



ISoP PYP

Science

Scope and Sequence

In the 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. Our understanding of science is constantly changing and evolving. The inclusion of science within the PYP leads learners to an appreciation and awareness of the world as it is viewed from a scientific perspective. It encourages curiosity and ingenuity and enables the student to develop an understanding of the world. Reflection on scientific knowledge also helps students to develop a sense of responsibility regarding the impact of their actions on themselves, others and their world.

The knowledge component of science in the PYP is arranged into four strands:

Science strands	
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.
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.
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.
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.

(PYP Science scope and sequence, 2008)

Science skills

- a. **Observe carefully in order to gather data** (for example, students 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** (for example, students 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** (for example, students 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** (for example, students 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** (for example, students 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** (for example, students will observe similarities and differences; guess and 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 that may be explored or tested).
- g. **Interpret and evaluate data gathered in order to draw conclusions** (for example, students will sort and classify according to observable features or selected criteria; look for and recognize 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) (for example, students 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).

Overall expectations in science: 3–5 year olds

Students 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. They will explore the way objects and phenomena function, and will recognize basic cause and effect relationships. Students will examine change over varying time periods and know that different variables and conditions may affect change. They will be aware of different perspectives, and they will show care and respect for themselves, other living things and the environment. Students will 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 outcomes in science
<p>Transdisciplinary theme (K1) How the world works</p> <p>Central idea Weather affects us everyday.</p> <p>Key concepts connection, change, function</p> <p>Related concepts cycles, adaptation, pattern, system</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Ways people act in different weather conditions ● Natural cycles (weather patterns and seasons) affect the weather ● Tools we use to observe and measure weather 	<p>Science strands Living things Earth and Space</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> ● Identify different types of weather. ● Identify the seasons of the year and connect them with weather patterns. ● Compare activities that occur during the seasons. ● Talk about how humans make choices regarding clothing and activities according to the weather. ● Make connections between the weather and how to protect himself/herself. ● Identify extreme weather and how it affects people's lives. ● Make predictions of daily weather and temperature. Compare what happened with predictions. ● Use basic tools to observe and record the daily temperature. ● Interpret data collected or observed in the weather forecast.

Learning will include the development of the following knowledge, concepts and skills	Possible learning outcomes in science
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<p>Transdisciplinary theme (K1) Sharing the planet</p> <p>Central idea Animals and people interact in different ways.</p> <p>Key concepts Form, function, responsibility</p> <p>Related concepts similarities, differences, role, behaviour, rights and values</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Characteristics of different animals ● The roles animals play in people’s lives ● Our responsibility for the well-being of animals 	<p>Science strands 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 student will be able to:</p> <ul style="list-style-type: none"> ● Compare and contrast different animals. ● Observe and describe the characteristics of different animals. ● Recognize the roles animals play in people’s lives. ● Observe the needs of animals (throughout the year) that enable them to stay healthy. ● Take responsibility for the well-being of animals. ● Reflect on the impact of human beings on animals and the other way around.
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Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (K1) Who we are</p> <p>Central idea Everyday I learn about who I am, my responsibilities to myself, my school and my friends.</p> <p>Key concepts reflection, responsibility, function</p> <p>Related concepts behaviour, justice, rights, communication</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Reflecting on who we are ● Ways in which we take care of ourselves ● The role of rules we follow at school ● Ways in which we interact with one another 	<p>Science strands 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 student will be able to:</p> <ul style="list-style-type: none"> ● Observe and describe his/her physical and social characteristics.

Overall expectations in science: 5-7 year olds

Students 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. They will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of cause and effect relationships. Students will examine change over varying time periods, and will recognize that more than one variable may affect change. They will 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. Students will 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 outcomes in science
<p>Transdisciplinary theme (K2) How the world works</p> <p>Central idea All living things go through process of change during their life cycles.</p> <p>Key concepts: form, change, connection</p> <p>Related concepts: pattern, similarity, difference, cycles</p> <p>Lines of inquiry:</p> <ul style="list-style-type: none"> ● Characteristics of living things ● Elements of a life cycle ● Similarities and differences of animals' and plants' life cycles 	<p>Science strands 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 student will be able to:</p> <ul style="list-style-type: none"> ● Know that plants and animals are living things. ● Explore how seeds grow into flowering plants. ● Know that animals produce offspring which grow into adults. ● Compare the life cycles of different living things. ● Identify the common components of life cycles (e.g. birth, growth, maturity, reproduction, death).

