

## 5 Natural Sciences

### Revised National Teaching Plan

#### Life and Living

TERM 1 48 days	Week 1 15 – 17 Jan (3 days)	Week 2 20 – 24 Jan	Week 3 27 – 31 Jan	Week 4 03 – 07 Feb	Week 5 10 – 14 Feb	Week 6 17 – 21 Feb	Week 7 24 – 28 Feb	Week 8 02 – 06 Mar	Week 9 09 – 13 Mar	Week 10 16 – 20 Mar	
<b>CAPS Topics</b>	• <b>Cells as the basic units of life</b>		• <b>Systems in the human body</b>		• <b>Human reproduction</b>		• <b>Circulatory and respiratory systems</b>	• <b>Digestive system</b>	<b>Assessment</b>		
<b>Topic, concepts, skills and values</b>	<ul style="list-style-type: none"> <li>Cell structure</li> <li>Differences between plant and animal cells</li> </ul>	<ul style="list-style-type: none"> <li>Cells in tissues, organs and systems</li> </ul>	<ul style="list-style-type: none"> <li>Body systems</li> </ul>	<ul style="list-style-type: none"> <li>Body systems</li> </ul>	<ul style="list-style-type: none"> <li>Purpose and puberty</li> <li>Reproductive organs</li> </ul>	<ul style="list-style-type: none"> <li>Stages of reproduction</li> </ul>	<ul style="list-style-type: none"> <li>Breathing, gaseous exchange, circulation and respiration</li> </ul>	<ul style="list-style-type: none"> <li>Healthy diet</li> <li>The alimentary canal and digestion</li> </ul>			
<b>Requisite pre-knowledge</b>	<ul style="list-style-type: none"> <li>Grade 4: Living things</li> </ul>		<ul style="list-style-type: none"> <li>Grade 5: Animal Skeletons</li> </ul>		<ul style="list-style-type: none"> <li>Grade 5: Life Cycles</li> <li>Grade 7: Human Reproduction</li> </ul>		<ul style="list-style-type: none"> <li>Grade 4: Living things</li> <li>Grade 6: Photosynthesis</li> <li>Grade 8: Respiration</li> </ul>	<ul style="list-style-type: none"> <li>Grade 6: Nutrition &amp; Nutrients in food</li> </ul>			
<b>Resources to enhance learning</b>	<ul style="list-style-type: none"> <li>Reference material</li> <li>3 dimensional (3D) model of a cell, and/or pictures</li> <li>micrographs of plant and animal cells</li> </ul>		<ul style="list-style-type: none"> <li>Models or charts of torso, heart, kidney, digestive system, lungs</li> </ul>		<ul style="list-style-type: none"> <li>Models or charts of the reproductive system</li> </ul>		<ul style="list-style-type: none"> <li>Sheep/pig heart and lungs</li> <li>Stop watch/cell phone (for timing)</li> </ul>	<ul style="list-style-type: none"> <li>Pictures of eating disorders</li> <li>Video clips</li> <li>Samples of food</li> <li>Iodine solution</li> <li>White paper</li> <li>Ethanol or pure alcohol</li> </ul>			
<b>Informal assessment; remediation</b>	<ul style="list-style-type: none"> <li>Research and write about the history of the discovery of the light and electron microscopes</li> <li>Tabulate the differences between plant and animal cells</li> <li>Prepare and examine slides of plant and animal cells such as onion cells, cheek cells.</li> <li>Draw and label a few cells from each observation</li> </ul>		<ul style="list-style-type: none"> <li>Draw a large outline of the human body, add and label each system</li> <li>Research and writing about the health issues related to each system</li> <li>Label diagrams and explain processes involved in Human Reproductive System</li> <li>Draw a flow chart to show the sequence of the stages in Human Reproduction</li> <li>Research and writing about the effects of alcohol, smoking and drug abuse on the foetus [Relate this to the role of the placenta]</li> <li>Debate and discuss issues such as abortion, infertility, surrogacy, contraception, population control</li> <li>Measure and compare heart rates before and after exercise. Draw a bar graph of the results. Make deductions of the findings.</li> <li>Draw flow charts to show the sequence of the stages from inhaling oxygen, to respiration, to exhaling carbon dioxide</li> <li>Research and write about one of the causes of health issues (such as smoking, drinking alcohol, high cholesterol levels) associated with the circulatory and respiratory systems</li> <li>Conduct an investigation to test for the presence of starch and grease (fats and oils) in food.</li> <li>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</li> <li>Compare balanced diets from different cultures such as kosher / halaal and non-kosher / non-halaal food</li> </ul>								
<b>Formal Assessment</b>	<ul style="list-style-type: none"> <li>Practical task / Investigation</li> <li>Test</li> </ul>										

