# 2021 Annual Teaching Plan

## Natural Sciences

## Grade 8

### Life and Living

| Term 1<br>45 days | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 |
|---|---|---|---|---|---|---|---|---|---|
| CAPS Topic | **Photosynthesis and respiration**<br>(2 weeks) | | **Interactions and interdependence within the environment**<br>(5 weeks) | | | | | **Micro-organisms**<br>(2 weeks) | |
| Core Concepts, Skills and Values | • Photosynthesis<br>• Respiration | | • Introduction to ecology<br>• Ecosystems<br>• Feeding relationships<br>• Balance in an ecosystem<br>• Adaptations<br>• Conservation of the ecosystem | | | | | • Types of micro-organisms<br>• Harmful micro-organisms<br>• Useful micro-organisms | |
| Requisite Pre-Knowledge | • Grades 4 and 5: Seven life processes of living things.<br>• Grades 5 and 6: Photosynthesis in the context of green plants and food chains.<br>• Grades 6 and 7 (*Energy and Change*): Energy for movement (kinetic energy) and energy that is stored (potential energy). | | • Grades 5 and 6: The concept of an ecosystem and feeding relationships (food chains in Grade 5 and 6).<br>• Grades 7 (*Life and Living*): Biosphere; Biodiversity and Sexual Reproduction in Angiosperms, (including sections on pollination). | | | | | • Grades 7: Classification of living organisms | |
| Resources (other than textbook) to enhance learning | • Reference materials<br>• A variety of leaves<br>• Heat source/spirit or Bunsen burners<br>• Glass containers/test tubes<br>• Ethanol/methylated spirits<br>• Iodine solution<br>• White surfaces<br>• Slaked lime (to make lime water)<br>• Drinking straws | | • Pictures of different ecosystems (large and small) showing the living and non-living components<br>• Thermometers<br>• Hand lenses<br>• String (for making quadrats)<br>• Rulers/meter sticks<br>• Sieves<br>• Hand lenses<br>• Field guides for identifying plants and animals<br>• Pictures of different local/South African organisms<br>• Video clips<br>• Pictures of plants and animals in different ecosystems, such as forests, oceans, deserts | | | | | • Hand lenses, or<br>• Bio-viewers | |
| Informal Assessment | • Explain the requirements and products of photosynthesis<br>• Investigate which leaves photosynthesise?<br>• Test if human breath contains carbon dioxide<br>• Identify and explain requirements and products of respiration<br>• Compare photosynthesis and respiration | | • Evaluate disruptions to an ecosystem; giving causes, effects and solutions<br>• Identify the type of interaction between organisms within an ecosystem<br>• Identifying a food chain or food web in an ecosystem in or near the school grounds<br>• Draw food chains and food webs (linking names with arrows) in different ecosystems<br>• Draw and analysing energy pyramids<br>• Describe how the different organisms are adapted to live in their specific environments.<br>• Researching and writing on:<br>- Factors that disrupt a balanced ecosystem<br>- The importance of maintaining biodiversity and sustainable use of natural resources<br>- Air pollution, water pollution, landfills and climate change | | | | | • 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.<br>• Research various useful microorganism used in, e.g.; food and food-making | |

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| | | - Irresponsible human practices (such as inappropriate waste disposal) and their impact on ecosystems with suggestions of possible solutions | processes, water treatment, biotechnology research to produce alternative, renewable energy, for example, biogas and biofuels, the development of various medicines, for example, antibiotics.<br>• Investigating the growth of yeast under different conditions, e.g.; different amounts of sugar, different temperatures, etc.<br>• Research all the scientists who made contributions in the study of various types of microorganisms. |
| SBA (Formal Assessment) | • Practical task<br>• Test | | |

