Primary Years Programme

Science scope and sequence

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IB mission statement

The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect.

To this end the organization works with schools, governments and international organizations to develop challenging programmes of international education and rigorous assessment.

These programmes encourage students across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right.

IB learner profile

The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world.

As IB learners we strive to be:

INQUIRERS
We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life.

KNOWLEDGEABLE
We develop and use conceptual understanding, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance.

THINKERS
We use critical and creative thinking skills to analyse and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions.

COMMUNICATORS
We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.

PRINCIPLED
We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences.

OPEN-MINDED
We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.

CARING
We show empathy, compassion and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us.

RISK-TAKERS
We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.

BALANCED
We understand the importance of balancing different aspects of our lives—intellectual, physical, and emotional—to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live.

REFLECTIVE
We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.

The IB learner profile represents 10 attributes valued by IB World Schools. We believe these attributes, and others like them, can help individuals and groups become responsible members of local, national and global communities.

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Contents

Science in the Primary Years Programme

Beliefs and values in science

In the 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. Inquiry is central to scientific investigation and understanding. Students actively construct and challenge their understanding of the world around them by combining scientific knowledge with reasoning and thinking skills. Scientific knowledge is made relevant through its innumerable applications in the real world. The science process, by encouraging hands-on experience and inquiry, enables the individual to make informed and responsible decisions, not only in science but also in other areas of life.

The importance of science in an international curriculum is recognized as universal and transcends the boundaries of gender, cultural, linguistic and national biases. The inclusion of science within the curriculum develops an understanding of, and competence in using, the facilities of a rapidly changing scientific and technological world while gaining a positive image of science and its contribution to the quality of life today. It also involves the development of an appreciation for the scientific contributions of people from various cultures and backgrounds.

The IB learner profile is integral to learning and teaching science in the PYP because it represents the qualities of effective learners and internationally minded students. The learner profile, together with the other elements of the programme—knowledge, concepts, skills and action—informs planning and teaching in science.

Effective science practice

Science can be used to provide explanations and models of behaviour for phenomena and objects around us. It can also be used to investigate the interrelationships between the biological, chemical and physical worlds. The science component of the curriculum is considered to be driven by concepts and skills rather than by content. Science should be viewed as a way of thinking and as a process that strives for balance between the construction of meaning and the acquisition of knowledge and skills.

There is no single right way to plan scientific inquiry. Teachers should provide a range of opportunities and situations for students to investigate, and then guide them to make their investigations more effectual. These opportunities and situations should include a variety of external resources and settings, as well as classroom-based work.

Guided inquiry is the way in which students learn best, and the starting point should always be students' prior and current understanding. Students should be invited to investigate science by formulating their own questions, looking at the various means available to answer these questions, and proceeding with research, experimentation, observation and other means that will lead them to their own responses to the questions. The goal is the active construction of meaning that is achieved by building connections between a student's experience and the information and processes derived from the inquiry into new content.

It is suggested that the teacher's role in this process is to create an educational environment that encourages students to take responsibility, to the greatest possible extent, for their own science learning. This means that resources must be provided for each student to become involved in self-initiated inquiry.

In the PYP classroom, the teacher facilitates the process of students becoming initiators rather than followers by asking carefully thought out, open-ended questions, and by encouraging students to ask questions of each other as well as of the teacher. The teacher must also model and value inquiry.

Teachers can use the key concepts and related questions (presented later in this section) to guide their own inquiry. By engaging in inquiry themselves, teachers will not only achieve a deeper understanding of the scientific issues involved, but will also be a model for their students by assuming the role of "teacher as learner".

A PYP teacher's personal knowledge of science is of key importance. What teachers themselves understand shapes which resources they choose, what learning experiences they design and how effectively they teach. The teacher's own interest in, and development of, the subject is maintained through regular professional development, reading of professional journals and, especially, through regular contact with colleagues who share their commitment to teaching science through inquiry. Commercially available resources for teaching science are carefully evaluated to ensure that they meet the needs of the teacher and the students, and the requirements of the programme.

