

SCIENCE GRADE 7

From Integrated Resource Package 2005

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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.

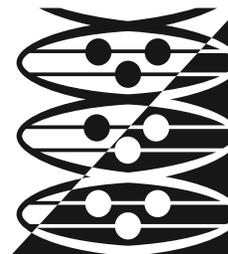
Each unit includes the prescribed learning outcomes, suggested achievement indicators, key elements, a suggested timeframe, a sequence of suggested instruction and assessment activities, recommended learning resources, selected relevant web sites, and sample assessment instruments.

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

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.

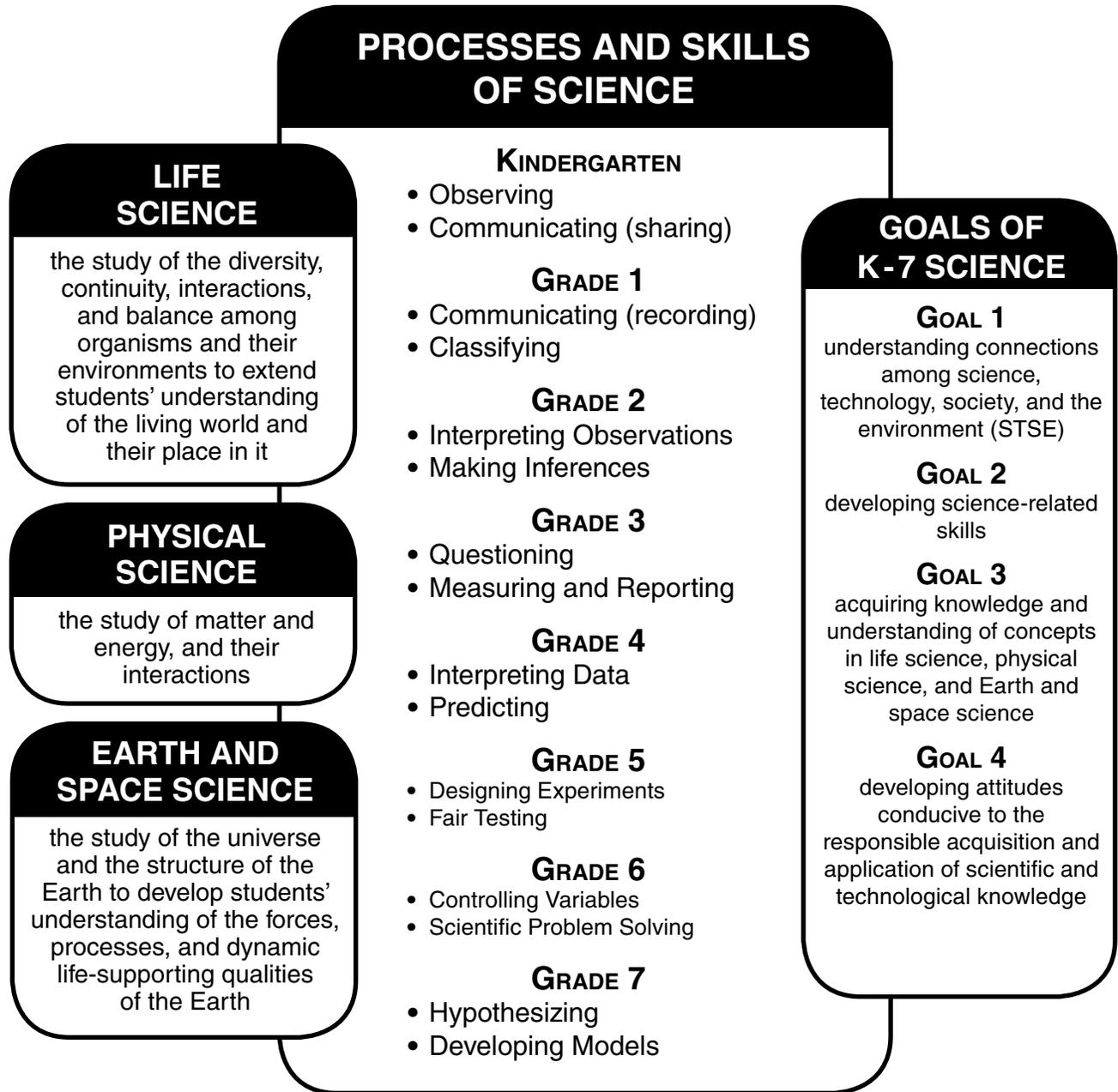
Curriculum Organizer	Suggested Time
Applications of Science	integrated with other organizers
Life Science	25-30 hours
Physical Science	25-30 hours
Earth and Space Science	25-30 hours

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

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

GETTING THE MOST OUT OF THIS IRP



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

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

Human Rights Code
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

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

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.

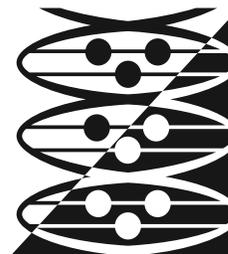
In order to respect copyright it is necessary to understand the law. It is unlawful to do the following, unless permission has been given by a copyright owner:

- 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.

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PRESCRIBED LEARNING OUTCOMES

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).

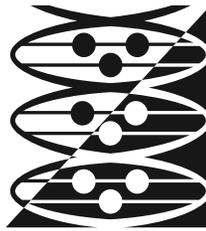
The **cognitive domain** deals with the recall or recognition of knowledge and the development of intellectual abilities. The cognitive domain can be further specified as including three cognitive levels: knowledge, understanding and application, and higher mental processes. These levels are determined 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

By Curriculum Organizer

PROCESSES OF SCIENCE

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

LIFE SCIENCE

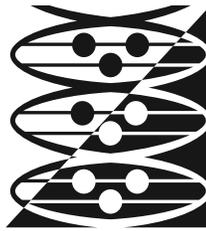
<p>Kindergarten</p> <ul style="list-style-type: none"> • describe features of local plants and animals (e.g., colour, shape, size, texture) • compare local plants • compare common animals
<p>Grade 1</p> <ul style="list-style-type: none"> • classify living and non-living things • describe the basic needs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

PHYSICAL SCIENCE

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

EARTH AND SPACE SCIENCE

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



PRESCRIBED LEARNING OUTCOMES

Grade 7

GRADE 7

Processes and Skills of Science

It is expected that students will:

- test a hypothesis by planning and conducting an experiment that controls for two or more variables
- create models that help to explain scientific concepts and hypotheses

Life Science: Ecosystems

It is expected that students will:

- analyse the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems
- assess survival needs and interactions between organisms and the environment
- assess the requirements for sustaining healthy local ecosystems
- evaluate human impacts on local ecosystems

Physical Science: Chemistry

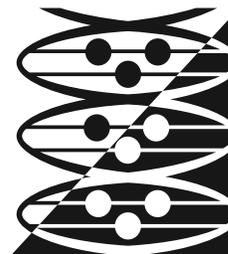
It is expected that students will:

- conduct investigations into properties of matter
- classify substances as elements, compounds, and mixtures
- measure substances and solutions according to pH, solubility, and concentration

Earth and Space Science: Earth's Crust

It is expected that students will:

- compare the characteristics of the Earth's core, mantle, and crust, and describe the formation of rocks
- analyse the dynamics of tectonic plate movement and landmass formation
- explain how the Earth's surface changes over time



STUDENT ACHIEVEMENT

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.

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

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

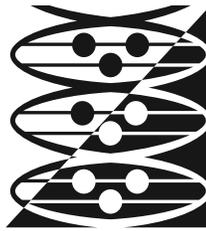
To support teachers in assessing provincially prescribed curricula, this IRP includes sets of achievement indicators in relation to each learning outcome.

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

Grade 7

GRADE 7: PROCESSES OF SCIENCE**Key Elements: Processes of Science**

Estimated Time: integrate with other curriculum organizers

Hypothesizing

Hypothesizing happens when a prediction is made about the causes and results of an event with two variables. The investigation and testing of the event is referred as to a scientific inquiry and includes these actions:

- examine previous predictions
- formulate questions that can be answered by scientific investigations
- suggest possible explanation based upon a number of inferences
- identify the independent and dependent variables
- determine if the key variables can be isolated for testing
- predict cause and effect, and state a testable hypothesis
- determine limits for the controls
- design the experiment
- conduct the experiment and collect data
- analyse the results
- communicate by reporting the result
- repeat and retest if necessary.

When assessing students' understanding and ability to apply hypothesizing and questioning skills, consider how well their experimental design identifies and fairly tests the independent and dependent variables.

Developing Models

Creating physical models and building prototypes is very similar to the design problem-solving steps and includes investigating a question or observations with these actions:

- determine the appropriateness for a model (and scale) that fit the question
- identify the specifics of the problem observed and select possible solutions
- problem solve creatively, and plan a set of procedures
- determine available materials or equipment
- build a prototype or model (drawings help)
- test and evaluate the model
- communicate and present a product
- evaluate the results.

When assessing students' understanding and ability to apply modeling, consider how well the model communicates students' synthesis and understanding of the concepts involved, and consider the extent to which the model is relevant and accurately identifies the key components of the system (validity). Good models should demonstrate the basic principle or phenomenon involved and allow students to represent their understanding according to analogies of the scientific concepts.

GRADE 7 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"> test a hypothesis by planning and conducting an experiment that controls for two or more variables 	<ul style="list-style-type: none"> supply relevant supporting evidence for hypotheses presented develop a testable question that considers the variables involved based on previous inferences communicate precisely the question under observation so others can review the plan and procedures question the relevance of the hypothesis by checking the control and the accuracy of the testing methods (fair test) communicate the results of an experiment, using graphs and charts
<ul style="list-style-type: none"> create models that help to explain scientific concepts and hypotheses 	<ul style="list-style-type: none"> observe a problem situation, and formulate a plan for investigating a solution plan in detail all of the steps necessary to build or make a product, and prepare a written outline showing the order of events identify key components of the system or process being modelled. develop a testable question that considers the variables involved (independent and dependent) build a relevant and appropriate model based on the available materials and constraints of the problem apply all appropriate safety measures when building a model

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"> Observing Communicating (sharing) 	<ul style="list-style-type: none"> Communicating (recording) Classifying 	<ul style="list-style-type: none"> Interpreting Observations Making Inferences 	<ul style="list-style-type: none"> Questioning Measuring and Reporting 	<ul style="list-style-type: none"> Interpreting Data Predicting 	<ul style="list-style-type: none"> Designing Experiments Fair Testing 	<ul style="list-style-type: none"> Controlling Variables Scientific Problem Solving 	<ul style="list-style-type: none"> Hypothesizing Developing Models

GRADE 7 LIFE SCIENCE: ECOSYSTEMS**Key Elements: Life Science**

Estimated Time: 25 – 30 hours

By the end of the grade, students will have developed a basic understanding of ecosystem relationships and evaluated human impact on the environment.

Ecosystems

This study is undertaken to achieve a basic understanding of ecosystems in order to make informed, ethical decisions about their conservation. Through observation and investigation of local ecosystems, students describe characteristics, conditions essential for growth, and reproduction of organisms as well as the roles of these organisms. Students analyse human activity in local ecosystems and propose how best to preserve that ecosystem.

Vocabulary

ecosystem, biosphere, organisms, cycle, food chain, food web, photosynthesis, sustainability, stewardship, producer, consumer, decomposer, micro-organisms, niche, population, species, community, biomes, detritivores, herbivores, carnivores, omnivores, predator, prey, habitat

Knowledge

- living things interact with each other and their physical environment
- organisms are influenced by environmental forces, and each organism influences the environment to some extent
- ecosystems are entire systems formed by interactions among the different living and non-living parts of the environment (e.g., forests, deserts)
- non-living physical characteristics of an ecosystem include: soil, landforms, water, sunlight, temperature
- organisms interact with each other and use and recycle chemicals from the environment
- living things need energy to carry out their activities; the flow of energy from one organism to another is part of an energy web
- producers of food such as plants are related to consumers (e.g., animals) and decomposers (e.g., bacteria and fungi) in webs of interdependence called food chains and food webs
- food webs are individual food chains that are linked
- populations are groups of the same kinds of organisms (species) living together because they share common environmental needs
- populations in ecosystems tend to be regulated by predation and competition
- human activity such as logging, farming, fishing, and buildings can impact the living (biotic) and physical (abiotic) components of an ecosystem

Skills and Attitudes

- observe and record the biotic and abiotic components in a local ecosystem
- analyse limiting factors in an ecosystem
- design and conduct a simulation to demonstrate control of one or more variables in an ecosystem
- create models to show large scale ecosystems
- show respect for the environment

GRADE 7 LIFE SCIENCE: ECOSYSTEMS

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"> • analyse the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems 	<ul style="list-style-type: none"> <input type="checkbox"/> identify populations of organisms in communities and ecosystems according to simplified food webs <input type="checkbox"/> explain how habitats provide basic needs for the organisms living in them (e.g., food, water, light) <input type="checkbox"/> identify factors that are critical for healthy populations and ecosystems, including air and water quality (e.g., acid rain, greenhouse gases, turbidity), and explain their significance
<ul style="list-style-type: none"> • assess survival needs and interactions between organisms and the environment 	<ul style="list-style-type: none"> <input type="checkbox"/> identify interactions between decomposers, producers, and consumers, according to the food pyramid <input type="checkbox"/> describe in detail how decomposers recycle nutrients within ecosystems, and how plants, animals, and decomposers depend on each other (composting) <input type="checkbox"/> explain and provide several examples of how energy is transferred through food webs and food chains within an ecosystem
<ul style="list-style-type: none"> • assess the requirements for sustaining healthy local ecosystems 	<ul style="list-style-type: none"> <input type="checkbox"/> create and justify a description of a suitable environment for a specific organism, taking into account the limiting factors (e.g., food, water, light, living space) <input type="checkbox"/> explain relationships between living (biotic) and non-living (abiotic) things within an ecosystem (e.g., soil, bacteria, plants, animals), with reference to several examples <input type="checkbox"/> evaluate the likely effects of habitat loss for certain species
<ul style="list-style-type: none"> • evaluate human impacts on local ecosystems 	<ul style="list-style-type: none"> <input type="checkbox"/> describe, using examples, how forestry practices affect ecosystems (e.g., riparian zones, fishing, forest debris, beetle kill, controlled burn) <input type="checkbox"/> determine the sources of pollutants, and analyse their effects (e.g., autos and air quality, oil spills and water contamination) <input type="checkbox"/> describe, using examples, how practices of Aboriginal peoples in BC affect environmental sustainability in a specific ecosystem

GRADE 7 PHYSICAL SCIENCE: CHEMISTRY**Key Elements: Physical Science**

Estimated Time: 25 – 30 hours

By the end of the grade, students will have understood the characteristics of mixtures and solutions, as well as chemical and physical properties of various substances.

