Science in the PYP

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.

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.

It is recognized that teaching and learning 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 area.

In the PYP, students learn concepts and skills as well as content through the six transdisciplinary themes:

- Who we are
- Where we are in place and time
- How we express ourselves
- How the world works
- How we organise ourselves
- Sharing the planet

The transdisciplinary themes provide the framework for a highly defined, focused, in-depth programme of inquiry, and as science is relevant to all the transdisciplinary themes, all planned science learning takes place within this framework.

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 spontaneous, student-initiated science inquiries will occur that are not directly related to any planned units of inquiry. These are valuable teaching and learning experiences in themselves and they provide teachers and students with the opportunity to apply the pedagogy of the PYP to authentic, of-the-moment situations.

Adapted from Making the PYP Happen (2007)

At Peak School, we strive to become effective communicators, confident critical thinkers and enthusiastic life-long learners. In partnershp with our community, we strive to have integrity and be socially responsible citizens.

Overall expectations in Science

The Science scope and sequence (2008) identifies the overall expectations considered appropriate in the PYP. It does this by identifying the essential understandings and processes being developed within each age range.

The science component of the PYP is characterised by concepts and skills rather than by content.

Years 1 and 2

- In Years 1 and 2, 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.

For example, Year 1s will be exploring different materials, carefully observing their properties and making predictions on their uses.

- Students will explore the way objects and phenomena function, identify parts of a system, and gain an understanding of cause and effect relationships.

For example, in Y2, children will begin looking into the solar system – specifically the sun, moon and Earth. They will also be learning about different forces.

- 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.

In Y1 children will observe plants and animals over a number of weeks, and make predictions on what they need to grow and stay healthy. In Y2, their unit on environmental sustainability will allow them to reflect on our impact on the environment.

- Students will communicate their ideas or provide explanations using their own scientific experience.

As early Y1, children learn to document observations and communicate their findings through drawings and pictures. In Y2, they begin to use charts and diagrams in order to share their understandings in science.

Years 3 and 4

- Y3 and Y4 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

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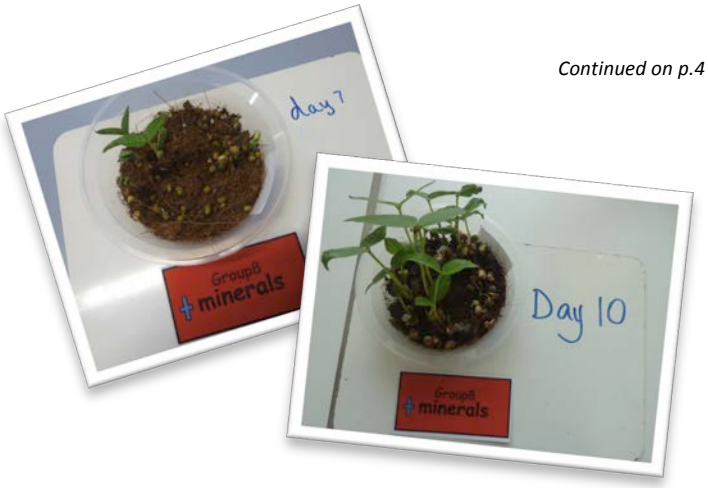

The knowledge component of science in the PYP is arranged into four strands: living things, Earth and space, materials and matter, and forces and energy.

Learn more about the science strands on p. 5

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.*

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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.

This year, Y3 will be exploring various scientific concepts including natural cycles, human body systems, seasons, consumption and sustainability. They will be looking into the Earth's resources, particularly water and its significance on the lives of living creatures on our planet. In Y4, they will be investigating natural forces, the earth's physical features, animal adaptation, extinction, and health.

Throughout their investigations, the Y3s and Y4s will be developing research skills; formulating questions; observing; planning; collecting, recording, organizing and interpreting data; and presenting their research findings.

Years 5 and 6

- 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.

Y5 and Y6 will be exploring concepts such as conversion and transformation of energy, sources of energy, chemical and physical changes, and technology. We will be providing hands-on learning experiences to ensure that students experience and learn science process skills. Students will be challenged to answer open-ended questions with investigations.

Adapted from Making the PYP Happen: Science in the Primary Years Programme

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.Interests, abilities, and feelings can connect people.

Science Skills

- Observe carefully in order to gather data
- Use a variety of instruments and tools to measure dataa 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

More information on the next page.

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.

Related concepts: adaptation, animals, biodiversity, biology, classification, conservation, ecosystems, evolution, growth, habitat, 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: geography, geology, gravity, renewable and non-renewable energy sources, resources, seasons, space, sustainability, systems (solar, water cycle, weather), tectonic plate movement.

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.

A note on related concepts: *Related concepts provide further links to the programme of inquiry or further understanding of the subject area. A few examples of related concepts addressed through the Peak School Programme of Inquiry have been listed here.*

Adapted from IB PYP Science scope and sequence (2008)

Science Skills

All teaching and learning provides the opportunity to utilize and develop the transdisciplinary skills: thinking, communication, research, self management and social skills. In addition to these, the science component of the curriculum also provides opportunities for students to develop a range of science-specific skills and processes. In the list that follows, each of the science-specific skills is accompanied by examples of how these skills might manifest themselves in the classroom. These examples vary in their degree of complexity and are intended to show progression in the development of each skill as children transition from Y1 to Y6.

a. **Observe carefully in order to gather data** - for example, students in Y1 will examine materials to determine their properties; Y2 students will observe and manipulate objects when they conduct tests on forces and motion; Y3 will observe changes in living things, objects and events over a period of time when they learn about life and decay cycles; students will 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 such as videos, charts, models, diagrams, and mind maps, 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 including those gathered from first hand experiences, books, or the internet; 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.