



SCIENCE

SCOPE AND SEQUENCE



NEXUS
INTERNATIONAL
SCHOOL
SINGAPORE

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Overview

In the Nexus Primary Years Programme (PYP), Science is viewed as the exploration of the biological, chemical and physical aspects of the natural world, and the relationships between them. Science encourages curiosity and ingenuity and enables the learner to develop an understanding, appreciation and awareness of the world as it is viewed from a scientific perspective. Reflection on scientific knowledge also helps learners to develop a sense of responsibility regarding the impact of their actions on themselves, others and their world.

The transdisciplinary themes provide the framework for a highly defined, focused, in-depth programme of inquiry, and as Science is relevant to all the transdisciplinary themes, all planned Science learning takes place within this framework. However, we strongly encourage spontaneous, learner-initiated Science inquiries will occur that are not directly related to any planned units of inquiry. These are valuable teaching and learning experiences in themselves.

Our Science component of the PYP is characterised by concepts and skills rather than by content. However, we ensure that a breadth and balance of Science content is covered through our units of inquiry. The knowledge component of Science in the PYP is arranged into four strands: Living Things, Earth and Space, Materials and Matter, and Forces and Energy.

- Adapted from IBO “PYP Science scope and sequence”, (Published July 2008 Updated December 2018)

Science Strands

<u>Strand</u>	<u>Descriptor</u>	<u>Possible related concepts</u>
Living things	The study of the characteristics, systems and behaviours of humans and other animals, and of plants; the interactions and relationships between and among them, and with their environment.	adaptation, animals, biodiversity, biology, classification, conservation, ecosystems, evolution, genetics, growth, habitat, homeostasis, organism, plants, systems (digestive, nervous, reproductive, respiratory)
Earth and space	The study of planet Earth and its position in the universe, particularly its relationship with the sun; the natural phenomena and systems that shape the planet and the distinctive features that identify it; the infinite and finite resources of the planet	atmosphere, climate, erosion, evidence, geography, geology, gravity, renewable and non-renewable energy sources, resources, seasons, space, sustainability, systems (solar, water cycle, weather), tectonic plate movement, theory of origin.
Materials and matter	The study of the properties, behaviours and uses of materials, both natural and human-made; the origins of human-made materials and how they are manipulated to suit a purpose.	changes of state, chemical and physical changes, conduction and convection, density, gases, liquids, properties and uses of materials, solids, structures, sustainability.
Forces and energy	The study of energy, its origins, storage and transfer, and the work it can do; the study of forces; the application of scientific understanding through inventions and machines.	conservation of energy, efficiency, equilibrium, forms of energy (electricity, heat, kinetic, light, potential, sound), magnetism, mechanics, physics, pollution, power, technological advances, transformation of energy

Science Skills

All our learning and teaching provides the opportunity to utilise and develop the approaches to learning. In addition to these, the Science component of our curriculum also provides opportunities for learners to develop a range of science-specific skills and processes. In the list that follows, each of the science-specific skills is accompanied by examples of how these skills might manifest themselves in the classroom. These examples vary in their degree of complexity and are intended to show progression in the development of each skill.