## Matter and Materials

| Term 2<br>51 days | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** | **Week 6** | **Week 7** | **Week 8** |
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| CAPS Topic | **Introduction to the periodic table of elements**<br>(1 week) | **Atoms**<br>(2 weeks) | | **Particle model of matter**<br>(5 weeks) | | | | |
| Core Concepts, Skills and Values | • Arrangement of elements on the periodic table<br>• Some properties of metals, semi-metal and non-metals | • Atoms – building blocks of matter<br>• Sub-atomic particles<br>• The concept of the particle model of matter | | • Pure substances<br>• Elements<br>• Compounds<br>• The concept of the particle model of matter<br>• Change of state<br>• Density, mass and volume<br>• Density and states of matter<br>• Density of different materials<br>• Expansion and contraction of materials<br>• Pressure | | | | |
| Requisite Pre-Knowledge | Grade 4: Materials around us<br>Grade 6: Solids, Liquids and Gases<br>Grade 7: Introduction to the Periodic Table of elements | | | | | | | |
| Resources (other than textbook) to enhance learning | • Periodic Tables<br>• Three colours of pencils / crayons | • Reference materials<br>• Video clips from the internet showing animations of atoms and molecules<br>• Beads/ dried lentils or dried peas<br>• Paper plates<br>• Glue<br>• Plastic “popit” beads or modelling clay or playdough<br>• Copper(II) chloride | | • Ether<br>• Measuring cylinder/large glass jar<br>• Potassium permanganate<br>• Empty tins<br>• Spirit burners<br>• Foil pie dishes<br>• Tripod stands<br>• Gauze wire mats<br>• Candle wax | | | | |

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| | | • Cell/ battery<br>• Conducting wires<br>• Metal plates (electrodes)<br>• Test tubes or small glass containers<br>• Potassium permanganate<br>• Heat source (such as Bunsen burner or spirit lamp)<br>• Wooden splint<br>• Matches<br>• Small ceramic/glass dish (heat resistant) | • Matches<br>• Sponge,<br>• Polystyrene<br>• Wooden and metal blocks of the same size<br>• Paper / plastic cups (of identical size)<br>• Water, sand, flour<br>• Beakers<br>• Oil and water<br>• Ball and ring apparatus<br>• Balloons<br>• Soccer ball<br>• Bicycle tyre<br>• Hand pump |
| Informal Assessment | • 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.<br>• 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.<br>• Draw a table comparing the particles of gases, liquids and solids<br>• Do an investigation to determine whether it is possible to decompose copper chloride using electrical energy.<br>• Investigate if particles diffuse (mix) faster when they are in the liquid state or in the gaseous state.<br>• Investigate what happens when we heat and then cool candle wax.<br>• 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.<br>• Compare the densities of different states of the same material, a solid, a liquid or a gas.<br>• Investigate which material has the highest density; sand, flour, water or air? |
| SBA (Formal Assessment) | • Practical task<br>• Test | | |

## Energy and Change

| Term 3<br>52 days | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 |
|---|---|---|---|---|---|---|---|---|---|
| CAPS Topic | **Potential and Kinetic energy** (1 week) | **Static electricity** (1 week) | **Energy transfer in electrical Systems** (3 weeks) | | | **Series and parallel circuits** (1 week) | **Visible light** (3 weeks) | | |
| Core Concepts, Skills and Values | • Potential energy<br>• Kinetic energy<br>• Potential energy and kinetic energy in systems<br>• Law of conservation of energy | • Friction and static electricity | • Circuits and current electricity<br>• Components of a circuit<br>• Effects of an electric current | | | • Series circuits<br>• Parallel circuits | • Radiation of light<br>• Spectrum of visible light<br>• Opaque and transparent substances<br>• Absorption of light<br>• Reflection of light<br>• Seeing light<br>• Refraction of light | | |
| Requisite Pre-Knowledge | Grade 5 & 6: Circuits and current electricity<br>Grade 7: The transfer of energy; Solar energy;<br>Grade 7: The seasons and life on Earth | | | | | | | | |

