

# SCIENCE GRADE 2

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*From Integrated Resource Package 2005*

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Many people contributed their expertise to this document. The Project Co-ordinators were Darlene Monkman, Pierre Gilbert, and Wael Afifi of the Ministry of Education, working with other ministry personnel and our partners in education. Important contributions were made by the Aboriginal Education Branch and Aboriginal Working Group. We would like to thank all who participated in this process, including members of the various focus groups that reviewed early drafts.

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This Integrated Resource Package (IRP) provides basic information teachers will require in order to implement Science K to 7. This document supersedes the *Science Kindergarten to Grade 7 Integrated Resource Package* 1995.

This IRP has been modified from the 1995 version in the following ways:

- fewer topics and thus fewer prescribed learning outcomes per grade level
- separation of the prescribed learning outcomes for Kindergarten, Grade 1, Grade 2, and Grade 3
- integration of science processes through all grades
- addition of Key Elements and Achievement Indicators
- improved support for planning and assessment
- alignment with the Pan-Canadian Common Framework of Science Learning Outcomes, 1997 (Council of Ministers of Education, Canada, <http://cmec.ca/science/framework/>)
- integration of Aboriginal content in the prescribed learning outcomes
- integration of Information and Communication Technology in the prescribed learning outcomes.

A variety of resources were used in the development of this IRP:

- British Columbia Science Kindergarten to Grade 7 IRP (1995)
- Pan-Canadian Common Framework of Science Learning Outcomes (1997), Council of Ministers of Education, Canada (<http://cmec.ca/science/framework/>)
- Science Curriculum Review Report (2001) <http://www.bced.gov.bc.ca/branches/pserr/whatsnew.htm#scrr>
- Provincial science curricula
  - APEF (Atlantic Provinces Education Foundation)
  - Ontario
  - Manitoba
  - Alberta
- *Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education*, 3rd Edition (2000), Kendall, J. S. & Marzano, R.J. (<http://www.mcrcel.org/standards-benchmarks>)
- *Atlas of Science Literacy* (2001), American Association for the Advancement of Science, Project 2061, National Science Teachers Association, Washington DC
- *Designs for Science Literacy* (2000), American Association for the Advancement of Science, Project 2061, National Science Teachers Association, Washington DC

- *Elementary Science Reference Cards*, David Penner, Gilbert Smith. BCTF Lesson Aide (1987)
- *Science K to 7 & Multi-graded Classrooms: A Supplement to the Science K to 7 Curriculum* (1997), Year A. Susan Martin, BCTF Lesson Aide.
- *Science K to 7 & Multi-Graded Classrooms – A Supplement to the Science K to 7 Curriculum* (1997), Year B. Susan Martin, BCTF Lesson Aide
- *Shared Learnings* (1998), Aboriginal Education Initiative, British Columbia Ministry of Education

The information contained in this document is also available on the Internet at <http://www.bced.gov.bc.ca/irp/irp.htm>

The following paragraphs provide brief descriptions of the components of the IRP.

### INTRODUCTION TO SCIENCE K TO 7

The Introduction provides general information about Science K to 7, including special features and requirements. It also provides a rationale for teaching Science K to 7 in BC schools, and specific considerations for program delivery.

This section also contains more specific information about the curriculum to guide educators in planning their program. Included are:

- a graphic overview of the course content
- curriculum organizers (and suborganizers as appropriate) – groupings for prescribed learning outcomes that share a common focus
- suggested timeframe for each curriculum organizer

### PRESCRIBED LEARNING OUTCOMES

This section contains the prescribed learning outcomes, which are content standards for the provincial education system; they are the prescribed curriculum. They set out the required attitudes, skills, and knowledge – what students are expected to know and be able to do – for each subject and grade. Learning outcomes are clearly stated and expressed in measurable terms. All learning outcomes complete the stem, “It is expected that students will ....” In this section, prescribed learning outcomes are presented both by organizer and by grade.

### **STUDENT ACHIEVEMENT**

This section restates the prescribed learning outcomes, along with information about classroom assessment and measuring student achievement, including sets of specific achievement indicators for each prescribed learning outcome. Achievement indicators are statements that describe what students should be able to do in order to demonstrate that they fully meet the curriculum expectations for the subject and grade level. Achievement indicators are not mandatory; they are provided to assist teachers in assessing how well their students achieve the prescribed learning outcomes.

This section further includes key elements, which provide guidance for teachers regarding the expected depth and breadth of the prescribed learning outcomes, including vocabulary, knowledge, and skills and attitudes.

### **CLASSROOM ASSESSMENT MODEL**

This section contains a series of classroom units that address clusters of learning outcomes organized by topic or theme. The units have been developed

by BC teachers, and are provided to support classroom assessment. These units are suggestions only – teachers may use or modify the units to assist them as they plan for the implementation of this curriculum.

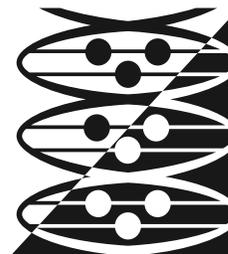
Each unit includes the prescribed learning outcomes, suggested achievement indicators, key elements, a suggested timeframe, a sequence of suggested instruction and assessment activities, recommended learning resources, selected relevant web sites, and sample assessment instruments.

### **LEARNING RESOURCES**

This section contains general information on learning resources, and provides the titles, descriptions, and ordering information for the recommended learning resources in the Science K to 7 Grade Collection.

### **GLOSSARY**

The glossary defines terms used in this Integrated Resource Package.



# INTRODUCTION

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This IRP sets out the provincially prescribed curriculum for science Kindergarten to grade 7. The development of this IRP has been guided by the principles of learning:

- Learning requires the active participation of the student.
- People learn in a variety of ways and at different rates.
- Learning is both an individual and a group process.

In addition to these three principles, this document recognizes that British Columbia's schools include young people of varied backgrounds, interests, abilities, and needs. Wherever appropriate for this curriculum, ways to meet these needs and to ensure equity and access for all learners have been integrated as much as possible into the learning outcomes, achievement indicators, instructional activities, and assessment activities.

## CURRICULUM OVERVIEW

### *Rationale*

The British Columbia Ministry of Education supports the statement that advancements in science and technology play a significant role in everyday life.

British Columbia also subscribes to the vision that all Canadian students, regardless of gender or cultural background, should have opportunities to develop scientific literacy.

Scientific literacy is an evolving combination of the science-related attitudes, skills, and knowledge students need to:

- develop inquiry, problem-solving, and decision-making abilities as citizens
- become lifelong learners
- maintain a sense of wonder about the world around them.

Diverse experiences in a Science program will provide students with many opportunities to understand their interrelationships among science, technology, and society that will affect their personal lives, their careers, and their future.

### *Goals for Scientific Literacy*

These goals are in alignment with the four foundational statements from the Pan-Canadian Science Framework (Council of Ministers of Education, Canada, 1997) that delineate the four critical aspects of students' scientific literacy.

#### **GOAL 1: Science, technology, society, and the environment (STSE)**

Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

#### **GOAL 2: Skills**

Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

#### **GOAL 3: Knowledge**

Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

#### **GOAL 4: Attitudes**

Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

## CURRICULUM ORGANIZERS

A curriculum organizer consists of a set of prescribed learning outcomes that share a common focus. The prescribed learning outcomes for Science K to 7 are grouped under the following curriculum organizers and suborganizers

- Processes of Science
- Life Science
- Physical Science
- Earth and Space Science

### *Processes of Science*

Science, as a process, starts with students learning skills such as observing, classifying, predicting, inferring, and hypothesizing. It also includes scientific reasoning, critical thinking, and decision making. The combination of these skills within the science curriculum content enables students to develop their understanding of science. While these skills are not unique to science, they are important in the application of science to new situations.

There is no universal list of scientific process skills. Those identified in this curriculum are not intended to be a linear scope and sequence; instead, they suggest multiple ways in which learning science can be explored. At each grade level, two processes are introduced and then reinforced with the curriculum content in the subsequent grades; but teachers are expected to involve all of the skills their students are capable of using.

Teachers will know when the process skills are developmentally appropriate for their students. While this IRP has highlighted specific process skills for each grade, other skills could be actively developed and extended with students after the initial skills are introduced.

Process skills are best learned in hands-on activities where students engage in a problem-solving task while doing science. The hands-on model of learning science allows students to construct meaningful connections within the brain. In young children, process skills can be found in the natural practice of manipulating materials while asking questions and being curious. The names of the skills can be used and reinforced by teachers as students use and learn to apply these skills to science activities. The science process names will become familiar to students, enabling them to use the correct vocabulary when they explain their involvement in science and technology inquiries.

### *Life Science*

This is the study of the diversity, continuity, interactions, and balance among organisms and their environments. By using the skills, processes, and attitudes of science, students extend their understanding of the living world and their place within it.

### *Physical Science*

This is the study of matter and energy, and their interactions. By using the skills, processes, and attitudes of science, students build a foundation for their understanding of the physical world.

### *Earth and Space Science*

This is the study of the universe and the structure of the Earth. By using the skills, processes, and attitudes of science, students develop an understanding of the forces, processes, and dynamic life-supporting qualities of the Earth.

## ABORIGINAL CONTENT IN THE SCIENCE CURRICULUM

The science curriculum guide integrates prescribed learning outcomes within a classroom model that includes instructional strategies, assessment tools and models that can help teachers provide all students with an understanding and appreciation of Aboriginal science. Integration of authentic Aboriginal content into the K to 7 science curriculum with the support of Aboriginal people will help promote understanding of BC's Aboriginal peoples among *all* students.

The incorporating of Aboriginal science with western science can provide a meaningful context for Aboriginal students and enhance the learning experience for all students. The inclusion of Aboriginal examples of science and technologies can make the subject more authentic, exciting, relevant and interesting for *all* students.

Numerous difficulties arise when trying to incorporate indigenous knowledge and world views into the western science classroom. The participants of the Ministry of Education Aboriginal Science meetings therefore suggest a model involving a parallel process, where Aboriginal and Western understandings exist separately, yet side-by-side and in partnership with one another. Each side is enriched by the contrasting perspective that the other brings to any discussion. Aboriginal peoples are calling for this type of relationship with Canadian schools in a

variety of settings (e.g., Ministry documents, science textbooks and curriculum materials, and teaching methods).

Traditional Ecological Knowledge and Wisdom (TEKW) is defined as the study of systems of knowledge developed by a given culture. It brings the concept of wisdom to our discussion of science and technology. TEKW tends to be holistic, viewing the world as an interconnected whole where humans are not regarded as more important than nature. It is a subset of traditional science, and is considered a branch of biological and ecological science. This knowledge with its characteristic respect for sustaining community and environment offers proven conceptual approaches which are becoming increasingly important to all BC residents.

Examples of TEKW science may be accessed through living elders and specialists of various kinds or found in the literature of TEKW, anthropology, ethnology, ecology, biology, botany, ethnobiology, medicine, horticulture, agriculture, astronomy, geology, climatology, architecture, navigation, nautical science, engineering, and mathematics.

Recognition of the importance of incorporating TEKW into environmental planning is evident in science-based reports and agreements in Canada and internationally. The Brundtland Commission report, *Our Common Future* (World Commission on Environment and Development, 1987), drew our attention to the contributions of traditional knowledge. In British Columbia, the report of the scientific panel for sustainable forest practices in Clayoquot Sound emphasizes TEKW and the importance of including indigenous knowledge in planning and managing traditional territories. The recognition of TEKW globally is explicitly addressed in international agreements including the Convention on Biological Diversity, Agenda 21, and UNCED '92, or the Earth Summit at Rio de Janeiro.

**ORGANIZING FOR INSTRUCTION AND ASSESSMENT**

*Suggested Time Frame*

The Kindergarten to Grade 12 Education Plan (1994) outlines the required areas of study for the primary and intermediate years and, as appropriate, indicates the recommended time allotments for each area of learning. In the primary years, teachers determine the time allotments for each required area of study

and may choose to combine various curricula to enable students to integrate ideas and see applications of knowledge. Teachers are encouraged to exercise professional judgment when interpreting the suggested instructional time allotments provided here and in the Classroom Model units.

In grades 4 to 7, a minimum of 30% (285 hours/year, slightly more than 7 hours/week) of the total time in school is recommended for the study of science, mathematics, and technology. (see below).

The following chart shows the suggested estimated instructional time to deliver the prescribed learning outcomes for each Science curriculum organizer, Grade 1 to Grade 7. At the Kindergarten level, the suggested time is 50% of the amount outlined below for each organizer. These estimations have been provided as suggestions only; when delivering the prescribed curriculum, teachers will adjust the instructional time as necessary.

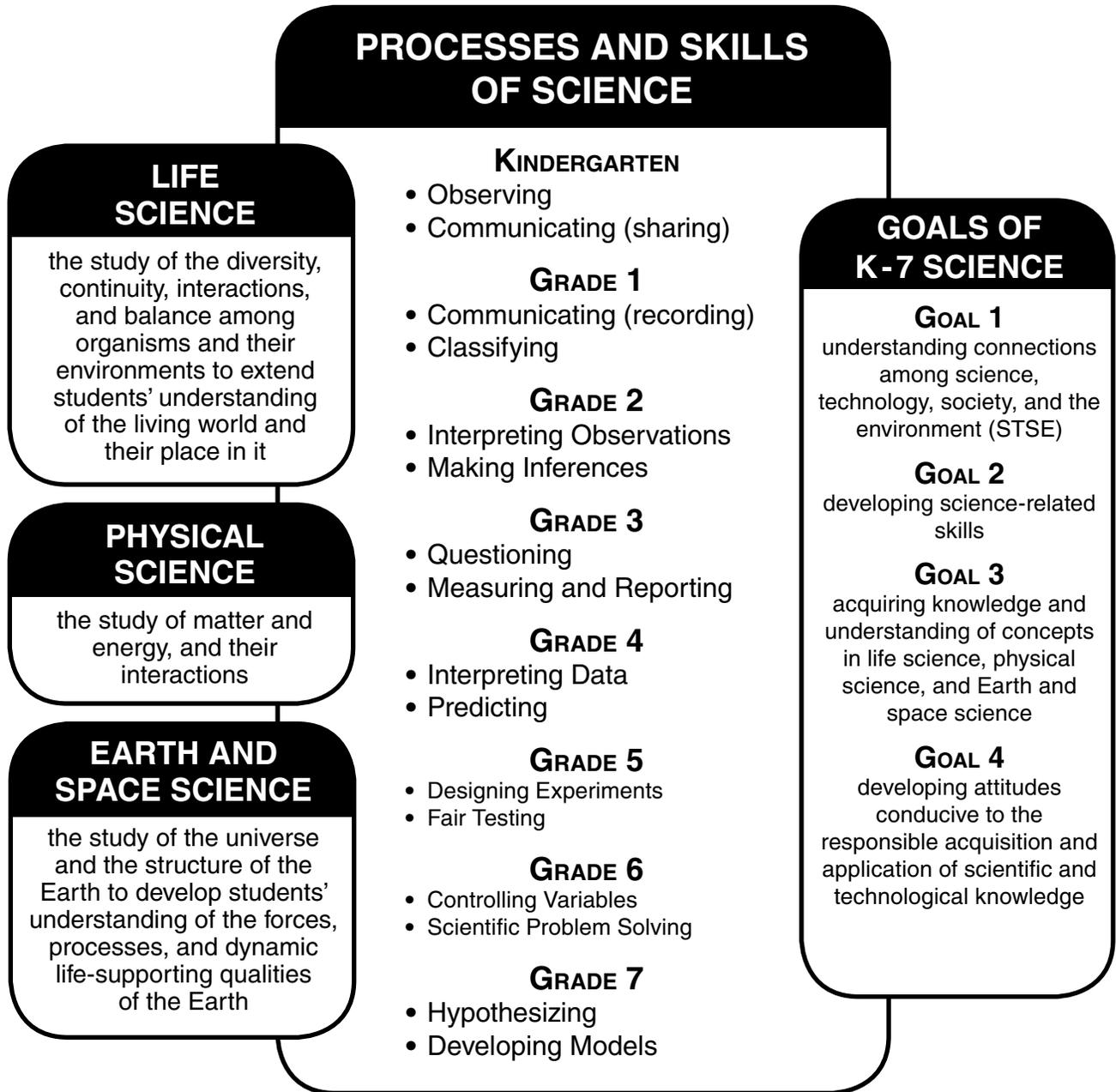
Curriculum Organizer	Suggested Time
Applications of Science	integrated with other organizers
Life Science	25-30 hours
Physical Science	25-30 hours
Earth and Space Science	25-30 hours

These estimated time allotments represent the amount of instructional time that has been recommended to meet the prescribed learning outcomes within each curriculum organizer. When delivering the prescribed curriculum, teachers may freely adjust the instructional time to meet their students' diverse needs. These estimated instructional times have been recommended by the IRP writers to assist their colleagues; they are suggestions only.

SCIENCE K TO 7: TOPICS AT A GLANCE

	<b>Processes and Skills of Science</b>	<b>Life Science</b>	<b>Physical Science</b>	<b>Earth and Space Science</b>
<b>Kindergarten</b>	<ul style="list-style-type: none"> <li>• Observing</li> <li>• Communicating (sharing)</li> </ul>	Characteristics of Living Things	Properties of Objects and Materials	Surroundings
<b>Grade 1</b>	<ul style="list-style-type: none"> <li>• Communicating (recording)</li> <li>• Classifying</li> </ul>	Needs of Living Things	Force and Motion	Daily and Seasonal Changes
<b>Grade 2</b>	<ul style="list-style-type: none"> <li>• Interpreting Observations</li> <li>• Making Inferences</li> </ul>	Animal Growth and Changes	Properties of Matter	Air, Water, and Soil
<b>Grade 3</b>	<ul style="list-style-type: none"> <li>• Questioning</li> <li>• Measuring and Reporting</li> </ul>	Plant Growth and Changes	Materials and Structures	Stars and Planets
<b>Grade 4</b>	<ul style="list-style-type: none"> <li>• Interpreting Data</li> <li>• Predicting</li> </ul>	Habitats and Communities	Light and Sound	Weather
<b>Grade 5</b>	<ul style="list-style-type: none"> <li>• Designing Experiments</li> <li>• Fair Testing</li> </ul>	Human Body	Forces and Simple Machines	Renewable and Non-Renewable Resources
<b>Grade 6</b>	<ul style="list-style-type: none"> <li>• Controlling Variables</li> <li>• Scientific Problem Solving</li> </ul>	Diversity of Life	Electricity	Exploration of Extreme Environments
<b>Grade 7</b>	<ul style="list-style-type: none"> <li>• Hypothesizing</li> <li>• Developing Models</li> </ul>	Ecosystems	Chemistry	Earth's Crust

GETTING THE MOST OUT OF THIS IRP



**PROCESSES AND SKILLS OF SCIENCE**

**KINDERGARTEN**

- Observing
- Communicating (sharing)

**GRADE 1**

- Communicating (recording)
- Classifying

**GRADE 2**

- Interpreting Observations
- Making Inferences

**GRADE 3**

- Questioning
- Measuring and Reporting

**GRADE 4**

- Interpreting Data
- Predicting

**GRADE 5**

- Designing Experiments
- Fair Testing

**GRADE 6**

- Controlling Variables
- Scientific Problem Solving

**GRADE 7**

- Hypothesizing
- Developing Models

**LIFE SCIENCE**

the study of the diversity, continuity, interactions, and balance among organisms and their environments to extend students' understanding of the living world and their place in it

**PHYSICAL SCIENCE**

the study of matter and energy, and their interactions

**EARTH AND SPACE SCIENCE**

the study of the universe and the structure of the Earth to develop students' understanding of the forces, processes, and dynamic life-supporting qualities of the Earth

**GOALS OF K-7 SCIENCE**

**GOAL 1**

understanding connections among science, technology, society, and the environment (STSE)

**GOAL 2**

developing science-related skills

**GOAL 3**

acquiring knowledge and understanding of concepts in life science, physical science, and Earth and space science

**GOAL 4**

developing attitudes conducive to the responsible acquisition and application of scientific and technological knowledge

## CONSIDERATIONS FOR PROGRAM DELIVERY

This section of the IRP contains additional information to help educators develop their school practices and plan their program delivery to meet the needs of all learners. Included in this section is information about:

- addressing local needs
- involving parents and guardians
- course requirements respecting beliefs
- establishing a positive classroom climate
- safety in the Science K to 7 classroom
- confidentiality
- inclusion, accessibility, and equity
- working with the school and community
- working with the Aboriginal community
- information and communications technology
- copyright.

### *Addressing Local Needs*

The Science K to 7 curriculum includes opportunities for individual teacher and student choice in the exploration of topics to meet certain learning outcomes. This flexibility allows educators to plan their programs to meet the particular requirements of their students and to respond to local needs. It may be appropriate to allow for student input when selecting current and relevant topics.

Where specific topics have been included in the learning outcomes, the intent is for all students to have an opportunity to address these important issues. The inclusion of these topics is not intended to exclude any additional issues that may also be relevant for individual school communities.

### *Involving Parents and Guardians*

The family is the primary educator in the development of students' attitudes and values. The school plays a supportive role by focussing on the prescribed learning outcomes in the Science K to 7 curriculum. Parents and guardians can support, enrich, and extend the curriculum at home.

It is highly recommended that schools inform parents and guardians about the Science K to 7 curriculum, and teachers (along with school and district administrators) may use various strategies to do so:

- Inform parents/guardians and students, via a course outline at the beginning of the course, of the prescribed learning outcomes for the course.
- Respond to parent and guardian requests to discuss course unit plans, learning resources, etc.

### *Course Requirements Respecting Beliefs*

For many students and teachers, the study of some science concepts may lead to issues and questions that go beyond the immediate scope of curriculum (e.g., science is used to meet many industrial requirements, but industrial decision makers must consider factors other than scientific feasibility before adopting a particular process). The technological application of science in areas such as genetic engineering, human reproduction, and medical technology raises questions of ethics and values. Because these social questions arise, in part, from capabilities that science makes possible, they should be addressed. It must be made clear to students, however, that science only provides the background for what is hoped will be informed personal and social decisions. Teachers must handle these questions objectively and with sensitivity.