Science skills	Descriptor
a. Observe carefully in order to gather data	Learners will examine objects and living things to find out more about them; observe and manipulate objects by using all their senses as appropriate; observe changes in living things, objects and events over a period of time; distinguish between significant and less significant observations; record observations in a systematic way.
b. Use a variety of instruments and tools to measure data accurately	Learners will use a range of tools and techniques with increasing competency; use standard and non-standard units for measurement; measure, compare and record data including mass, weight, time and temperature; select appropriate tools and measurement units.
c. Use scientific vocabulary to explain their observations and experiences	Learners will talk about what is observed; describe simple features of objects and events; describe what is happening using an increasing scientific vocabulary; record and present findings and conclusions using a variety of strategies and appropriate scientific vocabulary.
d. Identify or generate a question or problem to be explored	Curiosity and generation of questions is part of all scientific inquiries and learners will do this with an increasing degree of independence eg: learners will ask questions or show curiosity about the natural and physical environment; ask questions or identify problems that may lead to investigations; pose questions and define problems that will facilitate effective investigations or inquiries.
e. Plan and carry out systematic investigations, manipulating variables as necessary	Learners will identify variables; collect information and data from a range of sources; suggest approaches and methods for solving problems; identify one or two variables relevant to an investigation; recognize the way in which an experiment is unfair if the relevant variables are not controlled; reflect on methods used in investigations and their effectiveness.
f. Make and test predictions	Learners will observe similarities/differences; suggest what will happen next in structured situations; based on prior learning and/or observations, suggest outcomes of an investigation; make justified predictions; propose ideas or simple theories to be explored or tested.
g. Interpret and evaluate data gathered in order to draw conclusions	Learners will sort and classify according to observable features or selected criteria; look for and recognise patterns in observations; compare results of different investigations; interpret information and offer explanations.
h. Consider scientific models and applications of these models (including their limitations)	Learners will share findings with peers informally; represent findings using pictures and models; reflect on and build upon their own current scientific theories and applications; apply scientific knowledge to reconstruct or refine their understandings of the physical, chemical and biological worlds; assess their understanding in light of new data or reconsideration of existing data.

Phase 1 Expectations

Overall expectations in Science: Phase 1 (Nursery and Kindergarten)

Learners will:

- ❖ develop their observational skills by using their senses to gather and record information, and they will use their observations to identify simple patterns, make predictions and discuss their ideas.
- ❖ explore the way objects and phenomena function, and will recognize basic cause and effect relationships.
- ❖ examine change over varying time periods and know that different variables and conditions may affect change.
- ❖ be aware of different perspectives, and they will show care and respect for themselves, other living things and the environment.
- ❖ communicate their ideas or provide explanations using their own scientific experience and vocabulary.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Sharing the Planet</p> <p>An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.</p> <p>Central idea</p> <p>Living things have shared needs to grow and stay healthy.</p> <p>Key concepts</p> <p>Form Causation Change Responsibility</p> <p>Related concepts</p> <p>Classification (Living and nonliving) Animals Plants Interdependence</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ Differences between living and nonliving things. ❖ The needs of living things. ❖ Sharing our lives with living things. 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ observe and describe the characteristics of living and non-living things ❖ observe the needs of living things that enable them to stay healthy ❖ take responsibility for living things found in his or her environment. ❖ sort living and non-living things based on characteristics ❖ recognise the needs of living things in a range of situations such as pets at home, plants in the garden or plants and animals in bushland

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Who we are</p> <p>An inquiry into the nature of the self; beliefs and values; personal, physical, mental, social and spiritual health; human relationships including families, friends, communities and cultures; rights and responsibilities; what it means to be human.</p> <p>Central idea</p> <p>People use their senses to learn about themselves and the environment.</p> <p>Key concepts</p> <p>Causation Function Connection</p> <p>Related concepts</p> <p>Senses Environment Relationships Behaviour Communication Choices</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ How our senses help us to make decisions. ❖ The senses and how they work. ❖ How the senses help us to understand and explore. 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. ❖ Identify the different senses and how they work. ❖ Explain how we use our different senses in the environment

Phase 2 Expectations

Overall expectations in Science: Phase 2 (Year 1 and 2)

Learners will

- ❖ develop their observational skills by using their senses to gather and record information, and they will use their observations to identify patterns, make predictions and refine their ideas.
- ❖ explore the way objects and phenomena function, identify parts of a system, and gain an understanding of cause and effect relationships.
- ❖ examine change over varying time periods, and will recognize that more than one variable may affect change.
- ❖ be aware of different perspectives and ways of organizing the world, and they will show care and respect for themselves, other living things and the environment.
- ❖ communicate their ideas or provide explanations using their own scientific experience.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Sharing the Planet</p> <p>An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.</p> <p>Central idea</p> <p>Our choices can change our environment.</p> <p>Key concepts</p> <p>Change Causation Responsibility</p> <p>Related concepts</p> <p>Sustainability Choice Consumption Conservation</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ The influences of our choices on the environment ❖ How waste can be reduced. ❖ Action we can take at home and at school to reduce, reuse, recycle 	<p>Science strands</p> <p>Materials and matter Earth and space</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ Ask questions related to sustainability ❖ Identify and solve problems related to sustainability.