Chemistry

In this introduction to chemistry, students develop a greater understanding of matter through various hands-on activities in a “kitchen chemistry” setting. Students use appropriate tools and techniques to understand the characteristics of mixtures and solutions. They gain understanding of the pH scale by testing weak acids or bases. Students are also introduced to the particle model theory and to quantitative and qualitative properties of materials, as well as chemical and physical changes in matter.

Vocabulary

matter, volume, state, solid, liquid, gas, chemical change, physical change, reversible and non-reversible changes, pure substance, element, compound, mixture, solution, suspension, emulsion, solubility, concentration, dilute, saturation, supersaturated, unsaturated, dissolve, pH, acid, acidic, base, basic, neutral, hydrometer

Knowledge

- matter is anything that has mass and volume; it is generally classified as pure substances or mixtures
- the observable properties of matter include colour, texture, state
- the measurable properties of matter include density, melting and freezing points
- changes to matter can be reversible (mixtures and changes of state) and non-reversible (mechanical change such as grinding, chemical change such as cooking)
- matter is made up of tiny particles (particle model theory)
- pure substances are either elements or compounds, and their properties are always the same
- mixtures have two or more kind of particles
- mixtures can be classed as solutions, suspensions, or mechanical mixtures
- mixtures can be separated physically or chemically by removing one of the components (evaporation, crystallization, filtration, dissolving, magnetic separation, flotation)
- suspensions consist of solid pieces scattered throughout the mixture
- solutions are mixtures that appear as a single substance
- pH is the measure of the tendency toward acidic or basic conditions

Skills and Attitudes

- demonstrate curiosity, scepticism, creativity, open-mindedness, accuracy, precision, honesty, and persistence as important scientific attributes
- ask questions and formulate hypotheses that are tentative and testable, and draw conclusions from results
- use appropriate tools and techniques to gather, analyse, interpret, and share information
- recognize that an experiment must be repeated and yield consistent results to be considered scientifically valid
- develop models to represent systems or analogies about matter
- handle chemicals and equipment safely and responsibly

GRADE 7 PHYSICAL SCIENCE: CHEMISTRY

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"> • conduct investigations into properties of matter 	<ul style="list-style-type: none"> <input type="checkbox"/> identify several qualitative (e.g., colour, texture, state) and quantitative (e.g., density, melting point, freezing point) properties of materials <input type="checkbox"/> accurately measure, record, and present data collected during an experiment involving solutions and mixtures <input type="checkbox"/> describe chemical and physical changes in matter, citing examples
<ul style="list-style-type: none"> • classify substances as elements, compounds, and mixtures 	<ul style="list-style-type: none"> <input type="checkbox"/> accurately sort products found in the home into substances, suspensions, emulsions, mechanical mixtures, and solutions and summarize their similarities and differences <input type="checkbox"/> correctly relate the particle theory to the properties of elements, compounds, and mixtures
<ul style="list-style-type: none"> • measure substances and solutions according to pH, solubility, and concentration 	<ul style="list-style-type: none"> <input type="checkbox"/> describe the effects of a variety of factors (e.g., type of solute, type of solvent, temperature) on solubility <input type="checkbox"/> determine factors (e.g., heat, stirring, surface area) that affect the rate at which substances dissolve <input type="checkbox"/> use test papers with teacher support to carefully analyse various substances and solutions for acidic or basic characteristics (pH scale)

GRADE 7 EARTH AND SPACE SCIENCE: EARTH'S CRUST

Key Elements: Earth and Space Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have demonstrated understanding of the Earth's surface and how it changes over time.

Earth's Crust

The study of the Earth's crust includes an investigation of the Earth's structure, characteristics of the Earth's core, geological processes, rock and mineral formations, and changes in the landscape over time. Students examine theories explaining the Earth's geology and the dynamics of plate tectonics. Through investigation, observation, diagrams, and models, students begin to identify geological features and simulate changes that occur on the Earth's surface and on the ocean floor. Students apply this knowledge to suggest the effect that these features and changes have on people and communities. They identify technologies that are related to the scientific study of these changes.

Vocabulary

crust, mantle, outer core, inner core, weathering, erosion, deposition, fossil, fossil record, geologic time scale, rock cycle, plate tectonics, continental crust, mid-ocean ridge, delta, mountain, valley, volcano, plain, plateau, ocean crust, convergent, divergent, transform plate boundaries, subduction zone, igneous, metamorphic, sedimentary, magma, lava, seismic waves

Knowledge

- the Earth is broadly differentiated into a crust, mantle, and core
- the geosphere refers to the physical Earth; the atmosphere refers to the air; the biosphere refers to life forms; and the hydrosphere refers to water
- mountains, valleys, plains, deserts, rivers, lakes, and oceans are features of the surface of Earth
- the Earth's crust and uppermost mantle are made of large moving sections called tectonic plates
- the features on the surface of the Earth are formed by tectonic activity, particularly at convergent, divergent, or transform fault tectonic plate boundaries and by the processes of wind, water, and ice that wear down surface features over time
- the theory of plate tectonics explains how and why the tectonic plates move and explains why the Earth's surface is continually changing
- stress in the Earth's crust is released in tectonic plate movement and earthquakes
- heat within the Earth is released in volcanic activity
- information about the mantle and core is obtained by recording and charting energy waves from earthquakes and by looking at rocks exposed at the Earth's surface
- earthquakes are common along all tectonic plate boundaries and occur deep in the Earth at subduction zones
- rocks are made of minerals that have unique properties
- minerals are made from pure elements in the Earth
- minerals can be identified by their colour, lustre, hardness, cleavage, crystal structure, and their reaction to certain chemicals
- rocks are classified by how they are formed within the rock cycle and their mineral content
- igneous, sedimentary, and metamorphic rocks can be changed from one form to another
- fossils in sedimentary rocks allow us to interpret ancient environments
- the history of changes in life on Earth are recorded in the fossil record
- the geologic time scale is based on changes in life on Earth

continued next page

Key Elements (continued)

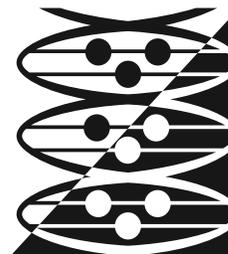
Key Elements: Earth and Space Science

Skills and Attitudes

- use analogies to visualize science concepts
- collect data from research resources and apply to diagrams and graphs
- report on the rock cycle from lab research results and observations
- observe how the positions of earthquakes, volcanoes, and mountain ranges outline the boundaries of tectonic plates
- classify rock collections
- examine and identify commonly found rocks and local geological formations
- use models to predict how earthquake waves travel through the Earth and how this information leads to an understanding of the interior of the Earth
- investigate the use of models to show large scale systems

GRADE 7 EARTH AND SPACE SCIENCE: EARTH'S CRUST

Prescribed Learning Outcomes	Suggested Achievement Indicators
<i>It is expected that students will:</i>	<i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i> <i>Students who have fully met the prescribed learning outcome are able to:</i>
<ul style="list-style-type: none"> • compare the characteristics of the Earth's core, mantle, and crust, and describe the formation of rocks 	<ul style="list-style-type: none"> <input type="checkbox"/> accurately list the characteristics of each layer of the Earth <input type="checkbox"/> construct a flow chart to explain in detail the geological processes involved in forming minerals and rocks <input type="checkbox"/> catalogue the properties of rock and mineral samples (e.g., cleavage, colour, crystal habit, fracture, hardness, lustre, and streak) on the basis of a detailed examination
<ul style="list-style-type: none"> • analyse the dynamics of tectonic plate movement and landmass formation 	<ul style="list-style-type: none"> <input type="checkbox"/> explain how earthquakes have helped scientists understand the Earth's structure (e.g., primary and secondary seismic waves) <input type="checkbox"/> detail the effects of earthquakes, volcanoes, and fault boundaries on the Earth's crust <input type="checkbox"/> model tectonic plate movement to show convergent, divergent, and transform plate boundaries
<ul style="list-style-type: none"> • explain how the Earth's surface changes over time 	<ul style="list-style-type: none"> <input type="checkbox"/> explain how scientists use the placement and position of an object to infer the time of events (e.g., superposition) <input type="checkbox"/> illustrate how fossils come to be associated with sedimentary rock <input type="checkbox"/> report on how fossil record is used to identify Millennium changes in the Earth's surfaces



CLASSROOM ASSESSMENT MODEL

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

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 time, 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"> 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. 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. Through leaf collecting, picture collages, and word splashes, have students explore characteristics of seasonal changes and day time/night time. 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. 	<ul style="list-style-type: none"> 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"> observe weather conditions, cloud cover, precipitation, and temperature use appropriate vocabulary. 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. 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.

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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"> Choose one local deciduous tree to observe throughout the year. Take photos and make a pictorial record of the tree in each season. 	<ul style="list-style-type: none"> 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..."). <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"> In small groups, have students create seasonal murals or dioramas using pictures, words, and objects from a prepared tub. 	<ul style="list-style-type: none"> 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"> possible weather conditions appropriate clothing recreation activity phases of plant growth animal activity

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

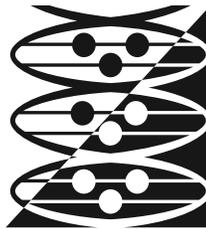
Sample assessment instruments are provided at the end of each unit, and contain criteria specifically keyed to one or more of the suggested assessment activities contained in the unit.

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

Grade 7

ASSESSMENT OVERVIEW TABLE FOR: GRADE 7

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						
PROCESSES OF SCIENCE	Integrated	Integrated	Integrated	2		1	1
LIFE SCIENCE	25-30	<ul style="list-style-type: none"> • presentation • model • map • quiz • summative project <ul style="list-style-type: none"> • research report • group presentation • diagram • diorama 	33½ %	4		1	3
PHYSICAL SCIENCE	25-30	<ul style="list-style-type: none"> • lab report • chart • quiz • model <ul style="list-style-type: none"> • demo • oral summary • diagram • science journal 	33½ %	3	1	1	1
EARTH AND SPACE SCIENCE	25-30	<ul style="list-style-type: none"> • model • written report • map <ul style="list-style-type: none"> • graph • quiz • demo 	33½ %	3		3	
TOTALS	75-90		100 %	12	1	6	5

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

GRADE 7: PROCESSES OF SCIENCE

Key Elements: Processes of Science

Estimated Time: integrate with other curriculum organizers

Hypothesizing

Hypothesizing happens when a prediction is made about the causes and results of an event with two variables. The investigation and testing of the event is referred as to a scientific inquiry and includes these actions:

- examine previous predictions
- formulate questions that can be answered by scientific investigations
- suggest possible explanation based upon a number of inferences
- identify the independent and dependent variables
- determine if the key variables can be isolated for testing
- predict cause and effect, and state a testable hypothesis
- determine limits for the controls
- design the experiment
- conduct the experiment and collect data
- analyse the results
- communicate by reporting the result
- repeat and retest if necessary.

When assessing students' understanding and ability to apply hypothesizing and questioning skills, consider how well their experimental design identifies and fairly tests the independent and dependent variables.

Developing Models

Creating physical models and building prototypes is very similar to the design problem-solving steps and includes investigating a question or observations with these actions:

- determine the appropriateness for a model (and scale) that fit the question
- identify the specifics of the problem observed and select possible solutions
- problem solve creatively, and plan a set of procedures
- determine available materials or equipment
- build a prototype or model (drawings help)
- test and evaluate the model
- communicate and present a product
- evaluate the results.

When assessing students' understanding and ability to apply modeling, consider how well the model communicates students' synthesis and understanding of the concepts involved, and consider the extent to which the model is relevant and accurately identifies the key components of the system (validity). Good models should demonstrate the basic principle or phenomenon involved and allow students to represent their understanding according to analogies of the scientific concepts.