The role of science in the programme of inquiry

It is recognized that learning and teaching science as a subject, while necessary, is not sufficient. Of equal importance is the need to learn science in context, exploring content relevant to students, and transcending the boundaries of the traditional subject. 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, science learning should take place within this framework. In return, the science knowledge and the application of that knowledge will enhance inquiries into the central ideas defined by the transdisciplinary themes.

It is worthwhile to note that there will be occasions that present themselves for student-initiated, spontaneous science inquiries that are not directly related to any planned units of inquiry. These are valuable learning and teaching experiences in themselves and they provide teachers and students with the opportunity to apply the pedagogy of the PYP to authentic, of-the-moment situations. Schools that have local and/or national curriculum requirements in science should articulate how best this predetermined knowledge (or skills) can be incorporated into their programme of inquiry to the fullest possible extent. They will need to plan how students can be encouraged to think scientifically, and promote this way of working throughout the curriculum and not just in the programme of inquiry.

If successful learning in science has taken place, students should be able to select key ideas and significant understanding from the data acquired for a unit of inquiry. They should be able to frame genuine, open-ended questions worthy of sustained research. As they conduct their inquiries, they should be able to provide accurate information and valid explanations. They should be able to identify the possible causes of an issue, choose a solution, and determine appropriate action to be taken. A willingness and ability to take action demonstrates evidence of learning. Through these processes, students should develop the habits and attitudes of successful lifelong learners.

How science practices are changing

Guided inquiry is the main approach to learning and teaching science in the PYP. The PYP represents an approach to teaching that is broad and inclusive in that it provides a context within which a wide variety of teaching strategies and styles can be accommodated, provided that they are driven by a spirit of inquiry and a clear sense of purpose.

As an aid to reflection, the following set of subject-specific examples of effective practice has been produced.

How are science practices changing?	
Increased emphasis on:	**Decreased emphasis on:**
hands-on learning experiences to ensure that students experience and learn science process skills; high level of student involvement in a flexible learning environment	teacher demonstration and strict adherence to teacher-defined activities and direction of process
units of inquiry that lend themselves to transdisciplinary investigations	science lessons/units in isolation
challenging students to answer open-ended questions with investigations so that they can abandon/modify their misconceptions by observations, measurements or experimentation (teacher as facilitator)	the teacher as the sole authority for the correct answer or for disseminating information (teacher as expert)
a wider and responsible use of technology in all its forms as a tool for science learning	a limited use of technology as a tool for learning science or the teaching of an isolated group of skills
accepting uncertainty and ambiguity or the possibility of more than one acceptable solution/ hypothesis	finding pre-set answers
more than one approach, model or process	one scientific model to approach investigations
discussion, dialogue, elaboration and interpretation of data gathered, with students proposing explanations and conclusions	written recording of data only; collecting and recording data as the sole purpose of an activity
challenging students to find applications for, and take action on, what they have learned	simply learning science facts and skills
instruction that recognizes that process and content are interdependent	separating instruction in scientific process and scientific content
providing students with the opportunities to explore a science interest when it arises	confining science to set times
a concept-driven curriculum using a wide variety of materials and manipulatives.	a textbook-driven curriculum using a limited range of science textbooks.

Knowledge and skills in science

The science area of the PYP encompasses science and its applications. In the PYP, the science component of the curriculum should be driven by concepts and skills rather than by content. The key concepts are inevitably influential in driving the curriculum, but there are many other related science concepts that provide further understanding of the subject.

When schools develop their programme of inquiry, they should ensure that a breadth and balance of science content is covered through the units of inquiry. The central ideas a school develops should be directly reflected in the school's scope and sequence documents.

Science scope and sequence aims to provide information for the whole school community about the learning that is going on in science and identifies units of inquiry that could provide authentic opportunities for science learning in the PYP.

In the following "Science strands" section, the knowledge component is arranged into four strands: **living things, Earth and space, materials and matter** and **forces and energy**. The four strands do not need to be taught each year, but there does need to be a balance throughout the programme of inquiry.