Please note: this unit is also included in the social studies scope and sequence.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>How the world works</p> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <p>Central idea People can apply their understanding of forces to invent and create.</p> <p>Key concepts</p> <p>Form Function Causation</p> <p>Related concepts</p> <p>Forces Energy</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ What forces are. ❖ How forces work. ❖ Inventing and creating using forces 	<p>Science strands</p> <p>Forces and energy</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ Name, identify and discuss a range of different forces that include push /pull, gravity, friction, twist, buoyancy and motion ❖ Make simple predictions when carrying out scientific investigations ❖ Explain their reasons for making the predictions they have ❖ Name, identify and discuss simple machines that include lever, wheel and axle, wedge, pulley and inclined plane.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Who we are</p> <p>An inquiry into the nature of the self; beliefs and values; personal, physical, mental, social and spiritual health; human relationships including families, friends, communities and cultures; rights and responsibilities; what it means to be human.</p> <p>Central idea</p> <p>Our choices affect our health.</p> <p>Key concepts</p> <p>Form Perspective Causation</p> <p>Related concepts</p> <p>Relationships Mindfulness Reflection Choice</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ The choices we make. ❖ What it means to be healthy. ❖ The impact of lifestyle choices 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <p>a. Observe carefully in order to gather data</p> <p>b. Use a variety of instruments and tools to measure data accurately</p> <p>c. Use scientific vocabulary to explain their observations and experiences</p> <p>d. Identify or generate a question or problem to be explored</p> <p>e. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>f. Make and test predictions</p> <p>g. Interpret and evaluate data gathered in order to draw conclusions</p> <p>h. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ recognize that living things, including humans, need certain resources for energy and growth ❖ identify the major food groups and be aware of the role they play in human development.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>How the world works</p> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <p>Central idea</p> <p>Exploring light helps us experience our world.</p> <p>Key concepts</p> <p>Form Function Causation Connection</p> <p>Related concepts</p> <p>Light Shadow Colour</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ The properties of light ❖ The sources of light ❖ The application of light 	<p>Science strands</p> <p>Earth and space</p> <p>Forces and energy</p> <p>Science skills</p> <p>a. Observe carefully in order to gather data</p> <p>b. Use a variety of instruments and tools to measure data accurately</p> <p>c. Use scientific vocabulary to explain their observations and experiences</p> <p>d. Identify or generate a question or problem to be explored</p> <p>e. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>f. Make and test predictions</p> <p>g. Interpret and evaluate data gathered in order to draw conclusions</p> <p>h. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ investigate and identify the properties of light ❖ examine how people use light in their everyday lives ❖ reflect on the impact of light on living things ❖ apply their understanding about the properties of light ❖ explore links between light, air and sound (for example, thunder and lightning).

Learning will include the development of the following knowledge, concepts and skills	Possible learning intentions in science	
<p>Transdisciplinary theme</p> <p>Sharing the Planet</p> <p>An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.</p> <p>Central idea</p> <p>People's actions impact living things and their environment</p> <p>Key concepts</p> <p>Causation Connection Responsibility</p> <p>Related concepts</p> <p>Environment Habitats Living things</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ How different environments meet the needs of living things ❖ The impact our actions have on living things ❖ Our responsibility to living things 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ describe the interactions of living things within and between ecosystems ❖ analyse the effects of changing a link in a food web ❖ explain how human activities can have positive or adverse effects on local and other environments (for example, waste disposal, agriculture, industry). ❖ Observe living things and their habitats and note the significant features of that habitat. ❖ Describe habitats and processes and change within them using an increasing scientific vocabulary (learner generated) ❖ Ask questions or identify problems that may lead to investigation. ❖ Apply scientific knowledge to construct and refine their understandings of the biological world ❖ Impact of changes in habitats on animal communities.