Grade 7 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"> • test a hypothesis by planning and conducting an experiment that controls for two or more variables 	<ul style="list-style-type: none"> <input type="checkbox"/> supply relevant supporting evidence for hypotheses presented <input type="checkbox"/> develop a testable question that considers the variables involved based on previous inferences <input type="checkbox"/> communicate precisely the question under observation so others can review the plan and procedures <input type="checkbox"/> question the relevance of the hypothesis by checking the control and the accuracy of the testing methods (fair test) <input type="checkbox"/> communicate the results of an experiment, using graphs and charts
<ul style="list-style-type: none"> • create models that help to explain scientific concepts and hypotheses 	<ul style="list-style-type: none"> <input type="checkbox"/> observe a problem situation, and formulate a plan for investigating a solution <input type="checkbox"/> plan in detail all of the steps necessary to build or make a product, and prepare a written outline showing the order of events <input type="checkbox"/> identify key components of the system or process being modelled. <input type="checkbox"/> develop a testable question that considers the variables involved (independent and dependent) <input type="checkbox"/> build a relevant and appropriate model based on the available materials and constraints of the problem <input type="checkbox"/> apply all appropriate safety measures when building a model

GRADE 7 LIFE SCIENCE: ECOSYSTEMS

Key Elements: Life Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have developed a basic understanding of ecosystem relationships and evaluated human impact on the environment.

Ecosystems

This study is undertaken to achieve a basic understanding of ecosystems in order to make informed, ethical decisions about their conservation. Through observation and investigation of local ecosystems, students describe characteristics, conditions essential for growth, and reproduction of organisms as well as the roles of these organisms. Students analyse human activity in local ecosystems and propose how best to preserve that ecosystem.

Vocabulary

ecosystem, biosphere, organisms, cycle, food chain, food web, photosynthesis, sustainability, stewardship, producer, consumer, decomposer, micro-organisms, niche, population, species, community, biomes, detritivores, herbivores, carnivores, omnivores, predator, prey, habitat

Knowledge

- living things interact with each other and their physical environment
- organisms are influenced by environmental forces, and each organism influences the environment to some extent
- ecosystems are entire systems formed by interactions among the different living and non-living parts of the environment (e.g., forests, deserts)
- non-living physical characteristics of an ecosystem include: soil, landforms, water, sunlight, temperature
- organisms interact with each other and use and recycle chemicals from the environment
- living things need energy to carry out their activities; the flow of energy from one organism to another is part of an energy web
- producers of food such as plants are related to consumers (e.g., animals) and decomposers (e.g., bacteria and fungi) in webs of interdependence called food chains and food webs
- food webs are individual food chains that are linked
- populations are groups of the same kinds of organisms (species) living together because they share common environmental needs
- populations in ecosystems tend to be regulated by predation and competition
- human activity such as logging, farming, fishing, and buildings can impact the living (biotic) and physical (abiotic) components of an ecosystem

Skills and Attitudes

- observe and record the biotic and abiotic components in a local ecosystem
- analyse limiting factors in an ecosystem
- design and conduct a simulation to demonstrate control of one or more variables in an ecosystem
- create models to show large scale ecosystems
- show respect for the environment

Grade 7 Life Science: Ecosystems

Prescribed Learning Outcomes

It is expected that students will:

- analyse the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems

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 populations of organisms in communities and ecosystems according to simplified food webs
- explain how habitats provide basic needs for the organisms living in them (e.g., food, water, light)
- identify factors that are critical for healthy populations and ecosystems, including air and water quality (e.g., acid rain, greenhouse gases, turbidity), and explain their significance

Planning for Assessment

- Identify local ecosystems within your school district. (Local ecosystems include unused building lots, wild areas on property edges, schoolyard fringe, parks with tall grass and brush, intertidal zones, forest, stream valleys, parks with wooded areas, beaches.)

Suggested Assessment Activities

- Have students bring (or provide them with) pictures from old magazines that include various carnivores, omnivores, herbivores, and plants. Have the students cut them out to arrange and glue in a manner that represents food chains within a food web. Items may be connected and information added by students.

Criteria to assess student work include

- carnivores, omnivores, herbivores, and plants are all represented
- they are in the appropriate order
- no elements are missing
- the food chains are accurate and clearly illustrated
- the food web is accurate and clearly illustrated
- added information is clear, appropriate, accurate, and comprehensive.

- After exploring other topics in Ecology (such as food chains, food webs, and photosynthesis), research and organize information from a variety of sources on ecosystems. Then create a presentation.

- Have students complete an Ecology Report. Look for evidence that student reports
 - describe organisms in terms of their roles in a food web
 - describe ways species interact with each other
 - identify and describe recovery stages of a local damaged ecosystem
 - outline factors that influence the length and quality of life.

continued next page

Ecosystems (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Do a community survey of a city or town's waterways, farms, malls, storm drains, wetlands, highways, and subdivisions. • Generate opportunities so students meet those who make decisions about the city's (town's) infrastructure (e.g., water, transportation, waste, air quality, land use) and the area's natural resources base as it relates to air and water. • Visit a local water treatment plant. 	<ul style="list-style-type: none"> • Create a model showing a city's (town's) urban environment based on survey information. Student models could include <ul style="list-style-type: none"> - green space - pavement - wetlands and undeveloped land - the effects of pollution - where water comes from and goes - effects of pollution on the environment. See the sample scoring guide (Ecosystems Diorama) provide at the end of this grade.
<ul style="list-style-type: none"> • Ask students to illustrate a food web (e.g., marsh plant, protozoa, amphipod, stickleback, great blue heron), and identify each organism in terms of its niche role (producer, consumer, decomposer). • Ask students to create a graphic organizer with major headings in order to illustrate an ecosystem. Students should receive a page of circles to fill in and complete for an ecosystem (e.g., marine tidal zone). Students then write or draw the food items into the circles, and draw appropriate producer, consumer, decomposer links between items. 	<ul style="list-style-type: none"> • Have students observe populations in a 1m² quadrant (terrestrial or aquatic habitat). Students then design a map to present their collected data in an organized way that shows the connections between types of organisms and plant matter they are physically near. <p>Criteria for assessing student maps include</p> <ul style="list-style-type: none"> - shows a colour coded legend - indicates the variety and number of plant species - shows the number of separate animal organisms by symbol or icon - shows animals on or near plant matter they eat.
<ul style="list-style-type: none"> • Have students investigate sources of CO₂ and acid rain in the community. 	<ul style="list-style-type: none"> • Students should develop questions that isolate cause and effect factors (e.g., Do smoke, rotting leaves create CO₂?). Then ask students to design an experiment to control one of these cause-and-effect factors. The experiment does not necessarily have to be performed.

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*Ecosystems (continued)***Recommended Learning Resources**

- BC Science 7
- BC Science Probe 7
- Beavers: The Master Builders
- Below Zero
- Biology Concepts
- The Biosphere
- Cycle of Life/Recycle Handbook for Educators
- Ecology: Communities
- Ecology: Food Chains
- Ecology: Organisms in their Environment
- Ecosystems
- Forests in Focus
- Kokanee of British Columbia
- McDougal Littell Science (Ecology)
- Nelson Science & Technology 7
- Nelson Science & Technology Skills Handbook
- Our Wonderful World (AIMS Activities)
- Parasites & Partners
- Project WILD
- Salish Sea
- Salmonids in the Classroom
- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
- Thinking Connections: Concept Maps for Life Science
- The Watershed Works
- Wonderwise: Women in Science Learning Series (Urban Ecologist)

Grade 7 Life Science: Ecosystems

Prescribed Learning Outcomes

It is expected that students will:

- assess survival needs and interactions between organisms and the environment

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 interactions between decomposers, producers, and consumers, according to the food pyramid
- describe in detail how decomposers recycle nutrients within ecosystems, and how plants, animals, and decomposers depend on each other (composting)
- explain and provide several examples of how energy is transferred through food webs and food chains within an ecosystem

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Review prior learning and understanding of key terms and concepts using crossword puzzles and vocabulary materials. 	<ul style="list-style-type: none"> • introductory activity – no corresponding assessment necessary
<ul style="list-style-type: none"> • Visit a compost to observe its contents at an interval of 3-4 weeks. Inventory the layers, items, and life forms. Take a top item sample for experimentation. As a possible extension activity, measure the temperature at various levels of the composter. 	<ul style="list-style-type: none"> • Use a baggie to create a compost to observe over time. It should contain organic material and be void of air pockets. Ensure that students observe and record changes in the material (e.g., gas production, changes in colour and structure), on a weekly basis. As an extension, have students design an experiment to determine how to accelerate the process, once the factors are understood. • Ask students to illustrate a food web (e.g., containing cat, caterpillar, corn, bacteria, cow, crow, deer, hawk, human, lettuce, mouse, fox, rabbit). Students should be able to identify each organism in terms of its niche (producer, consumer, decomposer).
<ul style="list-style-type: none"> • Investigate the food volume required by various species. Determine the volume of biomass required to sustain various creatures (e.g., volume of grass for elephants, plankton for whales, mosquitoes and swallows, prey and bears). 	<ul style="list-style-type: none"> • Students draw a diagram with the food pyramid data. Teachers look for evidence that their diagram details how the amount of organisms (biomass) at the base of the food pyramid increases. Criteria could include the following: <ul style="list-style-type: none"> - matrix compares more than two organisms - organisms are from the same environment - quantified data are used for each organism, such as <ul style="list-style-type: none"> ➤ relative size ➤ amount of food eaten daily ➤ number of organisms in a measured area (e.g., 20 grams of plankton per litre of seawater) ➤ estimated number in the environment.

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Ecosystems (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Discuss with students how light energy is transformed into chemical energy, which is transformed into mechanical energy in a living creature (all living things use nutrients produced either by photosynthesis or chemosynthesis). 	<ul style="list-style-type: none"> • Grow and raise micro pets (e.g., brine shrimp, fruit flies, mealworms, crickets) by successfully managing its energy sources. Sustain life to these organisms for a period of time equal to one life cycle.
<p>Recommended Learning Resources</p> <ul style="list-style-type: none"> • Backyard Biodiversity and Beyond • BC Science 7 • BC Science Probe 7 • Below Zero • Biology Concepts • The Biosphere • Cycle of Life/Recycle Handbook for Educators • Ecology: Communities • Ecology: Food Chains • Ecology: Organisms in their Environment • Ecology: Populations • Ecosystems • Ecosystems: The Role of Abiotic Factors • Forests in Focus • Kokanee of British Columbia • McDougal Littell Science (Ecology) • Nelson Science & Technology 7 • Our Wonderful World (AIMS Activities) • Parasites & Partners • Project WET • Project WILD • Salish Sea • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Thinking Connections: Concept Maps for Life Science • Urban Stewards • The Watershed Works • Wonderwise: Women in Science Learning Series (Urban Ecologist) 	

Grade 7 Life Science: Ecosystems

Prescribed Learning Outcomes	
<p><i>It is expected that students will:</i></p> <ul style="list-style-type: none"> • assess the requirements for sustaining healthy local ecosystems 	
Suggested Achievement Indicators	
<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"> <input type="checkbox"/> create and justify a description of a suitable environment for a specific organism, taking into account the limiting factors (e.g., food, water, light, living space) <input type="checkbox"/> explain relationships between living (biotic) and non-living (abiotic) things within an ecosystem (e.g., soil, bacteria, plants, animals), with reference to several examples <input type="checkbox"/> evaluate the likely effects of habitat loss for certain species 	
Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • On a schoolyard walk, have students study interactions among living and non-living parts in the natural ecosystem. Students should record their observations and write journal entries. • Later visit an Estuary region and observe the many types of interactions to see. 	<ul style="list-style-type: none"> • introductory activity – no corresponding assessment necessary
<ul style="list-style-type: none"> • Have students discuss key components for creating and maintaining a contained ecosystem (e.g., vivarium). Have students research the limiting factors specific to an organism. 	<ul style="list-style-type: none"> • Have students build and maintain a non-commercial container for a miniature ecosystem. The vivarium must sustain plant and animals with adequate light, food, water, living space for the life forms to be placed inside (insects, invertebrates, fish, amphibians).
<ul style="list-style-type: none"> • After creating an ecosystem, have students explain all items in the ecosystem, justifying how each contributes to the ecosystem. • Explore reclamation of a “clean” land site for how various living organisms can be reintroduced naturally and by conservation methods. Sites could include: mining (tailings), volcanic lava beds, old garbage dumps, sand dune beaches, and glacial moraines, 	<ul style="list-style-type: none"> • When explaining any ecosystem, natural or artificial, students should be able to answer questions such as the following: <ul style="list-style-type: none"> - Who are the decomposers in the ecosystem? - Where are the detritivores mostly located? (Detritus) - How do the producers feed the consumers? - What predators are in the ecosystem naturally? - How many predators can this ecosystem support?