## Matter and Materials

(Will be done in 7 weeks over Terms 2 & 3)

TERM 2 9 days	Week 17 13 – 17 July	Week 18 20 – 24 July
<b>CAPS Topics</b>	<ul style="list-style-type: none"><li>• <b>Compounds</b></li></ul>	
<b>Topic, concepts, skills and values</b>	<ul style="list-style-type: none"><li>• The Periodic Table</li><li>• Names of compounds</li></ul>	
<b>Requisite pre-knowledge</b>	<ul style="list-style-type: none"><li>• Grade 7: Introduction to the Periodic Table of Elements</li><li>• Grade 8: Atoms</li></ul>	
<b>Resources to enhance learning</b>	<ul style="list-style-type: none"><li>• Reference materials</li><li>• Periodic Table of Elements</li><li>• beads/ beans/plasticine or playdough</li></ul>	
<b>Informal assessment; remediation</b>	<ul style="list-style-type: none"><li>• Distinguish between pure substances and mixtures</li><li>• Identify the relevant elements, mentioned in the reactions studied, on the Periodic Table of Elements</li><li>• Write the names and the formulae (chemical symbols) of ALL the substances for every studied reaction. Write their balanced equations.</li><li>• Describe the neutralisation of an acid with a base using pH</li></ul>	
<b>Formal Assessment</b>	<ul style="list-style-type: none"><li>• None</li></ul>	

## Matter and Materials

(Will be done in 7 weeks over Terms 2 & 3)

