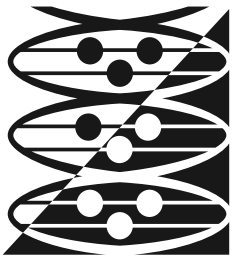


SCIENCE GRADE 3

From Integrated Resource Package 2005

BRITISH COLUMBIA
Ministry of Education

GBG 003

Table of Contents

Acknowledgments

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

Science K to 7 IRP Writing Team

Caroline Auffredou	School District No. 40 (New Westminster)
David Barnum	School District No. 46 (Sunshine Coast)
Lori Boychuk	School District No. 91 (Nechako Lakes)
Bev Craig	School District No. 46 (Sunshine Coast)
Burton Deeter	School District No. 36 (Surrey)
Frances Harber	School District No. 61 (Victoria—Independent School)
Joanne Heron	School District No. 75 (Mission)
Bruce Inglis	School District No. 39 (Vancouver)
Nancy Josephon	University College of the Cariboo
Nicole Laurendeau	School District No. 75 (Mission)
Joan Tucknott	School District No. 61 (Victoria)
Pam Yearwood	School District No. 46 (Surrey)

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/pser/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.mcrel.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.

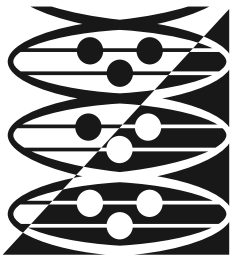
Each unit includes the prescribed learning outcomes, suggested achievement indicators, key elements, a suggested timeframe, a sequence of suggested instruction and assessment activities, recommended learning resources, selected relevant web sites, and sample assessment instruments.

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.

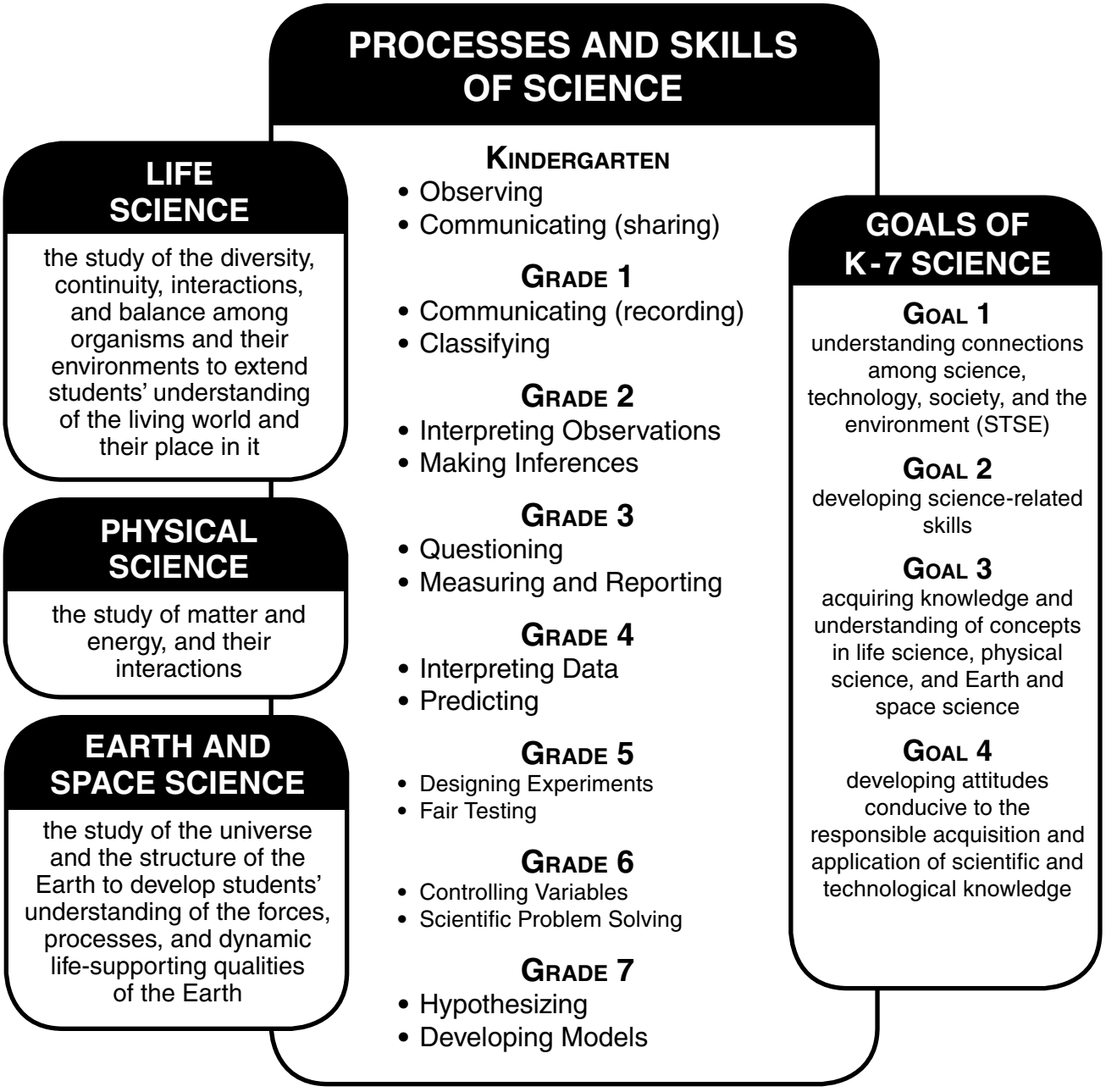
Curriculum Organizer	Suggested Time
Applications of Science	integrated with other organizers
Life Science	25-30 hours
Physical Science	25-30 hours
Earth and Space Science	25-30 hours

