

## **Area B: The Physical Universe and its Life Forms: Scientific and Mathematical Literacy**

Scientifically and mathematically literate individuals understand the characteristic features of science and mathematics as forms of human knowledge and inquiry, and they are aware of how science and mathematics shape their material, intellectual, and cultural environments<sup>1</sup>. Scientifically and mathematically literate individuals are willing to engage in science- and math-related issues and ideas as reflective citizens and they are able to draw evidence-based conclusions and make reasoned decisions concerning science- and math-related issues in real-life contexts.

Scientific and mathematical literacy includes both an individual's knowledge of scientific and mathematical concepts and principles as well as the use of that knowledge to acquire new knowledge, to identify questions, and to explain scientific and mathematical phenomena. Achieving scientific and mathematical literacy is a life-long process that requires the development of skills, confidence and the desire to apply what has been learned to new areas and issues as they arise in the individual's life.

<sup>1</sup>The definition of scientific literacy is based on: PISA 2003 Assessment Framework - Mathematics, Reading, Science and Problem Solving Knowledge and Skills (Organization for Economic Co-operation and Development).

### **Area B-1: Physical Science**

Drawing upon one or more of the physical sciences, students will be able to:

- Explain and apply core ideas and models concerning physical systems and mechanisms, citing critical observations, underlying assumptions and limitations.
- Describe how scientists create explanations of natural phenomena based on the systematic collection of empirical evidence subjected to rigorous testing and/or experimentation.
- Access and evaluate scientific information, including interpreting tables, graphs and equations.
- Recognize evidence-based conclusions and form reasoned opinions about science-related matters of personal, public and ethical concern.

### **Area B-2: Life Forms**

Drawing upon one or more of the life sciences, students will be able to:

- Explain and apply core ideas and models concerning living systems and life forms, citing critical observations, underlying assumptions and limitations.

- Describe how scientists create explanations of natural phenomena based on the systematic collection of empirical evidence subjected to rigorous testing and/or experimentation.
- Access and evaluate scientific information, including interpreting tables, graphs and equations.
- Recognize evidence-based conclusions and form reasoned opinions about science-related matters of personal, public and ethical concern.

### **Area B-3: Laboratory Component**

- Students will be able to use their senses and scientific instruments to gather, organize, and display empirical data.
- Students will be able to identify patterns in data and use these to hypothesize underlying relationships.
- Students will be able to explain and apply scientific techniques for coping with complexity and variability in the natural world.

### **Area B-4: Mathematical Concepts and Quantitative Reasoning**

- Students will be able to solve problems by thinking logically, making conjectures, and constructing valid mathematical arguments.
- Students will be able to make valid inferences from numerical, graphical and symbolic information.
- Students will be able to apply mathematical reasoning to both abstract and applied problems, and to both scientific and non-scientific problems.

### **Area B-5: Further Studies**

Students will be able to do one or more of the following:

- Cite critical observations, underlying assumptions and limitations to explain and apply important ideas and models in one or more of the following: physical science, life science, mathematics or computer science.
- Recognize evidence-based conclusions and form reasoned opinions about science-related matters of personal, public and ethical concern.
- Discuss historical or philosophical perspectives pertaining to the practice of science or mathematics.