

### Science in the Primary Years Programme

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 students to make informed and responsible decisions, not only in science but also in other areas of life. (International Baccalaureate Organization 95)

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 interrelationship 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.

#### Science skills and processes

The science curriculum provides opportunities for students to develop a range of science-specific skills and processes.

- 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)
- (International Baccalaureate Organization 99)

## Science concepts

Science concepts are divided into four science strands briefly described below.

Science strands	
<b>Living things</b>	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.
<b>Earth and space</b>	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.
<b>Materials and matter</b>	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.
<b>Forces and energy</b>	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.

(International Baccalaureate Organization 1)

## Learning continuum

The IBO recognizes that learning in science is a developmental process and that the phases through which a learner passes are not always linear or age related. For this reason overall expectations are presented in a continuum divided into phases. The overall expectations provide a summary of the understandings and subsequent learning being developed in each phase.

## Overall expectations

### Phase 1

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.

### Phase 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. 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.

### Phase 3

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.



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### Phase 4

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. (International Baccalaureate Organization 5)



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### Works Cited

*Primary Years Programme Science scope and sequence.* Cardiff: International Baccalaureate Organization, 2008.

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