Reconciling scientific discoveries (for example, in genetic engineering) and religious faith poses a particular challenge for some students. While respecting the personal beliefs of students, teachers should be careful to distinguish between knowledge based on the application of scientific methods, and religious teachings and associated beliefs such as creationism, theory of divine creation, or intelligent-design theory.

### *Establishing a Positive Classroom Climate*

Teachers are responsible for setting and promoting a classroom climate in which students feel comfortable learning about and discussing topics in Science K to 7. The following are some guidelines that may help educators establish and promote a positive classroom climate.

- Allow class members sufficient time and opportunities to become comfortable with each other before engaging in group discussion. It is important that the classroom climate encourage students to relate to one another in positive, respectful, and supportive ways. Be prepared to facilitate any potentially controversial discussions.
- Establish clear ground rules for class discussions that demonstrate respect for privacy, for diversity, and for the expression of differing viewpoints.
- Become familiar with:
  - relevant legislation (e.g., Human Rights Code; Child, Family and Community Services Act)
  - relevant initiatives (e.g., Safe, Caring and Orderly Schools: A Guide and Diversity in BC Schools: A Framework)
  - provincial and district policies and protocols concerning topics such as disclosure related to child abuse, and protection of privacy.

Further information about these policies and initiatives is available online:

*BC Handbook for Action on Child Abuse and Neglect*  
[http://www.mcf.gov.bc.ca/child\\_protection/pdf/handbook\\_action\\_child\\_abuse.pdf](http://www.mcf.gov.bc.ca/child_protection/pdf/handbook_action_child_abuse.pdf)

Safe, Caring and Orderly Schools  
<http://www.bced.gov.bc.ca/sco/>

*Diversity in BC Schools: A Framework*  
[http://www.bced.gov.bc.ca/diversity/diversity\\_framework.pdf](http://www.bced.gov.bc.ca/diversity/diversity_framework.pdf)

Human Rights Code  
[http://www.qp.gov.bc.ca/statreg/stat/H/96210\\_01.htm](http://www.qp.gov.bc.ca/statreg/stat/H/96210_01.htm)

Child, Family and Community Services Act  
[http://www.qp.gov.bc.ca/statreg/stat/C/96046\\_01.htm](http://www.qp.gov.bc.ca/statreg/stat/C/96046_01.htm)

Activities and discussion related to some of the topics in Science K to 7 may evoke an emotional response from individual students. Inform an administrator or counsellor when any concern arises, and ensure students know where to go for help and support.

Ensure that any external groups or organizations making a presentation to students have met the district's guidelines for presenting. There should be a direct relationship between the content of the presentation and the prescribed learning outcomes. Review any materials they may use, especially handouts, for appropriateness.

### ***Safety in the Science Kindergarten to Grade 7 Classroom***

Science education is an activity-based process that provides an exciting method of teaching and learning. However, experiments and demonstrations may involve inherent risks for both the teacher and the student.

Safety guidelines must be discussed with students. These safety guidelines must support and encourage the investigative approach generally and laboratory instruction specifically, while at the same time promoting safety in the classroom and laboratory. Encouraging a positive safety attitude

is a responsibility shared among the board, school administrators, teachers, and students in every school district. The co-operation of all these groups helps develop a strong safety consciousness both inside and outside our schools.

Teachers are reminded especially of the potential risks associated with activities that involve extraction and analysis of human fluids or tissue. Before attempting these activities, they should consult the ministry's Science Safety Manual on the use of human tissue and fluid in science classrooms.

Another important aspect of in-school safety is the Workplace Hazardous Materials Information System (WHMIS). Through labelling, material safety data sheets, and education and training, WHMIS is designed to ensure that those using hazardous materials have sufficient information to handle them safely. Each school district should have an individual trained in WHMIS who can work with teachers to establish safe, well-ventilated classroom and laboratory working conditions.

To assist teachers in providing a safe science-learning environment, the Ministry of Education publishes the Science Safety Resource Manual, which has been distributed to every school. This resource is available online at <http://www.bced.gov.bc.ca/irp/resdocs/scisafety.htm>.

### ***Confidentiality***

The Freedom of Information and Protection of Privacy Act (FOIPPA) applies to students, to school district employees, and to all curricula. Teachers, administrators, and district staff should consider the following:

- Be aware of district and school guidelines regarding the provisions of FOIPPA and how it applies to all courses, including Science K to 7.
- Inform students of their rights under FOIPPA, especially the right to have access to their own personal information in their school records.
- Do not use students' Personal Education Numbers (PEN) on any assignments that students wish to keep confidential.
- Minimize the type and amount of personal information collected and ensure that it is used only for relevant purposes.
- Inform students that they will be the only ones recording personal information about themselves unless they have consented to teachers collecting that information from other people, including parents.

- Inform students why they are being asked to provide any personal information in the context of the Science K to 7 curriculum.
- Ensure that any information used in assessing students' progress is up-to-date, accurate, and complete.
- Inform students they can request that the school correct or annotate any of their personal information kept in records at the school.
- Be aware that parents' rights to have access to their children's personal information are limited to that which pertains to their child's progress. Ensure students are aware that their parents may have access to the work they create as part of the course.

For more information about confidentiality, refer to [http://www.mser.gov.bc.ca/FOI\\_POP/index.htm](http://www.mser.gov.bc.ca/FOI_POP/index.htm)

### ***Inclusion, Equity, and Accessibility for All Learners***

British Columbia's schools include young people of varied backgrounds, interests, and abilities. The Kindergarten to grade 12 school system is committed to meeting the needs of all students. When selecting specific topics, activities, and resources to support the implementation of Science K to 7, teachers are encouraged to ensure that these choices support inclusion, equity, and accessibility for all students. In particular, teachers should ensure that classroom instruction, assessment, and resources reflect sensitivity to diversity and incorporate positive role portrayals, relevant issues, and themes such as inclusion, respect, and acceptance.

Government policy supports the principles of integration and inclusion of students who have English as a second language and of students with special needs. Most of the suggested assessment activities in this IRP can be used with all students, including those with special and/or ESL needs. Some strategies may require adaptations to ensure that those with special and/or ESL needs can successfully achieve the prescribed learning outcomes. Modifications can be made to the prescribed learning outcomes for students with Individual Education Plans.

For more information about resources and support for students with special needs, refer to <http://www.bced.gov.bc.ca/specialed/>

For more information about resources and support for ESL students, refer to <http://www.bced.gov.bc.ca/esl/>

### ***Working with the School and Community***

This curriculum addresses a wide range of skills and understandings that students are developing in other areas of their lives. It is important to recognize that learning related to this curriculum extends beyond the science classroom.

School and district-wide programs — such as active schools, workplace safety, work experience, anti-bullying, and alcohol and drug education — support and extend learning in Science K to 7. Community organizations may also support the curriculum with locally developed learning resources, guest speakers, workshops, and field studies. Teachers may wish to draw on the expertise of these community organizations and members.

### ***Working with the Aboriginal Community***

The Ministry of Education is dedicated to ensuring that the cultures and contributions of Aboriginal peoples in BC are reflected in all provincial curricula. To address these topics in the classroom in a way that is accurate and that respectfully reflects Aboriginal concepts of teaching and learning, teachers are strongly encouraged to seek the advice and support of local Aboriginal communities. As Aboriginal communities are diverse in terms of language, culture, and available resources, each community will have its own unique protocol to gain support for integration of local knowledge and expertise. To begin discussion of possible instructional and assessment activities, teachers should first contact Aboriginal education co-ordinators, teachers, support workers, and counsellors in their district who will be able to facilitate the identification of local resources and contacts such as Elders, chiefs, tribal or band councils, Aboriginal cultural centres, Aboriginal Friendship Centres, and Métis or Inuit organizations.

In addition, teachers may wish to consult the various Ministry of Education publications available, including the "Planning Your Program" section of the resource, *Shared Learnings* (1998). This resource was developed to help all teachers provide students with

knowledge of, and opportunities to share experiences with, Aboriginal peoples in BC.

For more information about these documents, consult the Aboriginal Education web site: <http://www.bced.gov.bc.ca/abed/welcome.htm>

### ***Information and Communications Technology***

The study of information and communications technology is increasingly important in our society. Students need to be able to acquire and analyse information, to reason and communicate, to make informed decisions, and to understand and use information and communications technology for a variety of purposes. Development of these skills is important for students in their education, their future careers, and their everyday lives.

Literacy in the area of information and communications technology can be defined as the ability to obtain and share knowledge through investigation, study, instruction, or transmission of information by means of media technology. Becoming literate in this area involves finding, gathering, assessing, and communicating information using electronic means, as well as developing the knowledge and skills to use and solve problems effectively with the technology. Literacy also involves a critical examination and understanding of the ethical and social issues related to the use of information and communications technology. When planning for instruction and assessment in Science K to 7, teachers should provide opportunities for students to develop literacy in relation to information and communications technology sources, and to reflect critically on the role of these technologies in society.

### ***Copyright and Responsibility***

Copyright is the legal protection of literary, dramatic, artistic, and musical works; sound recordings; performances; and communications signals. Copyright provides creators with the legal right to be paid for their work and the right to say how their work is to be used. There are some exceptions in the law (i.e., specific things permitted) for schools but these are very limited, such as copying for private study or research. The copyright law determines how resources can be used in the classroom and by students at home.

In order to respect copyright it is necessary to understand the law. It is unlawful to do the following, unless permission has been given by a copyright owner:

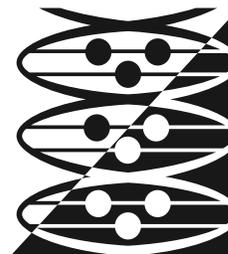
- photocopy copyrighted material to avoid purchasing the original resource for any reason
- photocopy or perform copyrighted material beyond a very small part—in some cases the copyright law considers it “fair” to copy whole works, such as an article in a journal or a photograph, for purposes of research and private study, criticism, and review
- show videotaped television or radio programs to students in the classroom unless these are cleared for copyright for educational use (there are exceptions such as for news and news commentary taped within one year of broadcast that by law have record-keeping requirements—see the web site at the end of this section for more details)
- photocopy print music, workbooks, instructional materials, instruction manuals, teacher guides, and commercially available tests and examinations
- show videotapes at schools that are not cleared for public performance
- perform music or do performances of copyrighted material for entertainment (i.e., for purposes other than a specific educational objective)
- copy work from the Internet without an express message that the work can be copied.

Permission from or on behalf of the copyright owner must be given in writing. Permission may also be given to copy or use all or some portion of copyrighted work through a licence or agreement. Many creators, publishers, and producers have formed groups or “collectives” to negotiate royalty payments and copying conditions for educational institutions. It is important to know what licences are in place and how these affect the activities schools are involved in. Some licenses may also have royalty payments that are determined by the quantity of photocopying or the length of performances. In these cases, it is important to assess the educational value and merits of copying or performing certain works to protect the school’s financial exposure (i.e., only copy or use that portion that is absolutely necessary to meet an educational objective).

It is important for education professionals, parents, and students to respect the value of original thinking and the importance of not plagiarizing the work of others. The works of others should not be used without their permission.

For more information about copyright, refer to: <http://cmec.ca/copyright/indexe.stm>





# PRESCRIBED LEARNING OUTCOMES

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Prescribed learning outcomes are content standards for the provincial education system; they are the prescribed curriculum. They set out the required attitudes, skills, and knowledge—what students are expected to know and be able to do—by the end of the specified subject and grade. Learning outcomes are clearly stated and expressed in measurable and observable terms.

Schools have the responsibility to ensure that all prescribed learning outcomes in this curriculum are met; however, schools have flexibility in determining how delivery of the curriculum can best take place.

It is expected that student achievement will vary in relation to the learning outcomes. Evaluation, reporting, and student placement with respect to these outcomes are dependent on the professional judgment and experience of teachers, guided by provincial policy.

Prescribed learning outcomes for Science K to 7 are presented by grade and by curriculum organizer and suborganizer; however, this arrangement is not intended to imply a required instructional sequence.

### Wording of Prescribed Learning Outcomes

All learning outcomes complete the stem, “It is expected that students will ....”

When used in a prescribed learning outcome, the word “including” indicates that any ensuing item **must be addressed**. Lists of items introduced by the word “including” represent a set of minimum requirements associated with the general requirement set out by the outcome. The lists are not necessarily exhaustive, however, and teachers may choose to address additional items that also fall under the general requirement set out by the outcome.

Conversely, the abbreviation “e.g.,” (for example) in a prescribed learning outcome indicates that the ensuing items are provided for illustrative purposes or clarification, and are **not requirements that must be addressed**. Presented in parentheses, the list of items introduced by “e.g.,” is neither exhaustive

nor prescriptive, nor is it put forward in any special order of importance or priority. Teachers are free to substitute items of their own choosing that they feel best address the intent of the learning outcome.

### Domains of Learning

Prescribed learning outcomes in BC curricula identify required learning in relation to one or more of the three domains of learning: cognitive, psychomotor, and affective. The following definitions of the three domains are based on Bloom’s taxonomy (*Taxonomy of Educational Objectives*, Bloom et al., 1956).

The **cognitive domain** deals with the recall or recognition of knowledge and the development of intellectual abilities. The cognitive domain can be further specified as including three cognitive levels: knowledge, understanding and application, and higher mental processes. These levels are determined by the verb used in the learning outcome, and illustrate how student learning develops over time.

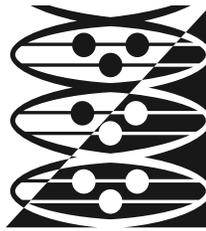
- *Knowledge* includes those behaviours that emphasize the recognition or recall of ideas, material, or phenomena.
- *Understanding and application* represents a comprehension of the literal message contained in a communication, and the ability to apply an appropriate theory, principle, idea, or method to a new situation.
- *Higher mental processes* include analysis, synthesis, and evaluation. The higher mental processes level subsumes both the knowledge and the understanding and application levels.

The **affective domain** concerns attitudes, beliefs, and the spectrum of values and value systems.

The **psychomotor domain** includes those aspects of learning associated with movement and skill demonstration, and integrates the cognitive and affective consequences with physical performances.

Domains of learning and cognitive levels also form the basis of the Assessment Overview Tables provided for each grade in the Classroom Assessment Model.





# PRESCRIBED LEARNING OUTCOMES

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*By Curriculum Organizer*

**PROCESSES OF SCIENCE**

<p><b><i>Kindergarten</i></b></p> <ul style="list-style-type: none"> <li>• use the five senses to make observations</li> <li>• share with others information obtained by observing</li> </ul>
<p><b><i>Grade 1</i></b></p> <ul style="list-style-type: none"> <li>• communicate their observations, experiences, and thinking in a variety of ways (e.g., verbally, pictorially, graphically)</li> <li>• classify objects, events, and organisms</li> </ul>
<p><b><i>Grade 2</i></b></p> <ul style="list-style-type: none"> <li>• use their senses to interpret observations</li> <li>• infer the probable outcome of an event or behaviour based on observations</li> </ul>
<p><b><i>Grade 3</i></b></p> <ul style="list-style-type: none"> <li>• ask questions that foster investigations and explorations relevant to the content</li> <li>• measure objects and events</li> </ul>
<p><b><i>Grade 4</i></b></p> <ul style="list-style-type: none"> <li>• make predictions, supported by reasons and relevant to the content</li> <li>• use data from investigations to recognize patterns and relationships and reach conclusions</li> </ul>
<p><b><i>Grade 5</i></b></p> <ul style="list-style-type: none"> <li>• identify variables that can be changed in an experiment</li> <li>• evaluate the fairness of a given experiment</li> <li>• describe the steps in designing an experiment</li> </ul>
<p><b><i>Grade 6</i></b></p> <ul style="list-style-type: none"> <li>• manipulate and control a number of variables in an experiment</li> <li>• apply solutions to a technical problem (e.g., malfunctioning electrical circuit)</li> </ul>
<p><b><i>Grade 7</i></b></p> <ul style="list-style-type: none"> <li>• test a hypothesis by planning and conducting an experiment that controls for two or more variables</li> <li>• create models that help to explain scientific concepts and hypotheses</li> </ul>

LIFE SCIENCE

<p><b>Kindergarten</b></p> <ul style="list-style-type: none"> <li>• describe features of local plants and animals (e.g., colour, shape, size, texture)</li> <li>• compare local plants</li> <li>• compare common animals</li> </ul>
<p><b>Grade 1</b></p> <ul style="list-style-type: none"> <li>• classify living and non-living things</li> <li>• describe the basic needs of local plants and animals (e.g., food, water, light)</li> <li>• describe how the basic needs of plants and animals are met in their environment</li> </ul>
<p><b>Grade 2</b></p> <ul style="list-style-type: none"> <li>• classify familiar animals according to similarities and differences in appearance, behaviour, and life cycles</li> <li>• describe some changes that affect animals (e.g., hibernation, migration, decline in population)</li> <li>• describe how animals are important in the lives Aboriginal peoples in BC</li> <li>• describe ways in which animals are important to other living things and the environment</li> </ul>
<p><b>Grade 3</b></p> <ul style="list-style-type: none"> <li>• compare familiar plants according to similarities and differences in appearance and life cycles</li> <li>• describe ways in which plants are important to other living things and the environment</li> <li>• describe how plants are harvested and used throughout the seasons</li> </ul>
<p><b>Grade 4</b></p> <ul style="list-style-type: none"> <li>• compare the structures and behaviours of local animals and plants in different habitats and communities</li> <li>• analyse simple food chains</li> <li>• demonstrate awareness of the Aboriginal concept of respect for the environment</li> <li>• determine how personal choices and actions have environmental consequences</li> </ul>
<p><b>Grade 5</b></p> <ul style="list-style-type: none"> <li>• describe the basic structure and functions of the human respiratory, digestive, circulatory, skeletal, muscular, and nervous systems</li> <li>• explain how the different body systems are interconnected</li> </ul>
<p><b>Grade 6</b></p> <ul style="list-style-type: none"> <li>• demonstrate the appropriate use of tools to examine living things that cannot be seen with the naked eye</li> <li>• analyse how different organisms adapt to their environments</li> <li>• distinguish between life forms as single or multi-celled organisms and belonging to one of five kingdoms: Plantae, Animalia, Monera, Protista, Fungi</li> </ul>
<p><b>Grade 7</b></p> <ul style="list-style-type: none"> <li>• analyse the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems</li> <li>• assess survival needs and interactions between organisms and the environment</li> <li>• assess the requirements for sustaining healthy local ecosystems</li> <li>• evaluate human impacts on local ecosystems</li> </ul>

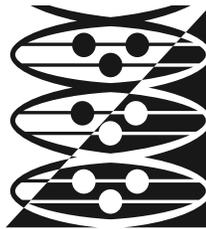
PHYSICAL SCIENCE

<p><b>Kindergarten</b></p> <ul style="list-style-type: none"> <li>• describe properties of materials, including colour, shape, texture, size, and weight</li> <li>• identify materials that make up familiar objects</li> <li>• describe ways to rethink, refuse, reduce, reuse, and recycle</li> </ul>
<p><b>Grade 1</b></p> <ul style="list-style-type: none"> <li>• demonstrate how force can be applied to move an object</li> <li>• compare the effect of friction on the movement of an object over a variety of surfaces</li> <li>• demonstrate and describe the effects of magnets on different materials</li> </ul>
<p><b>Grade 2</b></p> <ul style="list-style-type: none"> <li>• identify the properties of solids, liquids, and gases</li> <li>• investigate changes to the properties of matter when it is heated or cooled</li> <li>• investigate the interactions of liquids and solids</li> </ul>
<p><b>Grade 3</b></p> <ul style="list-style-type: none"> <li>• describe shapes that are part of natural and human-built structures (e.g., domes, arches, pyramids)</li> <li>• compare the effects of different materials, shapes, and forces on the strength and stability of different structures</li> <li>• conduct investigations into ways to improve the strength and stability of structures</li> </ul>
<p><b>Grade 4</b></p> <ul style="list-style-type: none"> <li>• identify sources of light and sound</li> <li>• explain properties of light (e.g., travels in a straight path, can be reflected)</li> <li>• explain properties of sound (e.g., travels in waves, travels in all directions)</li> </ul>
<p><b>Grade 5</b></p> <ul style="list-style-type: none"> <li>• demonstrate how various forces can affect the movement of objects</li> <li>• demonstrate mechanical advantage of simple machines, including lever, wedge, pulley, ramp, screw, and wheel</li> <li>• design a compound machine</li> <li>• describe applications of simple and compound machines used in daily life in BC communities</li> </ul>
<p><b>Grade 6</b></p> <ul style="list-style-type: none"> <li>• evaluate various methods for producing small electrical charges</li> <li>• test a variety of electrical pathways using direct current circuits</li> <li>• demonstrate that electricity can be transformed into light, heat, sound, motion, and magnetic effects</li> <li>• differentiate between renewable and non-renewable methods of producing electrical energy</li> </ul>
<p><b>Grade 7</b></p> <ul style="list-style-type: none"> <li>• conduct investigations into properties of matter</li> <li>• classify substances as elements, compounds, and mixtures</li> <li>• measure substances and solutions according to pH, solubility, and concentration</li> </ul>

**EARTH AND SPACE SCIENCE**

<p><b><i>Kindergarten</i></b></p> <ul style="list-style-type: none"> <li>• demonstrate the ability to observe their surroundings</li> <li>• describe features of their immediate environment</li> </ul>
<p><b><i>Grade 1</i></b></p> <ul style="list-style-type: none"> <li>• describe changes that occur in daily and seasonal cycles and their effects on living things</li> <li>• describe activities of Aboriginal peoples in BC in each seasonal cycle</li> </ul>
<p><b><i>Grade 2</i></b></p> <ul style="list-style-type: none"> <li>• describe physical properties of air, water, and soil</li> <li>• distinguish ways in which air, water, and soil interact</li> <li>• explain why air, water, and soil are important for living things</li> </ul>
<p><b><i>Grade 3</i></b></p> <ul style="list-style-type: none"> <li>• describe characteristics and movements of objects in our solar system</li> <li>• compare familiar constellations in seasonal skies</li> <li>• demonstrate awareness of the special significance of celestial objects for Aboriginal peoples</li> </ul>
<p><b><i>Grade 4</i></b></p> <ul style="list-style-type: none"> <li>• measure weather in terms of temperature, precipitation, cloud cover, wind speed and direction</li> <li>• analyse impacts of weather on living and non-living things</li> </ul>
<p><b><i>Grade 5</i></b></p> <ul style="list-style-type: none"> <li>• analyse how BC’s living and non-living resources are used</li> <li>• identify methods of extracting or harvesting and processing BC’s resources</li> <li>• analyse how the Aboriginal concept of interconnectedness of the environment is reflected in responsibility for and caretaking of resources</li> <li>• describe potential environmental impacts of using BC’s living and non-living resources</li> </ul>
<p><b><i>Grade 6</i></b></p> <ul style="list-style-type: none"> <li>• explain obstacles unique to exploration of a specific extreme environment</li> <li>• assess technologies used for extreme environments</li> <li>• describe contributions of Canadians to exploration technologies</li> </ul>
<p><b><i>Grade 7</i></b></p> <ul style="list-style-type: none"> <li>• compare the characteristics of the Earth’s core, mantle, and crust, and describe the formation of rocks</li> <li>• analyse the dynamics of tectonic plate movement and landmass formation</li> <li>• explain how the Earth’s surface changes over time</li> </ul>





PRESCRIBED LEARNING OUTCOMES

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*Grade 2*

**GRADE 2**

***Processes and Skills of Science***

*It is expected that students will:*

- use their senses to interpret observations
- infer the probable outcome of an event or behaviour based on observations

***Life Science: Animal Growth and Changes***

*It is expected that students will:*

- classify familiar animals according to similarities and differences in appearance, behaviour, and life cycles
- describe some changes that affect animals (e.g., hibernation, migration, decline in population)
- describe how animals are important in the lives of Aboriginal peoples in BC
- describe ways in which animals are important to other living things and the environment

***Physical Science: Properties of Matter***

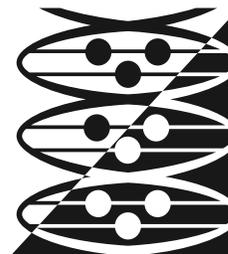
*It is expected that students will:*

- identify the properties of solids, liquids, and gases
- investigate changes to the properties of matter when it is heated or cooled
- investigate the interactions of liquids and solids

***Earth and Space Science: Air, Water, and Soil***

*It is expected that students will:*

- describe physical properties of air, water, and soil
- distinguish ways in which air, water, and soil interact
- explain why air, water, and soil are important for living things



# STUDENT ACHIEVEMENT

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This section of the IRP contains information about classroom assessment and student achievement, including specific achievement indicators to assist teachers in assessing student achievement in relation to each prescribed learning outcome. Also included in this section are key elements—descriptions of content that help determine the intended depth and breadth of prescribed learning outcomes.