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	• Observing • Communicating (sharing)	Characteristics of Living Things	Properties of Objects and Materials	Surroundings
Grade 1	• Communicating (recording) • Classifying	Needs of Living Things	Force and Motion	Daily and Seasonal Changes
Grade 2	• Interpreting Observations • Making Inferences	Animal Growth and Changes	Properties of Matter	Air, Water, and Soil
Grade 3	• Questioning • Measuring and Reporting	Plant Growth and Changes	Materials and Structures	Stars and Planets
Grade 4	• Interpreting Data • Predicting	Habitats and Communities	Light and Sound	Weather
Grade 5	• Designing Experiments • Fair Testing	Human Body	Forces and Simple Machines	Renewable and Non-Renewable Resources
Grade 6	• Controlling Variables • Scientific Problem Solving	Diversity of Life	Electricity	Exploration of Extreme Environments
Grade 7	• 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.

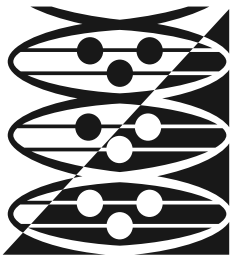
In order to respect copyright it is necessary to understand the law. It is unlawful to do the following, unless permission has been given by a copyright owner:

- 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.

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



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).

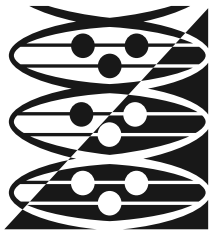
The **cognitive domain** deals with the recall or recognition of knowledge and the development of intellectual abilities. The cognitive domain can be further specified as including three cognitive levels: knowledge, understanding and application, and higher mental processes. These levels are determined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

Kindergarten
- use the five senses to make observations
- share with others information obtained by observing

Grade 1
- communicate their observations, experiences, and thinking in a variety of ways (e.g., verbally, pictorially, graphically)
- classify objects, events, and organisms

Grade 2
- use their senses to interpret observations
- infer the probable outcome of an event or behaviour based on observations

Grade 3
- ask questions that foster investigations and explorations relevant to the content
- measure objects and events

Grade 4
- make predictions, supported by reasons and relevant to the content
- use data from investigations to recognize patterns and relationships and reach conclusions

Grade 5
- identify variables that can be changed in an experiment
- evaluate the fairness of a given experiment
- describe the steps in designing an experiment