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (K2) Sharing the Planet</p> <p>Central idea: Plants sustain life on Earth.</p> <p>Key concepts: connection, function, responsibility</p> <p>Related concepts: value, role, review</p> <p>Lines of inquiry:</p> <ul style="list-style-type: none"> • Products we use from plants • How plants contribute to life on Earth • Caring for plants 	<p>Science strands 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 student will be able to:</p> <ul style="list-style-type: none"> • Name the major parts of a plant, looking at real plants and models. • Identify the parts of plants that are used by other living things: e.g. for food, shelter, tools, medicine, cosmetics. • Differentiate between types of plants (ex.grouping plants according to their use, like tree- wood- to make houses, vegetables- to produce food, flowers- to produce cosmetics). • Be aware of the role of plants in sustaining life. • Explain observations that plants need certain conditions to grow. • Show responsibility in caring for plants.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (K2) Where we are in place and time</p> <p>Central idea Homes reflect cultural influences and local conditions.</p> <p>Key concepts: form, function, causation</p> <p>Related concepts: structure, role, impact</p> <p>Lines of inquiry:</p> <ul style="list-style-type: none"> • What constitutes a home • How homes reflect local culture and conditions • Factors that determine where people live 	<p>Science strands 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 student will be able to:</p> <ul style="list-style-type: none"> • Understand that people around the world have different kinds of houses due to the weather, climate and living conditions of their environment.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 1) How the world works</p> <p>Central idea People apply their understanding of forces to manipulate with objects.</p> <p>Key concepts function, change, causation</p> <p>Related concepts gravity, magnetism, physical changes, evidence, power, spatial awareness</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • Forces and their properties • Manipulating with objects using forces • The impact of forces on our life 	<p>Science strands Materials and matter Forces and energy</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Explore, talk about and describe the movement of familiar things. • Recognize that pushes and pulls are forces, investigate the different types of forces (including friction and gravity). • Recognize that when things speed up, slow down or change direction there is a cause. • Explore how forces can change the shape of objects. Know that the shapes of some materials can be changed by squashing, bending, twisting or stretching. • Sort materials according to their properties. • Recognize the effect that surface has on how an object moves when force is applied. • Explore how some materials are magnetic but many are not. • Explore the forces between magnets and know that magnets can attract or repel each other. • Measure and record how different objects move. • Interpret data collected and draw conclusions.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 1) How we organize ourselves</p> <p>Central idea Food products go through many different processes before we eat them.</p> <p>Key concepts Form, change, perspective</p> <p>Related concepts classification, processed food, recipes, choice</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • Sources of food products • Processes food products go through • How people select food products 	<p>Science strands Living things Materials and matter</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 student will be able to:</p> <ul style="list-style-type: none"> • Recognize food products that come from plants or animals. • Talk about the different processes that food can go through before it is used or eaten • Name the four food groups. The four food groups are: the Milk Group (Milk and Milk Substitutes), the Bread Group (Bannock, Bread and Cereals) ,the Meat Group (Meat, Fish, Birds and Eggs), the Fruit and Vegetables Group • Know that processed food can be damaging to health • Give an explanation about the problem that has been explored

Social Studies

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 1) Sharing the planet</p> <p>Central idea: We have the responsibility to take care of our environment.</p> <p>Key concepts causation, function, responsibility</p> <p>Related concepts: ecology, pollution, resources, recycling, choice</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> Limited natural resources How we can reduce waste, reuse and recycle different materials Our personal choices affect the environment 	<p>Science strands Living things 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 student will be able to:</p> <ul style="list-style-type: none"> Discuss what is meant by a “limited natural resource” Analyse ways in which humans use the natural environment; identify natural resources Explain why natural resources are limited; Identify or generate a question or problem to be explored in relation to humans’ impact on the environment; Describe the impact of waste on the environment (positive and negative effects) Group materials on the basis of properties for the purpose of recycling; Describe how particular materials are recycled;