TERM 3 37 days	Week 19 3 – 7 Aug	Week 20 10 – 14 Aug	Week 21 17 – 21 Aug	Week 22 24 – 28 Aug	Week 23 31 Aug – 4 Sept	Week 24 7 – 11 Sept	Week 25 14 – 18 Sept	Week 26 21 – 23 Sept (3 days)	
<b>CAPS Topics</b>	<b>Chemical reactions</b>	<b>Reactions of metals with oxygen</b>	<b>Reactions of non-metals with oxygen</b>	<b>Acids &amp; bases and pH value</b>	<b>Reactions of acids with bases: Part I</b>	<b>Reactions of acids with bases: Part II</b>	<b>Consolidation/Revision</b>	<b>Assessment</b>	
<b>Topic, concepts, skills and values</b>	<ul style="list-style-type: none"> <li>Chemical equations to represent reactions</li> <li>Balanced equations</li> </ul>	<ul style="list-style-type: none"> <li>The general reaction of metals with oxygen</li> <li>Reaction of iron with oxygen</li> <li>Reaction of magnesium with oxygen</li> <li>Formation of rust</li> <li>Ways to prevent rusting</li> </ul>	<ul style="list-style-type: none"> <li>The general reaction of non-metals with oxygen</li> <li>Reaction of carbon with oxygen</li> <li>Reaction of sulfur with oxygen</li> </ul>	<ul style="list-style-type: none"> <li>The concept of pH value</li> </ul>	<ul style="list-style-type: none"> <li>Neutralisation and pH</li> </ul>	<ul style="list-style-type: none"> <li>The general reaction of an acid with a metal oxide (base)</li> <li>Applications</li> <li>The general reaction of an acid with a metal hydroxide (base)</li> </ul>			
<b>Requisite pre-knowledge</b>	<ul style="list-style-type: none"> <li>Grade 6: Mixtures</li> <li>Grade 8: Atoms; Particle model of matter; Chemical reactions</li> </ul>	<ul style="list-style-type: none"> <li>Grade 6: Mixtures</li> <li>Grade 8: Atoms; Particle model of matter; Chemical reactions</li> </ul>		<ul style="list-style-type: none"> <li>Grade 7: Introduction to the Periodic Table of Elements; Acids, bases and neutrals</li> <li>Grade 8: Atoms</li> </ul>					
<b>Resources to enhance learning</b>	<ul style="list-style-type: none"> <li>Plastic beads/beans/plasticine or playdough</li> </ul>	<ul style="list-style-type: none"> <li>Heat source (such as Bunsen burner or spirit lamp)</li> <li>Matches</li> <li>Safety goggles</li> <li>Steel wool</li> <li>Tongs/ pliers</li> <li>Magnesium ribbon</li> <li>Tongs/ pliers</li> <li>Pictures of rusty objects</li> </ul>	<ul style="list-style-type: none"> <li>Plastic beads/beans/plasticine or playdough</li> </ul>	<ul style="list-style-type: none"> <li>Universal indicator</li> <li>Red cabbage/ red onion/ turmeric/bromothymol blue or phenolphthalein</li> <li>Test tubes</li> <li>Test tube racks</li> <li>Glass containers</li> <li>Liquids such as: tea, rooibos, coffee, milk, fruit juices, fizzy drinks</li> <li>Household substances such as: vinegar, tartaric acid, lemon, soap, bicarbonate of soda, liquid soap</li> </ul>	<ul style="list-style-type: none"> <li>Beakers/ glass jars</li> <li>Test tubes</li> <li>Vinegar</li> <li>Bicarbonate of soda</li> <li>Water</li> <li>Universal indicator</li> </ul>	<ul style="list-style-type: none"> <li>Magnesium oxide powder</li> <li>Water</li> <li>Universal indicator</li> <li>Test tubes</li> <li>Test tube racks</li> <li>Glass containers</li> <li>Pictures illustrating the effects of acid rain</li> <li>Dilute sodium hydroxide</li> <li>Dilute hydrochloric acid</li> <li>Beakers/ glass jars</li> <li>Heat source (such as Bunsen or spirit burner)</li> <li>Evaporating tins</li> <li>Dropper</li> </ul>			
<b>Informal assessment; remediation</b>	<ul style="list-style-type: none"> <li>Distinguish between pure substances and mixtures</li> <li>Identify the relevant elements, mentioned in the reactions studied, on the Periodic Table of Elements</li> <li>Write the names and the formulae (chemical symbols) of ALL the substances for every studied reaction. Write their balanced equations.</li> <li>Describe the neutralisation of an acid with a base using pH</li> </ul>								
<b>Formal Assessment</b>	<ul style="list-style-type: none"> <li>Test</li> </ul>								

## Energy and Change

(Will be done in 7 weeks only in Term 4)