## CLASSROOM ASSESSMENT AND EVALUATION

Assessment is the systematic gathering of information about what students know, are able to do, and are working toward. Assessment evidence can be collected using a wide variety of methods, such as:

- observation
- student self-assessments and peer assessments
- quizzes and tests (written, oral, practical)
- samples of student work
- projects
- oral and written reports
- journals and learning logs
- performance reviews
- portfolio assessments.

Student performance is based on the information collected through assessment activities. Teachers use their insight, knowledge about learning, and experience with students, along with the specific criteria they establish, to make judgments about student performance in relation to prescribed learning outcomes.

There are three major types of assessment that can be used in conjunction with each other to support student achievement.

- **Assessment for learning** is assessment for purposes of greater learning achievement.
- **Assessment as learning** is assessment as a process of developing and supporting students' active participation in their own learning.
- **Assessment of learning** is assessment for purposes of providing evidence of achievement for reporting.

### *Assessment for Learning*

Classroom assessment for learning provides ways to engage and encourage students to become involved in their own day-to-day assessment—to acquire the skills of thoughtful self-assessment and to promote their own achievement.

This type of assessment serves to answer the following questions:

- What do students need to learn to be successful?
- What does the evidence of this learning look like?

Assessment for learning is criterion-referenced, in which a student's achievement is compared to established criteria rather than to the performance of other students. Criteria are based on prescribed learning outcomes, as well as on suggested achievement indicators or other learning expectations.

Students benefit most when assessment feedback is provided on a regular, ongoing basis. When assessment is seen as an opportunity to promote learning rather than as a final judgment, it shows students their strengths and suggests how they can develop further. Students can use this information to redirect their efforts, make plans, communicate with others (e.g., peers, teachers, parents) about their growth, and set future learning goals.

Assessment for learning also provides an opportunity for teachers to review what their students are learning and what areas need further attention. This information can be used to inform teaching and create a direct link between assessment and instruction. Using assessment as a way of obtaining feedback on instruction supports student achievement by informing teacher planning and classroom practice.

### *Assessment as Learning*

Assessment as learning actively involves students in their own learning processes. With support and guidance from their teacher, students take responsibility for their own learning, constructing meaning for themselves. Through a process of continuous self-assessment, students develop the ability to take stock of what they have already learned, determine what they have not yet learned, and decide how they can best improve their own achievement.

Although assessment as learning is student-driven, teachers can play a key role in facilitating how this assessment takes place. By providing regular opportunities for reflection and self-assessment, teachers can help students develop, practise, and become comfortable with critical analysis of their own learning.

### *Assessment of Learning*

Assessment of learning can be addressed through summative assessment, including large-scale assessments and teacher assessments. These summative assessments can occur at the end of the year or at periodic stages in the instructional process.

Large-scale assessments, such as Foundation Skills Assessment (FSA) and Graduation Program exams, gather information on student performance

throughout the province and provide information for the development and revision of curriculum. These assessments are used to make judgments about

students' achievement in relation to provincial and national standards. There is no large-scale provincial assessment for science K to 7.

<b>Assessment <i>for</i> Learning</b>	<b>Assessment <i>as</i> Learning</b>	<b>Assessment <i>of</i> Learning</b>
<p>Formative assessment <i>ongoing in the classroom</i></p> <ul style="list-style-type: none"> <li>• teacher assessment, student self-assessment, and/or student peer assessment</li> <li>• criterion-referenced – criteria based on prescribed learning outcomes identified in the provincial curriculum, reflecting performance in relation to a specific learning task</li> <li>• involves both teacher and student in a process of continual reflection and review about progress</li> <li>• teachers adjust their plans and engage in corrective teaching in response to formative assessment</li> </ul>	<p>Formative assessment <i>ongoing in the classroom</i></p> <ul style="list-style-type: none"> <li>• self-assessment</li> <li>• provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning</li> <li>• student-determined criteria based on previous learning and personal learning goals</li> <li>• students use assessment information to make adaptations to their learning process and to develop new understandings</li> </ul>	<p>Summative assessment <i>occurs at end of year or at key stages</i></p> <ul style="list-style-type: none"> <li>• teacher assessment</li> <li>• may be either criterion-referenced (based on prescribed learning outcomes) or norm-referenced (comparing student achievement to that of others)</li> <li>• information on student performance can be shared with parents/guardians, school and district staff, and other education professionals (e.g., for the purposes of curriculum development)</li> <li>• used to make judgments about students' performance in relation to provincial standards</li> </ul>

***Criterion-Referenced Assessment and Evaluation***

In criterion-referenced evaluation, a student's performance is compared to established criteria rather than to the performance of other students. Evaluation in relation to prescribed curriculum requires that criteria be established based on the learning outcomes.

Criteria are the basis for evaluating student progress. They identify, in specific terms, the critical aspects of

a performance or a product that indicate how well the student is meeting the prescribed learning outcomes. For example, weighted criteria, rating scales, or scoring guides (reference sets) are ways that student performance can be evaluated using criteria.

Wherever possible, students should be involved in setting the assessment criteria. This helps students develop an understanding of what high-quality work or performance looks like.

**Criterion-referenced assessment and evaluation may involve these steps:**

- Step 1** Identify the prescribed learning outcomes and suggested achievement indicators (as articulated in this IRP) that will be used as the basis for assessment.
- Step 2** Establish criteria. When appropriate, involve students in establishing criteria.
- Step 3** Plan learning activities that will help students gain the attitudes, skills, or knowledge outlined in the criteria.
- Step 4** Prior to the learning activity, inform students of the criteria against which their work will be evaluated.
- Step 5** Provide examples of the desired levels of performance.
- Step 6** Conduct the learning activities.
- Step 7** Use appropriate assessment instruments (e.g., rating scale, checklist, scoring guide) and methods (e.g., observation, collection, self-assessment) based on the particular assignment and student.
- Step 8** Review the assessment data and evaluate each student's level of performance or quality of work in relation to criteria.
- Step 9** Where appropriate, provide feedback and/or a letter grade to indicate how well the criteria are met.
- Step 10** Communicate the results of the assessment and evaluation to students and parents/guardians.

**KEY ELEMENTS**

Key elements provide an overview of content in each curriculum organizer. They can be used to determine the expected depth and breadth of the prescribed learning outcomes.

Note that some topics appear at multiple grade levels in order to emphasize their importance and to allow for developmental learning.

**ACHIEVEMENT INDICATORS**

To support teachers in assessing provincially prescribed curricula, this IRP includes sets of achievement indicators in relation to each learning outcome.

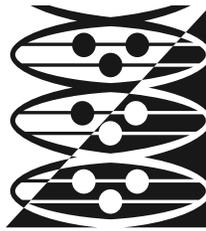
Achievement indicators define the specific level of attitudes demonstrated, skills applied, or knowledge acquired by the student in relation to a corresponding prescribed learning outcome. They describe what evidence a teacher might look for to determine whether or not the student has fully met the intent

of the learning outcome. In some cases, achievement indicators may also include suggestions as to the type of task that would provide evidence of having met the learning outcome (e.g., a constructed response such as a list, comparison, analysis, or chart; a product created and presented such as a report, drama presentation, poster, letter, or model; a particular skill demonstrated such as interpreting data).

Achievement indicators are not mandatory; they are suggestions only, provided to assist teachers in assessing how well their students achieve the prescribed learning outcomes. Teachers are encouraged to modify and expand on these suggestions as required to address local needs.

The following pages contain the suggested achievement indicators corresponding to each prescribed learning outcome for the Science K to 7 curriculum. The achievement indicators are arranged by curriculum organizer and suborganizer for each grade; however, this order is not intended to imply a required sequence of instruction and assessment.





# STUDENT ACHIEVEMENT

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*Grade 2*

**GRADE 2: PROCESSES OF SCIENCE****Key Elements: Processes of Science**

Estimated Time: integrate with other curriculum organizers

***Interpreting Observations***

After using the senses directly and indirectly to gather information, students look for ways to exchange meaningful summaries of the collected experiences they are learning to call ‘scientific observations’. This involves explaining the significance of their observations and drawing general conclusions about interconnections (e.g., small animals eat small seeds). Explaining the importance of these interactions requires students to describe the observed changes according to actions, patterns, and relationships. Students at a skilful level analyse results by looking for a pattern or making associations about events of which they have previously learned. Many of these interpreting skills include: searching for patterns, thinking, forecasting actions, estimating, finding relations, sorting objects, identifying similarities and differences and summarizing facts.

***Making Inferences***

Along with learning to make observations and examine “facts,” students are learning to make inferences (consciously draw informal conclusions about something they have not yet seen, on the basis of previous experience, familiar-looking evidence, and reasoning). To do this well, it helps if students learn the differences between predicting, guessing, and restating facts. With prompting, students can begin to provide reasons or evidence to support their guesses or predictions. As well, students develop their ability to make inferences if they are encouraged to draw informal conclusions based on good observations and previous experience.

GRADE 2 PROCESSES OF SCIENCE

Prescribed Learning Outcomes	Suggested Achievement Indicators
<p><i>It is expected that students will:</i></p>	<p><i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i></p> <p><i>Students who have fully met the prescribed learning outcome are able to:</i></p>
<ul style="list-style-type: none"> <li>• use their senses to interpret observations</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> observe, record, and make sensory comparisons</li> <li><input type="checkbox"/> provide comprehensive explanations based on observations made or facts learned (e.g., “The best shape for a boat is...”)</li> <li><input type="checkbox"/> draw specific conclusions based on observations (e.g., water is being wasted – protect our water)</li> </ul>
<ul style="list-style-type: none"> <li>• infer the probable outcome of an event or behaviour based on observations</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> with teacher support, observe and accurately record a specific process (e.g., a plant developing from a seed)</li> <li><input type="checkbox"/> predict several likely recurrences not yet observed in other, similar situations (e.g., after seeing how a plant develops from a seed, recognize that the same type of development can be expected from other, different plant seeds)</li> </ul>

Processes and Skills of Science							
Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
<ul style="list-style-type: none"> <li>• Observing</li> <li>• Communicating (sharing)</li> </ul>	<ul style="list-style-type: none"> <li>• Communicating (recording)</li> <li>• Classifying</li> </ul>	<ul style="list-style-type: none"> <li>• Interpreting Observations</li> <li>• Making Inferences</li> </ul>	<ul style="list-style-type: none"> <li>• Questioning</li> <li>• Measuring and Reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Interpreting Data</li> <li>• Predicting</li> </ul>	<ul style="list-style-type: none"> <li>• Designing Experiments</li> <li>• Fair Testing</li> </ul>	<ul style="list-style-type: none"> <li>• Controlling Variables</li> <li>• Scientific Problem Solving</li> </ul>	<ul style="list-style-type: none"> <li>• Hypothesizing</li> <li>• Developing Models</li> </ul>

**GRADE 2 LIFE SCIENCE: ANIMAL GROWTH AND CHANGES****Key Elements: Life Science**

Estimated Time: 25 – 30 hours

By the end of the grade, students will have understood animal life cycles and why animals are important to other living things.

***Animal Growth and Changes***

The study of animal life cycles and interactions begins with a focus on animal growth and change. Through a study of animals in a variety of environments and seasons, students describe characteristics, behaviours, needs, and life cycles. Students begin to understand the interactions of animals with each other, the environment, and humans.

***Vocabulary***

young, adult, life cycle, behaviour, appearance, food, predator, prey, enemies, environment, male, female, characteristics, insect, bird, mammal, reptile, amphibian, fish, hibernate, migrate

***Knowledge***

- different kinds of animals have different life cycles (e.g., bird, insect, mammal)
- animals' characteristics (e.g., skin covering) help them adapt to the conditions in their environment
- animals have behaviours such as hibernation and migration
- animals' behaviours help them adapt to seasonal conditions in their environment
- animals are important in the lives of Aboriginal peoples

***Skills and Attitudes***

- observe and record the life cycles of a variety of animals
- predict and infer the stages in the life cycles of related animals
- make inferences about an animal's environment from its characteristics
- use facts and observations to draw conclusions about animal populations

## GRADE 2 LIFE SCIENCE: ANIMAL GROWTH AND CHANGES

Prescribed Learning Outcomes	Suggested Achievement Indicators
<p><i>It is expected that students will:</i></p>	<p><i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i></p> <p><i>Students who have fully met the prescribed learning outcome are able to:</i></p>
<ul style="list-style-type: none"> <li>• classify familiar animals according to similarities and differences in appearance, behaviour, and life cycles</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> describe and illustrate in detail the appearance and behaviour of familiar animals</li> <li><input type="checkbox"/> identify and compare similarities and differences between animals</li> <li><input type="checkbox"/> compare and illustrate different types of animal life cycles</li> </ul>
<ul style="list-style-type: none"> <li>• describe some changes that affect animals (e.g., hibernation, migration, decline in population)</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> accurately list a group of animals that hibernate, migrate, or change coat to respond to the conditions encountered in the different seasons</li> <li><input type="checkbox"/> identify the effects of a decline in a specific animal population (e.g., species extinction)</li> </ul>
<ul style="list-style-type: none"> <li>• describe how animals are important in the lives of Aboriginal peoples in BC</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> identify from historical sources how animals were part of the lives of Aboriginal peoples (e.g., bear: fur for warmth during the winter; grease for cooking and personal care; bones for tools)</li> <li><input type="checkbox"/> illustrate in detail how animals help to meet the needs of local Aboriginal peoples (e.g., seal oil and meat on the West Coast; eagle feathers in ceremonies)</li> </ul>
<ul style="list-style-type: none"> <li>• describe ways in which animals are important to other living things and the environment</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> make a comprehensive food web of items that can be obtained from a particular animal (e.g., leather, meat, milk)</li> <li><input type="checkbox"/> identify things that are essential for the survival of an animal (e.g., water, food, shelter)</li> <li><input type="checkbox"/> with teacher support, illustrate ways in which animals contribute to the environment (e.g., interdependence of food chains; nutrients for soil)</li> </ul>

**GRADE 2 PHYSICAL SCIENCE: PROPERTIES OF MATTER****Key Elements: Physical Science**

Estimated Time: 25 – 30 hours

By the end of the grade, students will have recognized states of matter and investigated how liquids and solids interact.

***Properties of Matter***

The study of properties of matter begins with an exploration of common objects. Students discover the similarities and differences in the properties of materials and, through a series of activities and experiments, determine the three states of matter: solid, liquid, and gas. Further investigations explore how matter can be changed through mixing, dissolving, heating, cooling, or freezing.

***Vocabulary***

solid, liquid, gas, vapour, dissolve, float, sink, temperature, freeze, melt, evaporate, condense, boil, heat, cool, pressure

***Knowledge***

- water is the only substance that exists naturally on Earth in three states, which change from one to another depending on heat loss or gain
- changes of state are reversible
- solids stay the same shape, are visible, and can be felt (are usually hard)
- liquids flow and form shapes (i.e., take the shape of their container and can be poured), can be visible or invisible, and can usually be felt
- gases expand or contract to change shape, and are generally invisible, but can be felt when they are moving and pushing
- solids, liquids, and gases all have mass
- the volume of liquids does not change with the shape of the container
- solids can sink or float in liquids depending on density and shape
- liquids can float on top of other liquids
- gases “float” on top of liquids (bubbles rise) because they are less dense or “lighter”
- all gases are less dense than water

***Skills and Attitudes***

- demonstrate curiosity
- conduct simple experiments safely
- observe and record observations
- draw inferences about the real world from observations, demonstrations, and experiments

## GRADE 2 PHYSICAL SCIENCE: PROPERTIES OF MATTER

Prescribed Learning Outcomes	Suggested Achievement Indicators
<i>It is expected that students will:</i>	<p><i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i></p> <p><i>Students who have fully met the prescribed learning outcome are able to:</i></p>
<ul style="list-style-type: none"> <li>• identify the properties of solids, liquids, and gases</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> observe and accurately list the properties of each state of matter (e.g., solid: stays the same shape, visible, you can feel it ; liquid: changes shape, fills and stays in the bottom of a container, may be visible or invisible; gas: changes shape, can escape from a container, generally invisible)</li> </ul>
<ul style="list-style-type: none"> <li>• investigate changes to the properties of matter when it is heated or cooled</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> conduct experiments on the properties of water (e.g., freezing, melting, evaporation)</li> <li><input type="checkbox"/> observe and accurately record changes during experiments</li> <li><input type="checkbox"/> describe in detail the results of their observations and investigations</li> <li><input type="checkbox"/> interpret their observations and answer specific questions (e.g., Will cold water freeze faster than hot water?)</li> </ul>
<ul style="list-style-type: none"> <li>• investigate the interactions of liquids and solids</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> conduct experiments on the interactions of liquids and solids (e.g., sink, float, or dissolve)</li> <li><input type="checkbox"/> observe and accurately record changes during experiments</li> <li><input type="checkbox"/> describe in detail the results of their observations and investigations</li> <li><input type="checkbox"/> interpret their observations and answer specific questions (e.g., Will solids sink, float, or dissolve in a liquid?)</li> </ul>

**GRADE 2 EARTH AND SPACE SCIENCE: AIR, WATER, AND SOIL****Key Elements: Earth and Space Science**

Estimated Time: 25 – 30 hours

By the end of the grade, students will have described the interactions of air, water, and soil, and their importance for living things.

***Air, Water, and Soil***

This study focuses on the properties of air, water, and soil. Students investigate and describe characteristics of air and water in their daily lives, and learn about the water cycle and processes of evaporation and condensation. By examining soil in a variety of locations, students describe its components and uses. Students also learn that air, water, and soil are important to living things.

***Vocabulary***

evaporation, condensation, precipitation, dry, wet, clay, sand, evaporate, condense, freeze, rain, snow, air, water, soil, conservation, pollution, float, glide, wind, water cycle

***Knowledge***

- soils are composed of small particles of rock (sand and clay) and humus
- soils contain nutrients necessary for plants to grow
- soils have differing capacity to hold water depending on composition
- soil can be moved (eroded) by the action of wind, liquid water, and ice
- water cycles through precipitation, evaporation, and condensation
- the rate of evaporation of water from soils is determined by factors such as temperature, surface area, and wind speed
- evaporated water is a gas that becomes part of the air
- the evaporated water carried in air condenses into liquid water when the air is cooled
- air has mass and can push on things when it moves
- living things depend on water, air, and soil (either directly or indirectly)

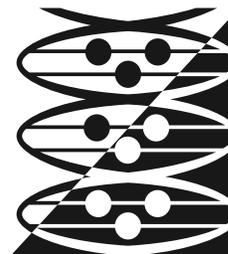
***Skills and Attitudes***

- use magnifying devices
- compare the characteristics of soil samples
- record and interpret the results of investigations
- explain the events in the water cycle in order
- infer the effects of erosion, drought, and flood on living things
- recognize the value of conserving clean air and water and healthy soil

## GRADE 2 EARTH AND SPACE SCIENCE: AIR, WATER, AND SOIL

Prescribed Learning Outcomes	Suggested Achievement Indicators
<i>It is expected that students will:</i>	<p><i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i></p> <p><i>Students who have fully met the prescribed learning outcome are able to:</i></p>
<ul style="list-style-type: none"> <li>• describe physical properties of air, water, and soil</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> list the properties of air (e.g., expands or contracts; generally invisible) and water (e.g., changes state, shaped by container)</li> <li><input type="checkbox"/> identify the main components of soil (e.g., sand, rocks, clay)</li> </ul>
<ul style="list-style-type: none"> <li>• distinguish ways in which air, water, and soil interact</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> illustrate and accurately label the parts of the water cycle</li> <li><input type="checkbox"/> define and describe the processes of evaporation, condensation, and erosion</li> </ul>
<ul style="list-style-type: none"> <li>• explain why air, water, and soil are important for living things</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> with teacher support, create a micro environmental system, infer possible consequences of changes in that ecosystem</li> <li><input type="checkbox"/> describe in detail how living things depend on air, water, and/or soil</li> </ul>





# CLASSROOM ASSESSMENT MODEL

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The Classroom Assessment Model outlines a series of assessment units for Science K to 7. These units have been structured by grade level and according to the curriculum organizers

- Life Science
- Physical Science
- Earth and Space Science

Processes of Science are integrated throughout the other three organizers. These units collectively address all of the prescribed learning outcomes for Science K to 7.