Grade 6
- manipulate and control a number of variables in an experiment
- apply solutions to a technical problem (e.g., malfunctioning electrical circuit)

Grade 7
- 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

Kindergarten

- describe features of local plants and animals (e.g., colour, shape, size, texture)
- compare local plants
- compare common animals

Grade 1

- 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

Grade 2

- 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

Grade 3

- 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

Grade 4

- 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

Grade 5

- 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

Grade 6

- 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

Grade 7

- 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

Kindergarten
- 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

Grade 1
- 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

Grade 2
- 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

Grade 3
- 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

Grade 4
- 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)

Grade 5
- 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

Grade 6
- 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

Grade 7
- 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

Kindergarten
- demonstrate the ability to observe their surroundings
- describe features of their immediate environment

Grade 1
- 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

Grade 2
- 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

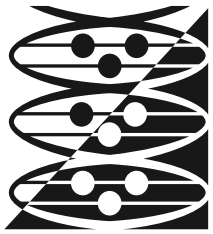
Grade 3
- describe characteristics and movements of objects in our solar system
- compare familiar constellations in seasonal skies
- demonstrate awareness of the special significance of celestial objects for Aboriginal peoples

Grade 4
- measure weather in terms of temperature, precipitation, cloud cover, wind speed and direction
- analyse impacts of weather on living and non-living things

Grade 5
- 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

Grade 6
- explain obstacles unique to exploration of a specific extreme environment
- assess technologies used for extreme environments
- describe contributions of Canadians to exploration technologies

Grade 7
- 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 3

GRADE 3

Processes and Skills of Science

It is expected that students will:

- ask questions that foster investigations and explorations relevant to the content
- measure objects and events

Life Science: Plant Growth and Change

It is expected that students will:

- 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

Physical Science: Materials and Structures

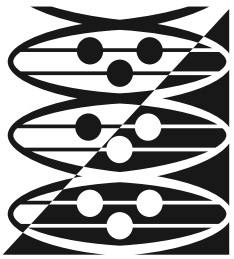
It is expected that students will:

- 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

Earth and Space Science: Stars and Planets

It is expected that students will:

- 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



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
Formative assessment *ongoing in the classroom* • 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	Formative assessment *ongoing in the classroom* • 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	Summative assessment occurs at *end of year or at key stages* • 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.

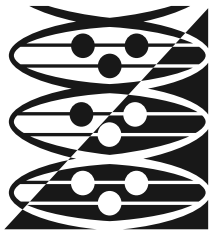
Achievement Indicators

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 3

GRADE 3: PROCESSES OF SCIENCE

Key Elements: Processes of Science

Estimated Time: integrate with other curriculum organizers

Questioning

Raising good questions requires looking at an object or event in thoughtful ways. As they develop and learn new perceptions, students ask a variety of useful and necessary questions (e.g., I wonder... or... What causes...? How does...?). Learning to ask questions is a fundamental scientific skill, as not every question can be tested in science. How students learn to ask good science questions starts with distinguishing between what is certain and can be proven to be true, and what is uncertain and cannot yet be explored. Students begin by identifying simple science-related questions that can be tested, discussed, and answered. Allowing a variety of questions helps guide further observations and suggests explorations for students' curiosity and wonder.

Measuring and Reporting

Simple measurement requires the use of basic tools such as rulers, clocks, beakers, thermometers, and scales. The process of measuring involves comparing something to standard and non-standard units. These units are arranged on a scale that extends from least to most (e.g., coldest-hottest, shortest-tallest, lightest-heaviest). Previous skills of classifying, sorting, interpreting, and recording are used to quantify objects and amounts. When the appropriate forms and units of measure are understood, students can make precise measurements using different tools. In this way, objects can be compared with other objects using the standard units (length, mass, time, temperature, volume, etc.). Reporting what was measured and recorded is a careful science skill requiring precision and exactness. Reporting this type of data is done in many ways, but always done diligently.