Overall expectations in science: 7-9 year olds

Students will develop their observational skills by using their senses and selected observational tools. They will 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. Students will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships. They will examine change over time, and will recognize that change may be affected by one or more variables. They will examine how products and tools have been developed through the application of science concepts. They will 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. Students will 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. Students will 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 outcomes in science
<p>Transdisciplinary theme (Grade 2) Who we are</p> <p>Central idea Taking care of ourselves allows us to be healthy in many different ways.</p> <p>Key concepts Form, connection, perspective</p> <p>Related concepts initiative, body control, body form, physiology</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • What it means to have a balanced lifestyle • Influence of personal choices on health • The way different sources of information help us make choices 	<p>Science strands 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 student 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 food groups and what makes a balanced diet (food pyramid) • Identify the role exercise and rest plays in a healthy lifestyle • Make and test predictions about the amount of sugar found in certain drinks and food. • Plan and carry out a simple investigation to find out how much sugar is in certain drinks and food. • Plan and carry out simple investigations to find out the effects of exercise on the body (pulse rate, fitness tests) • Apply their understanding of good health (diet, exercise, hygiene, rest, mental health, dressing properly for the weather) to make personal choices.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 2) How the world works</p> <p>Central idea People change states of matter for different purposes.</p> <p>Key concepts Function, change, causation</p> <p>Related concepts behaviour, properties, transformation, impact</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Properties of materials ● Changes of matter (reversible and irreversible) ● Reasons why we change matter 	<p>Science strands Materials and matter</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> ● Recognize and explain that matter can be solid, liquid or gas. ● Describe observable changes that occur in materials. ● Investigate how materials change when they are heated and cooled. ● Describe how to change water into a solid, liquid and gas. ● Plan and carry out numerous experiments, manipulating with states of matter. ● Interpret data and draw conclusions. ● Apply understanding of properties of materials in order to match materials to purpose. ● Assess the benefits and challenges of changing materials to suit people’s needs and wants.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 2) Sharing the planet</p> <p>Central idea The decisions people make can affect habitats and inhabitants.</p> <p>Key concepts: Form, change, responsibility</p> <p>Related concepts: Properties, adaptation, impact</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • The diversity of habitats and inhabitants • Living things and their needs within the habitat • Human impact on natural habitats 	<p>Science strands Living things Earth and space Materials and matter</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 student will be able to:</p> <ul style="list-style-type: none"> • Explain how different habitats are interdependent. • Name and describe organisms living in various habitats and their living conditions (oceans, freshwaters, deserts, rain forest, grassland, wetlands). • Identify dangers caused by humans. • Recognize how different people rely, use and care for natural habitats. • Recognize that people make choices based on their understanding, and the actions they take as a result, to make a difference

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 3) Who we are</p> <p>Central idea Exploring various ways of learning helps individuals understand themselves and others.</p> <p>Key concepts: Form, connection, perspective</p> <p>Related concepts: evidence, opinion, behaviour, self-awareness, growth, independence, interdependence</p> <p>Lines of inquiry:</p> <ul style="list-style-type: none"> • What learning is • Similarities and differences between learning styles • Conditions for learning 	<p>Science strands 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 student will be able to:</p> <ul style="list-style-type: none"> • Compare and contrast the physical similarities and differences of different learning styles (auditory, visual, kinesthetic) • Show an appreciation that everybody has a unique way of learning and that the differences are natural. • Interpret and evaluate class data collected on preferred class learning styles • Observe and describe physical characteristics of the learning environment (school and home) • Observe and describe the actions humans can do in order to learn effectively • Make predictions about what our senses and brain have to do with learning and how they are used • Apply their understanding of how they learn in order to plan their learning