This organization is not intended to prescribe a linear means of course delivery. Teachers are encouraged to address the learning outcomes in any order, and to combine and organize the units to meet the needs of their students and to respond to local requirements. Some students with special needs may have learning outcomes set for them that are modified and documented in their Individualized Education Plan (IEP). For more information, see the section on Inclusion, Equity, and Accessibility for All Learners in the Introduction to this IRP.

### CONSIDERATIONS FOR INSTRUCTION AND ASSESSMENT IN SCIENCE K TO 7

It is highly recommended that parents and guardians be kept informed about all aspects of Science K to 7. For suggested strategies for involving parents and guardians, refer to the Introduction to this IRP.

Teachers are responsible for setting a positive classroom climate in which students feel comfortable learning about and discussing topics in Science K to 7. Guidelines that may help educators establish a positive climate that is open to free inquiry and respectful of various points of view can be found in the section on Establishing a Positive Classroom Climate in the Introduction to this IRP.

Teachers may also wish to consider the following:

- Involve students in establishing guidelines for group discussion and presentations. Guidelines might include using appropriate listening and speaking skills, respecting students who are reluctant to share personal information in group settings, and agreeing to maintain confidentiality if sharing of personal information occurs.
- Promote critical thinking and open-mindedness, and refrain from taking sides on one point of view.

- Develop and discuss procedures associated with recording and using personal information that may be collected as part of students' work for the purposes of instruction and/or assessment (e.g., why the information is being collected, what the information will be used for, where the information will be kept; who can access it—students, administrators, parents; how safely it will be kept).
- Ensure students are aware that if they disclose personal information that indicates they are at risk for harm, then that information cannot be kept confidential. For more information, see the section on Confidentiality in the Introduction to this IRP.

### *Classroom Assessment and Evaluation*

Teachers should consider using a variety of assessment techniques to assess students' abilities to meet the prescribed learning outcomes. Tools and techniques for assessment in Science K to 7 can include:

- teacher assessment tools such as observation checklists, rating scales, and scoring guides
- self-assessment tools such as checklists, rating scales, and scoring guides
- peer assessment tools such as checklists, rating scales, and scoring guides
- journals or learning logs
- video (to record and critique student demonstration)
- written tests, oral tests (true/false, multiple choice, short answer)
- worksheets
- portfolios
- student-teacher conferences.

Assessment in Science K to 7 can also occur while students are engaged in, and based on the product of, activities such as:

- case studies and simulations
- group and class discussions
- brainstorming, clusters, webs
- research projects
- role plays
- charts and graphs
- posters, collages, models, web sites
- oral and multimedia presentations
- peer teaching
- personal pledges or contracts.

For more information about student assessment, refer to the section on Student Achievement.

***Information and Communications Technology***

The Science K to 7 curriculum requires students to be able to use and analyse the most current information to make informed decisions on a range of topics. This information is often found on the Internet as well as in other information and communications technology resources. When organizing for instruction and assessment, Science K to 7 teachers should consider how students will best be able to access the relevant technology, and ensure that students are aware of school district policies on Internet and computer use.

***Teaching Science in Multi-Grade Classrooms***

Teachers often have a multi-grade teaching assignment whereby it is necessary to teach all of the prescribed learning outcomes for the different grade levels in one classroom. Here are some suggestions

- teamwork with colleagues to develop a two-year alternating program with topics unique to the combined classrooms; topics can be designated for Year A (even) and Year B (odd)
- development of topics from commonalities within the prescribed learning outcomes
- selection of topics that would facilitate school planning and cross-grade articulation for students and teachers
- using an approach that integrates learning in other subject areas.

**CONTENTS OF THE MODEL**

***Assessment Overview Table***

The Assessment Overview Table provides teachers with suggestions and guidelines for assessment of each grade of the curriculum. This table identifies the domains of learning and cognitive levels of the learning outcomes, along with a listing of suggested assessment activities and a suggested weight for grading for each curriculum organizer.

***Key Elements***

This section includes a brief description of the unit, identifying relevant vocabulary, knowledge, skills, and attitudes.

***Suggested Timeframe***

The suggested time indicates the average number of hours needed to address the prescribed learning outcomes identified in that unit; it does not necessarily indicate the time required to implement the suggested instructional and assessment activities listed.

***Prescribed Learning Outcomes and Suggested Achievement Indicators***

Each set of prescribed learning outcomes identifies the content standards for that unit. The corresponding achievement indicators provide additional information about the expected level or degree of student performance and can be used as the basis for assessment.

***Suggested Planning and Assessment Activities***

Planning and assessment activities have been included for each prescribed learning outcome and set of corresponding achievement indicators. Each suggested assessment activity directly corresponds to a particular planning activity as indicated by the order and arrangement of these activities.

A wide variety of planning (instructional) activities has been included to address a variety of learning and teaching styles. The assessment activities describe a variety of tools and methods for gathering evidence of student performance.

These strategies are suggestions only, designed to provide guidance for teachers in planning and carrying out assessment to meet the prescribed learning outcomes.

### ***Recommended Learning Resources***

This section lists the Science K to 7 recommended learning resources that relate to the specific learning outcomes in each topic. The resources listed do not necessarily relate to the suggested instruction and assessment. Teachers may choose to use these resources, or they may use other locally approved resources. See the section on Recommended Learning Resources in this IRP for more information.

As new resources are recommended, information will be posted on the ministry web site: [http://www.bced.gov.bc.ca/irp\\_resources/lr/resource/consub.htm](http://www.bced.gov.bc.ca/irp_resources/lr/resource/consub.htm)

### ***Assessment Instruments***

Sample assessment instruments have been included at the end of each unit, and are provided to help teachers determine the extent to which students are meeting the prescribed learning outcomes. These instruments contain criteria specifically keyed to one or more of the suggested assessment activities contained in the unit.

## USING THE CLASSROOM ASSESSMENT MODEL

The following two pages illustrate how all the elements of the Classroom Assessment Model relate to each other

CLASSROOM ASSESSMENT MODEL • Grade 1

**GRADE 1 EARTH AND SPACE SCIENCE: DAILY AND SEASONAL CHANGES**

**Key Elements: Earth and Space Science**

E Time: 2 30 s

By the end of the study, students will have demonstrated understanding of changes that occur in daily and seasonal cycles and their effects on living things.

**Daily and Seasonal Changes**  
This study focuses on weather and seasonal changes and their effects on plants, animals, and human activity. Students discover patterns of weather change during a year by recording daily weather information. Through observation and investigation, students learn that predictable changes occur in daily and seasonal cycles.

**Vocabulary**  
day, time, night, morning, afternoon, evening, days of the week, seasons, spring, fall, summer, winter, today, yesterday, tomorrow, months of year, heat, cold, snowy, rainy, cloudy, stormy, sun, light, shadow

**Knowledge**

- the daily weather may include changes in temperature, wind, cloud, and precipitation
- weather patterns change predictably according to the seasons
- weather and seasonal changes affect plants and animals
- the cycle of day and night changes predictably according to the seasons
- changes in the length of day and night occur predictably according to the seasons
- daily and seasonal changes affect human activities
- Aboriginal peoples in BC have a variety of seasonal activities

**Skills and Attitudes**

- observe and record daily and seasonal changes
- record observations and results of investigations using graphs, pictures, symbols, and words
- use classroom materials responsibly and safely

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### Suggested Timeframe

The suggested time indicates the approximate number of hours needed to deliver the prescribed learning outcomes identified in the unit.

### Key Elements

Key elements provide an overview of content in each curriculum organizer. They can be used to determine the expected depth and breadth of the prescribed learning outcomes.

### Prescribed Learning Outcomes

Prescribed learning outcomes are arranged by suborganizer.

### Suggested Achievement Indicators

Each set of suggested achievement indicators corresponds to the prescribed learning outcomes for that suborganizer.

### Planning for Assessment

This section is designed to provide guidance for teachers in helping students meet the prescribed learning outcomes.

### Suggested Assessment Activities

Each suggested assessment activity directly corresponds to a particular planning activity as indicated by the order and arrangement of these activities.

CLASSROOM ASSESSMENT MODEL • Grade 1

**GRADE 1 EARTH AND SPACE SCIENCE: DAILY AND SEASONAL CHANGES**

**Prescribed Learning Outcomes**

It is expected that students will:

- describe changes that occur in daily and seasonal cycles and their effects on living things

**Suggested Achievement Indicators**

The following set of indicators may be used to assess student achievement for the prescribed learning outcome above. Students who fully meet the prescribed learning outcome are able to:

- describe the effects of weather on living things (e.g., migration of birds, leisure activities)
- accurately sort pictures or objects that pertain to daily and seasonal changes (e.g., new plant growth, snow melting, leaves falling, bears hibernating)
- illustrate and record changes that occur throughout the seasons (e.g., flowers blooming, snow melting, leaves falling, lakes freezing)
- with teacher support, identify daily weather conditions and seasonal patterns (e.g., how people or animals prepare for weather conditions)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>Keep a class chart to track the weather for a period of time. Each student is responsible for predicting and recording the weather for a specific period. Emphasis is on conditions that can be observed (e.g., cloud cover, precipitation, temperature). Ask the class to agree on a standard set of symbols for recording the weather information.</li> <li>Discuss how weather and seasonal changes affect humans. Ask students to consider foods eaten, feelings, leisure activities, outdoor/indoor activity, health (e.g., colds, flu, sunburn, hay fever, insect bites), clothing, holidays, and feasts.</li> <li>Through leaf collecting, picture collages, and word splashes, have students explore characteristics of seasonal changes and day time/night time.</li> <li>Make two large charts on sturdy tag board to use throughout the year as instructional tools and assessment organizer models, one for Seasonal divided into four quadrants, and one for Daily divided in half.</li> </ul>	<ul style="list-style-type: none"> <li>After students have recorded the weather on the class chart, ask each student to present his or her "weather report" to the class. Assess each student's ability to:                             <ul style="list-style-type: none"> <li>observe weather conditions, cloud cover, precipitation, and temperature</li> <li>use appropriate vocabulary.</li> </ul> </li> <li>To determine if students can describe how weather affects them, ask them to describe how they would prepare or dress for a specific weather condition. Assess the description based on whether it is realistic and complete for that weather condition.</li> <li>In partners, have students sort and paste pictures/words into a graphic organizer. Note the extent to which students were able to distinguish day and night, and seasonal features.</li> </ul>

continued next page

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CLASSROOM ASSESSMENT MODEL • Grade 1

*Daily and Seasonal Changes (continued)*

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>Choose one local deciduous tree to observe throughout the year. Take photos and make a pictorial record of the tree in each season.</li> </ul>	<ul style="list-style-type: none"> <li>Give students a graphic of a circle divided into four quadrants, and have them draw to represent their understanding (e.g., "In Spring, my tree...").</li> </ul> <p>Look for evidence that students have placed the seasons in the correct quadrant and that they have included seasonal characteristics in their drawings.</p>
<ul style="list-style-type: none"> <li>In small groups, have students create seasonal murals or dioramas using pictures, words, and objects from a prepared tub.</li> </ul>	<ul style="list-style-type: none"> <li>When students have created their representations, work together to establish criteria for assessing their work, such as: seasonal murals/dioramas show                         <ul style="list-style-type: none"> <li>possible weather conditions</li> <li>appropriate clothing</li> <li>recreation activity</li> <li>phases of plant growth</li> <li>animal activity</li> </ul> </li> </ul>

**Recommended Learning Resources**

- Discovery Works Modules for B.C. Grade 1 (Weather and Seasons)
- Earth Watch! (an Canadian Science Place)
- Everyday Life
- Glide Into Winter with Math and Science (AIMS Activities)
- Hands-on Science (Daily and Seasonal Changes)
- Project WET
- Seasons
- Spring Into Math and Science (AIMS Activities)

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**Recommended Learning Resources**

This section lists the recommended learning resources that relate to the specific learning outcomes in each suborganizer or cluster of learning outcomes. See the section on Learning Resources in this IRP for more information.

CLASSROOM ASSESSMENT MODEL • Grade 1

**HOW WE WORKED TOGETHER** 

My name is: \_\_\_\_\_ The date is: \_\_\_\_\_

Other group members: \_\_\_\_\_

Our task was: \_\_\_\_\_

GROUP MEMBERS:	 Not Yet (not yet within expectations)	 Sometimes (meets expectations)	 Yes (fully meets expectations)	 Always (exceeds expectations)
Everyone participated				
We listened to each other				
We encouraged each other (Yeah... Great... I like that idea...)				
We took turns sharing ideas				
The group stayed together				
We accomplished our task				

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**Assessment Instruments**

Sample assessment instruments are provided at the end of each unit, and contain criteria specifically keyed to one or more of the suggested assessment activities contained in the unit.

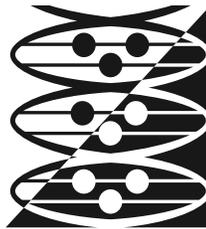
CLASSROOM ASSESSMENT MODEL • Grade 1

**NEEDS OF LIVING THINGS**

1 - not yet within expectations	2 - meets expectations	3 - fully meets expectations	4 - exceeds expectations
limited understanding of the needs of living things	basic understanding of the needs of living things	good understanding of the needs of living things	solid understanding of the needs of living things
one basic need identified	two basic needs identified	three basic needs identified	four basic needs (food, water, air and shelter) identified
explanation unclear or incomplete	explanation may or may not be clear	clear explanation with consistent examples	clear and complete explanation
confusion with non-living	clear distinction between living and non-living	clear distinction between living and non-living	clear distinction between living and non-living

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# CLASSROOM ASSESSMENT MODEL

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*Grade 2*

## ASSESSMENT OVERVIEW TABLE FOR: GRADE 2

The purpose of this table is to provide teachers with suggestions and guidelines for classroom-based formative and summative assessment and grading of Science K to 7.

Curriculum Organizers	Suggested Timeframe	Suggested Assessment Activities	Suggested Weight for Grading	Number of Outcomes	Number of Outcomes by Cognitive Level *		
					K	U & A	HMP
	Average # of hours						
<b>PROCESSES OF SCIENCE</b>	Integrated	Integrated	Integrated	2		1	1
<b>LIFE SCIENCE</b>	25-30	<ul style="list-style-type: none"> <li>• diagram</li> <li>• science log</li> <li>• mind map</li> <li>• mural</li> <li>• presentation</li> <li>• oral summary</li> <li>• chart</li> <li>• diorama</li> </ul>	33 $\frac{1}{3}$ %	4	2		
<b>PHYSICAL SCIENCE</b>	25-30	<ul style="list-style-type: none"> <li>• science log</li> <li>• drawing</li> <li>• oral summary</li> <li>• quiz</li> <li>• model</li> </ul>	33 $\frac{1}{3}$ %	3	1		2
<b>EARTH AND SPACE SCIENCE</b>	25-30	<ul style="list-style-type: none"> <li>• work sheet</li> <li>• role play</li> <li>• diagram</li> <li>• drawing</li> <li>• self evaluation</li> <li>• project</li> <li>• oral summary</li> <li>• oral quiz</li> <li>• graph</li> </ul>	33 $\frac{1}{3}$ %	3	1		1
<b>TOTALS</b>	<b>75-90</b>		<b>100 %</b>	<b>12</b>	<b>4</b>	<b>4</b>	<b>4</b>

\* The following abbreviations are used to represent the three cognitive levels: K = Knowledge; U & A = Understanding and Application; HMP = Higher Mental Processes

## GRADE 2: PROCESSES OF SCIENCE

**Key Elements: Processes of Science**

Estimated Time: integrate with other curriculum organizers

***Interpreting Observations***

After using the senses directly and indirectly to gather information, students look for ways to exchange meaningful summaries of the collected experiences they are learning to call 'scientific observations'. This involves explaining the significance of their observations and drawing general conclusions about interconnections (e.g., small animals eat small seeds). Explaining the importance of these interactions requires students to describe the observed changes according to actions, patterns, and relationships. Students at a skilful level analyse results by looking for a pattern or making associations about events of which they have previously learned. Many of these interpreting skills include: searching for patterns, thinking, forecasting actions, estimating, finding relations, sorting objects, identifying similarities and differences and summarizing facts.

***Making Inferences***

Along with learning to make observations and examine "facts," students are learning to make inferences (consciously draw informal conclusions about something they have not yet seen, on the basis of previous experience, familiar-looking evidence, and reasoning). To do this well, it helps if students learn the differences between predicting, guessing, and restating facts. With prompting, students can begin to provide reasons or evidence to support their guesses or predictions. As well, students develop their ability to make inferences if they are encouraged to draw informal conclusions based on good observations and previous experience.

### Grade 2 Processes of Science

Prescribed Learning Outcomes	Suggested Achievement Indicators
<p><i>It is expected that students will:</i></p>	<p><i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i></p> <p><i>Students who have fully met the prescribed learning outcome are able to:</i></p>
<ul style="list-style-type: none"> <li>• use their senses to interpret observations</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> observe, record, and make sensory comparisons</li> <li><input type="checkbox"/> provide comprehensive explanations based on observations made or facts learned (e.g., “The best shape for a boat is...”)</li> <li><input type="checkbox"/> draw specific conclusions based on observations (e.g., water is being wasted – protect our water)</li> </ul>
<ul style="list-style-type: none"> <li>• infer the probable outcome of an event or behaviour based on observations</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> with teacher support, observe and accurately record a specific process (e.g., a plant developing from a seed)</li> <li><input type="checkbox"/> predict several likely recurrences not yet observed in other, similar situations (e.g., after seeing how a plant develops from a seed, recognize that the same type of development can be expected from other, different plant seeds)</li> </ul>

**GRADE 2 LIFE SCIENCE: ANIMAL GROWTH AND CHANGES****Key Elements: Life Science**

Estimated Time: 25 – 30 hours

By the end of the grade, students will have understood animal life cycles and why animals are important to other living things.

***Animal Growth and Changes***

The study of animal life cycles and interactions begins with a focus on animal growth and change. Through a study of animals in a variety of environments and seasons, students describe characteristics, behaviours, needs, and life cycles. Students begin to understand the interactions of animals with each other, the environment, and humans.