GRADE 3 PROCESSES OF SCIENCE

Prescribed Learning Outcomes	Suggested Achievement Indicators
It is expected that students will:	*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:*
• ask questions that foster investigations and explorations relevant to the content	❑ ask a question specific to the content elements (e.g., "I wonder...?"; "What causes...?"; "What do I need to use to...?; "How is ____ the same as ____?") ❑ ask questions that demonstrate a range of thinking skills (e.g., "What happens if ___?"; "Can you find a way to ____?"; How is ____ both good and bad for ____ [the environment]?"; "What reason do you have for ____?")
• measure objects and events	❑ correctly use standard or non-standard units where appropriate (e.g., hand spans or metre stick) to develop quantitative descriptions ❑ place objects/observations on appropriate scales (e.g., lightest to heaviest; shortest to longest; weakest to strongest; closest to farthest) ❑ accurately record observations using charts and diagrams (e.g., Venn diagrams, compare/contrast charts) and use standardized formats (e.g., Know, Want-to-Know, Did, Learned) to report results of measurements ❑ apply appropriate scales for several events (e.g., day, night; seasons)

Processes and Skills of Science							
Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**
• Observing • Communicating (sharing)	• Communicating (recording) • Classifying	• Interpreting Observations • Making Inferences	• Questioning • Measuring and Reporting	• Interpreting Data • Predicting	• Designing Experiments • Fair Testing	• Controlling Variables • Scientific Problem Solving	• Hypothesizing • Developing Models

GRADE 3 LIFE SCIENCE: PLANT GROWTH AND CHANGES

Key Elements: Life Science

Estimated Time: 25 – 30 hours

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

Plant Growth and Changes

The study of plants focuses on their characteristics, needs, and growth patterns. Through investigation and experimentation with a variety of plants, students determine the needs, structures, and adaptations of plants. Observing, measuring, and recording growth gives students the opportunity to understand the life cycle and different ways that plants can reproduce. Students also investigate plant uses, harvesting methods, and other relationships of plants to other living things.

Vocabulary

food, energy, root, stem, leaf, flower, pollen, seed, fruit, adaptation, life cycle, garden, harvest

Knowledge

- plants can reproduce in different ways (sexually from seed, or asexually from cuttings, bulbs, or tubers)
- the basic parts of plants include roots, stems, and leaves, which are adapted to the conditions in their environment
- plants carry on a variety of life processes
- plants need light, water, air, and nutrients to grow
- plants' characteristics change throughout their life cycle

Skills and Attitudes

- make inferences about a plant's environment from its characteristics
- demonstrate a sense of responsibility and caring for plants and for the environment

GRADE 3 LIFE SCIENCE: PLANT GROWTH AND CHANGES

Prescribed Learning Outcomes	Suggested Achievement Indicators
It is expected that students will:	*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:*
• compare familiar plants according to similarities and differences in appearance and life cycles	❑ classify several types of familiar plants and explain the sorting method, with teacher support ❑ accurately illustrate the life cycle of a flowering plant ❑ identify characteristics that remain constant and those that change throughout the life cycle of a flowering plant ❑ conduct experiments to compare conditions needed for healthy plant growth (e.g., water, light, soil)
• describe ways in which plants are important to other living things and the environment	❑ identify the needs of common plants and animals, and provide a detailed description as to how they meet those needs ❑ illustrate ways that plants and animals depend on each other, using drawings, graphs, charts, and/or Venn diagrams ❑ prepare a detailed report on ways plants are important to the environment, giving examples
• describe how plants are harvested and used throughout the seasons	❑ identify and illustrate different methods of harvesting (e.g., mechanized, by hand) ❑ research and report on how BC Aboriginal peoples use plants for food, medicine, and products

GRADE 3 PHYSICAL SCIENCE: MATERIALS AND STRUCTURES

Key Elements: Physical Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have examined the shapes of various structures and tested the materials for those structures.

Materials and Structures

The study of materials and structures begins with the examination of the shape, components, and function of natural and human-built structures. Students investigate and experience the design process as they select and use materials suitable to the task at hand, manipulate and test materials, and build structures. Students discover that the strength and other characteristics of structures they build are linked to the properties of the materials they use, and to the particular way the materials are configured and joined.