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Ecosystems (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Ask students to research a species that has become endangered/extinct as a result of habitat loss. Using the food chain and communities concept, have students relate the impact this loss has had on other organisms. Special attention should be placed on critical members of the food chain and bio-diversity of the ecosystem. 	<ul style="list-style-type: none"> • Assign students to work in one of these ecosystems for a display project: <ul style="list-style-type: none"> - water (wetlands) – bird life - water (standing) – mosquitoes - wild plant market gardens - ethno-botany projects – how people use plants. Displays should show <ul style="list-style-type: none"> - how a scientific investigation was conducted in collecting and detailing the facts about an endangered/extinct organism - some steps people can take to remedy the habitat loss problem. - how this endangered organism is connected to other life forms. - scientifically why this endangered organism must be protected as well as its habitat.
<p>Recommended Learning Resources</p> <ul style="list-style-type: none"> • Backyard Biodiversity and Beyond • BC Science 7 • BC Science Probe 7 • Below Zero • Biology Concepts • The Biosphere • Cycle of Life/Recycle Handbook for Educators • Ecology: Populations • Ecosystems • Forests in Focus • Kokanee of British Columbia • McDougal Littell Science (Ecology) • Nelson Science & Technology 7 • Our Wonderful World (AIMS Activities) • Project WET • Project WILD • Salish Sea • Salmonids in the Classroom • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Thinking Connections: Concept Maps for Life Science • Urban Stewards • The Watershed Works • Wonderwise: Women in Science Learning Series (Urban Ecologist) 	

Grade 7 Life Science: Ecosystems

Prescribed Learning Outcomes	
<p><i>It is expected that students will:</i></p> <ul style="list-style-type: none"> • evaluate human impacts on local ecosystems 	
Suggested Achievement Indicators	
<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"> <input type="checkbox"/> describe, using examples, how forestry practices affect ecosystems (e.g., riparian zones, fishing, forest debris, beetle kill, controlled burn) <input type="checkbox"/> determine the sources of pollutants, and analyse their effects (e.g., autos and air quality, oil spills and water contamination) <input type="checkbox"/> describe, using examples, how practices of Aboriginal peoples in BC affect environmental sustainability in a specific ecosystem 	
Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Working in groups, have students imagine they are to decide on the appropriate harvest of some Forest land outside city limits. Several interest groups have come forward with suggestions and points of view. Have student groups identify the pros and cons of each suggestion, make an informed decision, and prepare a summary of their decision and of the supporting rationale. 	<ul style="list-style-type: none"> • As groups present viewpoints and persuasive arguments to the other members of the class, look for evidence that they have presented <ul style="list-style-type: none"> - major aspects of the living forest - a range of perspectives - relevant issues and conclusions - identified ethical considerations - expressed awareness of other’s viewpoints - consider forest floor sustainability - consider watershed resource affect.
<ul style="list-style-type: none"> • Research Aboriginal practices within a specific ecosystem (e.g., river: salmon fishing; intertidal waters: herring roe; forestry: trapping). • Working in groups, have students identify the pros and cons of Aboriginal practices within a specific ecosystem (e.g., controlled burns, fish wheels, culturally modified trees). • Discuss the Aboriginal value (concept) of “giving back to the environment what you take” and how it may affect a specific ecosystem (i.e., reforestation, protecting stream beds, harvest rotation). 	<ul style="list-style-type: none"> • Student research and discussion should reflect <ul style="list-style-type: none"> - understanding of Aboriginal practices and values - sensitivity to Aboriginal concerns - how practices affect environmental sustainability.

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Ecosystems (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Have students assess ways in which humans affect habitats, both positively and negatively (e.g., urbanization, adding greenbelts, habitat fragmentation, or riparian zones). Views could be portrayed in multimedia presentations. Include the level of damage and stage of recovery of a given local ecosystem. Students could be asked to make a pro/con chart or a before and after diorama display. Please see the Scoring Guide at the end of this unit. 	<ul style="list-style-type: none"> • Choose a large habitat and have students create a pro/con chart reflecting the human impacts on it and a list of experimental questions for further study. Assess by having students pose relevant questions, such as those focused on <ul style="list-style-type: none"> - looking for a cause and effect link (e.g., Does new road building cause water erosion?) - asking if changing one impact slightly will reverse an effect (e.g., Is the effluent water temperature encouraging the wrong shellfish to grow?).
<ul style="list-style-type: none"> • Ask students to record how people in a community interact with each other and with ecosystems at a local level. Have students list non-point sources of aquatic pollution (a river or sewer pipe is a point source, while farm manure is a non-point sources of aquatic nitrates). 	<ul style="list-style-type: none"> • After students build the polluted community model, assess how well they can suggest rearranging the model to reduce aquatic pollution. Some questions might be: <ul style="list-style-type: none"> - Is the run-off water cleaner? - Are oils and other messy chemical removed from sewage? - Does less farm manure enter the ditches? - How can solid wastes be better handled before going to the landfill site?
<p>Recommended Learning Resources</p> <ul style="list-style-type: none"> • Backyard Biodiversity and Beyond • BC Science 7 • BC Science Probe 7 • Below Zero • Biology Concepts • The Biosphere • Cycle of Life/Recycle Handbook for Educators • Forests in Focus • Gitga'ata Spring Harvest • Kokanee of British Columbia • Legacy of an Oil Spill • McDougal Littell Science (Ecology) • Nelson Science & Technology 7 • Our Wonderful World (AIMS Activities) • Project WET • Project WILD • Salish Sea • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Thinking Connections: Concept Maps for Life Science • The Watershed Works 	

GRADE 7 PHYSICAL SCIENCE: CHEMISTRY

Key Elements: Physical Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have understood the characteristics of mixtures and solutions, as well as chemical and physical properties of various substances.

Chemistry

In this introduction to chemistry, students develop a greater understanding of matter through various hands-on activities in a “kitchen chemistry” setting. Students use appropriate tools and techniques to understand the characteristics of mixtures and solutions. They gain understanding of the pH scale by testing weak acids or bases. Students are also introduced to the particle model theory and to quantitative and qualitative properties of materials, as well as chemical and physical changes in matter.

Vocabulary

matter, volume, state, solid, liquid, gas, chemical change, physical change, reversible and non-reversible changes, pure substance, element, compound, mixture, solution, suspension, emulsion, solubility, concentration, dilute, saturation, supersaturated, unsaturated, dissolve, pH, acid, acidic, base, basic, neutral, hydrometer

Knowledge

- matter is anything that has mass and volume; it is generally classified as pure substances or mixtures
- the observable properties of matter include colour, texture, and state
- the measurable properties of matter include density, melting and freezing points
- changes to matter can be reversible (mixtures and changes of state) and non-reversible (mechanical change such as grinding, chemical change such as cooking)
- matter is made up of tiny particles (particle model theory)
- pure substances are either elements or compounds, and their properties are always the same
- mixtures have two or more kind of particles
- mixtures can be classed as solutions, suspensions, or mechanical mixtures
- mixtures can be separated physically or chemically by removing one of the components (evaporation, crystallization, filtration, dissolving, magnetic separation, flotation)
- suspensions consist of solid pieces scattered throughout the mixture
- solutions are mixtures that appear as a single substance
- pH is the measure of the tendency toward acidic or basic conditions

Skills and Attitudes

- demonstrate curiosity, scepticism, creativity, open-mindedness, accuracy, precision, honesty, and persistence as important scientific attributes
- ask questions and formulate hypotheses that are tentative and testable, and draw conclusions from results
- use appropriate tools and techniques to gather, analyse, interpret, and share information
- recognize that an experiment must be repeated and yield consistent results to be considered scientifically valid
- develop models to represent systems or analogies about matter
- handle chemicals and equipment safely and responsibly

Grade 7 Physical Science: Chemistry

Prescribed Learning Outcomes

It is expected that students will:

- conduct investigations into properties of matter

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 several qualitative (e.g., colour, texture, state) and quantitative (e.g., density, melting point, freezing point) properties of materials
- accurately measure, record, and present data collected during an experiment involving solutions and mixtures
- describe chemical and physical changes in matter, citing examples

Planning for Assessment

Suggested Assessment Activities

- Provide an outline of the particle model theory.
- Molecules of different substances have different properties and travel up a solvent paper strip to produce coloured streaks. Have student explore Chromatography by using pen inks with water.
- Have students use a felt ink colour to make a 2mm dot near the end of a paper strip. (Use coffee filter paper.) Hang the ends vertically in water and allow it to be absorbed and the water will dissolve the ink particles and move them into coloured bands.

- Consider how well the students relate the resulting colours according to the particle model theory. Ask students to explain
 - why multiple colours, not the original colour, are seen
 - how the original ink can be one colour but the chromatogram shows many
 - how all the inks fit into the spaces of the original colour.
- For a final assessment, model solid, liquid, and gas states for students by using cups and bags filled with the same amount of marbles. (These containers show there are spaces between molecules and that the spaces can be increased in a large bag.) After these demonstrations students should be able to provide a written explanation of this analogy by using the particle model theory in words and simple diagrams. If a different molecule (rice) is added to the marbles what chemistry can be explained by this modelling?

- Work with heating water and cooling water exercises separately. Demonstrate the boiling point of water (e.g., using a microwave oven and thermometer). Have students record results of the demonstration.
- On a different day have students use ice cubes to measure the cooling of several different samples of water (differing quantities).

- Have students accurately report all their measurements. If certain tools are used be sure that the reported measures use the correct units. Suggested measurements:
 - temperature before & after
 - volume of liquid
 - mass of solids (ice cubes)
 - observations of physical features
 - time involved heating or cooling.

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Chemistry (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Demonstrate for students a number of reversible and non-reversible processes, each representing a different chemical or physical process <ul style="list-style-type: none"> - burning paper (combustion) - carbonated drinks (gaseous) - borax and glue [slime] (suspension) - cooking oatmeal (heating). - sand and water (mud) - breaking up soup crackers [mush]. 	<ul style="list-style-type: none"> • Ask students to describe in their science journals whether the original material has changed into a new substance with different properties. Then have students create a four-column chart, classifying processes as either physical or chemical, and reversible or non-reversible. Assess student ability to properly classify processes.
<ul style="list-style-type: none"> • In “What Happens When labs” have students measure and record simple experiments conducted by making various solutions and mixtures. The main purpose is to see how students perform the processes, not just discover what happens and in what amounts. Students must record measurements of mass, size, number, and amounts using measuring tools. Students must observe what they see in detailed charts, not what they think is happening. Suggested labs <ul style="list-style-type: none"> - underwater volcano - juice crystals dissolving until saturation - salt water and fresh water mixing - exothermic reaction—calcium chloride and vinegar - proportions for a perfect cup of coffee - bread yeast and sugar substitutes. 	<ul style="list-style-type: none"> • In all these investigations, students must start by asking the What Happens When ... question to be explored. The question also has to have a How Much is Needed component. For example: <ul style="list-style-type: none"> - What happens when juice crystals are mixed in water and how much makes a good drink? - What happens when one package of yeast is mixed with one package of sugar substitute? Have students design their own lab procedures and record and observe their data. The collected results are then formatted into a report. To assess student lab work, see the sample scoring guide (Laboratory Report) provided at the end of this grade.
<p>Recommended Learning Resources</p> <ul style="list-style-type: none"> • BC Science 7 • BC Science Probe 7 • Below Zero • Nelson Science & Technology 7 • Project WET • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Science, Please! (Parts 1 & 2) 	

Grade 7 Physical Science: Chemistry

Prescribed Learning Outcomes	
<p><i>It is expected that students will:</i></p> <ul style="list-style-type: none"> • classify substances as elements, compounds, and mixtures 	
Suggested Achievement Indicators	
<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"> <input type="checkbox"/> accurately sort products found in the home into substances, suspensions, emulsions, mechanical mixtures, and solutions and summarize their similarities and differences <input type="checkbox"/> correctly relate the particle theory to the properties of elements, compounds, and mixtures 	
Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Using materials from home, ask students to prepare examples of <ul style="list-style-type: none"> - substances (e.g., sugar) - suspensions (e.g., pepper and water) - emulsions (e.g., oil and vinegar) - mechanical mixtures (e.g., tea leaves and coffee beans) - solutions (e.g., salt and water). 	<ul style="list-style-type: none"> • Using the particle theory of matter, students should be able to diagram how the different molecules mix together when making <ul style="list-style-type: none"> - mixtures (mechanical & emulsions) - solutions - compounds.
<ul style="list-style-type: none"> • As an extension to previous work showing the particle model theory using marbles and rice. Now observe students as they combine mini marshmallows to model atoms and molecules in regular compounds (CO₂ sugar, water, salt) Use coloured mini marshmallows and toothpicks to make molecular structures. 	<ul style="list-style-type: none"> • Determine if the models were correctly arranged according to standard molecular diagrams shown in chemistry references. <ul style="list-style-type: none"> - Assess students work according to - can they identify which molecules are involved? - can they change the model to show chemical changes? - have they identified the correct number and type of molecules needed?
Recommended Learning Resources	
<ul style="list-style-type: none"> • BC Science 7 • BC Science Probe 7 • McDougal Littell Science (Chemical Interactions) • Nelson Science & Technology 7 • Nelson Science & Technology Skills Handbook • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Science, Please! (Parts 1 & 2) 	

Grade 7 Physical Science: Chemistry**Prescribed Learning Outcomes**

It is expected that students will:

- measure substances and solutions according to pH, solubility, and concentration

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 the effects of a variety of factors (e.g., type of solute, type of solvent, temperature) on solubility
- determine factors (e.g., heat, stirring, surface area) that affect the rate at which substances dissolve
- use test papers with teacher support to carefully analyse various substances and solutions for acidic or basic characteristics (pH scale)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Use lab equipment to measure (e.g., volume, mass) of a solvent and solute. Prepare various water and salt mixtures. Use a whole, raw egg and shell (as a hydrometer) to indicate density of a solvent and solute. Use fruit juice crystals to prepare several “drink” solutions. 	<ul style="list-style-type: none"> • When finished, students can quantify their results by <ul style="list-style-type: none"> - mass of crystals used - volume and mass of water used - measure of final solution - percentage by mass of each solution.
<ul style="list-style-type: none"> • Ask students to problem solve how to dissolve lifesavers at a faster rate, and record a list of possible variables to test. Once the important dissolving factors have been identified, have students design an experiment to test these factors in a precise, measurable way. 	<ul style="list-style-type: none"> • Have students prepare reports showing that the variables were tested in a fair manner. Student reports should address <ul style="list-style-type: none"> - time - physical motion (stirring, shaking) - crushing - flavour - temperature of solvent - different solvents. Reliability can be tested later by a peer.