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| Resources (other than textbook) to enhance learning | • Rubber bands<br>• Various food packaging with labels showing energy content<br>• Cells (batteries) | • Reference materials<br>• Video clips from the internet<br>• Plastic or Perspex rods or rulers<br>• Pieces of wool/nylon/silk fabric<br>• Small pieces of paper | • Electrical circuit diagrams<br>• Cells/batteries<br>• Circuit boards<br>• Torch bulbs<br>• Switches<br>• Resistors (steel wool or nichrome wire)<br>• Copper wires<br>• Steel wires<br>• Copper(II)chloride<br>• Magnetic compasses<br>• Other (available) input and output devices | • Cells/batteries<br>• Circuit boards<br>• Torch bulbs<br>• Switches<br>• Resistors (various conducting wires, steel wool or nichrome wires)<br>• Copper wires<br>• Steel wires | • Video clips from the internet about the electromagnetic spectrum<br>• Pinhole camera (if available)<br>• Cardboard box (shoe box)<br>• Tissue paper<br>• Glue<br>• Pin<br>• Tinfoil (to make a pinhole camera)<br>• Light source<br>• Triangular prism<br>• Light source<br>• Cut-out cardboard shapes<br>• Reference materials<br>• Video clips from the internet<br>• Mirror<br>• Aluminium foil<br>• Parallel sided prism<br>• Cardboard with a narrow slit or glass<br>• Pencil or ruler<br>• Clear container with water |
| Informal Assessment | • Compare potential and kinetic energy<br>• Describe the input energy and trace and record the transfer and changes of energy through various energy transfer systems | • Observe what happens and describe in terms of same or opposite charge on the materials when:<br>- Rubbing a plastic or perspex ruler with a piece of wool or nylon or silk fabric<br>- Bringing the ruler close to small pieces of tissue paper or sawdust | • Draw and interpreting an electrical circuit diagrams and the symbols used in it<br>• Investigate the heating effect of a current by using a resistance wire (such as a strand of steel-wool/nichrome wire)<br>• Investigate the current strength at all points in a series circuit<br>• Investigate the magnetic effect of a current in a wire bent into a coil<br>• Investigate electrolysis of copper(II) chloride solution | • Investigate the heating effect of a current by using a resistance wire (such as a strand of steel-wool/nichrome wire)<br>• Investigate which metals offer the most resistance<br>• Investigate the magnetic effect of a current in a wire bent into a coil<br>• Investigate the effects of connecting more resistors into the series and parallel circuits.<br>• Investigate how different metals conduct electricity differently. | • Investigate the relationship between the angles of incidence and reflection.<br>• Investigate if light change direction when it passes through a glass block.<br>• Investigate the refraction of light as it enters water<br>• Draw diagrams to show how shadows are cast by opaque objects.<br>• Draw a ray diagram to show the change in direction of light rays at a smooth reflector (such as a mirror)<br>• Draw a ray diagram to show the changes in direction of light rays reflected off a rough surface (such as crumpled aluminium foil).<br>• Draw a ray diagram of a triangular prism and a magnifying glass (lens) to show dispersing and focusing of light<br>• Make Colour Spinning Wheels |
| SBA (Formal Assessment) | • Project<br>• Test | | | | |

## Planet Earth and Beyond

| Term 4<br>47 days | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** | **Week 6** | **Week 7** | **Week 8** |
|---|---|---|---|---|---|---|---|---|
| CAPS Topic | **The Solar System**<br>(3 weeks) | | | **Beyond the Solar System**<br>(3 Weeks) | | | **Looking into space**<br>(2 Weeks) | |
| Core Concepts, Skills and Values | • The Sun<br>• Objects around the Sun<br>• Earth's position in the Solar System | | | • The Milky Way Galaxy<br>• Our nearest star<br>• Light years, light hours, and light minutes<br>• Beyond the Milky Way Galaxy | | | • Early viewing of space<br>• Telescopes | |
| Requisite Pre-Knowledge | Grade 6: The solar system<br>Grade 6: Systems for looking into space<br>Grade 6: Systems to explore the moon and mars | | | | | | | |
| Resources (other than textbook) to enhance learning | • Reference materials<br>• Video clips from the internet showing:<br>- surface of the Sun<br>- movement of the planets around the Sun<br>- meteors, asteroids, comets<br>• Table of facts about the Solar System | | | | | | • Video clips and images from the internet such as:<br>- Constellations<br>- SALT telescope<br>- Hubble telescope<br>- SKA telescope<br>• Star maps from the internet | |
| Informal Assessment | • constructing a model of the Solar System showing relative distances of the planets from the Earth and relative sizes of planets<br>• interpreting a table of facts about the Solar System<br>• comparing and writing about the conditions on other planets in our Solar System including their special features<br>• presenting a fact sheet about any object found in our Solar System<br>• writing about why the conditions on Earth are ideal for life<br>• demonstrating the shape of the milky Way Galaxy with a spiral shape<br>• 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 | | | | | | • observing, recording and comparing the appearance of the Southern Cross constellation by viewing it at least three times during the months of September and October<br>• drawing with labels to explain how a telescope works [choose any type of telescope]<br>• presenting an information poster on a telescope, explaining how it is used and noting the most important information it has captured<br>• discussing the many opportunities in South Africa for careers in astronomy | |
| SBA (Formal Assessment) | • Test | | | | | | | |

**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?