In addition to these strands, students will have the opportunity to identify and reflect on "big ideas" by making connections between the questions asked and the concepts that drive the inquiry. They will become aware of the relevance that these concepts have to all of their learning.

In living things, students inquire into issues related to themselves and their environment, while in Earth and space, students extend their inquiry to include the study of planet Earth and its relationship to the universe. The remaining strands, materials and matter and forces and energy, focus on the study of the origins, properties and uses of solids, liquids, gases and energy sources. These strands do not have fixed boundaries; many areas will necessarily overlap with each other and with other subjects such as mathematics, social studies, and personal, social and physical education (PSPE). Students should be made aware of the inevitable links to other areas of the curriculum in order to understand the interconnected nature of the subjects, both with one another and with the transdisciplinary themes.

Science provides opportunities for students to engage in scientific investigations by making accurate observations, handling tools, recording and comparing data, and formulating explanations using their own scientific experiences and those of others. Students will gain experience in testing their own assumptions and thinking critically about the perspectives of others in order to develop further their own ideas.

All curriculum areas provide an opportunity to utilize the approaches to learning. The science component of the curriculum also provides opportunities for students to:

- 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).

Science strands

What do we want students to know?

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.

Related concepts: 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.

Related concepts: 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.

Related concepts: 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.

Related concepts: conservation of energy, efficiency, equilibrium, forms of energy (electricity, heat, kinetic, light, potential, sound), magnetism, mechanics, physics, pollution, power, technological advances, transformation of energy.

Related concepts: While the key concepts have been identified, related concepts could provide further links to the transdisciplinary programme of inquiry or further understanding of the subject. Here, examples of some possible related concepts have been provided for each of the strands. Schools may choose to develop their own related concepts.

Key concepts in the PYP: What do we want students to understand about science?

Central to the philosophy of the PYP is the principle that guided inquiry is a powerful vehicle for learning that promotes meaning and understanding, and challenges students to engage with significant ideas. Hence in the PYP there is also a commitment to a **concept-driven curriculum** as a means of supporting that inquiry. There are clusters of ideas that can usefully be grouped under a set of overarching concepts, each of which has major significance within and across subjects, regardless of time or place.

These key concepts are one of the essential elements of the PYP framework. It is accepted that these are not, in any sense, the only concepts worth exploring. Taken together they form a powerful curriculum component that drives the teacher- and/or student-constructed inquiries that lie at the heart of the PYP curriculum.

When viewed as a set of questions, the concepts form a research tool that is manageable, open-ended and more readily accessible to students. It is these questions, used flexibly by teachers and students when planning an inquiry-based unit, that shape that unit, giving it direction and purpose.

The following table explains each concept from both the generic perspective and the science perspective.

Concept	Generic perspective	Science perspective
Form What is it like?	Everything has a form with recognizable features that can be observed, identified, described and categorized.	Most things have a form or shape with an outward or visible manifestation and an internal structure.
Function How does it work?	Everything has a purpose, a role or a way of behaving that can be investigated.	The special activities, properties or purposes, natural or endowed, of a creature or thing.
Causation Why is it like it is?	Things do not just happen. There are causal relationships at work, and actions have consequences.	The effect brought about by an intended or unintended action or reaction.
Change How is it changing?	Change is the process of movement from one state to another. It is universal and inevitable.	The concept of change, also described as transformation, is a pervasive concept in science. Change is an inevitable aspect of the physical world as things become different or pass from one form to another. It can be natural or brought about and accelerated by outside influences.
Connection How is it connected to other things?	We live in a world of interacting systems in which the actions of any individual element affect others.	The world is full of interacting systems that depend on each other to form a working whole.
Perspective What are the points of view?	Knowledge is moderated by perspectives. Different perspectives lead to different interpretations, understandings and findings. Perspectives may be individual, group, cultural or disciplinary.	Events and findings can be interpreted differently, depending on knowledge, experience and motives. The difference between empirically proven facts and supposition must be emphasized.
Responsibility What is our responsibility?	People make choices based on their understandings, and the actions they take as a result do make a difference.	We have a responsibility to the world in which we live. This involves being aware of how scientific knowledge can be used to improve or worsen the quality of life of all living things. Responsibility entails action as well as awareness.