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Chemistry (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> Use marbles and rice to demonstrate the particle theory of matter. Explain how compounds in a solution are a mixture of different molecules together in the same container. Explain to students using the particle model theory that pure water is made up of hydrogen (H) and oxygen-hydrogen (OH) molecular parts called ions and these combine to form water molecules (H₂O) all the time. These molecules form the particles in all solutions of pure water. But various waters can have different amounts of these particles. When the number of (H) ions is measured it is called pH. It is a measure of the tendency towards acidic or basic conditions. High numbers of (H) ions = more acid water, while a low number of (H) ions = basic water. Thus a high number of (H) ions means a low pH and vice versa. 	<ul style="list-style-type: none"> Use known food and household products (e.g., apple juice, lemon juice, detergent, soda) to make solutions in water. Then have students test these products with pH paper and determine the correct range of their pH measure according to the colour chart for the pH indicator papers. Increase the sophistication of the testing by using a greater variety of household substances, and use indicator paper that reads pH with greater precision. Have students record their testing in precise chart format to reinforce effective reporting.
<ul style="list-style-type: none"> Ask students to hypothesize what realistic procedures can be used to make sugar dissolve in a liquid completely. Discuss with the class ways in which the relevant factors (stirring, particles, temperature) can be scientifically measured. Allow students to make a saturated solution of salt or sugar and follow up by conducting the experiment. They should then report results on the dissolving factors: stirring, particle size, and temperature. Using salt or sugar, have students determine how to saturate cold water; then observe what happens when a small amount of fresh water at the same temperature (e.g., 5ml or 10ml, coloured using food colour) is added to the top of the salt solution. This is a good model of how Estuary river water mixes with the ocean. 	<ul style="list-style-type: none"> Using the particle theory of matter, students should be able to diagram how the different molecules mix together when dissolving <ul style="list-style-type: none"> at room temperature if more heat is applied if they are made as small as possible. For very hot saturated solutions students should be able to describe what happens when the liquid cools (crystals grow). For the Estuary fresh and saltwater mixing, students should be able to describe that <ul style="list-style-type: none"> fresh water is less dense than saltwater freshwater floats on top of saltwater river-water floats onto the ocean water at the mouth of an Estuary.

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Chemistry (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Have students make purple cabbage tea. Chop 250 ml of cabbage leaves and cover with boiling water. After it cools, test various food ingredients for a colour change. Ask students to observe and record details to prove that acid foodstuffs turn one colour and basic foods turn a different colour. Use distilled water for a neutral solution. • Ask students to infer from known ideas (e.g., lemon is acidic, baking soda is basic) the colour scale for a full range of acids and base foodstuffs. Hint: when testing dry powders, sprinkle powder into 5ml sample of cabbage tea. For wet liquids drip liquid into a 5ml sample of cabbage tea. 	<ul style="list-style-type: none"> • Testing with the cabbage tea on household foodstuff, students should report <ul style="list-style-type: none"> - types of colours cabbage tea can change - which foods are acid, base, or neutral - the relative acidic or basic strength - if no colour change, conclude food is neutral.
<ul style="list-style-type: none"> • As an extension, have students use pH papers and litmus papers with the same food ingredients (dry and liquid). 	<ul style="list-style-type: none"> • To assess the extension activity, look for student's ability to set up a controlled set of procedures to determine pH readings for dry and liquid ingredients in an orderly arrangement. The collected data becomes their final chart for a report.
<p>Recommended Learning Resources</p> <ul style="list-style-type: none"> • BC Science 7 • BC Science Probe 7 • Below Zero • McDougal Littell Science (Chemical Interactions) • Project WET • Sci Short • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Science, Please! (Parts 1 & 2) 	

GRADE 7 EARTH AND SPACE SCIENCE: EARTH'S CRUST

Key Elements: Earth and Space Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have demonstrated understanding of the Earth's surface and how it changes over time.

Earth's Crust

The study of the Earth's crust includes an investigation of the Earth's structure, characteristics of the Earth's core, geological processes, rock and mineral formations, and changes in the landscape over time. Students examine theories explaining the Earth's geology and the dynamics of plate tectonics. Through investigation, observation, diagrams, and models, students begin to identify geological features and simulate changes that occur on the Earth's surface and on the ocean floor. Students apply this knowledge to suggest the effect that these features and changes have on people and communities. They identify technologies that are related to the scientific study of these changes.

Vocabulary

crust, mantle, outer core, inner core, weathering, erosion, deposition, fossil, fossil record, geologic time scale, rock cycle, plate tectonics, continental crust, mid-ocean ridge, delta, mountain, valley, volcano, plain, plateau, ocean crust, convergent, divergent, transform plate boundaries, subduction zone, igneous, metamorphic, sedimentary, magma, lava, seismic waves

Knowledge

- the Earth is broadly differentiated into a crust, mantle, and core
- the geosphere refers to the physical Earth; the atmosphere refers to the air; the biosphere refers to life forms; and the hydrosphere refers to water
- mountains, valleys, plains, deserts, rivers, lakes, and oceans are features of the surface of Earth
- the Earth's crust and uppermost mantle are made of large moving sections called tectonic plates
- the features on the surface of the Earth are formed by tectonic activity, particularly at convergent, divergent, or transform fault tectonic plate boundaries and by the processes of wind, water, and ice that wear down surface features over time
- the theory of plate tectonics explains how and why the tectonic plates move and explains why the Earth's surface is continually changing
- stress in the Earth's crust is released in tectonic plate movement and earthquakes
- heat within the Earth is released in volcanic activity
- information about the mantle and core is obtained by recording and charting energy waves from earthquakes and by looking at rocks exposed at the Earth's surface
- earthquakes are common along all tectonic plate boundaries and occur deep in the Earth at subduction zones
- rocks are made of minerals that have unique properties
- minerals are made from pure elements in the Earth
- minerals can be identified by their colour, lustre, hardness, cleavage, crystal structure, and their reaction to certain chemicals
- rocks are classified by how they are formed within the rock cycle and their mineral content
- igneous, sedimentary, and metamorphic rocks can be changed from one form to another
- fossils in sedimentary rocks allow us to interpret ancient environments
- the history of changes in life on Earth are recorded in the fossil record
- the geologic time scale is based on changes in life on Earth

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Key Elements (continued)

Key Elements: Earth and Space Science

Skills and Attitudes

- use analogies to visualize science concepts
- collect data from research resources and apply to diagrams and graphs
- report on the rock cycle from lab research results and observations
- observe how the positions of earthquakes, volcanoes, and mountain ranges outline the boundaries of tectonic plates
- classify rock collections
- examine and identify commonly found rocks and local geological formations
- use models to predict how earthquake waves travel through the Earth and how this information leads to an understanding of the interior of the Earth
- investigate the use of models to show large scale systems

Grade 7 Earth and Space Science: Earth's Crust

Prescribed Learning Outcomes

It is expected that students will:

- compare the characteristics of the Earth's core, mantle, and crust, and describe the formation of rocks

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 the characteristics of each layer of the Earth
- construct a flow chart to explain in detail the geological processes involved in forming minerals and rocks
- catalogue the properties of rock and mineral samples (e.g., cleavage, colour, crystal habit, fracture, hardness, lustre, and streak) on the basis of a detailed examination

Planning for Assessment

- Compare the Earth to an apple. Examine the crust (skin), mantle, (flesh), and outer and inner core (core and seeds). Cut the apple in half, showing students the thinness of the skin, which is analogous to the thinness of the Earth's crust.
- Search available resources for diagrams, and have students locate and name the layers of the geosphere.
- Construct a data table that summarizes, in sequence, the names, thickness, and temperature of each of the Earth's layers.
- Generate a class discussion with the following questions:
 - How have we acquired our information about the Earth's layers?
 - Is it possible to travel through the centre of the Earth?
 - Can we send probes to the centre of the Earth as we send probes out into space?
 - How far have we drilled into the Earth's crust?

Suggested Assessment Activities

- Assess students by asking them to construct a bar graph of the Earth's layers using their data table. Graph thickness (0 to 3000 km) against continental crust, ocean crust, lithosphere, mantle, outer core, and inner core. Graphs should be well labelled and accurate.
- Ask students to draw a wedge-shaped diagram, which represents a slice of the Earth, from the crust to the centre of the inner core. Divide the slice into layers of appropriate thickness and ask students to label them and add the information from their data table to the layers. Ask students to summarize changes in the layers by drawing arrows that indicate changes in temperature and density. Assess students' ability to
 - accurately transfer the information from the data tables to the diagram
 - summarize changes from the surface to the centre of the Earth.

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Earth's Crust (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Discuss and list the characteristics of igneous, sedimentary, and metamorphic rocks. Discuss how and why rocks change from one type to another. Show students examples of the three types of rock, and invite them to create a collection of rock samples or rock photos in the classroom. • Model Igneous Rock: Melt sugar and allow it to cool rapidly on a pan set over an ice bath; and slowly (over several weeks) in a jar. Notice the difference in crystal habit or texture. Compare the fast-cooled solution to a piece of obsidian (volcanic glass). Compare the slow cooled crystals to the mineral crystals in a piece of granite. Ask students where igneous rocks could form and what the conditions would be like in each environment. • Make sedimentary rocks: Use concentrated salt and sugar solutions and a thin slurry of Plaster of Paris to cement jars of sand into "sandstone." As the water evaporates and the salt or sugar crystals (or plaster) precipitate between the sand grains, the sediments are cemented together. • Ask the students where and how sediments accumulate and what conditions would be necessary for forming sedimentary rocks. If cements crystallize from solutions, where is the formation of sedimentary rock likely to occur on the Earth's surface? • Model metamorphic rocks by layering sand and silt and chunks of wax crayon between two pieces of aluminium foil. Place a hot iron on top of the aluminium foil and press down, long enough for the wax crayon to melt. Peel off the aluminium foil once the "rock" has cooled and cut the rock in two. Ask students if they can tell which direction the pressure was applied from what they see. Ask students if this rock would have "morphed" if no heat was involved. • Discuss where each type of rock can be found and how one type of rock can be changed to another. Chart what processes are necessary to change the rocks. Explain to the students that these changes are summarized in the rock cycle. 	<ul style="list-style-type: none"> • As each rock type is modelled or illustrated, have students report on what they have learned. Reports should address the following <ul style="list-style-type: none"> - a description of each rock type - the method for forming each rock model - places on Earth where the formation of each rock could occur and the conditions which would have to be present in order for the rock to form - criteria for identifying each rock type. • Assess students' knowledge of igneous, sedimentary, and metamorphic rocks in a Rock Cycle Report that summarizes facts about each type of rock and how they may change from one form to another. Reports could be done as posters, booklets, or classroom displays. Students may wish to add photos (of rock samples or outcrops) to illustrate their understanding of the rock cycle.

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Earth's Crust (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> Investigate the properties of minerals (e.g., cleavage, colour, crystal habit, fracture, hardness, lustre, and streak) by showing students samples or photos of minerals, which clearly illustrate various properties. Include gemstones as examples of minerals and use them to discuss various properties. Have students create a mineral report for up to ten different minerals. Use a generic fact sheet and complete it with the students for a known mineral such as diamond. The fact sheet should include spaces for cleavage, colour, crystal habit, fracture, hardness, lustre, streak, space for an illustration, and space for common occurrences and uses of the mineral. Students should then choose minerals from a collection or list supplied by the teacher and research each one, completing a mineral report sheet for each. By examining a collection of minerals, students will be compiling their own mineral identification booklet. 	<ul style="list-style-type: none"> In evaluating students' mineral reports, make sure that they have <ul style="list-style-type: none"> identified the mineral properties illustrated with diagrams, drawings or photos described all the minerals included in their report described where the minerals could be found.
<ul style="list-style-type: none"> Discuss the difference between rocks and minerals. Examine the rock cycle charts (and classroom rock samples) and, using students mineral properties reports, identify as many minerals as possible. Challenge students to explain why minerals are often easier to identify in igneous intrusive rocks. Ask students to consider what conditions would be needed for large mineral specimens to form. 	<ul style="list-style-type: none"> Set up a practical test. Have between 10 and 20 stations each with a rock sample or illustration to be identified as igneous, sedimentary or metamorphic; or with a question about a mineral property. Have individual students move at timed intervals to each station to complete the questions. Caution: the rock samples or illustrations must be very obvious for students to be successful.
<p>Recommended Learning Resources</p> <ul style="list-style-type: none"> BC Science 7 BC Science Probe 7 Down To Earth (AIMS Activities) Earth in Action Series Earth in Change: The Earth's Crust Fire and Ice Geologist's Notebook Series: Three Rocks Geologist's Notebook Series: What Exactly Are Minerals? Mountains and Mountain Building Processes Nelson Science & Technology 7 OceanNews Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science Wonderwise: Women in Science Learning Series (Space Geologist) 	

Grade 7 Earth and Space Science: Earth's Crust**Prescribed Learning Outcomes**

It is expected that students will:

- analyse the dynamics of tectonic plate movement and landmass formation

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:

- explain how earthquakes have helped scientists understand the Earth's structure (e.g., primary and secondary seismic waves)
- detail the effects of earthquakes, volcanoes, and fault boundaries on the Earth's crust
- model tectonic plate movement to show convergent, divergent, and transform plate boundaries

Planning for Assessment

- Introduce earthquakes by bending a wooden metre stick. Demonstrate the elastic strength in the wood and ask students what will happen if you continue to apply force to the wood. Demonstrate with an old metre stick or a stick. Point out to students that the vibration of the stick as it breaks is a good model of an earthquake. When brittle, the cold Earth's crust builds up stresses near fault zones; when the elastic strength of the rock is exceeded the rock will break and major vibrations, like earthquake waves, occur.