Vocabulary

strength, balance, structure, materials, force, gravity, tension, compression, flexible, dome, arch, triangle, pyramid, cylinder, load , fasteners, design, construction

Knowledge

- a structure is any supporting framework that is built to hold a load or enclose a 'space'
- geometric shapes and forms are concepts used to understand and describe natural and human-built structures
- structures are built to withstand the loads and forces acting on them without breaking.
- forces on structures can push, pull, stretch, squeeze, and bend the structure to move
- flexible structures allow some forces to move the structure without breaking
- stable structures are able to support greater loads
- strength and stability can also be achieved by adding width and mass, and by layering materials
- braces hold two or more structures together
- stability of a structure is related to its **design** (height, width, and base) and to its **construction** (materials and fasteners); buildings that are short and wide are usually more stable than objects that are tall and narrow
- folding, bending, or bracing can strengthen materials
- most stable structures contain triangle arrangements of the construction materials
- fasteners are used to join materials together

Skills and Attitudes

- recognize geometric shapes and forms
- demonstrate curiosity
- use problem-solving strategies in building simple structures
- use simple tools safely and carefully to build structures
- accept failures as part of engineering discovery
- question, measure, and report procedures and results

GRADE 3 PHYSICAL SCIENCE: MATERIALS AND STRUCTURES

Prescribed Learning Outcomes	Suggested Achievement Indicators
It is expected that students will:	*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 shapes that are part of natural and human-built structures (e.g., domes, arches, pyramids)	❑ identify domes, triangles, arches, pyramids, cylinders in natural and human-built structures ❑ illustrate local structures using detailed diagrams and accurately sort their characteristics (e.g., shapes, components)
• compare the effects of different materials, shapes, and forces on the strength and stability of different structures	❑ describe and demonstrate construction techniques (e.g., joint construction, strengthening, and stabilizing) using given materials ❑ conduct a variety of experiments to test and compare the strength of different structures (e.g., arches, domes, and triangles) ❑ accurately measure and report the effects of various forces (e.g., compression, tension, load) on different structures
• conduct investigations into ways to improve the strength and stability of structures	❑ identify several techniques for improving strength and stability (e.g., reinforcing, bundling, and bracing) ❑ describe and apply a variety of material-strengthening techniques and methods to improve the design and stability of a given structure (e.g., build a bridge or tower that supports a given load)

GRADE 3 EARTH AND SPACE SCIENCE: STARS AND PLANETS

Key Elements: Earth and Space Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have understood various components of the solar system and explained the significance of celestial objects for Aboriginal peoples.

Stars and Planets

This study focuses on the characteristics of stars and planets. Students describe the physical characteristics and components of the solar system: the Sun, planets, moons, comets, asteroids, and meteors. They observe and explain how the relative positions of the Earth, Moon, and the Sun are responsible for the moon phases, eclipses, tides and phenomena such as the cycle of day and night and the yearly cycle of the seasons. They observe and identify familiar patterns of stars and constellations. Students also explore the significance of celestial objects to indigenous peoples.

Vocabulary

seasonal cycle, day/night, sun, star, planet, meteor, comet, orbit, moon, axis, rotate, solar system, Milky Way, galaxy, constellation

Knowledge

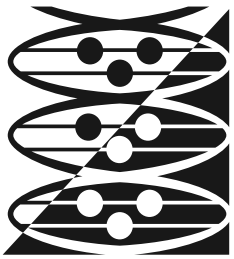
- stars are made of burning gases
- the Sun is a star
- other stars are in the sky all the time, but are invisible because the Sun is too bright during the day
- the energy from the Sun is essential for life on Earth (either directly or indirectly)
- planets do not make their own light, but reflect light
- planets revolve around a star
- moons revolve around planets
- comets, asteroids, and meteors are smaller bodies also revolving around stars
- the cycle of day and night is a result of the Earth's rotation about its axis
- the Earth revolves around the Sun once a year
- constellations are groups of stars (humans have imagined pictures and names for these groups)
- the position of these constellations appears to change over the year because our planet travels in a very large orbit around the Sun
- celestial objects have a special significance to Aboriginal peoples