Examples of questions that illustrate the key concepts

The following table provides sample teacher/student questions that illustrate the key concepts, and that may help to structure or frame an inquiry. These examples demonstrate broad, open-ended questioning—requiring investigation, discussion, and a full and considered response—that is essential in an inquiry-led programme.

Concept	Sample teacher/student questions
Form What is it like?	• What does it feel like? • Where do we get the food we eat? • If the Earth were cut in half between the North Pole and the South Pole, what would it look like on the inside? • What are the components of an ecosystem?
Function How does it work?	• What can you use shadows for? • How do seeds fit into the growth cycle of plants? • How is air being used around us? • What do reservoirs and purification plants do?
Causation Why is it like it is?	• How can you make a shadow? • Why are different foods processed in different ways? • How are houses around the world constructed to suit the local climate? • What causes the changes that occur during puberty?
Change How is it changing?	• How does the sand change from the morning to the afternoon? • What differences do you see in the growth of plants over time? • How do our bodies change when we exercise? • In what ways does air differ from place to place and over time?
Connection How is it connected to other things?	• What link is there between the time of day and the shadow your body makes? • Why are certain vehicles suitable for particular tasks? • How is the human life cycle the same as or different from that of other animals? • What are the similarities and differences between your local ecosystem and a larger ecosystem that you have researched?
Perspective What are the points of view?	• Do plants (or animals) in the classroom need to be taken care of in the same way? Why? • What are the different points of view supported by the evidence? • How does science explain the existence of the Earth, solar system and galaxy? • What are the implications for humans?
Responsibility What is our responsibility?	• What things should we do to care for our classroom plants and animals? • How can we make sure we do not waste water? • What factors do you need to consider when designing and making a vehicle? • What should we do to remain healthy?

How to use the PYP science scope and sequence

This scope and sequence aims to provide information for the whole school community about the learning that is going on in the subject of science through the transdisciplinary programme of inquiry. In addition, it is a tool that will support teaching, learning and assessment of science within the context of units of inquiry.

The sample programme of inquiry published in *Developing a transdisciplinary programme of inquiry* (2008) provides the context and the content for the *Science scope and sequence*. The subject-specific knowledge and skills identified in the subject area annex of *Making the PYP happen: A curriculum framework for international primary education* (2007) are also reflected in this document.

This scope and sequence document contains the following.

For each age range:

- overall expectations by age range.

For each unit selected from the PYP sample programme of inquiry:

- transdisciplinary theme
- central idea
- key concepts and related concepts
- lines of inquiry.

Specific reference to subject knowledge and skills:

- knowledge strands for science
- subject-specific skills for science
- possible learning outcomes for each unit of inquiry
- cross-reference to the *Social studies scope and sequence* document (where appropriate).

At the start of each age range, the **overall expectations** provide broad, summative descriptions of what a PYP student could have achieved in science by the end of each age range. The **possible learning outcomes** in the tables that follow are an extension of these overall expectations and relate directly to the units of inquiry from the PYP sample programme of inquiry. Verbs such as "analyse", "describe" or "identify" are used at the start of each possible learning outcome in order to focus the planning, teaching and assessment on what is demonstrable and observable, and to place the focus on the conceptual understanding of a particular central idea.

The annotated diagram (figure 1) explains the content of the *Science scope and sequence*.

The first column comes directly from the sample programme of inquiry and includes the **transdisciplinary theme** title and descriptor and the **central idea**. The **key** and **related concepts** and **lines of inquiry** are also listed here. This encourages schools to keep in mind the transdisciplinary nature of learning, and reminds them that they should utilize the subject-specific concepts, knowledge and skills to support learning that transcends the confines of the subject.

The second column lists the **science strands** applicable to this unit of inquiry. Full science strand descriptions are found in the introduction to this scope and sequence document.