Suggested Assessment Activities

- introductory activity – no corresponding assessment necessary

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Earth's Crust (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Model earthquake waves with a slinky or long spring. Moving the slinky directly back and forth between two students mimics a primary or P wave. Moving the slinky side to side, making the spring move like the movement of a snake, mimics a secondary wave or S wave. P waves will travel through rock or liquid, while S waves only travel through rock. Have students research how the speeds of P waves and S waves relate to fast cars, airplanes, jets, and the speed of sound. Can an earthquake be felt before it is heard? (The speed of sound in air is only 0.34 km/second, and jet fighters fly at about 0.85 km/second.) P waves travel at speeds of 4 to 7 km per second, and S waves travel at 3 to 4 km per second. (There are also surface waves, known as L waves, that travel along the surface of the crust and are the slowest earthquake waves.) • Earthquake waves bend as light waves bend going from one medium into another. Demonstrate this, using a pencil in a glass of water. Guided inquiry • Ask students to predict what will happen to earthquake waves as they travel from one medium to another. If light waves bend, will earthquake waves bend? Compare students' predictions of earthquake waves with diagrams in texts and resource books. 	<ul style="list-style-type: none"> • Assessment for this section might be done through a guided inquiry. Have students predict what would happen if stress builds up in hot material within the geosphere: <ul style="list-style-type: none"> - Would an earthquake occur? - Can an earthquake occur in the mantle? - Can an earthquake occur in the outer or inner core? - A flexible, plastic ruler is unlikely to break the same way as the wooden metre stick. What property found in the mantle and core does this characterize? <p>Ask students to apply their knowledge of the Earth's layers, and remind them that S waves cannot travel through liquids. Ask students to draw the pathway of earthquake waves as they go through the Earth's layers. Assess students' ability to predict that the S waves will stop at the outer core and that waves will bend as they go from layer to layer.</p>

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Earth's Crust (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • The crust of the Earth is broken into tectonic plates. Use the analogy of cars to introduce the three different types of tectonic plate boundaries: at a divergent plate boundary, tectonic plates move away from one another; at a convergent plate boundary, plates collide; and at a transform fault boundary, plates pass one another going in opposite directions. <ul style="list-style-type: none"> - Earthquakes, volcanoes, mountain ranges, and faults mark the outline of the plates. Discuss with students why this would be so and how plate movement shapes the surface of the geosphere. Ask: <ul style="list-style-type: none"> - Which area of a tectonic plate (the edge or the centre) will be more likely to experience an earthquake or a volcano? - Where do people need to be particularly mindful of earthquakes as they construct buildings, bridges, etc.? - Can earthquakes ever occur in the centre of tectonic plates? - What would happen to the surface of the Earth if all plate movement stopped? • Have students visit an Internet web site that shows plate movement over time. • Examine a world map with earthquakes and volcanoes and other tectonic features marked on it. Discuss the Ring of Fire with students and what it is like for people all around the Pacific to live with earthquakes and volcanoes. 	<ul style="list-style-type: none"> • Use large tectonic world maps for students to consolidate plate tectonic ideas. Assess students' ability to <ul style="list-style-type: none"> - name the seven major tectonic plates - identify the three types of tectonic plate boundaries using three different colours. (divergent plate boundaries are single lines; convergent boundaries are sawtooth lines and transform fault plate boundaries are double lines) - label the tectonic plate on which BC is located, as well as the neighbouring plates - show cross-section diagrams of the three types of plate boundaries with arrows indicating the direction of plate movement. <p>As an extension, students may complete their tectonic map by outlining the Ring of Fire and adding it to their map key.</p>
<p>Recommended Learning Resources:</p> <ul style="list-style-type: none"> • BC Science 7 • BC Science Probe 7 • Down to Earth (AIMS Activities) • Earth in Action Series • Earth in Change: The Earth's Crust • Earthquakes: Our Restless Land • Geologist's Notebook Series: Three Rocks • Geologist's Notebook Series: What Exactly Are Minerals? • McDougal Littell Science (The Changing Earth) • McDougal Littell Science (Earth's Surface) • Mountains and Mountain Building Processes • Nelson Science & Technology 7 • OceanNews • Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science • Volcanoes: Understanding the Hazards 	

Grade 7 Earth and Space Science: Earth's Crust

Prescribed Learning Outcomes

It is expected that students will:

- explain how the Earth's surface changes over time

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:

- explain how scientists use the placement and position of an object to infer the time of events (e.g., superposition)
- illustrate how fossils come to be associated with sedimentary rock
- report on how fossil record is used to identify Millennium changes in the Earth's surfaces

Planning for Assessment

- Use any recycling bin or garbage can to simulate how scientists study the geological past. Allow groups of students to "excavate" 10-20 cm of paper and study the "past" events (e.g., layers, depth of placement).

Suggested Assessment Activities

- Ask students to create a model that describes how the objects in the recycling bin are events occurring through time (time-rock). Consider the extent to which students
 - collected data accurately
 - sorted facts from unnecessary data
 - identified types of artefacts (e.g., paper, debris)
 - shown the placement of artefacts correctly
 - used systematic procedures for "excavating"
 - identified errors inferred by the placement of the artefacts in the excavation.
- Ask students what other events could disrupt the "time-rock" sequence. Could layers be overturned? Folded? Or "eroded away"?

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Earth's Crust (continued)

Planning for Assessment	Suggested Assessment Activities
<ul style="list-style-type: none"> • Discuss what a fossil is. Ask students <ul style="list-style-type: none"> - Is a fossil a bone or shell? (A fossil is the trace, imprint, or remains of an ancient life form found within the rock record.) - What kind of fossils humans will leave behind? Would a rusting piece of machinery be considered a fossil? A buried paved road? A concrete building foundation? A bone? False teeth? - What kinds of life forms are most likely to fossilize? Will a jellyfish make a fossil as easily as a dinosaur bone? • Make clay 'fossils' with the class by pressing leaf shapes into soft art clay. Allow time for drying; then make plaster moulds of each shape. Using this experience, discuss how real fossils are formed. Have students create a sequence of images for these fossil-making events as a cartoon strip. 	<ul style="list-style-type: none"> • Assign students the task of making several fossils in Plaster of Paris. Ask students to bring in a variety of different items with which to make fossils. Students should bring in something with hard parts and something that is more delicate, like a leaf or a feather. The Plaster of Paris must partially set before the items are pressed into it. Some items can be used for impressions and some can be left within the plaster. A feather will make a detailed fossil imprint if the plaster is almost set. Students can paint their fossils after they are dry, for a more realistic look. Grey or brown discoloured water is all that is needed. Assess student understanding of their fossil displays by having them answer the following questions: <ul style="list-style-type: none"> - Did some items fossilize more readily than others? - How realistic is the fossil rock record? - Do fossils provide a complete look at ancient life forms, or is there a bias? (limited view-point) - Can fossils be found in any type of rock? Are they more likely in sedimentary rock? Why? (Students should use the rock cycle to help solve this question.)
<ul style="list-style-type: none"> • Some fossil locations are extraordinary in their preservation. These fossil sites are called fossil Lagerstätten (translates loosely to "motherlode"). The Burgess Shale in BC is one of these and has been designated as a UNESCO world heritage site. The La Brea Tar pits in California and the Solenhofen Limestone in Germany are other examples. <ul style="list-style-type: none"> - Find a set of real fossils or use images of real fossils or fossil Lagerstätten image collections so that students can explore how ancient environments and life forms differed from modern ones - Use the fossil examples to look at geologic time and the fossil record. Ask students: <ul style="list-style-type: none"> - How long ago did life appear on Earth? - What were the oldest life forms like? - How old are the oldest mammals, birds, and dinosaurs? 	<ul style="list-style-type: none"> • Ask students to research fossil Lagerstätten sites and find out why they are so extraordinary. Have individual students do poster displays or short reports on different Lagerstätten sites or the class could choose one, such as the Burgess Shale, to research together. A class project on the Burgess Shale might include a short report done on one of the fossils by each student. Criteria for evaluation might include <ul style="list-style-type: none"> - name of the fossil - size of the fossil - preservation of the fossil (e.g., bone, imprint) - habitat of the fossil - lifestyle of the fossil - a modern animal to which the fossil is similar - unique features of the fossil - biographical sources - virtual museum Internet links (URLs).

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Earth's Crust (continued)

Recommended Learning Resources

- BC Science 7
- BC Science Probe 7
- Earth in Action Series
- Fire and Ice
- Geologist's Notebook Series: Three Rocks
- Geologist's Notebook Series: What Exactly Are Minerals?
- McDougal Littell Science (The Changing Earth)
- McDougal Littell Science (Earth's Surface)
- Mountains and Mountain Building Processes
- Nelson Science & Technology 7
- OceanNews
- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science

ECOSYSTEMS DIORAMA

Snapshot	1. Not Yet Within Expectations	2. Meets Expectations	3. Fully Meets Expectations	4. Exceeds Expectations
Attitude & Work Habits (task completion, time management, effort, interest)	<ul style="list-style-type: none"> task incomplete poor time management weak effort shows little interest in the topic 	<ul style="list-style-type: none"> Some project elements missing Usually engaged in the activity/project Adequate effort applied Show some interest in the topic 	<ul style="list-style-type: none"> completes project on time engaged in the activity/project gives activity/project best effort collaborates with peers 	<ul style="list-style-type: none"> task completed early gives best effort consistently uses rubric as a guide independently meets challenges & solves problems takes initiative to engage in further research out of school
Design (scale, key components, details, accuracy)	<ul style="list-style-type: none"> understanding of scale not evident missing several key components few details included many errors evident in model elements 	<ul style="list-style-type: none"> attempt to create to scale model appearance achieves its basic purpose key components are almost all included, though simplistic some details included many components show accuracy 	<ul style="list-style-type: none"> generally created to scale all components present creativity and originality evident accuracy can be seen in most components 	<ul style="list-style-type: none"> accurate scale additional relevant components/details included shows strong detail in creativity & original ideas components designed with precision
Content Knowledge (unit concepts)	<ul style="list-style-type: none"> few concepts included in model misunderstanding of many concepts unable to apply concepts to new situations 	<ul style="list-style-type: none"> some concepts included in model basic or partial understanding of concepts evident applies new concepts with some errors 	<ul style="list-style-type: none"> all concepts/principles included in model thorough and accurate understanding evident applies concepts accurately to new situations 	<ul style="list-style-type: none"> additional concepts included beyond required components thorough and integrated understanding with new insights demonstrates a broader, more global perspective than required

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Ecosystems Diorama (continued)

Snapshot	1. Not Yet Within Expectations	2. Meets Expectations	3. Fully Meets Expectations	4. Exceeds Expectations
<p>Quality (aesthetically pleasing, neatness, labelling, materials)</p>	<ul style="list-style-type: none"> • little effort evident • poorly constructed • labels missing • materials do not suit model component 	<ul style="list-style-type: none"> • some attempt to organize model/display • some missing labels • little variety in materials used 	<ul style="list-style-type: none"> • model is well organized and has a pleasing appearance • layout demonstrates care and thoughtfulness • labels used where appropriate • assembly shows care and time invested • variety of materials used 	<ul style="list-style-type: none"> • appearance of model attracts/engages the audience • labels are referenced to descriptors and/or a key is used • model components are student created
<p>Presentation (ideas, focus, oral communication, grammar, body language, eye contact)</p>	<ul style="list-style-type: none"> • ideas misinterpreted and statements regarding key ideas are incomplete or absent • little focus on key points of the presentation • rarely varies language; voice is often difficult to hear; may be inarticulate • poorly formed sentences and may speak slang • little or no use of body language to add emphasis • little or no eye contact made with audience 	<ul style="list-style-type: none"> • expression of ideas incomplete and statements are limited • attempt to maintain focus on key points of the presentation • some varied language for effect; voice is sometimes clear, fluctuates, and is at an appropriate volume • most sentences grammatically correct; may speak some slang • some use of body language to add emphasis • eye contact with audience attempted 	<ul style="list-style-type: none"> • expresses valid ideas clearly and concisely to form logical statements • presentation stays focused on the key points • generally varies language for effect; voice is usually, clear, holds fluctuation, and at an appropriate volume • uses grammatically correct sentences and language • appropriate use of body language adds emphasis • consistent eye contact with most of the audience 	<ul style="list-style-type: none"> • expresses ideas with insight and forms comprehensive statements • presentation is focused on the key points and may extend the key points • powerfully and confidently varies language for effect; voice has clarity, fluctuation, and appropriate volume • language is highly developed and uses newly learned words and terms appropriately within presentation • body language is naturally used and provides a positive emphasis • consistent eye contact made that includes the entire audience

LABORATORY REPORT

Student's name: _____ Date: _____

Statement or Question investigated: _____

Procedures Skills

- Is able to follow written or oral directions with care
- Chooses and uses appropriate materials and equipment for the task
- Is able to use the chosen materials and equipment with accuracy
- Uses the equipment carefully and follows all safety procedures
- Cleans up work station according to class expectations

Measurement Skills

- Uses appropriate tools to measure mass, volume, length, time, and quantity
- Uses the appropriate metric units for the measurements taken
- Uses and applies math skills to determine the correct measurements
- Correctly converts between metric units when necessary

Observation Skills

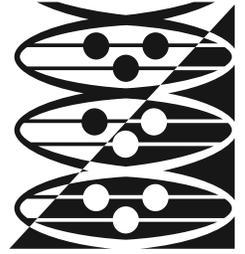
- Uses observations skills in making decisions
- Records data in a systematic fashion
- Collected observations show both quantitative descriptions and adjectives
- Collected observations show what was seen, and do not need to be revised
- Rough observations lab notes are kept and submitted with final report

Communication Skills

- Lab report clearly shows an understanding of the problem to be investigated
- Lab report details all the features investigated
- Report ends with a conclusions based upon the observations
- Concluding statement specifically addresses the experimental question investigated
- Report shows an understanding of possible errors and reasons for inaccuracy
- Concluding statement refers to generalizations learned from the observed results

Presentation Skills

- The report contains basic identification: name, topic, class, teacher and date
- All rough lab documents are attached to final report
- The report is neatly written or typed for legibility
- The report contains print, charts and labelled diagrams
- The report is completed on time



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.

