much power they require (most kettles require more than 2000 W, whilst a radio might require about 15 W*). Recording findings on a table • Researching and writing about renewable ways to generate electricity including in wind power generators, solar panels (photovoltaics)**, hydro- electric power generators	• 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 of renewable ways to generate electricity, including examples of wind power generators, solar power generators, hydro- electric power generators

Notes: * Learners in this grade do not have to know how Watts (W), kilo Watts (kW) and kilo Watt hours (kW.h) are measured and calculated

** Solar panels (photovoltaics) are different from solar water heaters

GRADE 6 TERM 3				
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Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can:** • draw and label an electric circuit correctly • demonstrate open and closed circuits with the use of a switch • distinguish between conductors and insulators in a range of materials • trace the 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 • explain how fossil fuels such as coal are formed • determine which appliances use more energy and explain why this is so	

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**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* **Moons** • 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	• researching/reading information about the planets focusing on size, distance from the Sun, average temperature, number of moons** and any other features • making models of the Solar System taking into account position in relation to the Sun, size and features of the planets*** • describing and drawing the objects in our Solar System	• Detailed pictures and models of the Solar System • Pictures of the Moon

Notes: * It is not necessary to memorize exact numbers of size of planets, number of moons, and distance from the Sun

** The number of moons around some planets may change as more are discovered

*** It is not necessary to make the models of the Solar System to scale

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week **(3 ½ hours)**	**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	• demonstrating the movements (rotation and revolution) and of the Earth using models and body movements • demonstrating how day and night occur using a model of the Earth and a light source (for the Sun) • drawing and writing about the rotation of the Earth in relation to the Sun - how day and night occur	• Models and a light source such as torch, lamp, or candle to demonstrate the movements of the Earth
Notes: **** Video clips could be used to help clarify the movements of the planets				

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week (3 ½ hours)	**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	• demonstrating rotation, and revolution of the Moon around the Earth, using models and body movements • drawing and writing about the movements of the Moon in relation to the Earth and the solar system • making a table of comparison between the Sun (a star), the Earth (a planet) and the Moon including: shape, composition, size, movement in relation to other space objects, ability to produce light	• Models and a light source such as torch, lamp, or candle to demonstrate the movements of the Moon
1 week (3 ½ hours)	**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	• reading a case study about telescopes such as simple telescopes, SALT (Southern African Large telescope), SKA (Square Kilometre Array)	• Pictures and information about telescopes

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Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**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)	• **researching** the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications • **designing, making and evaluating** a model of one of these vehicles which can move by means of wheels and axles *(refer to **Section 2.7**)* • measuring how far the different vehicles can run down a ramp and draw bar graphs *[This can be used as a possible project]*	• Pictures of the Moon Rovers and Mars Rovers • Apparatus including bottle tops, round tins or cardboard circles for the wheels, sosatie sticks or dowels and straws for the axles • Measuring tapes or meter sticks
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. As this is the exam term, the final two weeks may be required for revision of the year's work and for examinations. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • describe objects in our Solar System (planets, moons, the Sun, Asteroids) • demonstrate the Earth's rotation and revolution • explain the movements of the Moon • identify the essential differences between the Earth, Sun and the Moon • explain the uses of telescopes and the important telescopes in South Africa • make and evaluate a model vehicle featuring wheels and axles	