The **possible learning outcomes** in column three have been developed to reflect the knowledge, concepts and skills from columns one and two as well as being developmentally appropriate for the intended age group. They also take into account the attitudes and the attributes of the IB learner profile and transdisciplinary skills.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Sharing the planet** 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. **Central idea** People interact with, use and value the natural environment in different ways. **Key concepts** • Causation • Reflection • Responsibility **Related concepts** • Conservation • Interdependence • Order **Lines of inquiry** • Local natural environment • Human use of the local natural environment • Actions that benefit or harm the local environment	**Science strand(s)** Living things Earth and space **Science skills** 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)	**The student will be able to:** • describe the natural features of local and other environments (for example, underlying geology) • analyse ways in which humans use the natural environment • identify or generate a question or problem to be explored in relation to human impact on the local environment.

Reflecting a "less is more" principle, the number of learning outcomes has been carefully considered and limited in terms of what is achievable and assessable in each unit of inquiry.

The second column lists the **science skills** that have been identified in the subject annex of *Making the PYP happen: A curriculum framework for international primary education* (2007). Those science skills that might be easier to teach and observe for each unit are marked in bold text.

This box notifies users when possible learning outcomes for social studies have been developed for this unit. These outcomes can be found in the *Social studies scope and sequence*.

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

Figure 1

An explanation of the Science scope and sequence *content*

Overall expectations in science: 3–5 years

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.

Science scope and sequence: 3–5 years

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **How the world works** 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. **Central idea** Our activity is usually connected to the Earth's natural cycles. **Key concepts** • Change • Connection **Related concepts** • Cycles • Interaction **Lines of inquiry** • Night and day cycles (dark and light) • Seasonal changes • Health and safety as related to climate and seasonal changes	**Science strand(s)** Living things Earth and space **Science skills** 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)	**The student will be able to:** • talk about activities that occur during the day and night • compare activities that occur during the seasons • make connections between the weather and how to protect himself or herself • identify simple patterns in daily and seasonal cycles • observe the features of the local environment that are affected by daily and seasonal cycles.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Sharing the planet** 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. **Central idea** Living things have certain requirements in order to grow and stay healthy. **Key concepts** • Function • Responsibility **Related concepts** • Classification • Living and non-living **Lines of inquiry** • Characteristics of living things • Our needs and the needs of other living things • Our responsibility for the well-being of other living things	**Science strand(s)** Living things **Science skills** 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)**	**The student will be able to:** • 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.

<table>
<tr><th colspan="2">Learning will include the development of the following knowledge, concepts and skills</th><th>Possible learning outcomes in science</th></tr>
<tr>
<td>Transdisciplinary theme

How the world works

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.

Central idea

Understanding the way materials behave and interact determines how people use them.

Key concepts
• Function
• Change
Related concepts
• Prediction
• Behaviour
Lines of inquiry
• Behaviour and uses of materials
• Changing properties of materials
• Manipulation of materials for specific purposes</td>
<td>Science strand(s)

Materials and matter

Science skills
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)</td>
<td>The student will be able to:
• use senses to describe observable properties of familiar materials (including solids, liquids, gases)
• 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).</td>
</tr>
</table>

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Sharing the planet** 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 **Central idea** Plants are a life-sustaining resource for us and for other living things **Key concepts** • Form • Change • Connection **Related concepts** • Interdependence • Systems **Lines of inquiry** • What plants provide for us and other living things • The structure of a plant • Caring for plant life	**Science strand(s)** Living things **Science skills** 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)	**The student will be able to:** • identify the parts of plants that are used by other living things (for example, for food, shelter, tools) • be aware of the role of plants in sustaining life (for example, providing oxygen, food) • show responsibility when caring for plants.

Overall expectations in science: 5–7 years

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.