***Vocabulary***

young, adult, life cycle, behaviour, appearance, food, predator, prey, enemies, environment, male, female, characteristics, insect, bird, mammal, reptile, amphibian, fish, hibernate, migrate

***Knowledge***

- different kinds of animals have different life cycles (e.g., bird, insect, mammal)
- animals' characteristics (e.g., skin covering) help them adapt to the conditions in their environment
- animals have behaviours such as hibernation and migration
- animals' behaviours help them adapt to seasonal conditions in their environment
- animals are important in the lives of Aboriginal peoples

***Skills and Attitudes***

- observe and record the life cycles of a variety of animals
- predict and infer the stages in the life cycles of related animals
- make inferences about an animal's environment from its characteristics
- use facts and observations to draw conclusions about animal populations

## Grade 2 Life Science: Animal Growth and Changes

### Prescribed Learning Outcomes

*It is expected that students will:*

- classify familiar animals according to similarities and differences in appearance, behaviour, and life cycles

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- describe and illustrate in detail the appearance and behaviour of familiar animals
- identify and compare similarities and differences between animals
- compare and illustrate different types of animal life cycles

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Give students a set of pictures of familiar animals and have them classify using student-generated criteria (e.g., colour, size, special features, food choices, habitat movement.).</li> </ul>	<ul style="list-style-type: none"> <li>• Consider the extent to which students                             <ul style="list-style-type: none"> <li>- classify on the basis of similarities and differences</li> <li>- take account of previous knowledge as well as what they observe from the picture</li> <li>- classify consistently, using a coherent classification scheme</li> <li>- justify their classification choices.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Give students a set of pictures, including mammals, birds, reptiles, amphibians, fish, and insects. Ask them to sort the pictures into categories.</li> </ul>	<ul style="list-style-type: none"> <li>• In teams, have students develop countdown clues that will demonstrate their learning of animal appearance, behaviour and life cycles                             <ul style="list-style-type: none"> <li>- I am brown.</li> <li>- I live in the forest.</li> <li>- I eat _____.</li> <li>- I am a mammal.</li> <li>- I am a _____.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Show students how to draw and label a life cycle diagram (e.g., a butterfly), using science books, videos, and other resources. Have students work in partners to choose an animal and create a diagram of that animal's lifecycle in a poster or in their science journals.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to post their life cycle diagrams around the room and visit each diagram (gallery walk), selecting two cycles to compare. Student comparisons should identify two ways they are alike, and two ways they are different.</li> <li>• Students can assess their own diagrams as follows                             <ul style="list-style-type: none"> <li>- My diagram is neat.</li> <li>- My diagram is properly labelled, using science words.</li> <li>- It shows all the stages of my animal's life cycle.</li> </ul> </li> </ul>

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*Animal Growth and Changes (continued)*

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Have students observe and record daily the changes of a mealworm, ant, frog, or butterfly lifecycle.</li> </ul>	<ul style="list-style-type: none"> <li>• Students keep a science log about key concepts learned and new questions or thoughts. The log should support students' assessment of their learning by allowing them to reflect on their science activities. Ask students to describe and record events, observations, quotations, and/or diagrams from science activities and to reflect on these. Students could be prompted to think about an activity and comment on their learning by considering:               <ul style="list-style-type: none"> <li>- What do I still wonder about?</li> <li>- How is this related to what I already know?</li> <li>- What did I learn this week that I would like to know more about?</li> </ul> </li> </ul>
<p><b>Recommended Learning Resources</b></p> <ul style="list-style-type: none"> <li>• Animals Grow</li> <li>• Below Zero</li> <li>• Birds and Animals You Might See</li> <li>• Chickens Aren't The Only Ones</li> <li>• Critters</li> <li>• Cycle of Life/Recycle Handbook for Educators</li> <li>• Desert Giant – The World of the Saguaro Cactus</li> <li>• Everyday Life</li> <li>• Exploring the Animal Kingdom</li> <li>• Forests in Focus</li> <li>• Hands-on Science (Growth and Changes in Animals)</li> <li>• The Lives of Ants &amp; Bees for Students Series (Ant Bodies, Ant homes &amp; Communities, Bees &amp; Plants)</li> <li>• The Marsh: Nature's Nursery</li> <li>• Meeting Baby Animals</li> <li>• Moths and How They Live</li> <li>• Nature Babies Series</li> <li>• Once Upon a Seashore</li> <li>• Salish Sea</li> <li>• Salmonids in the Classroom</li> <li>• Science &amp; Technology 2 (All About Animals)</li> <li>• Smart-Bear Adventures, Volume 1</li> </ul>	

## Grade 2 Life Science: Animal Growth and Changes

### Prescribed Learning Outcomes

*It is expected that students will:*

- describe some changes that affect animals (e.g., hibernation, migration, decline in population)

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- accurately list a group of animals that hibernate, migrate, or change coat to respond to the conditions encountered in the different seasons
- identify the effects of a decline in a specific animal population (e.g., species extinction)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• As a class, brainstorm names of local animals (e.g., bear, salmon, robin, weasel) that hibernate, migrate, and/or change coat (colour, thickness).</li> </ul>	<ul style="list-style-type: none"> <li>• Have students work in cooperative groups, using the library or classroom resources to fill in a chart with labelled columns, “hibernate,” “migrate,” “change coat.” Then ask students to share their findings. In addition to the evaluation of the findings, the criteria for group assessment could include                             <ul style="list-style-type: none"> <li>- We worked well as a team.</li> <li>- We listened to one another and shared the project tasks.</li> <li>- We were able to share our findings and are proud of our work.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Ask students to investigate to find what animals (e.g., frog marmot, bear, squirrel, snake) do to prepare for hibernation (e.g., store food, seek protection), the time they spend hibernating, and the changes they experience while in hibernation. Then have students write reports that detail their findings and share with the class.</li> </ul>	<ul style="list-style-type: none"> <li>• Students create a mural that represents an ecological community, showing the group of animals that live, hibernate, and/or migrate there. Students should be able to explain why they chose particular plants and animals, and how these animals are able to live there throughout the year.</li> </ul>
<ul style="list-style-type: none"> <li>• Use a video or ask a local expert to share information related to the decline of a local animal population. Encourage students to ask appropriate questions and participate in a discussion of the reasons for the decline and its effects.</li> </ul>	<ul style="list-style-type: none"> <li>• Student journal entries on the presentation/discussion should include                             <ul style="list-style-type: none"> <li>- What I have learned.</li> <li>- What do I still wonder about?</li> <li>- What do I think should /could happen?</li> </ul>                             See also the sample assessment tool (<b>My Science Journal</b>) provided at the end of this grade.                         </li> </ul>

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*Animal Growth and Changes (continued)***Recommended Learning Resources**

- Animals Grow
- Below Zero
- Cycle of Life/Recycle Handbook for Educators
- Everyday Life
- Exploring the Animal Kingdom
- Forests in Focus
- Hands-on Science (Growth and Changes in Animals)
- Kokanee of British Columbia
- The Marsh: Nature's Nursery
- Meeting Baby Animals
- Moths and How They Live
- Nature Babies Series
- Once Upon a Seashore
- Salish Sea
- Salmonids in the Classroom
- Science & Technology 2 (All About Animals)
- Smart-Bear Adventures, Volume 1

## Grade 2 Life Science: Animal Growth and Changes

### Prescribed Learning Outcomes

*It is expected that students will:*

- describe how animals are important in the lives of Aboriginal peoples in BC

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- identify from historical sources how animals were part of the lives of Aboriginal peoples (e.g., bear: fur for warmth during the winter; grease for cooking and personal care; bones for tools)
- illustrate in detail how animals help to meet the needs of local Aboriginal peoples (e.g., seal oil and meat on the West Coast; eagle feathers in ceremonies)

#### Planning for Assessment

#### Suggested Assessment Activities

- Using historical sources, artefacts, and legends have students work in partners to create a mind map of pictures and/or words that shows how animals were part of the lives of Aboriginal peoples (e.g., bear: fur for warmth during the winter; grease for cooking and personal care; bones for tools).

- Assess student mind maps, looking for evidence that students
  - described the relationship between animals and Aboriginal peoples
  - identified a variety of animals
  - provided explanations of the importance of the animals cited
  - showed how all parts of the animal were used.

- Invite a local First Nations person to talk about how animals are important to Aboriginal people today. Have students generate questions to ask the speaker in advance of the visit. Contact the district Aboriginal Education coordinator or resource teacher for assistance in drawing on the local Aboriginal community.

- Look for evidence that student questions
  - show sensitivity to Aboriginal peoples
  - are relevant and appropriate.
 Student questions could include
  - Why is the moose an important animal for Aboriginal peoples?
  - What other animals do you use in your area for food or other cultural activities?
  - What other animals do you use in Aboriginal celebrations?
  - What other uses are there for animals other than food and clothing?
  - Do you know of any animal stories that tell about Aboriginal customs as they relate to animals (e.g., “Raven that brought Light”)?

#### Recommended Learning Resources

- Animals Grow
- Cycle of Life/Recycle Handbook for Educators
- Once Upon a Seashore
- Salish Sea
- Salmonids in the Classroom

## Grade 2 Life Science: Animal Growth and Changes

<b>Prescribed Learning Outcomes</b>	
<p><i>It is expected that students will:</i></p> <ul style="list-style-type: none"> <li>describe ways in which animals are important to other living things and the environment</li> </ul>	
<b>Suggested Achievement Indicators</b>	
<p><i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> make a comprehensive food web of items that can be obtained from a particular animal (e.g., leather, meat, milk)</li> <li><input type="checkbox"/> identify things that are essential for the survival of an animal (e.g., water, food, and shelter)</li> <li><input type="checkbox"/> with teacher support, illustrate ways in which animals contribute to the environment (e.g., interdependence of food chains; nutrients for soil)</li> </ul>	
<b>Planning for Assessment</b>	<b>Suggested Assessment Activities</b>
<ul style="list-style-type: none"> <li>Make a list of things in the classroom and at home that can be obtained from animals (e.g., leather, wool, meat, milk, feathers). Have students work in teams to create a food web for a particular animal (e.g., chicken, cow) and show that they understand what food products can be obtained from their animal.</li> </ul>	<ul style="list-style-type: none"> <li>Assessment should indicate the extent to which student webs are in a proper sequence and that students recognize                             <ul style="list-style-type: none"> <li>that organisms living in a habitat compete with each other for food resources</li> <li>the importance of plants as the food source at the start of all food chains</li> <li>that arrows in a food web or food chain show the direction of energy flow.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>Collect information in picture form to indicate how some animals satisfy their basic needs of food, water, shelter, and protection. Ask students to create dioramas to present this information.</li> </ul>	<ul style="list-style-type: none"> <li>Student dioramas should show that their animal can meet its basic needs (e.g., food, water, shelter) in this environment, and can explain how their animal is important to other living things.</li> </ul>

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*Animal Growth and Changes (continued)*

**Recommended Learning Resources**

- Animals Grow
- Below Zero
- Critters
- Cycle of Life/Recycle Handbook for Educators
- Everyday Life
- Exploring the Animal Kingdom
- Forests in Focus
- Hands-on Science (Growth and Changes in Animals)
- Kokanee of British Columbia
- The Lives of Ants & Bees for Students Series (Ant Bodies)
- The Marsh: Nature's Nursery
- Meeting Baby Animals
- Moths and How They Live
- Nature Babies Series
- Once Upon a Seashore
- Salish Sea
- Salmonids in the Classroom
- Science & Technology 2 (All About Animals)
- Smart-Bear Adventures, Volume 1

## GRADE 2 PHYSICAL SCIENCE: PROPERTIES OF MATTER

### Key Elements: Physical Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have recognized states of matter and investigated how liquids and solids interact.

#### *Properties of Matter*

The study of properties of matter begins with an exploration of common objects. Students discover the similarities and differences in the properties of materials and, through a series of activities and experiments, determine the three states of matter: solid, liquid, and gas. Further investigations explore how matter can be changed through mixing, dissolving, heating, cooling, or freezing.

#### *Vocabulary*

solid, liquid, gas, vapour, dissolve, float, sink, temperature, freeze, melt, evaporate, condense, boil, heat, cool, pressure

#### *Knowledge*

- water is the only substance that exists naturally on Earth in three states, which change from one to another depending on heat loss or gain
- changes of state are reversible
- solids stay the same shape, are visible, and can be felt (are usually hard)
- liquids flow and form shapes (i.e., take the shape of their container and can be poured), can be visible or invisible, and can usually be felt
- gases expand or contract to change shape, and are generally invisible, but can be felt when they are moving and pushing
- solids, liquids, and gases all have mass
- the volume of liquids does not change with the shape of the container
- solids can sink or float in liquids depending on density and shape
- liquids can float on top of other liquids
- gases “float” on top of liquids (bubbles rise) because they are less dense or “lighter”
- all gases are less dense than water

#### *Skills and Attitudes*

- demonstrate curiosity
- conduct simple experiments safely
- observe and record observations
- draw inferences about the real world from observations, demonstrations, and experiments

## Grade 2 Physical Science: Properties of Matter

### Prescribed Learning Outcomes

It is expected that students will:

- identify the properties of solids, liquids, and gases

### Suggested Achievement Indicators

The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:

- observe and accurately list the properties of each state of matter (e.g., solid: stays the same shape, visible, you can feel it; liquid: changes shape, may be visible or invisible; gas: changes shape, generally invisible)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Make a collection of solids and have students examine them using their senses of sight and touch. Use a balance scale to measure the mass of three solids.</li> <li>• Provide a variety of containers filled with water and add a different solid.</li> <li>• Discuss what students have learned in these experiments.</li> </ul>	<ul style="list-style-type: none"> <li>• During these experiences, students should record their observations in their science log. They should also be asked to ‘think aloud’ about               <ul style="list-style-type: none"> <li>- What will happen when each solid is added? (Assess if students are able to infer that the addition of each solid takes up more space and will add more mass.)</li> <li>- What will happen if they get into a bathtub that is filled to the top with water? (Assess if they are able to guess that it will overflow.)</li> </ul> </li> <li>• Ask the students to list properties of solids, including that they stay the same shape.</li> </ul>
<ul style="list-style-type: none"> <li>• Make a collection of safe liquids and have students examine them using the senses of sight and touch (may be visible or invisible). Use a balance scale with an empty container. Add liquids.</li> <li>• Collect a number of one-litre containers and pour a litre of water from one to the next.</li> </ul>	<ul style="list-style-type: none"> <li>• Students should record their observations and think about               <ul style="list-style-type: none"> <li>- What happens each time a liquid is added? (Assess if students are able to interpret from the observations that liquids have mass.)</li> <li>- What happens to the liquid’s shape?</li> <li>- What liquid’s property is evident through this experiment? (Students should notice the change of shape.)</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Blow up a variety of balloons with an air pump. Attach a filled balloon to one end of a wooden balance stick. Attach the same type of balloon to the other end and a string in the centre to make a simple balance. (Avoid using your mouth to inflate balloons as it will add warm moist air)</li> <li>• Take a deflated balloon and ask the class if it could lift a book. Place the book on the balloon. Inflate the balloon with an air pump.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider the extent to which students observe               <ul style="list-style-type: none"> <li>- the differences in shape</li> <li>- identify what is put into the balloons</li> <li>- that what is put into the balloons is invisible</li> <li>- that air takes up more space and has mass.</li> </ul> </li> <li>• Ask students:               <ul style="list-style-type: none"> <li>- If the balloon lifts the book, what is making the book move? (Students should notice that air inside or outside the balloon exerts pressure.) What pushes the book down when the balloon empties?</li> <li>- What force caused the motion of the book to change by lifting?</li> </ul> </li> </ul>

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*Properties of Matter (continued)*

Planning for Assessment	Suggested Assessment Activities
	<ul style="list-style-type: none"> <li>• Throughout the unit, students should maintain a science log that represents their learning. Logs should address the following               <ul style="list-style-type: none"> <li>- Two things I learned about solids</li> <li>- One thing I wonder about solids</li> <li>- Two things I learned about liquids</li> <li>- One thing I wonder about liquids</li> <li>- Two things I learned about gases</li> <li>- One thing I wonder about gases</li> </ul> </li> <li>• Look for evidence of student understanding of key science concepts               <ul style="list-style-type: none"> <li>➤ solid: stays the same shape, visible, you can feel it, has mass</li> <li>➤ liquid: changes shape, may be visible or invisible, can be poured, has mass</li> <li>➤ gas: changes shape, generally invisible, exerts pressure, has mass.</li> </ul> </li> </ul>
<p><b>Recommended Learning Resources</b></p> <ul style="list-style-type: none"> <li>• Below Zero</li> <li>• Discovery Works Modules for B.C. Grade 1 (Solids, Liquids, and Gases)</li> <li>• Hands-on Science (Properties of Liquids and Solids)</li> <li>• Matter, Matter Everywhere</li> <li>• Project WET</li> <li>• Science &amp; Technology 2 (In the Kitchen)</li> </ul>	

## Grade 2 Physical Science: Properties of Matter

### Prescribed Learning Outcomes

It is expected that students will:

- investigate changes to the properties of matter when it is heated or cooled

### Suggested Achievement Indicators

The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:

- conduct experiments on the properties of water (e.g., freezing, melting, evaporation)
- observe and accurately record changes during experiments
- describe in detail the results of their observations and investigations
- interpret their observations and answer specific questions (e.g., Will cold water freeze faster than hot water?)

#### Planning for Assessment

#### Suggested Assessment Activities

- Fill a container to the top with water. Have students recall the properties of water. Freeze the container. Ask, “Can we reverse the change?” Then, test this theory. Ask, “Guess what would happen if we freeze a milk container?” Then, test this theory.
- Heat some water and ask, “Where did the water go? Can we reverse the change?” Then, test this theory.
- Hold a very cold serving spoon over the steam so that students see the condensation.

- In these three experiments, evaluate students’ observations of:
  - the differences (state, colour, volume) between liquid water and frozen ice
  - the change of state and how the pan becomes dry and the steam rises
  - the liquid formation on the spoon.

- Have students place an ice cube in each of the following: polystyrene cup, paper cup, tin can, glass beaker, and plastic cup. Then have them place each container in hot tap water. Ask students to predict, observe, and record which ice cube melts first, second, third, and fourth. Ask students to record results in their journals.
- In pairs or small groups, have students design and present an experiment that answers the question: What are the conditions that cause a change in matter? Ask students to record results in their journals.

- Assess students’ science journals to ensure that they have recorded the properties of water, using scientific language and demonstrating understanding of the concepts. Look for evidence that students
  - used words such as matter, solid, liquid, gases, heat, and temperature to communicate understanding
  - followed clear procedures
  - designed an experiment that investigated a number of possible answers
  - developed answers based on observations from their experiments
  - used a variety of equipment safely.
 See also the sample scoring guide (**My Science Journal**) provided at the end of this grade.

#### Recommended Learning Resources

- Below Zero
- Discovery Works Modules for B.C. Grade 1 (Solids, Liquids, and Gases)
- Hands-on Science (Properties of Liquids and Solids)
- Matter, Matter Everywhere
- Project WET
- Science & Technology 2 (In the Kitchen)

## Grade 2 Physical Science: Properties of Matter

### Prescribed Learning Outcomes

*It is expected that students will:*

- investigate the interactions of liquids and solids

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- conduct experiments on the interactions of liquids and solids (e.g., sink, float, or dissolve)
- observe and accurately record changes during experiments
- describe in detail the results of their observations and investigations
- interpret their observations and answer specific questions (e.g., Will solids sink, float, or dissolve in a liquid?)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Have students predict, observe, and explain the changes that occur when water is added to materials such as salt, rice, vegetable oil, soap powder, paper, sugar, or coins. Record explanations of which items dissolve in a liquid.</li> </ul>	<ul style="list-style-type: none"> <li>• Present students with the following problem: What do you think will happen when we put this powdered sugar drink into this water? Have students write a prediction in their science logs; then conduct the experiment. Look for evidence that students can make inferences. Then, have students observe and record results.</li> <li>• Information on criteria for assessing journals (science logs) can be found in the Non-fiction Writing Performance Standards document.</li> </ul>
<ul style="list-style-type: none"> <li>• Have students predict, observe, and explain changes that occur when items such as tinfoil, paper towel, toilet paper, sponge cloth, and modelling clay are placed in a container that has a measured amount of water. Identify and record which items absorb the most liquid.</li> </ul>	<ul style="list-style-type: none"> <li>• Present students with the problem of cleaning up a juice spill. Have them write in their science logs a prediction of which material would best absorb the spill. Look for student ability to infer, and assess log entries using criteria previously generated.</li> </ul>
<ul style="list-style-type: none"> <li>• During student experiments testing whether different solids will float on water, have them focus on size, composition, shape, and density of the solids.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to answer the following question: What did you notice about the things that floated and the things that sank? Students can rate their understanding by responding to the following statements                         <ul style="list-style-type: none"> <li>- I used words and picture to tell about the things I learned.</li> <li>- I understood some important science ideas such as _____.</li> </ul> </li> </ul>

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*Properties of Matter (continued)*

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Have students test several containers for their cargo carrying capacity. Using a KWL strategy, ask students to summarize what they now know about characteristics necessary to create greater buoyancy. Ask students what they wonder makes a boat float and able to carry heavy loads.</li> </ul>	<ul style="list-style-type: none"> <li>• Give students a lump of modelling clay and have them build a boat that can carry cargo. Have them test their boat using marbles, washers, etc., and record results (in writing or by drawing). Based on results, ask students to modify their designs to increase carrying capacity. After each test, have students draw the results, and write a summary of what they learned about floating and carrying capacity.</li> </ul> <p>Look for the development of students’ ability to interpret observations and make inferences. Student journals should include drawings, results, and rate their understanding. (“I told what I learned clearly in words and pictures.”) See also the scoring guide (<b>My Science Journal</b>) provided at the end of this grade.</p>
<p><b>Recommended Learning Resources</b></p> <ul style="list-style-type: none"> <li>• Below Zero</li> <li>• Hands-on Science (Properties of Liquids and Solids)</li> <li>• Matter, Matter Everywhere</li> <li>• Project WET</li> <li>• Science &amp; Technology 2 (In the Kitchen)</li> </ul>	

## GRADE 2 EARTH AND SPACE SCIENCE: AIR, WATER, AND SOIL

### Key Elements: Earth and Space Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have described the interactions of air, water, and soil, and their importance for living things.

#### *Air, Water, and Soil*

This study focuses on the properties of air, water, and soil. Students investigate and describe characteristics of air and water in their daily lives, and learn about the water cycle and processes of evaporation and condensation. By examining soil in a variety of locations, students describe its components and uses. Students also learn that air, water, and soil are important to living things.

