Science Disciplinary Core Ideas

Grade 1

Overall expectations:
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. (IBPYP Science Scope and Sequence, 2008)

Unit of inquiry	Science Strand	Disciplinary Core Ideas
How do we organize ourselves?	Living Things	Plants depend on water and light to grow. Plants depend on animals for pollination or to move their seeds around. Plants and animals can change their environment. Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

		Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.
It does a body good Who we are	Living Things	Humans depend on certain resources for energy and growth. Major components of a healthy lifestyle: eating well, positive body image and being physically active.
Peace Sharing the planet	Earth and Space	Seasonal patterns of sunrise and sunset can be observed, described, and predicted. Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.
Feel the beat How we express ourselves	Physical Science: Forces and Energy Light and Sound	Sound can make matter vibrate, and vibrating matter can make sound. Objects can be seen if light is available to illuminate them or if they give off their own light. Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. People also use a variety of devices to communicate (send and receive information) over long distances.

Our changing Earth How the world works	Earth and Space	Processes that shape the Earth's surface. Wind and water can change the shape of the land Maps show where things are located. One can map the shapes and kinds of land and water in any area. Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.
Then and now Where we are in place and time	Physical Science Material and Matter	Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. Different properties are suited to different purposes. A great variety of objects can be built up from a small set of pieces. Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

Grade 2

Overall expectations:
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. (IBPYP Science Scope and Sequence, 2008)

Unit of inquiry	Science Strand	Disciplinary Core Ideas
Reduce Reuse Recycle Sharing the Planet	Earth System's	Reducing, reusing and recycling waste, can help protect the environment Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.
Animal adaptations How the world works	Living Things	Diversity of life exists in many kinds of natural habitats Plants and animals can change and adapt to their environment. Animals depend on plants or other animals for food. They use their senses to find food and water, and they use their body parts to gather, catch, eat, and chew the food.

This land is our land How we organize ourselves	Material and Matter	Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.
I know myself Who we are	Material and Matter	Matter can be described and classified by its observable properties. Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.
Ancient civilizations Where we are in place and time	Engineering Design	The shape and stability of structures of natural and designed objects are related to their function(s). Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. A situation that people want to change or create can be approached as a problem to be solved through engineering.
Natural storytellers How we express ourselves	Living Things	Whitby Certified Schoolyard Habitat Plants depend on air, water, minerals (in the soil), and light to grow. Plants depend on animals for pollination or to move their seeds around. Patterns in the natural world can be observed.

Grade 3

Overall expectations:

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. (IBPYP Science Scope and Sequence, 2008)

Unit of inquiry	Science Strand	Disciplinary Core Ideas
Ecosystems How the world works	Living Things	Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all of its populations. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die.

Expressions around the nation! How we express ourselves	Earth's Systems	Weather is the condition of the atmosphere at a given place and time. Climate is longer term and location sensitive. Weather and climate are shaped by complex interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions can drive changes that occur over multiple time scales—from days, weeks, and months for weather to years, decades, centuries, and beyond—for climate. Weather conditions can be measured and described to notice patterns over time.
Explorations	Earth's Systems Physical science	Magnetic, and gravitational forces between a pair of objects do not require that the objects be in contact—for example, magnets push or pull at a distance. Every magnet has a magnetic field, which interacts with the magnetic field of other magnets and some other objects. All magnets have two poles. Poles are the strongest points on a magnet. People use many methods for navigation such as compasses, satellites and stars.

Human Body Who we are	Living Things	All human body systems are connected and interact with one another; circulatory, digestive, nervous and muscular. All living things are made up of cells; in organisms, cells work together to form tissues and organs that are specialized for particular body functions. Organisms have both internal and external structures that serve various functions in growth, survival, behavior and reproduction. Nutrition provides humans with materials they need for body repair and growth and the energy they need to maintain body warmth and for movement.
Conflict resolution Sharing the planet	Physical Science	Objects pull or push each other when they collide or are connected. Pushes and pulls can have different strengths and directions. Friction slows things down and creates heat. All types of matter can cause friction. The patterns of an object's motion in various situations can be observed and measured; when past motion exhibits a regular pattern, future motion can be predicted from it. Simple machines can change the direction, transfer a force from one place to another, increase or decrease the amount of a force, and increase or decrease the distance or speed of a force.

Entrepreneurship How we organize ourselves	Living Things	Plants and animals have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. Plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. Traits can be influenced by the environment. Variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Grade 4

Overall expectations:

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. (IBPYP Science Scope and Sequence, 2008)

Unit of inquiry	Science Strand	Disciplinary Core Ideas
On the move Where we are in place and time	Physical Science: Forces and Energy	Definitions of energy Energy is present whenever there are moving objects, sound, light or heat. Interactions of objects can be explained and predicted using the concept of transfer of energy from one object or system of objects to another. Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

We the People How we organize ourselves	Physical Science: Forces and Energy	When objects collide, the contact forces transfer energy so as to change the objects' motions. Energy can be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. Forms of energy Energy is produced when it is converted from stored energy into a desired form for practical use.
Equal but not the same How we express ourselves	Earth's Systems	Evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. Observations and/or measurements provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.
Belief systems Who we are	Waves and their application	Waves are regular patterns of motion. Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). The wavelength and frequency of a wave are related to one another by the speed of travel of the wave and depends on the medium in which the wave is traveling.

		Many modern communication devices use digitized signals (sent as wave pulses) as a more reliable way to encode and transmit information.
Sustain it! Sharing the planet	Living Things Forces and Energy	All materials, energy, and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Sustainable gardening supports humans and the environment. (Whitby Garden) All forms of resource extraction and land use have associated economic, social, environmental, and geopolitical costs and risks, as well as benefits.