TERM 4 38 days	Week 27 28 Sept – 2 Oct	Week 28 5 – 9 Oct	Week 29 12 – 16 Oct	Week 30 19 – 23 Oct	Week 31 26 – 30 Oct	Week 32 2 – 6 Nov	Week 33 9 – 13 Nov	Week 34 16 – 18 Nov	Week 35... 19 Nov on-wards		
<b>CAPS Topics</b>	<b>Forces (2 weeks)</b>		<b>Electric cells as energy systems</b>	<b>Resistance</b>	<b>Series and parallel circuits</b>		<b>Safety with electricity</b>	<b>Energy and the national electricity grid</b>	<b>Consolidation/Revision</b>	<b>Assessment</b>	
<b>Topic, concepts, skills and values</b>	<ul style="list-style-type: none"> <li>Types of forces</li> <li>Contact forces</li> </ul>	Field forces (non-contact forces) <ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Electric cells</li> </ul>	<ul style="list-style-type: none"> <li>Uses of resistors</li> <li>Factors that affect resistance in a circuit</li> </ul>	<ul style="list-style-type: none"> <li>Series circuits</li> <li>Parallel circuits</li> </ul>		<ul style="list-style-type: none"> <li>Safety practices</li> </ul>	<ul style="list-style-type: none"> <li>Electricity generation</li> <li>Nuclear power in South Africa</li> <li>National electricity grid</li> </ul>			
<b>Requisite pre-knowledge</b>	<ul style="list-style-type: none"> <li>Gr. 8 Static electricity</li> <li>Gr. 8 Energy transfer in electrical systems</li> </ul>		<ul style="list-style-type: none"> <li>Gr 7 - Potential and Kinetic; energy and conservation of energy within a system;</li> <li>Gr 5 &amp; 6 - Electric cells;</li> <li>Gr 7 - The national electricity; supply system</li> <li>Gr 8 - Transfer of energy within electrical systems;</li> </ul>								
<b>Resources to enhance learning</b>	<ul style="list-style-type: none"> <li>Reference materials</li> <li>Wooden blocks</li> <li>Sponges</li> <li>Rubber (eraser)</li> <li>Fabric</li> <li>Balls/balloons</li> <li>Spring balances calibrated in newtons</li> <li>Bar magnets</li> <li>Iron fillings</li> <li>Wood</li> <li>Plastic</li> <li>Iron</li> <li>Brass</li> <li>Aluminium foil</li> <li>Perspex</li> <li>Plastic ruler/comb</li> <li>Plastic bags</li> <li>Silk cloth and other fabrics</li> <li>Inflated balloons</li> <li>Glass</li> <li>Pieces of paper</li> </ul>		<ul style="list-style-type: none"> <li>Conducting wires</li> <li>LED bulbs</li> <li>Zinc and copper plates, zinc sulphate, copper sulphate</li> </ul>	<ul style="list-style-type: none"> <li>Circuit board</li> <li>Cells/battery</li> <li>Different conductors (wires)</li> <li>Light bulbs or LEDs</li> <li>Ammeter</li> </ul>	<ul style="list-style-type: none"> <li>Circuit board</li> <li>Cells/battery</li> <li>Conductor (wire)</li> <li>Resistors</li> <li>Light bulbs or LEDs</li> <li>Voltmeter</li> <li>Ammeter</li> </ul>		<ul style="list-style-type: none"> <li>Pictures or diagrams of wiring showing fuses, circuit breakers and earthing</li> <li>Three-pin plugs</li> <li>Screw-drivers</li> </ul>	<ul style="list-style-type: none"> <li>Pictures of power stations in southern Africa</li> <li>Pictures of components of a power station</li> <li>Video clips from the internet</li> <li>Diagram showing the national electricity grid with main power stations</li> </ul>			

<b>Informal assessment; remediation</b>	<ul style="list-style-type: none"> <li>Investigate physical (mechanical) push and pull forces on objects and materials,</li> <li>Demonstrate gravitational force using falling objects</li> <li>Measure and record the weights (in Newtons) of different objects using a spring balance and force meter</li> <li>Investigate how to charge objects by rubbing different materials/objects together using available materials and objects</li> <li>Investigate the relationship between the normal force and friction? Draw a table to record the force. Plot a graph. Identify dependent and independent variables.</li> <li>Draw labelled free-body diagrams of the forces acting on the block</li> <li>Investigate: If different objects fall at the same rate; the mass of an object and its weight and Magnetic or non-magnetic materials</li> </ul>	<ul style="list-style-type: none"> <li>Construct the circuit with the cell, the ammeter, 1 bulb and the switch in series. Draw a circuit diagrams</li> <li>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.</li> <li>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</li> <li>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</li> <li>Identify fuses, circuit breakers, earthing and earth leakage systems in real circuits, or on circuit diagrams.</li> <li>Practise how to connect 3-pin plugs</li> </ul>
<b>Formal Assessment</b>	<ul style="list-style-type: none"> <li>Test</li> </ul>	

### Science process skills

The teaching and learning of Natural Sciences involves 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. *Hypothesizing* – 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?