Science scope and sequence: 5–7 years

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Who we are** 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. **Central idea** Making balanced choices about daily routines enables us to have a healthy lifestyle. **Key concepts** • Function • Causation • Reflection **Related concepts** • Balance • Well-being **Lines of inquiry** • Daily habits and routines (hygiene, sleep, play, eating) • Balanced choices • Consequences of choices	**Science strand(s)** Living things **Science skills** 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)	**The student will be able to:** • 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 outcomes in science
Transdisciplinary theme **How the world works** 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. **Central idea** All living things go through a process of change. **Key concepts** • Change • Connection **Related concepts** • Cycles • Transformation **Lines of inquiry** • Life cycles • How living things change over their life time • Developmental stages of various living things	**Science strand(s)** Living things **Science skills** 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)	**The student will be able to:** • describe the life cycles of a variety of living things (for example, a range of animals and plants) • compare the life cycles of different living things • identify the common components of life cycles (for example, birth, growth, maturity, reproduction, death) • investigate the responses of plants or animals to changes in their habitats.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Sharing the planet** 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. **Central idea** People interact with, use and value the natural environment in different ways. **Key concepts** • Causation • Reflection • Responsibility **Related concepts** • Conservation • Interdependence • Order **Lines of inquiry** • Local natural environment • Human use of the local natural environment • Actions that benefit or harm the local environment	**Science strand(s)** Living things Earth and space **Science skills** 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)	**The student will be able to:** • describe the natural features of local and other environments (for example, underlying geology) • analyse ways in which humans use the natural environment • identify or generate a question or problem to be explored in relation to human impact on the local environment.

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

<table>
<tr><th colspan="2">Learning will include the development of the following knowledge, concepts and skills</th><th>Possible learning outcomes in science</th></tr>
<tr>
<td>Transdisciplinary theme

How we express ourselves

An inquiry into the ways in which we discover and express ideas, feelings, nature, culture, beliefs and values; the ways in which we reflect on, extend and enjoy our creativity; our appreciation of the aesthetic.

Central idea

Imagination is a powerful tool for extending our ability to think, create and express ourselves.

Key concepts

• Causation
• Perspective
• Reflection

Related concepts

• Empathy
• Invention
• Transformation

Lines of inquiry

• How we demonstrate and enjoy our imagination
• How our imagination helps us to consider other perspectives
• How imagination helps us to solve problems
• The value of imagination</td>
<td>Science strand(s)

Living things

Earth and space

Materials and matter

Forces and energy

Science skills

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)</td>
<td>The student will be able to:

• recognize that imagination contributes to scientific developments
• explore the use of imagination as a tool to solve problems (for example, particular inventions, scientific discoveries).</td>
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<td>Transdisciplinary theme

How the world works

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.

Central idea

Understanding the properties of air allows people to make practical applications.

Key concepts

• Function
• Causation

Related concepts

• Force
• Energy

Lines of inquiry

• The evidence of the existence of air
• What air can do and how we use it
• The relationship between air, light and sound</td>
<td>Science strand(s)

Living things

Earth and space

Materials and matter

Forces and energy

Science skills

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)</td>
<td>The student will be able to:

• investigate and identify the properties of air
• examine how people use air in their everyday lives (for example, transportation, recreation)
• reflect on the impact of air on living things
• apply his or her understanding about the properties of air (for example, building a windmill)
• explore links between air, light and sound (for example, thunder and lightning).</td>
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<td>Transdisciplinary theme

Sharing the planet

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.

Central idea

People can establish practices in order to sustain and maintain the Earth's resources.

Key concepts
• Change
• Responsibility
• Reflection
Related concepts
• Lifestyle
• Resources
Lines of inquiry
• Limited nature of the Earth's resources
• Personal choices that can help sustain the environment
• Reusing and recycling different materials
• Reducing waste</td>
<td>Science strand(s)

Living things

Earth and space

Materials and matter

Science skills
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)</td>
<td>The student will be able to:
• reflect on and self-assess his or her personal use of natural resources
• investigate ways that familiar materials can be reused
• group materials on the basis of properties for the purpose of recycling
• describe how a particular material is recycled
• explore the role of living things in recycling energy and matter.</td>
</tr>
</table>

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

Overall expectations in science: 7–9 years

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.