#### *Vocabulary*

evaporation, condensation, precipitation, dry, wet, clay, sand, evaporate, condense, freeze, rain, snow, air, water, soil, conservation, pollution, float, glide, wind, water cycle

#### *Knowledge*

- soils are composed of small particles of rock (sand and clay) and humus
- soils contain nutrients necessary for plants to grow
- soils have differing capacity to hold water depending on composition
- soil can be moved (eroded) by the action of wind, liquid water, and ice
- water cycles through precipitation, evaporation, and condensation
- the rate of evaporation of water from soils is determined by factors such as temperature, surface area, and wind speed
- evaporated water is a gas that becomes part of the air
- the evaporated water carried in air condenses into liquid water when the air is cooled
- air has mass and can push on things when it moves
- living things depend on water, air, and soil (either directly or indirectly)

#### *Skills and Attitudes*

- use magnifying devices
- compare the characteristics of soil samples
- record and interpret the results of investigations
- explain the events in the water cycle in order
- infer the effects of erosion, drought, and flood on living things
- recognize the value of conserving clean air and water and healthy soil

## Grade 2 Earth and Space Science: Air, Water, and Soil

### Prescribed Learning Outcomes

*It is expected that students will:*

- describe physical properties of air, water, and soil

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- list the properties of air (e.g., expands or contracts; generally invisible) and water (e.g., changes state; shaped by container)
- identify the main components of soil (e.g., sand, rocks, clay)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Have students use balloons, fans, paper airplanes, pin wheels, and parachutes to investigate properties of air. Ask students to draw the objects' motion in the air.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify that                             <ul style="list-style-type: none"> <li>- students have followed instructions during activities</li> <li>- drawings have been labelled and motion words have been used.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Ask students to explain what air is. Using their senses, have them list physical characteristics and explain, in simple words, why air is important for humans and living things. Ask students to explain how it behaves.</li> </ul>	<ul style="list-style-type: none"> <li>• Have students write a short poem. Poems should include                             <ul style="list-style-type: none"> <li>- words related to the senses</li> <li>- unit vocabulary</li> <li>- the importance of air for life.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• After a rainstorm, take students outside to observe a puddle, or pour water on the sidewalk or tarmac to create a puddle. Working in pairs, have students list everything they observe about the water in the puddle when they move objects in and out of it, walk in it, etc. Back in class, record student observations on chart paper—how water moves (e.g., ripples, waves) or what happens when objects are placed in the water (e.g., float sink).</li> </ul>	<ul style="list-style-type: none"> <li>• Have students fill in a worksheet on the properties of water (e.g., identifying three things water does). Verify that students                             <ul style="list-style-type: none"> <li>- included properties discussed in class</li> <li>- explained these properties using their own words.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Explore ways air and water are used in technology (e.g., air bags, dams, windmills, water wheels).</li> </ul>	<ul style="list-style-type: none"> <li>• At an activity centre, provide students with materials and a challenge to construct a device to show how air or water can do work for us (water wheel, windmill). Look for answers such as "Wind can                             <ul style="list-style-type: none"> <li>- cool us down</li> <li>- blow things away</li> <li>- damage property</li> <li>- dry clothes</li> <li>- fly kites."</li> </ul> </li> </ul>

*continued next page*

*Air, Water and Sea (continued)*

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Provide samples of soil components (clay, sand, humus). Have students use their senses to describe each sample, and use a magnifying glass to observe particle size.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide a recording sheet divided into three types of soil. Have students describe what it looks and feels like. Consider the extent to which students have               <ul style="list-style-type: none"> <li>- organized information in the correct columns</li> <li>- used all senses to describe the soil types</li> <li>- used descriptive words that correspond to the soil types observed.</li> </ul> </li> </ul>
<p><b>Recommended Learning Resources</b></p> <ul style="list-style-type: none"> <li>• Air and Water</li> <li>• Everyday Life</li> <li>• Hands-on Science (Soils in the Environment)</li> <li>• Project WET</li> <li>• Seashore Surprises</li> <li>• Sharing a Small World: Environmental Activities for Young Learners</li> </ul>	

## Grade 2 Earth and Space Science: Air, Water, and Soil

### Prescribed Learning Outcomes

*It is expected that students will:*

- distinguish ways in which air, water, and soil interact

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- illustrate and accurately label the parts of the water cycle
- define and describe the processes of evaporation, condensation, and erosion

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• In small groups, have the students act out each phase of the water cycle, using their body, movement and sound. Then, ask students to diagram and label a picture to represent the water cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess student contributions to the role play, looking for evidence that                             <ul style="list-style-type: none"> <li>- all phases were demonstrated</li> <li>- students participated willingly</li> <li>- movement and sounds were appropriate.</li> </ul> </li> <li>• Use the following checklist to assess the diagram                             <ul style="list-style-type: none"> <li>- uses appropriate science vocabulary (evaporation, condensation, precipitation, ground water)</li> <li>- is labelled correctly</li> <li>- includes extra details – clouds, plants, glaciers.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Place a mirror in the freezer section of the refrigerator for five to ten minutes. Remove the mirror from the freezer and breathe on it. Ask students what forms on it.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess students’ ability to observe and infer by                             <ul style="list-style-type: none"> <li>- having them do a before/after illustration</li> <li>- asking them to compare what they found on the mirror to what they see on windows in a cold car/house</li> <li>- seeing how they use their senses to describe what they have seen.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Provide students with materials containing moisture (e.g., wet paper towels, potato). Ask them to determine factors that affect drying rates (e.g., temperature, surface area, wind).</li> </ul>	<ul style="list-style-type: none"> <li>• Note evidence of their ability to predict and test. Have students record their understandings about evaporation using a concept map.</li> </ul>
<ul style="list-style-type: none"> <li>• Have students compare three different types of soil (sand, clay, and humus). First they observe the soil types and feel their texture. Then, they put about 50ml of each type in a piece of cotton cloth, which they dip into water. They carefully remove them from the water and let them drip over a cup until not water is left. Ask them to observe which type of soil lets water drip the fastest and record the information. They then open the cloth pieces to feel the difference in texture of the soil when damp.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess students’ ability to:                             <ul style="list-style-type: none"> <li>- work together</li> <li>- focus on the task</li> <li>- follow the procedures</li> <li>- dispose of used materials and tidy up.</li> </ul> </li> </ul>

*continued next page*

*Air, Water and Sea (continued)*

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>Gather three types of soil (rocky, humus, sandy). Place a measured amount of soil on a paper in front of a fan with a cardboard barrier behind, and have students measure the amount of soil that remains after the fan blows for a given amount of time.</li> </ul>	<ul style="list-style-type: none"> <li>Suggest to students a scenario whereby there is a piece of land in a windy area. Have students infer which type of soil would best resist wind erosion, based on previous learning. Look for evidence that student responses are based on observations from the experiment (e.g., the wind doesn't move the rocks; the wind blows away the sandy soil).</li> </ul>
<ul style="list-style-type: none"> <li>Review the properties of air, water, and soil.</li> </ul>	<ul style="list-style-type: none"> <li>Have students create Venn diagrams to illustrate similarities/differences in properties of air and water. Students must indicate that               <ul style="list-style-type: none"> <li>the three are necessary for life</li> <li>they are found everywhere on Earth</li> <li>they can be found in various forms.</li> </ul> </li> </ul>
<p><b>Recommended Learning Resources</b></p> <ul style="list-style-type: none"> <li>Everyday Life</li> <li>Hands-on Science (Soils in the Environment)</li> <li>Project WET</li> <li>Seashore Surprises</li> <li>Sharing a Small World: Environmental Activities for Young Learners</li> </ul>	

## Grade 2 Earth and Space Science: Air, Water, and Soil

### Prescribed Learning Outcomes

*It is expected that students will:*

- explain why air, water, and soil are important for living things

### Suggested Achievement Indicators

*The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome. Students who have fully met the prescribed learning outcome are able to:*

- with teacher support, create a micro environmental system, infer possible consequences of changes in that ecosystem
- describe in detail how living things depend on air, water, and/or soil

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Collect forest soil (or other living soil). Put in a funnel in a glass jar, and leave exposed to a light bulb (≈100 watt) about 2.5 cm above the soil for several hours to dry the soil.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider the extent to which students can                             <ul style="list-style-type: none"> <li>- predict what may happen to living things in soil</li> <li>- answer questions (e.g., Why are earthworms only found in certain places? What types of relationships may exist between small animals and living soil and plants growing?).</li> </ul> </li> <li>• Evaluate students according to their ability to                             <ul style="list-style-type: none"> <li>- extend observations to larger contexts (earthworms in nature)</li> <li>- link plants and animals.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Ask students what would happen to an ecosystem if it did not rain for a long period of time. Discuss other possible scenarios (a flood, housing development, logging). Discuss what would happen to bigger living things in the same situations.</li> </ul>	<ul style="list-style-type: none"> <li>• Have students draw a before/after picture of the results of large changes in an ecosystem. Ensure that students understand what an ecosystem is, what can happen in an ecosystem, especially from human involvement.</li> </ul>
<ul style="list-style-type: none"> <li>• Observe a goldfish in a glass bowl. Discuss whether or not the fish breathes. Introduce the concept of gills and help students understand that fish need air to live.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to draw a fish and its identifying parts, including gills. Verify students' understanding by having them complete sentences, such as                             <ul style="list-style-type: none"> <li>- Fish need water to _____.</li> <li>- Fish collect air from water with their _____ to _____.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Take the class into the schoolyard, and have them list on one side of a page all the living things they can see. On the other side, they should identify what each needs (e.g., air, water, soil). Help them by naming other living things that need the same things to survive (e.g., whale, seaweed, salamander, dragonfly, earthworm).</li> </ul>	<ul style="list-style-type: none"> <li>• Observe students' ability to                             <ul style="list-style-type: none"> <li>- work cooperatively</li> <li>- negotiate with others to justify their decisions</li> <li>- identify the needs of animals.</li> </ul> </li> </ul>

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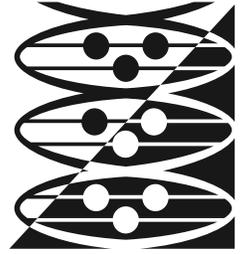
*Air, Water, and Soil (continued)*

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> <li>• Have students put seeds in cotton balls in different dishes labelled 1 to 3. Using a droplet, have students add 5 drops of water to the 1st dish, 10 drops to the 2nd, and 20 drops to the 3rd. Have them add the same amount of water twice a day for a few days.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to record how many days it takes in each dish to germinate the seeds, and graph the results. Assess student ability to               <ul style="list-style-type: none"> <li>- organize work</li> <li>- graph precisely and reliably</li> <li>- reflect on the events observed.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Have students compile an inventory of ways in which they use water. Challenge them to identify and present ways to reduce water usage.</li> </ul>	<ul style="list-style-type: none"> <li>• Criteria for assessing student work could include               <ul style="list-style-type: none"> <li>- number of examples of misuses of water</li> <li>- relevance of solutions suggested</li> <li>- integration of facts learned in the unit.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Investigate the issue of littering and develop an action plan on littering.. Have students brainstorm answers to questions such as               <ul style="list-style-type: none"> <li>- What happens when we litter?</li> <li>- What if it doesn't get picked up?</li> <li>- Is it easier to not litter or to pick it up afterward?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to complete a self-evaluation sheet on               <ul style="list-style-type: none"> <li>- my participation in the project</li> <li>- my cooperation with others</li> <li>- my helpfulness in running the project</li> <li>- my commitment to stopping littering.</li> </ul> </li> </ul>
<p><b>Recommended Learning Resources</b></p> <ul style="list-style-type: none"> <li>• Everyday Life</li> <li>• Hands-on Science (Soils in the Environment)</li> <li>• Project WET</li> <li>• Seashore Surprises</li> <li>• Sharing a Small World: Environmental Activities for Young Learners</li> </ul>	

## MY SCIENCE JOURNAL

Name: \_\_\_\_\_ Date: \_\_\_\_\_

<b>1. Still needs work</b> (not yet within expectations)	<b>2. Getting there</b> (meets expectations)	<b>3. A good scientist's journal</b> (fully meets expectations)	<b>4. Extra scientific thinking</b> (exceeds expectations)
often forgets title and dates	usually uses titles and dates	frequently uses titles and dates; organization is clear	always uses titles and dates; organization is clear; adds science content
science writing and drawings are hard to read and understand	science writing and drawings can be read but are still unclear	science writing and drawings are clear and easy to read	science writing and drawings are clear and easy to read; adds labels to diagrams
needs lots of help to show what I have learned	needs some help to show my learning	can show details of my learning with a little help	can show details of my science thinking and learning on my own
not really sure how to reflect on my learning	can include some reflection on my learning (I know...I wonder...I can)	usually reflects on my learning (I know...I wonder...I can)	reflection on my learning includes details and thoughtful questions



# LEARNING RESOURCES

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This section contains general information on learning resources and provides the titles, descriptions, and ordering information for the recommended learning resources in the Science K to 7 Grade Collection.

#### ***What Are Recommended Learning Resources?***

Recommended learning resources are resources that have undergone a provincial evaluation process using teacher evaluators and have Minister's Order granting them provincial recommended status. These resources may include print, video, software and CD-ROMs, games and manipulatives, and other multimedia formats. They are generally materials suitable for student use, but may also include information aimed primarily at teachers.

Information about the recommended resources is organized in the format of a Grade Collection. A Grade Collection can be regarded as a "starter set" of basic resources to deliver the curriculum. In many cases, the Grade Collection provides a choice of more than one resource to support curriculum organizers, enabling teachers to select resources that best suit different teaching and learning styles. Teachers may also wish to supplement Grade Collection resources with locally approved materials.

#### ***What Kinds of Resources Are Found in a Grade Collection?***

Learning resources in a Grade Collection are categorized as either comprehensive or additional. Comprehensive resources provide a broad coverage of a significant number of the learning outcomes. Additional resources are more topic-specific and support individual curriculum organizers or clusters of outcomes.

The ministry updates the Grade Collections on a regular basis on the ministry web site [http://www.bced.gov.bc.ca/irp\\_resources/lr/resource/gradcoll.htm](http://www.bced.gov.bc.ca/irp_resources/lr/resource/gradcoll.htm)

Please check this site for the most current list of recommended learning resources in the Grade Collection for each IRP.

#### ***How Can Teachers Choose Learning Resources to Meet Their Classroom Needs?***

Teachers must use either:

- provincially recommended resources OR
- resources that have been evaluated through a local, board-approved process.

Prior to selecting and purchasing new learning resources, an inventory of those resources that are already available should be established through consultation with the school and district resource centres. The Ministry also works with school districts to negotiate cost-effective access to various learning resources.

Information about Ministry initiatives to support resource acquisition can be found at: [http://www.bced.gov.bc.ca/irp\\_resources/lr/resource/res\\_main.htm](http://www.bced.gov.bc.ca/irp_resources/lr/resource/res_main.htm)

#### ***What Are the Criteria Used to Evaluate Learning Resources?***

The Ministry of Education evaluates learning resources that support BC curriculum, and that will be used by teachers and/or students for instructional and assessment purposes. Evaluation criteria focus on content, instructional design, technical considerations, and social considerations.

Additional information concerning the review and selection of learning resources is available from the ministry publication, *Evaluating, Selecting and Managing Learning Resources: A Guide* (Revised 2002). [http://www.bced.gov.bc.ca/irp/resdocs/esm\\_guide.pdf](http://www.bced.gov.bc.ca/irp/resdocs/esm_guide.pdf)

#### ***What Funding is Available for Purchasing Learning Resources?***

As part of the selection process, teachers should be aware of school and district funding policies and procedures to determine how much money is available for their needs. Funding for various purposes, including the purchase of learning resources, is provided to school districts. Learning resource selection should be viewed as an ongoing process that requires a determination of needs, as well as long-term planning to co-ordinate individual goals and local priorities.

**SCIENCE K TO 7 GRADE COLLECTIONS**

The Science K to 7 Grade Collection chart for each grade lists the recommended learning resources by media format, showing links to the curriculum organizers. The chart is followed by an annotated bibliography. Teachers should check with suppliers for complete and up-to-date ordering information. Most suppliers maintain web sites that are easy to access.

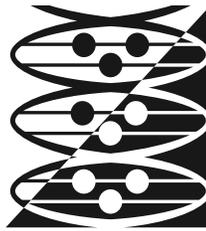
**Web Sites**

Due to their transitory nature, web sites are not typically evaluated as part of the provincial evaluation process. However, in some cases, the Internet is the most up-to-date source of information relevant to students in Science K to 7. As with all supplementary resources, local approval is required before use. Teachers should preview the sites in order to select those that are appropriate for use by their students, and must also ensure that students are aware of school district policies on Internet and computer use.

**MEDIA ICONS KEY**

The following icons identify the media formats of the recommended resources in the annotated bibliographies of the Grade Collections. Not all media formats are found in each Grade Collection.

	<i>Audio Cassette</i>
	<i>CD-ROM</i>
	<i>DVD</i>
	<i>Film</i>
	<i>Games/Manipulatives</i>
	<i>Kit</i>
	<i>Multimedia</i>
	<i>Music CD</i>
	<i>Print Materials</i>
	<i>Print Series</i>
	<i>Record</i>
	<i>Slides</i>
	<i>Software</i>
	<i>Video</i>
	<i>Video Series</i>
	<i>Web Site</i>



# LEARNING RESOURCES

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*Grade 2*

**SCIENCE – GRADE 2  
GRADE COLLECTION**

*Current as of March 2005. For latest updates go to  
[http://www.bced.gov.bc.ca/irp\\_resources/lr/resource/gradcoll.htm](http://www.bced.gov.bc.ca/irp_resources/lr/resource/gradcoll.htm)*

	Life Science	Physical Science	Earth and Space Science
	<i>Animal Growth and Changes</i>	<i>Properties of Matter</i>	<i>Air, Water, and Soil</i>
<b>Comprehensive Resources</b>			
There are no comprehensive resources for Grade 2 Science			
<b>Additional Resources – Print</b>			
Air and Water (Pan Canadian Science Place)			✓
Animals Grow (Pan Canadian Science Place)	▣		
Below Zero	✓	▣	
Critters	✓		
Cycle of Life/Recycle Handbook for Educators	▣		
Forests in Focus	✓		
Hands-On Science: Growth and Changes in Animals	✓		
Hands-On Science: Properties of Liquids and Solids		▣	
Hands-On Science: Soils in the Environment			▣
Kokanee of British Columbia	✓		
Matter, Matter Everywhere (Pan Canadian Science Place)		▣	
Once Upon a Seashore	▣		
Project WET	✓	▣	▣
Salish Sea	▣		
Salmonids in the Classroom	▣		
Science & Technology 2: All About Animals	✓		
Science & Technology 2: In the Kitchen		▣	
Sharing a Small World: Environmental Activities for Young Learners			▣
<b>Additional Resources – Print Series</b>			
Discovery Works Modules for B.C. Grade 1		✓	
Nature Babies Series	✓		

▣ Indicates satisfactory to good support for the majority of the learning outcomes within the curriculum organizer.

✓ Indicates support for one or more learning outcomes within the curriculum organizer.

□ Indicates minimal or no support for the prescribed learning outcomes within the curriculum organizer.

	Life Science	Physical Science	Earth and Space Science
	<i>Animal Growth and Changes</i>	<i>Properties of Matter</i>	<i>Air, Water, and Soil</i>
<b>Additional Resources – Video/DVD</b>			
Birds & Animals You Might See	✓		
Chickens Aren't The Only Ones	✓		
Desert Giant - The World of the Saguaro Cactus	✓		
Everyday Life	✓		✓
Exploring the Animal Kingdom	✓		
The Marsh: Nature's Nursery	✓		
Meeting Baby Animals	✓		
Moths and How They Live	✓		
<b>Additional Resources – Video/DVD Series</b>			
The Lives of Ants & Bees for Students Series	✓		
<b>Additional Resources – Software/CD-ROM</b>			
Seashore Surprises			✓
Smart-Bear Adventures, Volume I	✓		

 **Air and Water (Pan Canadian Science Place)**

**General Description:**

A colourful 32-page student text which includes a glossary and index. The text presents the concepts in an interesting, informative, easy to follow manner; it is engaging for students. Activities suggested are easy to do. The teacher's guide is well-organized and gives adequate support, including blackline masters and assessment tools. Teachers may buy the accompanying kit items from publisher or may buy them separately. *A Program and Assessment Guide*, as well as a *Integrating Science and Language Guide* are also available for teacher's use.

**Caution:** *Some of the activities suggested do not relate closely to the learning outcomes. The equipment kit contains only a small portion of the materials needed to carry out the activities.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Scholastic Canada/Les éditions Scholastic*

175 Hillmount Road  
Markham, ON L6C 1Z7

Telephone: (905) 887-7323

Fax: (905) 887-1131

Toll Free: 1-800-268-3860/1-800-625-858

Web Address: [www.scholastic.ca](http://www.scholastic.ca)

**Price:** Student Text: \$7.00  
Teacher's Guide: \$33.00

**ISBN/Order No:** Student Text: 1-55268-917-4  
Teacher's Guide: 0-7791-3497-4

**Copyright:** 2000

**Year Recommended in Grade Collection:** 2005

 **Animals Grow (Pan Canadian Science Place)**

**General Description:**

A 32-page student book abundantly illustrated with clear diagrams (e.g. life cycles) and photos/drawing. Print is large enough for small children, key words are in bold characters of a different colour. Suggested activities and experiments are organized in easy-to-do steps. Some critical thinking questions throughout the booklet. The teacher's guide is well-organized, with content background, outcomes, vocabulary, assessment tools, ESL learners tips and blackline masters for activities and assessment. Aboriginal content identified with easy-to-locate symbol.

Teachers may buy the accompanying kit items from publisher or may buy them separately. *A Program and Assessment Guide*, as well as a *Integrating Science and Language Guide* are also available for teacher's use.

**Caution:** *Some of the activities suggested in the student text need special resources or environments (seasons) to care for larva or bird feeders.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Scholastic Canada/Les éditions Scholastic*

175 Hillmount Road  
Markham, ON L6C 1Z7

Telephone: (905) 887-7323

Fax: (905) 887-1131

Toll Free: 1-800-268-3860/1-800-625-858

Web Address: [www.scholastic.ca](http://www.scholastic.ca)

**Price:** Student Text: \$7.00  
Teacher's Guide: \$33.00

**ISBN/Order No:** Student Text: 1-55268-913-1  
Teacher's Guide: 0-7791-3495-8

**Copyright:** 2000

**Year Recommended in Grade Collection:** 2005



**Below Zero**

**General Description:**

*Below Zero* is based on the *Project Wild* model. Instructional activities are designed for easy integration into K-7 school subjects. The teacher resource materials concentrate on the understanding and conservation of wildlife in a frozen environment. Goal of the resource is to help learners develop awareness, knowledge, skills, and commitment to make informed decisions, responsible behaviour, with wise actions concerning wildlife in winter and frozen environments.

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓		✓	✓	✓					

**Supplier:** *Wild BC*

P.O. Box 9354, St. Prov. Gov.  
200A-333 Quebec Street  
Victoria, BC V8W 9M1

Telephone: (250) 356-7111

Fax: (250) 952-6684

Toll Free: 1-800-387-9853

Web Address:

[www.env.gov.bc.ca/hctf/wild.htm](http://www.env.gov.bc.ca/hctf/wild.htm)

**Price:** \$25.00 with workshop

**ISBN/Order No:** 1-55029-146-7

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Birds & Animals You Might See**

**General Description:**

An eleven minute video shows British Columbia animals involved in their daily life in their environment. It covers behaviours such as hibernating, migration, and how some other behaviours help animals adapt to seasonal conditions. It would help students begin to understand the interactions of animals with each other and the environment. It portrays the Kermodei bear and links it to First Nations beliefs. It reports on two endangered animals and challenges the students to become environmental helpers.

**Caution:** *Teacher needs to supplement the narration of the video as it does not lead itself to student engagement.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓										

**Supplier:** *Back on Track Productions (Westland Television)*

Box 684  
Kaslo, BC V0G 1M0

Telephone: 250-353-2697

Fax: 250-353-2192

Web Address: [www.westlandtv.com](http://www.westlandtv.com)

**Price:** Not available

**ISBN/Order No:** Not available

**Copyright:** 2004

**Year Recommended in Grade Collection:** 2005



**Chickens Aren't The Only Ones**

**General Description:**

Video that animates a well loved children's book depicting living things which hatch from eggs. Interesting support material to introduce or summarize life cycle studies.

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
	✓	✓										

**Supplier:** *Canadian Learning Company Inc.*

95 Vansittart Avenue  
Woodstock, ON N4S 6E3

Telephone: (519) 537-2360

Fax: (519) 537-1035

Web Address: [www.canlearn.com](http://www.canlearn.com)

**Price:** Not available

**ISBN/Order No:** 5-1245F-1#389

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Critters (AIMS Activities)**

**General Description:**

Book investigates a variety of 'critters,' including insects, spiders, mealworms, earthworms, snails, silkworms, and isopods, through numerous hands-on activities that integrate math, science, language arts, and social studies. Detailed support materials accompany each project.