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 3) How the world works</p> <p>Central idea Inanimate nature influences life of people, animals and plants.</p> <p>Key concepts form, change, connection</p> <p>Related concepts Science, interaction, interdependence, properties, geography</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Earth's position in the Solar System. ● Earth's natural cycles. ● The interconnectedness of inanimate and animate nature 	<p>Science strands Earth and Space</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> ● Discover that the sun does not move; its <i>apparent</i> movement is caused by the Earth spinning on its axis. ● Present the Earth's place in the Solar System ● Know that the Earth spins on its axis once in every 24h; model how the spin of the Earth leads to day and night. ● Explain that sunlight directly affects the survival of plants and animals ● Investigate how different animals and plants adapt to seasons' change. ● Recognize some rocks and minerals and the way people use them ● Know that water and air are necessary to sustain life on Earth. ● Identify dangers caused by inanimate nature (e.g. extreme weather and natural hazards) and how they affect life on Earth. ● List and observe the elements of weather; name and use various measuring tools; record and analyse the results of the observations;

Overall expectations in Science: 9-12 year olds

Students will develop their observational skills by using their senses and selected observational tools. They will 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. Students will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of increasingly complex cause and effect relationships. They will examine change over time, and they will recognize that change may be affected by one or more variables. Students will reflect on the impact that the application of science, including advances in technology, has had on themselves, society and the environment. They will 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. Students will examine ethical and social issues in science-related contexts and express their responses appropriately. They will 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. Students will 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 outcomes in science
<p>Transdisciplinary theme (Grade 4) Who we are</p> <p>Central idea Our health depends on the (quality of) interactions between human body systems.</p> <p>Key concepts Function, connection, responsibility</p> <p>Related concepts systems, interdependence, initiative, organisms</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • Body systems and how they work (function) • How body systems are interdependent (connection) • The way our lifestyle affects body systems (responsibility) 	<p>Science strands Living things</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Name the body systems and understand their major roles; • Recognize that humans have bony skeletons inside their bodies. These skeletons grow as humans grow, support and protect the body; • Know that muscles are attached to the bones; • Name major organs of body systems and identify their positions; • Describe the main functions of the major organs of the body. • Explain the interconnectedness of body systems and give examples, showing the cause and effect relationship;

PSPE

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
<p>Transdisciplinary theme (Grade 4) How the world works</p> <p>Central idea We generate and use energy in different ways and it has an impact on the environment.</p> <p>Key concepts function, change, causation</p> <p>Related concepts chemical and physical changes, conservation of energy, forms of energy, transformation of energy</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • Different types and uses of energy • The storage and transformation of energy • The impact of energy on the environment and society 	<p>Science strands Forces and Energy Earth and Space Materials and matter</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Identify different forms of energy • Demonstrate and explain how different forms of energy are used and transformed • Contrast renewable and non-renewable sources of energy • Explain how renewable energy is generated, stored and transferred • Explain the impact of energy on society and the environment - both positive and negative • Interpret data in order to draw conclusions, make implications for future • Examine ways in which the local and global community could be improved in relation to the sustainable use and conservation of energy. • Discuss the use of the natural phenomena (water, wind, sun) to create energy. • Discuss the properties of natural and human-made materials and how they are manipulated to suit a purpose (e.g. using coal to produce heat).