Phase 3 Expectations

Overall expectations in Science: Phase 3 (Year 3 and 4)

Learners will

- ❖ develop their observational skills by using their senses and selected observational tools.
- ❖ gather and record observed information in a number of ways, and they will reflect on these findings to identify patterns or connections, make predictions, and test and refine their ideas with increasing accuracy.
- ❖ explore the way objects and phenomena function, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships.
- ❖ examine change over time, and will recognize that change may be affected by one or more variables.
- ❖ examine how products and tools have been developed through the application of science concepts.
- ❖ be aware of different perspectives and ways of organizing the world, and they will be able to consider how these views and customs may have been formulated.
- ❖ consider ethical issues in science-related contexts and use their learning in science to plan thoughtful and realistic action in order to improve their welfare and that of other living things and the environment.
- ❖ communicate their ideas or provide explanations using their own scientific experience and that of others.

Learning will include the development of the following knowledge, concepts and skills	Possible learning intentions in science	
<p>Transdisciplinary theme</p> <p>How the world works</p> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <p>Central idea</p> <p>Forces change the natural environment.</p> <p>Key concepts</p> <p>Form Causation Change</p> <p>Related concepts</p> <p>Change in state (solids, liquids and gases); Plate tectonics; Rock Cycle; Structure of the Earth; Geological Time; Erosion and Deposition; Natural Climate Change;</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ The Earth has different natural features. ❖ Natural phenomena (processes) shape the planet. ❖ Human adaptations to Earth's changes 	<p>Science strands</p> <p>Earth and space</p> <p>Materials and matter</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ identify the long-term and short-term changes on Earth (for example, plate tectonics, erosion, floods, deforestation) ❖ describe how natural phenomena shape the planet ❖ identify the evidence that the Earth has changed (for example, land formations in local environment) ❖ explore scientific and technological developments that help people understand and respond to the changing Earth ❖ reflect on the explanations from a range of sources as to why the Earth changes.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Sharing the Planet</p> <p>An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.</p> <p>Central idea</p> <p>Citizens contribute to communities.</p> <p>Key concepts</p> <p>Causation Perspective Responsibility</p> <p>Related concepts</p> <p>Community Citizens Issues Debate</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ Issues in our local community. (Causation) ❖ Different views on issues. (Perspective) ❖ Actions that support our local community. (Responsibility) 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <p>i. Observe carefully in order to gather data</p> <p>j. Use a variety of instruments and tools to measure data accurately</p> <p>k. Use scientific vocabulary to explain their observations and experiences</p> <p>l. Identify or generate a question or problem to be explored</p> <p>m. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>n. Make and test predictions</p> <p>o. Interpret and evaluate data gathered in order to draw conclusions</p> <p>p. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ consider different perspectives, and how these views may have been formulated. (causation) ❖ consider ethical issues in science-related contexts to plan thoughtful and realistic action in order to improve the wellbeing or welfare of a community. ❖ consider the balance of human activity and the needs of other living things. ❖ consider the balance of the welfare of the environment, resources and human activity.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>How the world works</p> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <p>Central idea</p> <p>People use simple machines to assist with everyday life.</p> <p>Key concepts</p> <p>Form Function Causation</p> <p>Related concepts</p> <p>Force Simple machines Design</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ Forces that act upon objects. ❖ How simple machines work. ❖ How simple machines can be used to solve problems. 	<p><u>Science strands</u></p> <p>Forces and energy</p> <p><u>Science skills</u></p> <p>a. Observe carefully in order to gather data</p> <p>b. Use a variety of instruments and tools to measure data accurately</p> <p>c. Use scientific vocabulary to explain their observations and experiences</p> <p>d. Identify or generate a question or problem to be explored</p> <p>e. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>f. Make and test predictions</p> <p>g. Interpret and evaluate data gathered in order to draw conclusions</p> <p>h. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. ❖ identify the effects of air resistance, water resistance and friction, that act between moving surfaces ❖ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ❖ compare how things move on different surfaces ❖ exploring how non-contact forces are similar to contact forces in terms of objects pushing and pulling another object ❖ investigating the effect of forces on the behaviour of an object through actions such as throwing, dropping, bouncing and rolling