Skills and Attitudes

- demonstrate curiosity about space
- maintain an astronomy journal
- identify patterns based on recorded observations
- identify questions based on recorded data
- distinguish between scientific and cultural information

GRADE 3 EARTH AND SPACE SCIENCE: STARS AND PLANETS

Prescribed Learning Outcomes	Suggested Achievement Indicators
It is expected that students will:	*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 characteristics and movements of objects in our solar system	❑ prepare a detailed report on the unique features (e.g., location, size, temperature, appearance, length of day) of the planets, asteroids, comets, the Sun, and moon ❑ illustrate the solar system (the Sun, nine planets, moons, asteroids, comets, and meteors) using accurate drawings, diagrams, collages, models, electronic presentations, and/or group role play ❑ complete a detailed model, with explanations, showing that the Sun is the centre of the solar system, and that it is the source of energy for the Earth
• compare familiar constellations in seasonal skies	❑ identify and accurately label the name of constellations on a constellation map ❑ create a chart that records how constellations change position in the sky at different times of the year
• demonstrate awareness of the special significance of celestial objects for Aboriginal peoples	❑ generate specific questions in response to an Aboriginal story focusing on celestial objects (e.g., stars, moon, planets, comets, eclipses) and illustrate answers using detailed drawings ❑ write their own stories, complete with picture, on a celestial object (e.g., how the moon came to be; why the sun is so hot)



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
- brainstorms, 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.

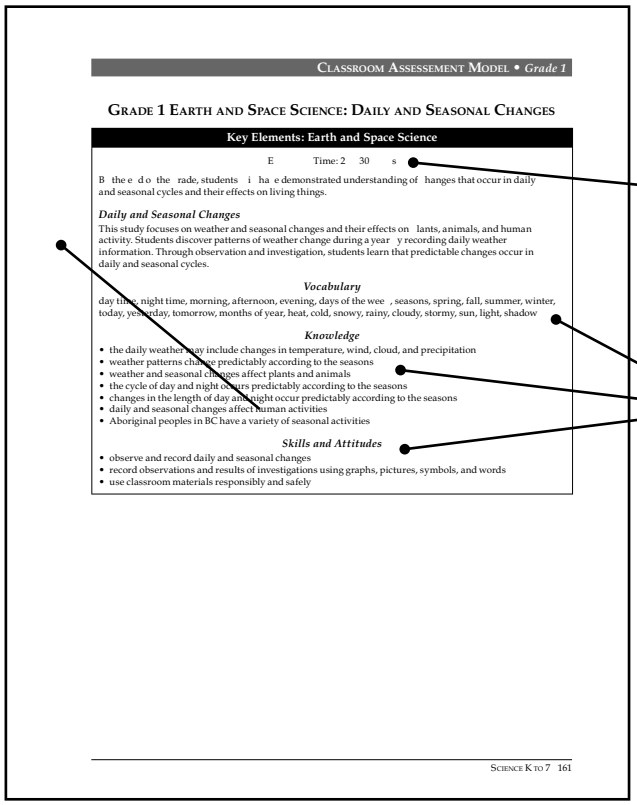
As new resources are recommended, information will be posted on the ministry web site: http://www.bced.gov.bc.ca/irp_resources/lr/resource/consub.htm

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 ASSESSEMENT MODEL • *Grade 1*

GRADE 1 EARTH AND SPACE SCIENCE: DAILY AND SEASONAL CHANGES

Key Elements: Earth and Space Science

E Time: 2 30 s

B the e d o the rade, students i ha e demonstrated understanding of hanges 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 lants, animals, and human activity. Students discover patterns of weather change during a year y 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 wee , 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 occurs 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