Science scope and sequence: 7–9 years

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **How the world works** 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. **Central idea** The design of buildings and structures is dependent on the environment and available materials. **Key concepts** • Connection • Responsibility **Related concepts** • Structure • Sustainability • Transformation **Lines of inquiry** • Considerations to take into account when building a structure • How building impacts on the environment • Indigenous architecture	**Science strand(s)** Living things Materials and matter Forces and energy **Science skills** 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)	**The student will be able to:** • investigate how buildings and other structures stand up (for example, piles, buttresses, I-beam girders) • investigate the construction of a building or structure and identify the materials used • critique the impact of a structure on the natural environment • explain people's responsibility regarding the use of materials from the environment.

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

<table>
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<td>Transdisciplinary theme

Sharing the planet

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.

Central idea

Over time, living things need to adapt in order to survive.

Key concepts

• Change
• Connection

Related concepts

• Adaptation
• Evolution

Lines of inquiry

• Concept of adaptation
• Circumstances that lead to adaptation
• How plants and animals adapt or respond to environmental conditions</td>
<td>Science strand(s)

Living things

Science skills

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)</td>
<td>The student will be able to:

• recognize the ways in which plants and animals have adapted over time
• make links between different features of the environment and the specific needs of living things
• assess the impact that changes in environmental conditions can have on living things
• recognize the importance of the fossil record to inform the concept of evolution.</td>
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<td>Transdisciplinary theme

How the world works

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.

Central idea

Human survival is connected to understanding the continual changing nature of the Earth.

Key concepts

• Causation
• Change
• Connection

Related concepts

• Erosion
• Geology
• Tectonic plates
• Movement

Lines of inquiry

• How the different components of the Earth are interrelated
• How the Earth has changed and is continuing to change
• Why the Earth changes
• Human response to the Earth's changes</td>
<td>Science strand(s)

Earth and space

Science skills

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)</td>
<td>The student will be able to:

• 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.</td>
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</table>

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 outcomes in science
Transdisciplinary theme **Sharing the planet** 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. **Central idea** Water is essential to life, and is a limited resource for many people. **Key concepts** • Function • Responsibility **Related concepts** • Conservation • Equity • Processes **Lines of inquiry** • Sources of water and how water is used • What happens to water after we have used it • Distribution and availability of usable water • Responsibilities regarding water	**Science strand(s)** Living things Earth and space **Science skills** 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)	**The student will be able to:** • 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 • analyse systems of water storage and usage, both natural and human-made • explain why fresh water is a limited resource • identify water issues and propose solutions for responsible, equitable water use (for example, desalination).

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

Overall expectations in science: 9–12 years

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.

Science scope and sequence: 9–12 years

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **How the world works** 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. **Central idea** Energy may be converted from one form to another and stored in various ways. **Key concepts** • Form • Function • Connection **Related concepts** • Conservation • Transformation **Lines of inquiry** • Forms of energy • The storage and transformation of energy • Conservation of energy • Renewable and sustainable energy	**Science strand(s)** Living things Earth and space Forces and energy **Science skills** 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)**	**The student will be able to:** • identify and describe different forms of energy • demonstrate how energy can be stored and transformed from one form to another (for example, storage of fat, batteries as a store of energy) • explain the impact of diet in providing the body with sources of potential energy • assess renewable and sustainable energy sources (for example, wind, solar, water) • examine ways in which the local community could be improved in relation to the conservation of energy.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Sharing the planet** 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. **Central idea** Children worldwide face a variety of challenges and risks. **Key concepts** • Function • Reflection **Related concepts** • Equality • Rights **Lines of inquiry** • Challenges and risks that children face • How children respond to challenges and risks • Ways in which individuals, organizations and nations work to protect children from risk	**Science strand(s)** Living things **Science skills** 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)**	**The student will be able to:** • explore health and safety issues facing children (for example, spread of disease, accidents, access to health care) • understand the role of vaccinations • explain the need to act responsibly with regards to his or her health and the health of others (for example, colds, head lice).

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

<table>
<tr><th colspan="2">Learning will include the development of the following knowledge, concepts and skills</th><th>Possible learning outcomes in science</th></tr>
<tr>
<td>Transdisciplinary theme

Where we are in place and time

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.

Central idea

Past civilizations shape present day systems and technologies.