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Sharing the planet</p> <p>An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.</p> <p>Central idea</p> <p>Water is an essential resource.</p> <p>Key concepts</p> <p>Function Change Responsibility</p> <p>Related concepts</p> <p>Cycles Impact Evaporation and Condensation Filtration and separation</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ A balanced water cycle. ❖ How water is used. ❖ Our local, national and global responsibilities regarding water. 	<p>Science strands</p> <p>Earth and space</p> <p>Materials and matter</p> <p>Forces and energy</p> <p>Living things</p> <p>Science skills</p> <p>a. Observe carefully in order to gather data</p> <p>b. Use a variety of instruments and tools to measure data accurately</p> <p>c. Use scientific vocabulary to explain their observations and experiences</p> <p>d. Identify or generate a question or problem to be explored</p> <p>e. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>f. Make and test predictions</p> <p>g. Interpret and evaluate data gathered in order to draw conclusions</p> <p>h. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ recognize that water exists in the air in different forms ❖ explore the impact of the sun on the availability of water ❖ describe how water sustains life ❖ explain why fresh water is a limited resource ❖ describe the relationships between the location of water and population distribution ❖ analyse systems of water storage and usage, both natural and human-made ❖ identify water issues and propose strategies for responsible, equitable water use (for example, desalination).

Please note: this unit is also included in the social studies scope and sequence.

Phase 4 Expectations

Overall expectations in Science: Phase 4 (Year 5 and 6)

Learners will

- ❖ develop their observational skills by using their senses and selected observational tools.
- ❖ gather and record observed information in a number of ways, and they will reflect on these findings to identify patterns or connections, make predictions, and test and refine their ideas with increasing accuracy.
- ❖ explore the way objects and phenomena function, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships.
- ❖ examine change over time, and they will recognize that change may be affected by one or more variables.
- ❖ reflect on the impact that the application of science, including advances in technology, has had on themselves, society and the environment.
- ❖ be aware of different perspectives and ways of organizing the world, and they will be able to consider how these views and customs may have been formulated.
- ❖ examine ethical and social issues in science-related contexts and express their responses appropriately.
- ❖ use their learning in science to plan thoughtful and realistic action in order to improve their welfare and that of other living things and the environment.
- ❖ communicate their ideas or provide explanations using their own scientific experience and that of others.

Learning will include the development of the following knowledge, concepts and skills	Possible learning intentions in science	
<p>Transdisciplinary theme</p> <p>Who we are</p> <p>An inquiry into the nature of the self; beliefs and values; personal, physical, mental, social and spiritual health; human relationships including families, friends, communities and cultures; rights and responsibilities; what it means to be human.</p> <p>Central idea</p> <p>As we grow up, our bodies, behaviours and responsibilities change.</p> <p>Key concepts</p> <p>Change Causation Responsibility</p> <p>Related concepts</p> <p>Puberty Personal Health and welfare Well Being (Balance)</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ How our bodies change as we grow up ❖ Ways to manage our wellbeing ❖ The impact of our choices 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ Recognise that living things including humans, need certain resources for energy and growth. ❖ Identify the major food groups and be aware of the role they play in human development.

Learning will include the development of the following knowledge, concepts and skills	Possible learning intentions in science	
<p>Transdisciplinary theme</p> <p>Where we are in time and place</p> <p>An inquiry into orientation in place and time; personal histories; homes and journeys; the discoveries, explorations and migrations of humankind; the relationships between, and the interconnectedness of, individuals and civilizations from local and global perspectives.</p> <p>Central idea</p> <p>Exploration expands human understanding.</p> <p>Key concepts</p> <p>Function Change Causation</p> <p>Related concepts</p> <p>Space Journeys Discovery</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ Earth and its place in the universe. ❖ How space exploration has changed over time. ❖ The reasons why people have explored space. 	<p>Science strands</p> <p>Earth and space</p> <p>Science skills</p> <p>a. Observe carefully in order to gather data</p> <p>b. Use a variety of instruments and tools to measure data accurately</p> <p>c. Use scientific vocabulary to explain their observations and experiences</p> <p>d. Identify or generate a question or problem to be explored</p> <p>e. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>f. Make and test predictions</p> <p>g. Interpret and evaluate data gathered in order to draw conclusions</p> <p>h. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ identify regular and irregular events in time and space that occur in the solar system ❖ examine the impact of events that occur in the solar system on the Earth ❖ investigate and explain how stars are used for navigation ❖ demonstrate an understanding of other methods of navigation (for example, compasses, satellites).