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<p>Transdisciplinary theme (Grade 5) Where we are in place and time</p> <p>Central idea Exploration leads to discoveries, opportunities and new understandings.</p> <p>Key concepts causation, change, reflection</p> <p>Related concepts colonialism, human rights, progress, innovation</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Reasons for exploration (causation) ● How exploration has evolved over time (change) ● The consequences of exploration (reflection) 	<p>Science strands Living things 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. Explore a variety of observational and orienteering instruments and tools</p> <p>e. Studying different kinds of maps and plans as a source of geographical data</p> <p>f. Identify or generate a question or problem to be explored</p> <p>g. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>h. Make and test predictions</p> <p>i. Interpret and evaluate data gathered in order to draw conclusions</p> <p>j. Consider scientific models and applications of these models (including their limitations)</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> ● Demonstrate an ability to observe and measure using plans, maps, magnifying glass, tape measure, compass, field glass and binoculars and understanding of different methods of navigation ● Follow written, verbal and pictographic instructions while conducting observation and experiments ● Analyse, describe, compare, classify using a variety of sources of information e.g. observations, maps, photographs, texts ● Tell the difference between maps and plans; know how to create a plan; know and use the key; is able to identify key buildings/ landmarks of the immediate surrounding ● Telling the difference between various types of maps ● See the integrity between the development of humankind and the value of nature ● Know the connection between the position of the sun and the length and direction of the shadow; describe changes of the position of the sun throughout the year above the horizon; know the position of East, West and zenith; identify equator, prime meridian, tropics, latitudes, longitudes ● Name water reservoirs - still and running; name major chosen continents, countries, islands, rivers, seas, oceans, mountain ranges, deserts ● Name animals and plants typical for particular climate zones

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<p>Transdisciplinary theme (Grade 5) How the world works</p> <p>Central idea Understanding of scientific knowledge is constantly evolving and has an impact on people’s lives.</p> <p>Key concepts causation, responsibility, perspective</p> <p>Related concepts transformation, technological advances, mechanics</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> • What leads to advances in scientific knowledge and understanding • The role of technology in scientific understanding • The effects of scientific advances on people and the environment 	<p>Science strands Materials and Matter Forces and Energy</p> <p>Science skills</p> <ol style="list-style-type: none"> Observe carefully in order to gather data Use a variety of instruments and tools to measure data accurately Use scientific vocabulary to explain their observations and experiences Explore a variety of observational and orienteering instruments and tools Studying different kinds of maps and plans as a source of geographical data Identify or generate a question or problem to be explored Plan and carry out systematic investigations, manipulating variables as necessary Make and test predictions Interpret and evaluate data gathered in order to draw conclusions Consider scientific models and applications of these models (including their limitations) 	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Give examples of using the 5 senses to conduct scientific observation; • Recognize the importance of the fossil record to inform the concept of evolution • Explain how simple machines work • Explore scientific and technological developments that help people understand and respond to the changing Earth • Identify the difference between physical and chemical changes • Investigate the ways materials can be changed (for example, metal, sand) • Give examples of items according to their plasticity, brittleness, elasticity and justify their use in everyday life objects. • Assess the benefits and challenges of changing materials to suit people’s needs and wants (for example plastic) • Analyse the way in which technology supports the functioning of workplaces • investigate technology developments • Examine the impact of particular technologies on sustainability • Suggest areas for future technological advances.

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<p>Transdisciplinary theme (Grade 5) How we organise ourselves.</p> <p>Central idea Biodiversity relies on maintaining the interdependent balance of organisms within systems.</p> <p>Key concepts connection, causation, responsibility</p> <p>Related concepts balance, biodiversity, interdependence</p> <p>Lines of inquiry</p> <ul style="list-style-type: none"> ● Interdependence within ecosystems, biomes and environment ● How human interaction with the environment can affect the balance of systems ● The consequences of imbalance within ecosystems 	<p>Science strands 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. Explore a variety of observational and orienteering instruments and tools</p> <p>e. Studying different kinds of maps and plans as a source of geographical data</p> <p>f. Identify or generate a question or problem to be explored</p> <p>g. Plan and carry out systematic investigations, manipulating variables as necessary</p> <p>h. Make and test predictions</p> <p>i. Interpret and evaluate data gathered in order to draw conclusions</p> <p>j. Consider scientific models and applications of these models (including their limitations)</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> ● Identify the different biomes and where they are located ● Observe different ecosystems locally and globally and identify their components ● Describe the interactions between the different components of an ecosystem ● Organize a food chain which explains the producers, consumers and decomposers ● Describe how events can impact an ecosystem both positively and negatively e.g. waste disposal and agriculture, sustainable farming procedures, building on land ● Propose actions that can be taken to protect ecosystems (locally and globally)