Key concepts
• Causation
• Change
• Perspective
Related concepts
• Continuity
• Progress
• Technology
Lines of inquiry
• Aspects of past civilizations that have survived
• Reasons these systems and technologies developed
• Why modern societies continue to use adaptations of these systems and technologies
• Implications for the future</td>
<td>Science strand(s)

Forces and energy

Science skills
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)</td>
<td>The student will be able to:
• investigate which simple machines were developed by past civilizations (for example, lever, ramp, pulley, screw, wheel)
• explore the principle of using gears to provide more work for less energy
• analyse why and how we still use simple machines.</td>
</tr>
</table>

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 outcomes in science
Transdisciplinary theme **How the world works** 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. **Central idea** The fact that materials can undergo permanent or temporary changes poses challenges and provides benefits for society and the environment. **Key concepts** • Form • Function • Responsibility **Related concepts** • Measurement • Transformation **Lines of inquiry** • Nature of chemical and physical energy • Practical applications and implications of change in materials • Ethical dilemmas associated with manufacturing processes and by-products	**Science strand(s)** Living things Materials and matter **Science skills** 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)**	**The student will be able to:** • identify the difference between physical and chemical changes • investigate the ways materials can be changed (for example, metal, sand) • assess the benefits and challenges of changing materials to suit people's needs and wants (for example, plastic) • recognize and report on the environmental impact of some manufacturing processes.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **Sharing the planet** 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. **Central idea** Biodiversity relies on maintaining the interdependent balance of organisms within systems. **Key concepts** • Connection • Responsibility **Related concepts** • Balance • Biodiversity • Interdependence **Lines of inquiry** • Interdependence within ecosystems, biomes and environments • Ways in which organisms are interconnected in nature • How human interaction with the environment can affect the balance of systems	**Science strand(s)** Living things **Science skills** 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)**	**The student will be able to:** • describe the interactions of living things within and between ecosystems • examine interactions between living things and non-living parts of the environment • recognize that solar energy sustains ecosystems through a transformation of energy • investigate the conservation of energy in 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).

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 outcomes in science
Transdisciplinary theme **Where we are in place and time** 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. **Central idea** Exploration leads to discovery and develops new understandings. **Key concepts** • Form • Perspective • Reflection **Related concepts** • Consequences • Discovery • Geography **Lines of inquiry** • Reasons for exploration (historical and personal) • Feelings and attitudes associated with exploration • What we learn through exploration • Methods of navigation	**Science strand(s)** Earth and space **Science skills** 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)**	**The student will be able to:** • 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 outcomes in science
Transdisciplinary theme **How the world works** 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. **Central idea** Reproduction of living things contributes to the continuation of the species. **Key concepts** • Change • Connection **Related concepts** • Cycles • Growth **Lines of inquiry** • Reproduction as part of a life cycle • Reproductive processes • Genetics and hereditary factors	**Science strand(s)** Living things **Science skills** 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)**	**The student will be able to:** • recognize that plants and animals go through predictable life cycles • identify the structures of plants and animals that are responsible for reproduction • analyse similarities and differences in the ways that different living things reproduce • be aware of the role of genetics in determining physical characteristics.

Learning will include the development of the following knowledge, concepts and skills		Possible learning outcomes in science
Transdisciplinary theme **How we organize ourselves** An inquiry into the interconnectedness of human-made systems and communities; the structure and function of organizations; societal decision-making; economic activities and their impact on humankind and the environment. **Central idea** Technology impacts on the world of work and leisure. **Key concepts** • Change • Connection • Responsibility **Related concepts** • Communication • Systems • Ethics **Lines of inquiry** • Technology and inventions of the home, workplace and leisure activities • Circumstances that lead to the development of important inventions and their impact • How technology supports/ impacts sustainability	**Science strand(s)** Living things Earth and space Forces and energy **Science skills** 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)	**The student will be able to:** • analyse the way in which technology supports the functioning of workplaces (for example, schools) • investigate technology developments • examine the impact of particular technologies on sustainability • suggest areas for future technological advances.

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