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

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

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

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.

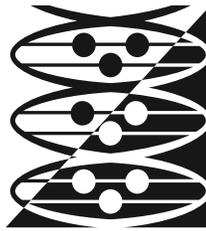
Web Sites

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

Grade 7

**SCIENCE – GRADE 7
GRADE COLLECTION**

*Current as of December 2005. For latest updates go to
http://www.bced.gov.bc.ca/irp_resources/lr/resource/gradcoll.htm*

	Life Science	Physical Science	Earth and Space Science
	<i>Ecosystems</i>	<i>Chemistry</i>	<i>Earth's Crust</i>
Comprehensive Resources			
B.C. Science Probe 7			
BC Science 7			
Additional Resources – Print			
Backyard Biodiversity and Beyond, 1999 Edition	✓		
Below Zero		✓	
Cycle of Life/Recycle Handbook for Educators			✓
Down To Earth (AIMS Activities)			✓
Ecosystems	✓		
Forests in Focus			
Kokanee of British Columbia			
Nelson Science & Technology Skills Handbook	✓	✓	
Our Wonderful World (AIMS Activities)			
Project WET	✓	✓	
Project WILD			
Salish Sea			
Salmonids in the Classroom	✓		
Science Detective™ Beginning: Higher-Order, Thinking, Reading, Writing in Science			✓
Thinking Connections: Concept Maps for Life Science	✓		
Urban Stewards	✓		
The Watershed Works			
Additional Resources – Print Series			
McDougal Littell Science Grade 7		✓	✓
Nelson Science & Technology 7	✓	✓	✓
Parasites & Partners 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.

LEARNING RESOURCES • Grade Collection — Grade 7

	Life Science	Physical Science	Earth and Space Science
	<i>Ecosystems</i>	<i>Chemistry</i>	<i>Earth's Crust</i>
Additional Resources – Video/DVD			
Beavers: The Master Builders	✓		
Biology Concepts: Ecology	✓		
The Biosphere	✓		
Earth in Change: The Earth's Crust			✓
Earthquakes: Our Restless Land			✓
Ecology: Communities	✓		
Ecology: Food Chains	✓		
Ecology: Organisms in their Environment	✓		
Ecology: Populations	✓		
Ecosystems: The Role of Abiotic Factors	✓		
Fire and Ice			✓
Geologist's Notebook: Three Rocks			✓
Geologist's Notebook: What Exactly Are Minerals?			✓
Gitga'ata Spring Harvest	✓		
Legacy of an Oil Spill	✓		
Mountains and Mountain Building Processes			✓
Sci Short	✓	✓	
Science, Please!		✓	
Volcanoes: Understanding the Hazards			✓
Additional Resources – Video/DVD Series			
Earth In Action Series			✓
Wonderwise: Women in Science Learning Series	✓		✓
Additional Resources – Multimedia			
OceanNews			✓
Additional Resources – Kit			
British Columbia's Mountain Pine Beetle	✓		✓



B.C. Science Probe 7

Author(s): *Chapman, A. et al.*

General Description:

This 314-page comprehensive student text fully supports the Grade 7 BC curriculum. The visuals are well chosen and reflect Canadian content. The applications and activities are easy-to-use and engaging. Aboriginal content is included. The 451-page teacher's resource binder supports, enhances, and amplifies the student text. The binder contains blackline masters and assessment tools.

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

Price: Not available

ISBN/Order No: Student Text: 0-17-627184-8
Teacher's Resource Binder:
0-17-627185-6

Copyright: 2005

Year Recommended in Grade Collection: 2005



Backyard Biodiversity and Beyond, 1999 Edition

Author(s): *Dulc, S. et al.*

General Description:

BC produced teacher resource has been revised and is now coil bound. Contains background information and student activities around the topic of biodiversity. It features native flora and fauna, as well as biodiversity issues and success stories. The booklet contains six modules and 150+ pages of instructional activities.

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: <http://www.hctf.ca/wild.htm>

Price: \$22.00

ISBN/Order No: 0-7726-3954-X

Copyright: 1999

Year Recommended in Grade Collection: 2005



BC Science 7

Author(s): *Mason, A. et al.*

General Description:

A comprehensive resource published to match the complete Grade 7 curricular components. The text promotes active learning, employs a solid Grade 7 science vocabulary, and has a well prepared glossary and index aligned with the body of the text. Student activities are easy to follow and use easily accessible material. CD-ROM helpful to generate tests. Text may be used in any chapter order.

Caution: *Student workbook is a consumable product that is under copyright and cannot be photocopied.*

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *McGraw-Hill Ryerson Ltd. (Ontario)*

300 Water Street
Whitby, ON L1N 9B6

Telephone: (905) 430-5000

Fax: (905) 430-5194

Toll Free: 1-800-565-5758 (orders)

Web Address: www.mcgrawhill.ca

Price: Student Text: \$49.95

Teacher's Resource w/CD-ROM: \$99.95

ISBN/Order No: Student Text: 0-07-094786-4

Teacher's Resource w/CD-ROM:
0-07-094790-2

Copyright: 2004

Year Recommended in Grade Collection: 2005



Beavers: The Master Builders

General Description:

This 30-minute video compares the skills, tools, and resources of the beaver to those of humans as both species attempt to construct shelters before winter sets in the Rockies (US side). Using nighttime, underwater photography this video shows how all species are interconnected and impact both the living and nonliving parts of local ecosystem. The narration is lively and thought provoking.

Caution: *British accent and some terms, i.e., larder, Imperial measurement.*

Local ecosystem is in Rockies, Wyoming, US.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *McNabb and Connolly*

60 Briarwood Avenue
Mississauga, ON L5G 3N6

Telephone: (905) 278-0566

Fax: (905) 278-2801

Web Address: www.mcnabbconnolly.ca

Price: \$99.00

ISBN/Order No: Not available

Copyright: 2003

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: <http://www.hctf.ca/wild.htm>

Price: \$25.00 with workshop

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

Copyright: 2003

Year Recommended in Grade Collection: 2005



Biology Concepts: Ecology

General Description:

Thirty-minute video introduces basic ecology concepts, including terminology, cycles of water, carbon and nitrogen, producer-consumer-decomposer relationships, and world biomes. Accompanying teacher's guide provides activity masters, glossary, quiz, background, strategies, extensions, bibliography, and answer key.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Educational Activities, Inc.*

1937 Grand Avenue
Baldwin, NY 11510

Telephone: (516) 223-4666

Fax: (516) 623-9282

Toll Free: 1-800-645-3739

Web Address: www.edact.com

Price: Check with supplier

ISBN/Order No: Not available

Copyright: 1992

Year Recommended in Grade Collection: 2005



The Biosphere

General Description:

Short, effective video on major components of ecosystems and the biosphere. Living and non-living factors, changes in the ecosystem succession, and biomes. Suitable for Grade 7, not highly engaging, but factually correct.

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

Web Address: www.bclc.bc.ca

Price: \$26.00

ISBN/Order No: SC0331

Copyright: 2003

Year Recommended in Grade Collection: 2005



British Columbia's Mountain Pine Beetle

General Description:

This resource package deals with a current British Columbia epidemic, the infestation of mountain pine beetles which are devastating the BC interior pine forests. This kit contains an engaging and informative video, CD-ROM, overheads, PowerPoint® presentation, poster, activity sheets as well as, a bark sample and a sample of pine beetles (in a vial). Lesson plans are clear and concise and can be adapted to suit grade levels from 4 through to 7. A glossary is included.

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *BC Market Outreach Network*

1130 West Pender Street, Suite 1200
Vancouver, BC V6E 4A4

Telephone: 604-685-7507

Fax: 604-685-5373

Web Address:

Price: Free to schools

ISBN/Order No: Not available

Copyright: 2005

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



Down To Earth (AIMS Activities)

General Description:

Book investigates aspects of geology, oceanography, and meteorology through numerous activities that integrate math, science, language arts, and social studies. Detailed support materials accompany each project. Some non-metric references.

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: 1-881431-00-2/20132

Copyright: 1987

Year Recommended in Grade Collection: 2005

 **Earth In Action Series**

General Description:

This series of three 30-minute videos and accompanying teacher guides are clear, concise, and appropriately paced for the Grade 7 audience.

Caution: *Slight American accent, miles are referred to.*

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

Price: Videos: \$165.00 each

ISBN/Order No: Plate Tectonics: 110066
Volcanoes & Earthquakes: 110067
Forces Shaping The Earth: 110068

Copyright: 2003

Year Recommended in Grade Collection: 2005

 **Earth in Change: The Earth's Crust**

General Description:

This video shows the earth's crust undergoing continual change. Plate tectonics, erosion, and weathering are explained using both live footage and diagrams.

Audience: *General*

ESL - suitable for moderate to advanced language proficiency; clear science concepts; interesting, dramatic style; suitable pacing and language

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Encyclopedia Britannica Educ. Corp.*

310 South Michigan
Chicago, IL 60604

Telephone: (312) 347-7900 ext. 6464

Fax: (312) 347-7903

Toll Free: (800) 554-9862 (orders)

Price: Check with supplier

ISBN/Order No: Not available

Copyright: 1989

Year Recommended in Grade Collection: 2005



Earthquakes: Our Restless Land

General Description:

Twenty-two-minute video explores the earth's composition, including plate tectonics, continental drift, subduction, and seismology. It features real footage of classrooms during the Los Angeles earthquake in 1989.

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

Price: Check with supplier

ISBN/Order No: Not available

Copyright: 1994

Year Recommended in Grade Collection: 2005



Ecology: Communities

General Description:

Twelve-minute video presents several examples of communities and describes relationships of mutualism, commensalism, and parasitism. Includes a brief discussion guide with objectives, vocabulary, and activities.

Audience: *General*

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: Check with supplier

ISBN/Order No: Not available

Copyright: 1992

Year Recommended in Grade Collection: 2005



Ecology: Food Chains

General Description:

Thirteen-minute video presents several examples of food chains and webs in the ocean, emphasizing energy flow through the food chains. Includes a brief discussion guide with activities.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Magic Lantern Communications (BC)*

23022 Cliff Avenue
Maple Ridge, BC V2X 7Z9

Telephone: (604) 476-1853

Fax: (604) 476-1859

Toll Free: 1-800-263-1818

Price: Check with supplier

ISBN/Order No: Not available

Copyright: 1992

Year Recommended in Grade Collection: 2005



Ecology: Organisms in their Environment

General Description:

This video examines the interactions between organisms in their environments, and poses two questions: "What are ecosystems and how do organisms interact in them?" and "How do matter and energy flow in the environment?" The concepts of ecosystem, population, niche, food chain, food web, food pyramid, and the carbon cycle are all explained.

Audience: *General*

Gifted - some advanced material in video suitable for highly able gifted learner

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Marlin Motion Pictures Ltd.*

211 Watline Avenue
Mississauga, ON L4Z 1P3

Telephone: (905) 890-1500

Fax: (905) 890-6550

Toll Free: 1-800-865-7617

Price: \$59.95

ISBN/Order No: Not available

Copyright: 2003

Year Recommended in Grade Collection: 2005



Ecology: Populations

General Description:

Thirteen-minute video presents several examples of populations and examines the physical and biological factors that limit the growth of a population. Includes a brief discussion guide with activities.

Audience: *General*

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: Check with supplier

ISBN/Order No: Not available

Copyright: 1992

Year Recommended in Grade Collection: 2005



Ecosystems

Author(s): *Chernin, B. et al*

General Description:

Resource contains text, numerical data, graphs, illustrations, photos, and maps on issues and topics related to ecosystems and resource management. The focus is on becoming environmentally literate to make informed personal decisions. Package opens out to a wall chart for classroom use.

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

Price: Not available

ISBN/Order No: 7715-81807

Copyright: 1995

Year Recommended in Grade Collection: 2005

  **Ecosystems: The Role of Abiotic Factors**

General Description:

This video examines the role non-living, abiotic factors play in shaping ecosystems. Five abiotic factors are examined: water, air, soil, heat, and light. In addition, three air-mediated cycles are presented: the water cycle, the carbon dioxide/oxygen cycle, and the nitrogen cycle. Concepts are well developed to an advanced level, and is recommended for highly able/gifted students.

Caution: *Pre-teaching suggestions are essential; "chunking" video is advised.*

Audience: *General*

Gifted - concepts well-developed to an advanced level

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Marlin Motion Pictures Ltd.*

211 Watline Avenue
Mississauga, ON L4Z 1P3

Telephone: (905) 890-1500

Fax: (905) 890-6550

Toll Free: 1-800-865-7617

Price: \$59.95

ISBN/Order No: Not available

Copyright: 2003

Year Recommended in Grade Collection: 2005

  **Fire and Ice**

General Description:

This 15-minute video is a presentation of how Antarctica landscape/icescape was formed. It also presents two scientists in Antarctica who both study the Earth's crust/glaciers and who both find evidence to support two very different theories about the shape, temperature, and climate of Antarctica as it might have been millions of years ago. It is an interesting look at two earth scientists using technology, direct, and indirect evidence.