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓		✓								

**Supplier:** *Spectrum Educational Supplies Ltd. (Ontario)*

125 Mary St.  
Aurora, ON L4G 1G3

Telephone: (905) 841-0600

Fax: (905) 727-6265

Toll Free: 1-800-668-0600

Web Address: <http://www.spectrumed.com>

**Price:** \$35.95

**ISBN/Order No:** 1-881431-23-1/20137

**Copyright:** 1992

**Year Recommended in Grade Collection:** 2005



**Cycle of Life/Recycle Handbook for Educators**

**Author(s):** Arntzen, H. et al.

**General Description:**

This 276-page teacher resource is divided into five sections: Introduction, Music, Biology, Recycling, and Resources. Through songs and activities, Kindergarten to Grade 7 students learn about at-risk Canadian plants and animals species. Topics include sustainability of resources, life cycles, food chains and webs, ecological footprints, the interrelated nature of living things, and Aboriginal practices. There is a music CD, *Cycle of Life*, with 14 ecology/nature songs. Lyrics are included in print material.

**Caution:** See Author's caution re: p. 83, Stan Rodger's song, lyrics refer to "beer" and "hell."

**Audience:** General

**Category:** Teacher Resource

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓	✓	✓	✓	✓					

**Supplier:** Artist Response Team Inc. (ART)

P.O. Box 91  
Brentwood Bay, BC V8M 1R3

Telephone: (250) 544-4006

Fax: (250) 544-4075

**Price:** \$35.00

**ISBN/Order No:** 0-9736-847

**Copyright:** 2004

**Year Recommended in Grade Collection:** 2005



**Desert Giant - The World of the Saguaro Cactus**

**Author(s):** Bash, B.

**General Description:**

A 30-minute video in DVD format that describes how some basic needs of some plants and animals are met in their environment. Good visual images of snakes and cacti are provided. There is a segment on the seasonal changes that occur in a desert ecosystem. The use of resource books to find scientific information is encouraged. There is a small package of teacher support material which suggests follow-up activities.

**Caution:** May not work in some older DVD players. Teacher print material is very limited.

**Audience:** General

**Category:** Student, Teacher Resource

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
	✓	✓										

**Supplier:** Canadian Learning Company Inc.

95 Vansittart Avenue  
Woodstock, ON N4S 6E3

Telephone: (519) 537-2360

Fax: (519) 537-1035

Web Address: [www.canlearn.com](http://www.canlearn.com)

**Price:** DVD: \$59.95

CD-ROM: \$59.95

**ISBN/Order No:** DVD: 126.062D/52135

CD-ROM: 52135CDR

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Discovery Works Modules for B.C. Grade 1**

**General Description:**

This American multimedia resource, organized by modules across several grades, consists of an annotated teaching guide, a poster book, picture cards, activity cards, and teacher resource book all stored in a nylon and plastic carrying bag. Full-colour photographs and illustrations in the teaching guide complement teaching strategies and lesson plans. Teacher resource book contains blackline masters for parent letters, activities, student recording, assessment grids, and unit project suggestions. The most suitable module for Grade 1 is *Weather and Seasons* (Earth and Space Science). The most suitable module for Grade 2 is *Solids, Liquids and Gases* (Physical Science).

**Caution:** *The writing on the front of the activity cards will require adult support.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
	✓	✓										

**Supplier:** *Thomson Nelson*

1120 Birchmount Road  
Scarborough, ON M1K 5G4

Telephone: (416) 752-9448

Fax: (416) 752-8101

Toll Free: 1-800-268-2222/1-800-668-067

Web Address: [www.nelson.com](http://www.nelson.com)

**Price:** Not available

**ISBN/Order No:** Solids, Liquids, and Gases:  
0-382-33903-7

Weather and Seasons: 0-382-33896-0

**Copyright:** 1996

**Year Recommended in Grade Collection:** 2005



**Everyday Life**

**General Description:**

A fast paced 55-minute video broken into 11 five-minute segments showing everyday life in the animal world. It covers communicating, feeding, moving, cleaning, sleeping, working, building, as well as intelligence, language use, and education in an entertaining format using clear images. The narration is clear using an age appropriate format that includes some scientific terminology

**Caution:** *There are several scenes of body functions, such as urination, defecation, and regurgitation.*

*One segment also portrays a snake killing a baby mammal (rat).*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓										

**Supplier:** *National Film Board of Canada*

200-1385 West 8th Avenue  
Vancouver, BC V6H 3V9

Telephone: (604) 666-3838

Fax: (604) 666-1569

Toll Free: 1-800-267-7710

Web Address: [www.nfb.ca](http://www.nfb.ca)

**Price:** Not available

**ISBN/Order No:** Not available

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Exploring the Animal Kingdom**

**General Description:**

This 25-minute video with a teacher's guide has two older students describing the classification of the Animal Kingdom. Clips of different living things are used to illustrate the differences between the classes. Some animation is used to clarify concepts.

**Caution:** *Much of the student activities suggested in the teacher resource would be too difficult for independent work at this level.*

**Audience:** *Gifted - extends concepts beyond the scope of regular learners*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *B.C. Learning Connection Inc.*

#4 - 8755 Ash Street  
Vancouver, BC V6P 6T3

Telephone: (604) 324-7752

Fax: (604) 324-1844

Toll Free: 1-800-884-2366

**Price:** \$26.00

**ISBN/Order No:** SC0334

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Forests in Focus**

**General Description:**

*Forests in Focus* is an 85-page activity book on the BC forest environment. It consists of 34 activities, a glossary, stories (for activities), and appendices containing detailed BC information. It is designed for K-12 use but not all activities are appropriate for all grades. Organizers and suggested themes are included in the introduction. All activities are organized 'lab style' with objectives, materials, method, and evaluation. Content is based upon forest process and ecosystem, and does not emphasize harvesting issues.

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓	✓	✓	✓	✓					

**Supplier:** *Wild BC*

P.O. Box 9354, St. Prov. Gov.  
200A-333 Quebec Street  
Victoria, BC V8W 9M1

Telephone: (250) 356-7111

Fax: (250) 952-6684

Toll Free: 1-800-387-9853

Web Address:

[www.env.gov.bc.ca/hctf/wild.htm](http://www.env.gov.bc.ca/hctf/wild.htm)

**Price:** \$26.00

\$22.00 with workshop

**ISBN/Order No:** 0-7726-3966-3

**Copyright:** 1999

**Year Recommended in Grade Collection:** 2005



**Hands-On Science: Growth and Changes in Animals**

**Author(s):** *Lawson, J. et al.*

**General Description:**

Teacher's guide which offers several hands-on activities with blackline masters for student activities and for assessment.

**Caution:** *Does not contain any information on BC Aboriginal people.*

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Portage & Main Press*

100 - 318 McDermot Avenue  
Winnipeg, MB R3A 0A2

Telephone: (204) 987-3500

Fax: 1-866-734-8477

Toll Free: 1-800-667-9673

Web Address:

[www.portageandmainpress.com](http://www.portageandmainpress.com)

**Price:** \$22.00

**ISBN/Order No:** 1-894110-78-1

**Copyright:** 2001

**Year Recommended in Grade Collection:** 2005



**Hands-On Science: Properties of Liquids and Solids**

**Author(s):** *Lawson, J. et al.*

**General Description:**

Teacher's guide which offers several hands-on activities with blackline masters for students and for assessment.

**Caution:** *Some of the photocopy-ready material is too advanced. Deals with gases minimally.*

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Portage & Main Press*

100 - 318 McDermot Avenue  
Winnipeg, MB R3A 0A2

Telephone: (204) 987-3500

Fax: 1-866-734-8477

Toll Free: 1-800-667-9673

Web Address:

[www.portageandmainpress.com](http://www.portageandmainpress.com)

**Price:** \$22.00

**ISBN/Order No:** 1-894110-80-3

**Copyright:** 2001

**Year Recommended in Grade Collection:** 2005



**Hands-On Science: Soils in the Environment**

**Author(s):** *Lawson, J. et al.*

**General Description:**

Teacher's guide which offers several hands-on activities with blackline masters for student work and for assessment.

**Caution:** *Some of the blackline masters may be a bit difficult for Grade 2 students.*

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Portage & Main Press*

100 - 318 McDermot Avenue  
Winnipeg, MB R3A 0A2

Telephone: (204) 987-3500

Fax: 1-866-734-8477

Toll Free: 1-800-667-9673

Web Address:

[www.portageandmainpress.com](http://www.portageandmainpress.com)

**Price:** \$22.00

**ISBN/Order No:** 1-894110-59-5

**Copyright:** 2001

**Year Recommended in Grade Collection:** 2005



**Kokanee of British Columbia**

**General Description:**

Activities and researched facts for the study and class investigation of landlocked salmonids called Kokanee. This is very appropriate for Interior waterways where Kokanee are mostly found. The teacher resource is organized to present all the same elements of the BC Salmon programs for Coastal BC using the Kokanee instead. Nine activities cover historical evolution life cycle, habitat, and human impacts so students will understand the relationship between Kokanee and the Interior environment. Field studies and observations are detailed in well organized units.

**Caution:** *This resource covers several learning outcomes at the Primary level, but it is more suitable for the Intermediate level.*

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
	✓	✓		✓	✓	✓	✓					

**Supplier:** *Wild BC*

P.O. Box 9354, St. Prov. Gov.  
200A-333 Quebec Street  
Victoria, BC V8W 9M1

Telephone: (250) 356-7111

Fax: (250) 952-6684

Toll Free: 1-800-387-9853

Web Address:

[www.env.gov.bc.ca/hctf/wild.htm](http://www.env.gov.bc.ca/hctf/wild.htm)

**Price:** \$22.00

**ISBN/Order No:** 0-7726-5130-2

**Copyright:** 2004

**Year Recommended in Grade Collection:** 2005

 **The Lives of Ants & Bees for Students Series**

**General Description:**

Three 10- to 11-minute videos which explore the body structures of ants and bees and shows their social behaviour and life cycles. The segment on the ant uses computerized 3D images. The symbiotic relationship between the bees and the plants is outlined. On-line resources are available for use once this series is purchased.

**Caution:** *One interview with the scientists may be a little hard to understand due to regional accents. The quality of the on-line component is unknown as access was not available to the review team.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓		✓								

**Supplier:** *McIntyre Media Ltd.*

75 First St., Suite 203  
Orangeville, ON L9W 5B6

Telephone: (519) 942-9640

Fax: (519) 942-8489

Toll Free: 1-800-565-3036

Web Address: [www.mcintyre.ca](http://www.mcintyre.ca)

**Price:** Videos: \$89.00 each  
or \$249.00 for all three

**ISBN/Order No:** Ant Bodies: 73418-HAVTX  
Ant Homes & Communities:  
73419-HAVTX  
Bees & Plants: 73420-HAVTX

**Copyright:** 2004

**Year Recommended in Grade Collection:** 2005

 **The Marsh: Nature's Nursery**

**General Description:**

In this 15-minute video, David Suzuki and naturalist Barbara McKean guide children through a marsh in Spring to discover the continuing life cycles of plants, animals, insects, and in particular, frogs.

**Audience:** *General*

*ESL - suitable for all language proficiencies; teacher support for beginner level required; visual and oral cues correspond*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓	✓									

**Supplier:** *Magic Lantern Communications (Ontario)*

1075 North Service Road West - Unit 27  
Oakville, ON L6M 2G2

Telephone: (905) 827-2755

Fax: (905) 827-2655

Toll Free: 1-800-263-1717

**Price:** Not available

**ISBN/Order No:** Not available

**Copyright:** 1988

**Year Recommended in Grade Collection:** 2005



**Matter, Matter Everywhere (Pan Canadian Science Place)**

**General Description:**

A colourful 33-page student text which includes a glossary and index. It presents new materials in an interesting, informative, easy to follow manner. Simple experiments are presented to help students discover the properties. The teacher's guide is well organized and gives adequate support including blackline masters and assessment materials. Teachers may buy the accompanying kit items from publisher or may buy them separately. A *Program and Assessment Guide*, as well as an *Integrating Science and Language Guide* are also available for teacher's use.

**Caution:** *Limited activities for gases.*

*The equipment kit contains only a small portion of the materials needed to carry out the activities.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Scholastic Canada/Les éditions Scholastic*

175 Hillmount Road  
Markham, ON L6C 1Z7

Telephone: (905) 887-7323

Fax: (905) 887-1131

Toll Free: 1-800-268-3860/1-800-625-858

Web Address: [www.scholastic.ca](http://www.scholastic.ca)

**Price:** Student Text: \$7.00  
Teacher's Guide: \$33.00

**ISBN/Order No:** Student Text: 1-55268-914-X  
Teacher's Guide: 0-7791-3496-6

**Copyright:** 2000

**Year Recommended in Grade Collection:** 2005



**Meeting Baby Animals**

**General Description:**

This 17-minute video shows several different animal classes, mammals, birds, amphibians, and reptiles, and describes their different life cycles. The audio encourages the students to examine how the babies are similar and different from their parents and how different animals care for their young. A summary at the end asks comparative questions.

**Caution:** *No teacher support material provided.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *B.C. Learning Connection Inc.*

#4 - 8755 Ash Street  
Vancouver, BC V6P 6T3

Telephone: (604) 324-7752

Fax: (604) 324-1844

Toll Free: 1-800-884-2366

**Price:** \$26.00

**ISBN/Order No:** SC0335

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Moths and How They Live**

**General Description:**

This 17-minute video outlines pupating, metamorphosis, and the life cycle of moths. References to the Emperor moth, the Pepper moth, and the Leaf Roller moth.

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Canadian Learning Company Inc.*

95 Vansittart Avenue  
Woodstock, ON N4S 6E3

Telephone: (519) 537-2360

Fax: (519) 537-1035

Web Address: [www.canlearn.com](http://www.canlearn.com)

**Price:** Not available

**ISBN/Order No:** Not available

**Copyright:** 1992

**Year Recommended in Grade Collection:** 2005



**Nature Babies Series**

**Author(s):** *Lang, A.*

**General Description:**

A series which reviews the life cycle of some common animals and portrays their daily life in easy to read paragraphs. Very clear close-up photos show the creatures and their habitats. A 'Did You Know' section enables further research, and an index enables quick searches. Because the information is parallel in each book, comparison charts could be created.

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓										

**Supplier:** *Fitzhenry & Whiteside Ltd.*

195 Allstate Parkway  
Markham, ON L3R 4T8

Telephone: (905) 477-9700

Fax: (905) 477-9179

Toll Free: 1-800-387-9776

Web Address: [www.fitzhenry.ca](http://www.fitzhenry.ca)

**Price:** \$8.95 to \$9.95 per book

**ISBN/Order No:** Various

**Copyright:** 2004

**Year Recommended in Grade Collection:** 2005



**Once Upon a Seashore**

**Author(s):** *Snively, G.*

**General Description:**

This 304-page adult reference was designed to help teachers in their study of the seashore. It contains clear illustrations, photos, a glossary, transparencies, activity sheets, and offers ideas for drama, creative writing, and art. An excellent resource for field trips to the seashore.

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
	✓	✓	✓	✓	✓	✓						

**Supplier:** *BCTF Lesson Aids Service*

100 - 550 West 6th Avenue  
Vancouver, BC V5Z 4P2

Telephone: (604) 871-2182

Fax: (604) 871-2295

Toll Free: 1-800-663-9163

Web Address:

<http://www.bctf.bc.ca/lessonaids>

**Price:** Not available

**ISBN/Order No:** 0-9687811-0-1/LA S65

**Copyright:** 2001

**Year Recommended in Grade Collection:** 2005



**Project WET**

**General Description:**

The 500-page detailed teacher resource includes directions and extensions for 120 activities related to water, wetlands, and water resource management. Each activity includes objectives, method, background, materials, procedures, variations, extensions and evaluation. A wealth of teaching ideas for Grades K to 7. A global perspective, but produced from Montana State University.

**Caution:** *Not much Canadian or BC highlights. Images are mostly global but some captions are US locations. Dual temperature references, i.e. Fahrenheit/Celsius.*

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓	✓	✓	✓	✓					

**Supplier:** *Wild BC*

P.O. Box 9354, St. Prov. Gov.  
200A-333 Quebec Street  
Victoria, BC V8W 9M1

Telephone: (250) 356-7111

Fax: (250) 952-6684

Toll Free: 1-800-387-9853

Web Address:

[www.env.gov.bc.ca/hctf/wild.htm](http://www.env.gov.bc.ca/hctf/wild.htm)

**Price:** \$30.00 with workshop

**ISBN/Order No:** Not available

**Copyright:** 1995

**Year Recommended in Grade Collection:** 2005



**Author(s):** *Arntzen, H. et al.*

**General Description:**

This 108-page detailed teacher resource includes background directions, activities, and extensions related to ecosystems, both land and marine, which are specific to the West Coast. This cross-curricular resource contains many Aboriginal references and suggests activities, songs, and projects to amplify student appreciation of historical stewardship and respect for the delicate balance of a coastal ecosystem. There are many references and web links as back-up material. A CD of eco-songs, one in Cowichan language, accompanies this resource which contains a wealth of teaching, learning, and hands-on activities for Grades K to 7.

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓	✓	✓	✓	✓					

**Supplier:** *Parks Canada*

711 Broughton St., 2nd Floor  
Victoria, BC V8W 1E2

Telephone: (250) 363-3511

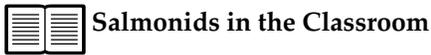
Fax: (250) 363-8552

**Price:** \$30.00

**ISBN/Order No:** 0-660-18596-2

**Copyright:** 2001

**Year Recommended in Grade Collection:** 2005



**General Description:**

*Salmonids in the Classroom* (either Primary or Intermediate versions) is a comprehensive collection of resource materials for the study of Pacific salmonids in British Columbia. The programs are divided into clearly organized and paced 10 units following the life cycle habitats of the salmon. Each unit in the guide includes suggested activities. Content is primarily science-oriented but the development of the units has a language arts approach incorporating unifying themes. The programs would allow the integration of science, social studies and language for extensive periods of time.

**Caution:** *The material has limited assessment devices explained. It make suggestions for assessment activities but doesn't give any 'how to do' assessment resources.*

**Audience:** *General*

*ESL - late primary to early intermediate; good key visuals; variety of student activities*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓		✓	✓	✓	✓					

**Supplier:** *BCTF Lesson Aids Service*

100 - 550 West 6th Avenue  
Vancouver, BC V5Z 4P2

Telephone: (604) 871-2182

Fax: (604) 871-2295

Toll Free: 1-800-663-9163

Web Address:

<http://www.bctf.bc.ca/lessonaids>

**Price:** Primary: \$71.10

Intermediate: \$66.60

**ISBN/Order No:** Primary: S33

Intermediate: S39

**Copyright:** 2001

**Year Recommended in Grade Collection:** 2005



**Science & Technology 2: All About Animals**

**General Description:**

Small child-friendly text with supporting teacher manual. Student text makes very good use of visuals and presents easily accomplished activities. Suggested follow-ups summarize and/or extend learning. Teacher manual gives pre-teaching, lesson help, and assessment activities in an easy to use format, including very usable blackline masters.

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Pearson Education Canada*

26 Prince Andrew Place  
Don Mills, ON M3C 2T8

Telephone: (416) 447-5101

Fax: 1-800-563-9196

Toll Free: 1-800-387-8028/7851

Web Address: <http://www.pearsoned.com>

**Price:** Not available

**ISBN/Order No:** Student Text: 0-13-088971-7

Teacher's Guide: 0-13-027911-0

**Copyright:** 2000

**Year Recommended in Grade Collection:** 2005



**Science & Technology 2: In the Kitchen**

**Author(s):** *Harcourt, L. et al.*

**General Description:**

Small 16-page student book which differentiates between three states of matter and offers easy experiments for students to investigate absorption, buoyancy, and mixtures. Teacher guide gives good support including easy-to-use blackline masters.

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Pearson Education Canada*

26 Prince Andrew Place  
Don Mills, ON M3C 2T8

Telephone: (416) 447-5101

Fax: 1-800-563-9196

Toll Free: 1-800-387-8028/7851

Web Address: <http://www.pearsoned.com>

**Price:** Not available

**ISBN/Order No:** Student Text: 0-13-019763-7

Teacher's Guide: 0-13-027911-0

**Copyright:** 2000

**Year Recommended in Grade Collection:** 2005



**Seashore Surprises**

**General Description:**

An interactive CD-ROM which provides video of a seashore depicting the interaction between water and soil and how water is important for living things. The users are invited to build an underwater habitat and try their skills at a seashore memory game. Strong links are made to four selections of children's literature. Six written teacher resources are provided. This resource is easy to use and the interactive segments are engaging.

System Requirements for Macintosh: System 7.5.5; 16 Mb RAM; Colour Monitor; Sound Card; 4X Speed CD-ROM Drive.

System Requirements for Windows: System 95/98/NT 4.0; 16 Mb RAM; Colour Monitor; Sound Card; 4X Speed CD-ROM Drive; Direct X version 3.0 or later recommended.

**Caution:** *The video segment is small and would be suitable for viewing by only a small group.*

**Audience:** *General*

**Category:** *Student, Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

**Supplier:** *Canadian Learning Company Inc.*

95 Vansittart Avenue  
Woodstock, ON N4S 6E3

Telephone: (519) 537-2360

Fax: (519) 537-1035

Web Address: [www.canlearn.com](http://www.canlearn.com)

**Price:** DVD: \$59.95  
CD-ROM: \$59.95

**ISBN/Order No:** DVD: 5-4055/126088D  
CD-ROM: 5-4055/CDR

**Copyright:** 2003

**Year Recommended in Grade Collection:** 2005



**Sharing a Small World: Environmental Activities for Young Learners**

**General Description:**

A 32-page teacher's guide to environmental activities for primary students. Exposes learners to basic concepts and terminology. Organization makes it teacher friendly, with key elements such as objectives, skills, time suggested, materials, and vocabulary listed on a side bar at the beginning of each activity. Some of the activities could be modified for younger learners (K/1).