Please note: this unit is also included in the social studies scope and sequence.

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>How the world works</p> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <p>Central idea</p> <p>Scientific inquiry helps us to investigate changing states of matter.</p> <p>Key concepts</p> <p>Form Change Perspective</p> <p>Related concepts</p> <p>Chemical and Physical changes</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ States of matter. ❖ Physical and chemical changes that solids, liquids and gases can undergo. ❖ How scientific inquiry can lead to new understandings. 	<p>Science strands</p> <p>Materials and matter</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ describe observable changes (including changes of state) that occur in materials ❖ recognize that materials can be solid, liquid or gas ❖ be aware of how to change water into a solid, liquid and gas ❖ apply understanding of basic properties of materials in order to match materials to purpose (for example, waterproofing, insulating). <p>1) Understand and demonstrate a fair test, identifying variables and constants.</p> <p>2) Understand that changes can be reversible or irreversible.</p> <p>2) Recognise that matter can be solid, liquid or gas.</p> <p>3) Describe the changes of state, using subject specific vocabulary.</p>

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>How the world works</p> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <p>Central idea</p> <p>Energy can be transformed and used for human purposes.</p> <p>Key concepts</p> <p>Connection Change Function</p> <p>Related concepts</p> <p>Conservation and Transformation of energy Innovation Properties Role Interdependence</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ How energy is transformed ❖ How energy is used. ❖ The changes in energy production due to advances in science and technology 	<p><u>Science strands</u></p> <p>Forces and energy</p> <p><u>Science skills</u></p> <p>a. Observe carefully in order to gather data</p> <p>b. Use a variety of instruments and tools to measure data accurately</p> <p>c. Use scientific vocabulary to explain their observations and experiences</p> <p>d. Identify or generate a question or problem to be explored</p> <p>e. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>f. Make and test predictions</p> <p>g. Interpret and evaluate data gathered in order to draw conclusions</p> <p>h. Consider scientific models and applications of these models (including their limitations)</p>	<p>The learner will be able to:</p> <p>Energy makes things move. The faster something moves, the more kinetic energy an object has. There are different forms of energy (sound, light, electrical currents). Energy can be stored as potential energy and released as kinetic energy - links to contact forces</p> <p>When objects collide, the contact forces transfer energy so as to change the objects' motions. This causes energy to be transferred from one object to another.</p> <p>Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.</p> <p>Energy that humans use is derived from natural sources. These can be renewable or nonrenewable. Their use affects the environment in multiple ways.</p> <p>Waves, which are regular patterns of motion, can be made in water by disturbing the surface. Waves can pass through solids, liquids and gas. Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks) - explicit link waves carry energy.</p>

Learning will include the development of the following knowledge, concepts and skills		Possible learning intentions in science
<p>Transdisciplinary theme</p> <p>Sharing the planet</p> <p>An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.</p> <p>Central idea</p> <p>Empathy and awareness drives responsible action for sustainability.</p> <p>Key concepts</p> <p>Perspective Connection Responsibility</p> <p>Related concepts</p> <p>Sustainability Balance Wants Vs Needs</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ❖ The environment is made up of interdependent systems. ❖ Human activity and inactions impact on these systems. ❖ People’s perspectives impact their actions. 	<p>Science strands</p> <p>Living things</p> <p>Science skills</p> <ol style="list-style-type: none"> a. Observe carefully in order to gather data b. Use a variety of instruments and tools to measure data accurately c. Use scientific vocabulary to explain their observations and experiences d. Identify or generate a question or problem to be explored e. Plan and carry out systematic investigations, manipulating variables as necessary f. Make and test predictions g. Interpret and evaluate data gathered in order to draw conclusions h. Consider scientific models and applications of these models (including their limitations) 	<p>The learner will be able to:</p> <ul style="list-style-type: none"> ❖ explain how human activities can have positive or adverse effects on local and other environments (for example, agriculture, industry). ❖ investigate how changing the physical conditions for plants impacts on their growth and survival such as salt water, use of fertilizers and soil types ❖ investigating the roles of living things in a habitat, for instance producers, consumers or decomposers

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