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

Toll Free: 1-800-267-2977

Web Address: www.canlearn.com

Price: \$39.95

ISBN/Order No: 5-5032F-1#4

Copyright: 2001

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: <http://www.hctf.ca/wild.htm>

Price: \$26.00

\$22.00 with workshop

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

Copyright: 1999

Year Recommended in Grade Collection: 2005



Geologist's Notebook: Three Rocks

Author(s): *LaComb, L.*

General Description:

This video program looks at three rocks: igneous, sedimentary, and metamorphic. The video investigates how they are formed and how they relate to one another through the rock cycle. The video follows the process of weathering including mechanical, chemical, and biological weathering, and explains how heat and pressure can metamorphose rock into another form.

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

Web Address: www.bclc.bc.ca

Price: \$26.00

ISBN/Order No: SC0328

Copyright: 2003

Year Recommended in Grade Collection: 2005



Geologist's Notebook: What Exactly Are Minerals?

Author(s): *LaComb, L.*

General Description:

This video is an in-depth explanation of the chemical structure of minerals, and looks at properties geologists use to identify them, such as hardness, luster, cleavage, and crystal form. The video also explains the relationship between minerals and rocks, and how humans obtain minerals.

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

Web Address: www.bclc.bc.ca

Price: \$26.00

ISBN/Order No: SC0329

Copyright: 2003

Year Recommended in Grade Collection: 2005



Gitga'ata Spring Harvest

General Description:

This 25-minute video examines a seasonal camp and follows a daily rhythm of food gathering and harvesting (cedar, seaweed, halibut, salmon, etc.). Elders share their wisdom and respect for the environment and highlight cultural values of the Gitga'ata peoples.

Caution: *Aboriginal perspective only represented concerning resource management. Safety standards (one child in boat without lifejacket). Current salmon farming practices referred to as 'bastardization' of species.*

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *McNabb and Connolly*

60 Briarwood Avenue
Mississauga, ON L5G 3N6

Telephone: (905) 278-0566

Fax: (905) 278-2801

Web Address: www.mcnabbconnolly.ca

Price: \$95.00

ISBN/Order No: Not available

Copyright: 2003

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: <http://www.hctf.ca/wild.htm>

Price: \$22.00

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

Copyright: 2004

Year Recommended in Grade Collection: 2005



Legacy of an Oil Spill

General Description:

This 28-minute video investigates short term and long term effects and recovery of a shoreline ecosystem after 11 million gallons of crude oil were spilled by super tanker, *Exxon Valdez*, in 1989. Scientists conduct on-site research on several species of fish, birds, and marine mammals to gauge recovery. The complexity and delicate interaction of an ecosystem and what happens when these are unbalanced are underscored.

Caution: *Some clips of animals suffering may be difficult to watch.*

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

Toll Free: 1-800-267-2977

Web Address: www.canlearn.com

Price: \$39.95

ISBN/Order No: 1-2842F-1#4

Copyright: 1999

Year Recommended in Grade Collection: 2005



McDougal Littell Science Grade 7

General Description:

This series is an excellent teacher resource to be used to broaden understanding of Grade 7 curricular topics. Titles include: *Ecology, Chemical Interactions, The Changing Earth, and Earth's Surface*. It is an excellent learning tool for gifted Grade 7 students who find the more traditional Grade 7 texts limited in scope.

Audience: *Gifted - provides a depth of topics not found in a general text*

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

Price: Modules: \$26.95 each

ISBN/Order No: Ecology: 0-618-33429-7
 Chemical Interactions: 0-618-33438-6
 The Changing Earth: 0-618-33424-6
 Earth's Surface: 0-618-33419-X
 Electricity and Magnitism:
 0-618-334-408

Copyright: 2004

Year Recommended in Grade Collection: 2005



Mountains and Mountain Building Processes

General Description:

This 23-minute video presents a thorough overview of how the Earth's crust is constantly changing through mountain formation, volcanoes, and earthquakes. Using worldwide examples, clear graphics, and scientific vocabulary it makes a clear connection between crust and surface formations. There is support material to accompany the video which elaborates on vocabulary, suggests activities, and provides assessment.

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

Toll Free: 1-800-267-2977

Web Address: www.canlearn.com

Price: \$39.95

ISBN/Order No: 1-2649F-1#4

Copyright: 2000

Year Recommended in Grade Collection: 2005



Nelson Science & Technology 7

General Description:

These are a series of modules reprinted from the *Nelson Science and Technology 7* student text (which is not recommended). *The Earth's Crust, Interactions Within Ecosystems, Pure Substances and Mixtures*, and particularly helpful, *The Skills Handbook* comprise this recommended series.

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

Price: Skills Handbook: \$19.45

Modules: \$15.45 each

ISBN/Order No: Skills Handbook: 0-17-612020-3

Pure Substances and Mixtures:
0-17-612001-7

The Earth's Crust: 0-17-612004-1

Interactions Within Ecosystems:
0-17-612000-9

Copyright: 2000

Year Recommended in Grade Collection: 2005



Nelson Science & Technology Skills Handbook

Author(s): *Allred, N. et al.*

General Description:

Nelson Skills Handbook is an excellent student and teacher resource for the skills and processes of Science at both Grade 6 and 7 levels. Contains diagrams for steps in various science processes and can be used as a resource for classes needing support for student hands-on activities. Shows the clear difference between scientific inquiry and technological problem-solving.

Audience: *General*

ESL

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

Price: \$19.45

ISBN/Order No: 0-17-612020-3

Copyright: 2000

Year Recommended in Grade Collection: 2005



General Description:

OceanNews is a series of learning resource packages developed by the Public Education Program of the Bamfield Marine Station to promote marine education. Each issue of *OceanNews* covers a theme of marine science: Exploring the Fluid Frontier, Marine Mammals, Seabirds, and Marine Pollution. Each theme issue comprises a newsletter, a teacher's guide, and an Ocean Explorer computer disk. Provides background concepts and current research in marine science. Activities in the teacher's guides extend concepts. Software programs enhance and extend activities. Systems Requirement: Installed Acrobat Reader®

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Bamfield Marine Sciences Centre*

Bamfield, BC V0R 1B0

Telephone: (250) 728-3301

Fax: (250) 728-3452

Web Address: www.bms.bc.ca

Price: 5 copies of each newsletter + 1 CD: \$53.00
30 copies + 1 CD: \$73.00

ISBN/Order No: Not available

Copyright: 1994

Year Recommended in Grade Collection: 2005



General Description:

Book investigates our relationship with the environment through numerous hands-on activities that integrate math, science, language arts, and social studies. Detailed support materials accompany each project. Some non-metric references.

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: 1-881431-08-8/20133

Copyright: 1987

Year Recommended in Grade Collection: 2005



Parasites & Partners Series

General Description:

The series provides good content for Grade 6 and 7 Life Sciences. Explains the close relationship between various animals, plants, and other creatures. From tiny bacteria living inside or on other organisms to survive. Detailed look at some of the most bizarre and surprising organisms and their parasitic relationships.

Audience: *General*

ESL

LD - high interest, but will need vocabulary support

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *J. Appleseed*

PO Box 129
Collingwood, ON L9Y 3Z7

Telephone:

Fax:

Toll Free: 1-866-575-5007

Web Address: www.jappleseed.ca

Price: \$12.00 each

ISBN/Order No: Feeders: 1-4109-0355-9

Hitchers and Thieves: 1-4109-0356-7

Lodgers and Cleaners: 1-4109-0358-3

Copyright: 2003

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: <http://www.hctf.ca/wild.htm>

Price: \$30.00 with workshop

ISBN/Order No: Not available

Copyright: 1995

Year Recommended in Grade Collection: 2005



Project WILD

General Description:

Teacher resource contains directions and extensions for approximately 80 activities that are related to wildlife and resource management. Each activity includes objectives, method, background, materials, procedure, variations, extension, and evaluation.

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: <http://www.hctf.ca/wild.htm>

Price: \$25.00 with workshop

ISBN/Order No: Not available

Copyright: 1998

Year Recommended in Grade Collection: 2005



Salish Sea

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



Salmonids in the Classroom

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



Sci Short

General Description:

An introduction to acids and the pH scale, plus a look at the origins of acid rain, and its effect on the environment. Part 3 - Acid Death - examines experiments on *Lake 223* in Northern Ontario, and how its ecosystem was destroyed by acid rain.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *TV Ontario - Program Sales*

P.O. Box 200, Station Q
2180 Yonge Street
Toronto, ON M4T 2T1

Telephone: (416) 484-2882

Fax: (416) 484-2896

Web Address: <http://tvontario.org/sales/>

Price: Check with supplier

ISBN/Order No: Not available

Copyright: 2001

Year Recommended in Grade Collection: 2005



Science Detective™ Beginning: Higher-Order, Thinking, Reading, Writing in Science

Author(s): Fischer, S. et al.

General Description:

Teacher resource for ESL or Learning Assistance programs includes simplified pages of science concepts in all strands. Basic teaching strategy of read and complete sheet. Good collection of key visuals and graphic organizers.

Audience: *ESL - key visuals and basic one page text per topic*
LD - key visuals and frames can be used to help learn concepts

Category: *Teacher Resource*

Grade Level:

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

Supplier: *The Critical Thinking Co.*

P.O. Box 1610
1069 Broadway Ave.
Seaside, CA 93955-1610

Telephone: (831) 393-3288

Fax: (831) 393-3277

Toll Free: 1-800-458-4849

Web Address: www.criticalthinking.com

Price: \$18.99 US

ISBN/Order No: 0-89455-834-X

Copyright: 2004

Year Recommended in Grade Collection: 2005



Science, Please!

General Description:

Fast, factual explanations of scientific phenomena and discoveries, who said science can't be fun? A poster with excellent questions and an extensive interactive web site support these videos (Part 1 and Part 2). Although the DVDs were not available for the reviewers, they felt DVD format would be more easily used as this is a series of science mini-clips.

Caution: *Teacher should preview Part 1, clip 3, for questionable humour.*

Audience: *General*

Gifted - fast-paced, attention-grabber

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

Price: Set of two tapes: \$97.95
Each: \$49.95

ISBN/Order No: Set of two tapes: C 9101 197
Part 1 or Part 2: C9101 195

Copyright: 2001

Year Recommended in Grade Collection: 2005



Thinking Connections: Concept Maps for Life Science

Author(s): *Burggraf, F.*

General Description:

Teacher resource for ESL or Learning Assistance programs with simplified pages of Science concepts in Grades 4 to 7 intermediate strands. Basic teaching strategy of read and complete sheets, and a reinforcement of vocabulary and concepts. Good collection of key visuals and graphic organizers.

Audience: *ESL - key visuals and basic one page text per topic*
LD - key visuals and frames can be used to help learn concepts

Category: *Teacher Resource*

Grade Level:

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

Supplier: *The Critical Thinking Co.*

P.O. Box 1610
1069 Broadway Ave.
Seaside, CA 93955-1610

Telephone: (831) 393-3288

Fax: (831) 393-3277

Toll Free: 1-800-458-4849

Web Address: www.criticalthinking.com

Price: \$23.99 US

ISBN/Order No: 0-89455-702-5

Copyright: 2001

Year Recommended in Grade Collection: 2005



Urban Stewards

Author(s): *Keetch, T.*

General Description:

Engages students in stimulating hands-on science and environmental education activities in the classroom and outside. Match to the learning outcomes in a cross-curricular fashion.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Stanley Park Ecology Society*

PO Box 5167
2nd Floor, Stanley Park Dining Pavilion
Vancouver, BC V6B 4B2

Telephone: 604-257-6908

Fax: 604-257-8378

Web Address: www.stanleyparkecology.ca

Price: Not available

ISBN/Order No: Not available

Copyright: 2004

Year Recommended in Grade Collection: 2005



Volcanoes: Understanding the Hazards

General Description:

Twenty-minute three-part video introduces volcanic activity, causes of vulcanism, different types of volcanic activity, and the hazards of living in an active volcanic zone. Includes a single-page teacher's guide with a vocabulary list, discussion questions, and activities.

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

Price: Check with supplier

ISBN/Order No: Not available

Copyright: 1992

Year Recommended in Grade Collection: 2005



The Watershed Works

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

General Description:

This booklet is an extensive guide for the study of the Fraser River Basin in BC. It includes student activities and teaching strategies that promote awareness and understanding of the social, economic, and environmental issues that are relevant to this area.

Caution: *These are photocopied pages in a binder.*

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: Not available

Copyright: 1998

Year Recommended in Grade Collection: 2005



Wonderwise: Women in Science Learning Series

General Description:

Set of two 18-minute videos highlighting women in science: Adriana Ocampo, a space geologist; and Carmen Cid, an urban ecologist. The videos follow the women as they observe, measure, and demonstrate scientific processes and investigation.

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

Toll Free: 1-800-267-2977

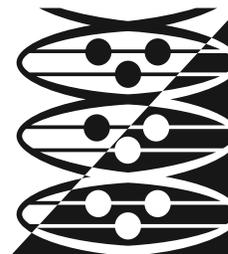
Web Address: www.canlearn.com

Price: Videos: \$39.95 each

ISBN/Order No: Space Geologist: 5-5141F-1#1
Urban Ecologist: 5-4630F-1#2

Copyright: 2002

Year Recommended in Grade Collection: 2005



GLOSSARY

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

- McGraw-Hill Ryerson
- Scholastic Canada Ltd.
- Thomson Nelson.

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.

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.

S**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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