**Audience:** *General*

**Category:** *Teacher Resource*

**Grade Level:**

K	1	2	3	4	5	6	7	8	9	10	11	12
		✓										

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**Author(s):** *Whistler, J.*

**General Description:**

Interactive CD-ROM which includes oral and read-along information. A magnifying feature allows the students to examine details. An activity centre is presented which allows the students to create and print a stamp picture. Students can connect to the Internet and receive a daily update on the weather and bear activity on the mountains at Whistler, BC.

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Teacher Guide: Included by request

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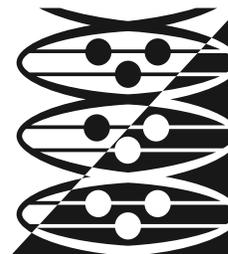
Read & Play: 1-894333-18-7

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# GLOSSARY

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This glossary includes terms used in this Integrated Resource Package, defined specifically in relation to how they pertain to Science K to 7 topics. It is provided for clarity only, and is not intended to be an exhaustive list of terminology related to Science K to 7 topics. Entries in this glossary have been adapted with permission from the Recommended Resources published by

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## A

### acid

A compound that produces hydrogen ions ( $H^+$ ) in water. Strong Acids can cause serious burns on skin. Acidic solutions turn blue litmus paper red and will have a pH value smaller than 7.

### acidic

A term used to describe a solution that has a value below 7 on the pH scale; the more acidic a solution, the lower its pH value.

### adaptation

The physical characteristic, or behaviour trait that helps an organism survive in its local environment.

### amphibian

A class of vertebrates that is born in water and lives both in water and on land. Amphibians begin life in water with gills; later, they develop lungs and legs so they can walk on land as adults. Examples include frogs, toads, and salamanders.

### Animalia

One of the Kingdoms of Life (which are part of the scientific system of classification). This Kingdom includes insects, birds, fish, and mammals.

### arch

An arch is a curved structure. The separate parts of the curve all push against one another and hold up the arch.

### arteries

Thick, muscular vessels that carry blood away from the heart to the rest of the body.

### attract

When objects are pulled together by a physical force that combines to unite the surfaces of the objects.

### axis

A straight line that runs through the centre of an object.

## B

### balanced forces

When the total of all forces on an object equals zero and the object's motion does not change.

### base

A compound that produces hydroxide ( $OH^-$ ) in water. A solution that is basic turns red litmus paper blue because it has less hydrogen ions.

### basic

A term used to describe a solution that has a value above 7 on the pH scale; the more basic a solution, the higher its pH value.

**battery**

An energy source that uses a chemical reaction to create an electric current.

**biodegradable**

Material that is able to be broken down or decomposed by natural processes into simpler compounds. Natural processes include exposure to sun, water, and air.

**biomass energy**

Energy created by burning any type of plant or animal tissue to heat water and create steam, which turns turbines and generates electricity.

**biomass**

An ecology term for the total mass of living organisms in a certain area.

**biomes**

Large regions of Earth where temperature and precipitation are distinct and certain types of plants and animals are found.

**biosphere**

The parts of Earth where life can be found, from mountaintops to the deepest parts of the ocean.

**buoyancy**

The ability to float in water; the upward force of water on any object placed in water.

**C****calculate**

To figure out by using mathematics the number for quantities, amounts, sizes, lengths, or mass of items.

**camouflage**

The colouring of an animal that allows it to blend into its environment to survive better.

**Canadarm**

A robotic manipulator arm developed by the Canadian Space Agency. The arm is controlled by astronauts inside the space shuttle.

**carnivore**

A consumer that eats other animals. For example, wolves and orca are carnivores.

**cell**

A microscopic structure that is the basic unit of all living things. Organisms can be made of as little as one cell (some types of bacteria) or as many as several trillion cells (human beings).

**cell cytoplasm**

The thick liquid inside the cell; area where the work of the cell is done, as directed by the nucleus.

**cell membrane**

A thin layer that surrounds the cell cytoplasm and controls which materials enter and leave the cell.

**cell nucleus**

The cell structure that acts as the control centre by directing all of the cell's activities, such as movement and growth.

**cell wall**

In plant cells the protective outer layer that surrounds the cell membrane and some protists. It provides protection and support for the cell.

**chlorophyll**

A green pigment found in chloroplasts that gives plants and some Protista their green colour. It captures sunlight used for photosynthesis.

**chloroplast**

A plant cell structure containing chlorophyll, found in all green plant cells and some Protista.

**classify**

Grouping and labelling a collections of items, objects, or living things. The grouping arrangements match a set of classification rules and common characteristics indicating their similarities and differences. [see SORT]

**climate**

The weather pattern for a geographical region over a long period of time.

**cloud**

Water vapour in the atmosphere that has cooled and come into contact with tiny particles of dust.

**colouration**

An adaptation of an organism's colour to help it survive in its environment. Mimicry and camouflage are examples of colouration.

**compare**

To look and identify two or more objects and see how they are different and how they are the same.

**compound machine**

Any machine containing two or more simple machines.

**compound**

A pure substance that is made up of two or more different elements and consists of only one kind of particle.

**compression**

An engineering term used opposite to tension; any of the forces applied towards the centre of structural objects.

**concentration**

The quantity of solute that is dissolved in a certain quantity of solvent; the more solute dissolved, the greater the concentration.

**condensation**

The process of changing from a gas or a vapour to a liquid.

**conductor**

A material that lets electricity flow through it easily; for example, most metals are good conductors.

**conservation**

Preserving and carefully managing natural resources so that they can be used by present and future generations. We conserve resources by using them more efficiently, with minimum waste.

**construct**

To make or build a model or to build a simple structure by joining materials together.

**consumer**

An organism, such as an animal, that must obtain its food by eating other organisms in its environment; can be a herbivore, carnivore, or omnivore.

**consumption**

The amount of resources or energy used by a household.

**continental crust**

The parts of Earth's crust that have continents on them.

**continental shelf**

A shallow underwater ledge located between a continent and the deep ocean crust.

**cover slip**

A small, thin piece of glass used to cover a specimen on a microscope slide.

**crust**

The thin, outer layer of Earth; made of solid rock. The crust "floats" on the inner layers of Earth because it is made of lighter materials than the lower layers.

**D****decomposer**

An organism that breaks down (decomposes) dead or waste materials, such as rotting wood, dead animals, or animal waste and returns important nutrients to the environment.

**design-process**

The sequence of steps that take an idea to a completed plan; can be the planning and building processes where prototypes are created and evaluated to solve technological problems.

**detrivore**

An organism that feeds on large bits of dead and decaying plant and animal matter. For example, earthworms, dung beetles, and wolverines are detritivores.

**dilute**

A solution that has a low concentration of the dissolved substance (the solute).

**dissolve**

To completely mix one substance (the solute) in another (the solvent) to form a solution. For example, if you add sugar to water, the sugar dissolves in the water.

**E****Earth's inner core**

The innermost layer of Earth, which is made up of iron and nickel.

**echo**

Repetition of sound produced by reflection of sound waves from a surface.

**ecosystem**

The network of interactions that link together the living and non-living parts of an environment.

**effort force**

The concept used to describe the force going into moving a simple machine a certain distance; used to describe the degree of effort someone applies to operate a machine.

**electric current**

A continuous flow of electric charges moving from one place to another along a pathway; required to make all electrical devices work; measured in amperes (A).

**electrical energy**

The better term for electricity; the form of energy that consists of a flow of electric charges as the energy is transferred through a conductor.

**electrical switch**

A device that controls the flow of electric current through a circuit. In an open circuit, a light will be off; in a closed circuit, a light will be on.

**electricity**

See electrical energy.

**electromagnet**

A magnet that is created by using electricity in a circuit placed around a piece of metal conductor such as steel or lead.

**electromagnetism**

A magnetic force caused by electric charges in motion; also, the relationship between magnetism and electricity where one can make the other.

**electron**

A negatively charged particle that is found outside the nucleus of an atom.

**element**

A pure substance that cannot be broken down into any other pure substance; made up of one type of atom.

**emulsion**

A special kind of suspension that has been treated to prevent the parts of the mixture from separating. For example, homogenized milk is an emulsion.

**energy**

Energy cannot be seen or touched. Energy is a property of all matter. Energy comes in many forms and can be transferred from one object to another, but it cannot be created or destroyed; written as the symbol E.

**environmental impact**

The effect, usually negative, of a human activity on a local area.

**equilibrium**

A condition where structures or systems are in complete balance. A state of rest or balance, in which all opposing forces are equal. [see BALANCED FORCES]

**erosion**

The loosening, dissolving, wearing away, or moving of soil and rock from one place to another by wind or water.

**estimate**

A math and science term for referring to how students use prior knowledge to make a reasonable and sensible decision about amounts. Amounts can be quantity, number, volume, length, weight, or size.

**estuary**

The region where a river flows into the ocean and fresh river water mixes with saltwater.

**evaporate**

To change into a gas or vapour.

**exploration**

Travelling some distance to observe a place or region to learn more about it.

**extraction**

Removing rock or minerals from the earth.

**extreme environment (1)**

A place where the conditions are so harsh that human survival is difficult or impossible without technology. For example, deserts, volcanoes, and space are extreme environments for humans to spend long periods of time.

**extreme environment (2)**

An environment that is difficult to reach, and that has extreme conditions such as high or low temperatures, high or low pressure, or little atmosphere or gravity. Space, deep oceans, the high arctic, the upper stratosphere, polar regions, and deep caves are extreme environments.

**F****fair test**

A test of a single variable when all the experimental actions around it are applied equally. During a scientific investigation, accurate fair testing involves isolating variables, eliminating bias, repeating the results, and analysing the intended experiment for errors.

**fasteners**

Special materials used for *joining* structural parts in construction. Fasteners are of differing types (e.g., fixed, rotating, rigid, flexible, and adjustable) and can serve different purposes. Nails, pins, bolts, glue, string, tape, sleeves, and screws are examples of fasteners used to join construction parts together.

**food chain**

A method for describing how food energy passes from organism to organism. The description establishes a hierarchy of organisms where each feeds on those below and is the source of food for those above.

**food web**

A network of interconnected food chains in an ecosystem.

**force**

The physics term used to describe the energy applied in various ways to move objects or change their position. Force usually involve a push or a pulling and is either balanced or unbalanced by other forces.

**fossil fuels**

Fuel formed over millions of years from compression of the decayed remains of living matter. Coal, oil, and natural gas are fossil fuels.

**friction**

The resistance a body meets when moving over a surface or through a gas or liquid; the force that resists the motion of two surfaces that are touching each other.

**fulcrum**

The point on which a lever rests or turns.

**Fungi**

One of the Kingdoms of Life (which are part of the scientific system of classification). Fungi are a life form consisting of a single or many-celled organisms, which have cell walls, do not have chlorophyll, get food from the environment, and reproduce by spores.

**G****geothermal**

Energy obtained from the natural heat of the Earth.

**gravity**

The forces of attraction which the Earth has for objects on its surface; also the force of attraction between any two objects.

**H****habitat**

The place where an animal or a plant naturally lives or grows and that provides it with everything it needs to grow.

**heat**

The transfer of thermal energy to other substances that are at a different temperature. Cold things still have heat energy.

**herbivores**

An animal that eats only plants. (also see CARNIVORE, OMNIVORE)

**hydrometer**

A device that reads specific gravity and is used to determine density of liquids.

**I****inclined plane**

A sloping surface; a simple machine that can be used to alter the effort and distance involved in doing work.

**insulator**

Material that does not transfer heat readily; also, a substance that does not allow any electric current to transfer to other objects.

**invertebrate**

An animal that does not have a backbone or spinal column. Examples of invertebrates include insects, worms, and crabs.

**L****lava**

The term used for magma, or molten rock, when it breaks through Earth's crust and reaches the surface, as in a volcanic eruption.

**leaching**

The process by which soluble materials in the soil, such as nutrients, pesticide chemicals, or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

**lever**

One of the simplest machines; a rigid beam that rotates around a fixed support point called the fulcrum. Levers changes the direction and effort force needed to move a load.

**life cycle**

All the stages in the life of a plant or animal organism, between life and death.

**life-support**

Any human-built system that provides air, water, food, and environmental conditions to sustain humans or other living things.

**light absorption**

To soak up visible and invisible electromagnetic radiation energy ranging in wavelength from about 400 to 700 nanometers. Light is usually absorbed by rough, dark surfaces.

**light refraction**

The bending of light into a different direction where it follows a new straight-line path.

**light**

Visible and invisible electromagnetic radiation energy, ranging in wavelength from about 400 to 700 nanometers and travels at a speed of 299, 972 km/s.

**load**

The mass (weight) of an object to be moved.

**local environment**

All the influences and conditions in which organisms live, including the actual place, circumstances, soil, water, air, and climate that surround and affect plants and animals in a particular area, and which determine their form and survival.

**loudness**

Amount of energy that a sound carries.

**M****magma**

Hot melted rock formed deep below Earth's crust by high temperatures and pressures; cools to form igneous rock.

**mantle**

The layer of Earth between the crust and the outer core; a hot, thick layer of solid and partly melted rock.

**mass**

The amount of matter in something, which is measured in grams (g).

**materials**

The collection of physical and chemical attributes for the objects used to build structures. "Construction materials" refers to the type of substance and its properties.

**measure**

Using special tools to accurately determine the amount of an object without guessing or estimating. The measured amount must be described relative to a standard unit system.

**micro-organism**

A living thing that is too small to be seen without the help of a microscope. For example, bacteria and some algae are micro-organisms.

**mid-ocean ridge**

A raised part of the sea floor, which can become large enough to be considered an underwater mountain range.

**migration**

The seasonal movement of animals to a less-harsh environment. For example, the elk moves from the mountains to spend the winter in the lowlands.

**mimicry**

Adaptations that let one animal look or behave like another animal for survival reasons.

**mixture**

A combination of two or more different types of matter that can be separated by physical changes.

## N

**model**

A method for showing an idea using objects and/or pictures. When students build a model, they make a physical structure to represent their idea.

**Monera**

One of the Kingdoms of Life forms; comprises the bacteria, blue-green algae, and various primitive micro-organisms.

**natural gas**

A fossil fuel formed by the decomposition of microscopic plants and animals over millions of years.

**net charge**

No static charge available as the amount of excess (+) electrons is equal to the amount of deficient (-) electrons.

**neutral charge**

No static charge and no excess electron or missing electrons.

**neutral pH**

Neither an acid nor a base. On the pH scale, a neutral substance or solution has a pH value of 7. Pure distilled water has a pH of 7.

**niche**

The way that an organism fits into an ecosystem, in terms of where it lives, how it obtains its food, and how it interacts with other organisms.

**non-renewable**

Something that cannot be replaced once it is used or that may take many hundreds of years to be replaced.

**nuclear energy**

Energy that uses uranium as a fuel to heat water and produce steam, which turns a turbine and produces electricity.

## O

**observation**

Activities where the senses are used to collect and record how objects or events behave. Students record what they see, smell, touch, or read from measuring tools. They do not state opinions about these events.

**oceanic crust**

The parts of Earth's crust that have only ocean floor on them; thinner and denser than the continental crust.

**omnivore**

An animal that eats both plants and animals. (see HERBIVORE, CARNIVORE)

**opaque**

Matter that does not allow any light to pass through.

**orbit**

A circular path that one object travels around another object.

**organ**

A body part composed of a collection of differing cells and tissues organized to perform a specific function.

## P

**parallel circuit**

A circuit in which the current travels along two or more separate paths to different devices. The current travels through each part of the circuit devices at the same time.

**pH scale**

A scale that measures the acidity of substances in solution; has numbers from 0 (strongly acidic) to 7 (neutral) to 14 (strongly basic).

**photosynthesis**

The process in which the Sun's energy is used by plants to make sugar (food) from carbon dioxide and water. Oxygen is released in this process.

**Plantae**

One of the Kingdoms of Life (which are part of the scientific system of classification). This Kingdom includes all land plants.

**plate tectonics**

The theory that the surface of Earth consists of large plates that are continually moving.

**predator**

An organism that hunts another living thing for food. [see CARNIVORE]

**predict**

Thinking by using prior knowledge about what a student knows to work out what is going to probably happen next, in a pattern of events.

**pressure**

A force applied equally to all surfaces of objects or surfaces. Air pressure is the force of all the atmosphere gases pushing down on people at the Earth's surface.

**prey**

An organism that is hunted by a predator.

**producer**

An organism that creates its own food rather than eating other organisms to obtain food; for example, a plant. (see also CONSUMER)

**Protista**

One of the Kingdoms of Life (which are part of the scientific system of classification). This Kingdom includes complex one-celled micro-organisms, such as amoeba, protozoa, slime molds, and algae.

**pure substance**

A substance that is composed of only one type of atomic particle and therefore always has the same properties. There are two kinds of pure substances: elements and compounds.

## R

**radar**

An acronym for RAdio Detection And Ranging. A device that sends out radio waves and picks up any echoes that are bounced back off objects to tell the distance, speed, direction of motion, and shape of objects.

**ramp**

Interchangeable with term meaning an incline plane or sloping surface.

## S

**recording**

To describe (an observation) by using words, numbers, writing, or pictures. To only describe what has been seen, measured, or calculated without any subject judgments.

**renewable resources**

Natural resources that can be renewed or replaced by nature within 100 years.

**rift**

An opening in the oceanic crust as plates move away from each other, where molten materials from Earth's mantle can escape.

**rotate**

To spin around on an axis.

**saturated**

A solution that contains as much of one substance (the solute) as can be dissolved in another substance (the solvent). For example, when you cannot dissolve any more drink crystals in water, the solution is saturated.

**scavenger**

Any animal that preys on food predators have killed, or food recently discarded.

**screw**

A simple machine consisting of an incline plane wrapped around a cylinder.

**scuba**

An acronym for Self-Contained Underwater Breathing Apparatus; allows divers to carry their air supply on their backs.

**sediment**

Small pieces of material that have broken off of rocks and have been deposited by water, wind, or ice.

**sedimentary rock**

Layered rock formed when sediment is compressed and forced together naturally over millions of years.

**seismic wave**

An energy wave that is released by an earthquake and travels outward from its focus.

**series circuit**

A circuit in which the current travels along a single path to two or more electric devices; the current must travel through each part of the circuit, one device after the other, in turn.

**SI system**

The most widely used and accepted version of the metric system of measurement employed by all scientists (SI is an abbreviation of *Le Système International d'Unités*); includes the units metre, litre, and gram.

**simple machine**

One of the basic devices used to redirect forces for a useful function: lever, wedge, ramp, screw, wheel, axle, and pulley.

**solubility**

The ability of a substance (the solute) to dissolve in another substance (the solvent). Temperature plays an important role in solubility. For example, you can dissolve more orange-drink crystals in warm water than in cold water.

**solute**

The smaller part that is put into a solution. A solute is mixed with a solvent to form a solution.

**solution**

A homogeneous mixture of two or more substances that combine so that the mixture is the same throughout and the properties of the substances blend.

**sonar**

An acronym for SOund NAvigation and Range; a device that ships use to chart the depth of oceans using the echoes of sound waves.

**sort**

Separating a collection of items, drawings, objects, ideas, or numbers into categories of attributes. [see CLASSIFY]

**sound absorption**

To soak up audible noise. Sound is usually absorbed by thick, dense materials.

**sound waves**

A movement of particles that transfers sound from one place to another.

**sound**

A form of energy that you can hear when something vibrates.

**species (1)**

A term used to describe a group of organisms that can mate and produce offspring that can in turn produce more offspring.

**species (2)**

Form *Scientific Names*: species is a specific division in the classification system of organisms. It is the category below genus.

**spin-off technology**

An everyday use of a technology that was first developed for another purpose. For example, bar codes used in grocery stores were first developed by NASA for space exploration.

**static-electric charge**

A type of electricity where the electric charges build up on an object by rubbing another object. The movement of the charge off the charged object is called a static discharge. For example, electric charges built up in rubbing a balloon against your pet's fur.

**static-electric discharge**

A form of electrical energy moving unbalanced charged electrons on an object back to a balanced condition.

**subduction zone**

A place on Earth's crust where high pressure pushes an oceanic plate under another, converging tectonic plate.

**sunlight**

Full spectrum electromagnetic radiation carrying energy from the nearest star to our planet.

**supersaturated**

A solution that is more than saturated; using temperature changes, a solution is forced to dissolve more of the substance (the solute) than would normally be found in a saturated solution.

**surface runoff**

Precipitation that travels over the soil surface to the nearest stream. It does not soak into the soil surface.

**suspension**

A cloudy mixture in which clumps of a solid or droplets of a liquid are scattered throughout a liquid or gas. For example, muddy water is a suspension.

**sustainability**

The ability of ecosystems to bear the impact of the human population over a long period of time, through the replacement of resources and the recycling of waste.

**T****technology**

Any method or tools that are made using scientific principles to solve problems. Science and technology make it possible to survive in challenging environments.

**temperature**

The measure of how hot or cold something is. In relative terms, it is a measure of the amount of heat present.

**tidal energy**

Energy created by filling a reservoir with ocean water at high tide, and later releasing the water through hydroelectric turbines as the tide ebbs to produce electricity.

**U****unbalanced forces**

Forces pulling or pushing each other in which one is greater than all others; when the net force on an object does not equal zero.

**unicellular**

Made of only one cell; a characteristic of organisms in the Monera Kingdom.

**V****veins**

Thin tubes that carry blood back to the heart from every part of the body.

**verify**

To double check by working out the answer or solution again. Usually another way is used to show that the first answer is correct because the second method yields an identical result.

**vertebrate**

Animal with a backbone, or spinal column; birds, fish, and mammals are examples of vertebrates.

**vibration**

The back and forth or up and down movement of an object.

**voltage**

A measure of the energy available to move charges in a circuit between positively-charged and negatively-charged terminals of a battery: measured in volts (V).

# W

**water pressure**

The application of force by water that increases with depth; measured in atmospheres.

**weigh**

To determine the mass of...

**weight**

Term often used as a synonym for mass in commercial and everyday use; in scientific and technical work, this term should be replaced by mass or force, depending on the application.

**weights**

Objects made from steel or metal, manufactured to be used for standard mass sets.







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