SCIENCE K TO 7 161

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

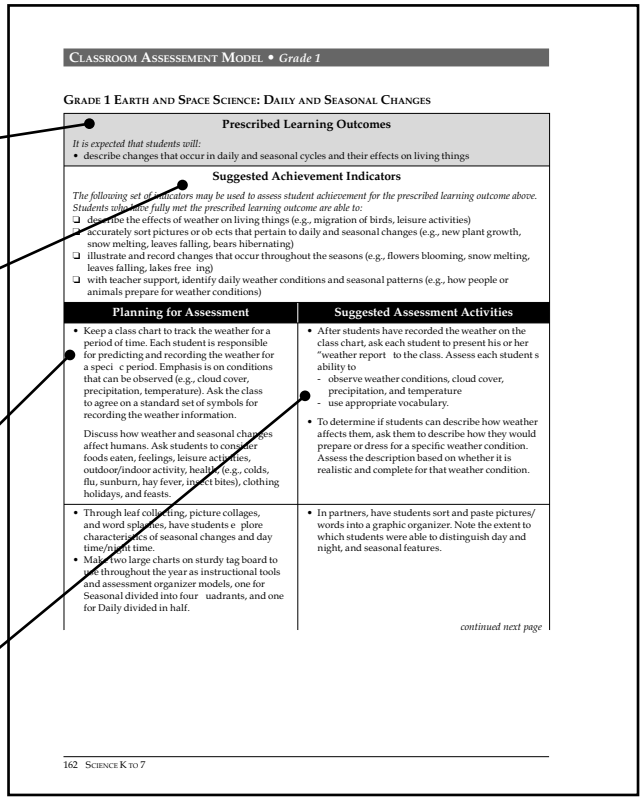
Each set of suggested achievement indicators corresponds to the prescribed learning outcomes for that suborganizer.

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

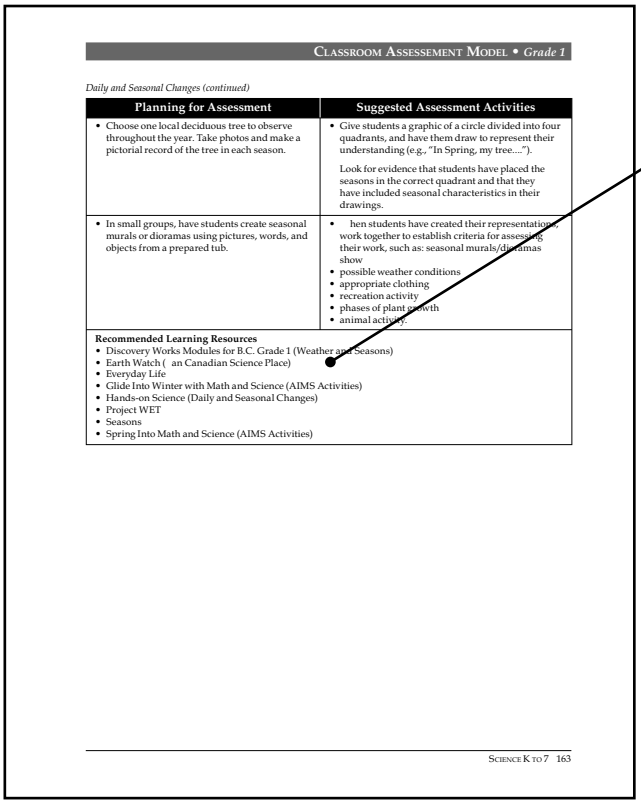
The following set of indicators may be used to assess student achievement for the prescribed learning outcome above. Students who have fully met the prescribed learning outcome are able to:

- ❑ describe the effects of weather on living things (e.g., migration of birds, leisure activities)
- ❑ accurately sort pictures or ob ects 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 free ing)
- ❑ 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
• 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 speci c 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.	• 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 - 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.
• Through leaf collecting, picture collages, and word splashes, have students e plore 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 uadrants, and one for Daily divided in half.	• 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.

continued next page

162 SCIENCE K TO 7



CLASSROOM ASSESSEMENT MODEL • *Grade 1*

Daily and Seasonal Changes (continued)

Planning for Assessment	Suggested Assessment Activities
• Choose one local deciduous tree to observe throughout the year. Take photos and make a pictorial record of the tree in each season.	• 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...."). Look for evidence that students have placed the seasons in the correct quadrant and that they have included seasonal characteristics in their drawings.
• In small groups, have students create seasonal murals or dioramas using pictures, words, and objects from a prepared tub.	• hen students have created their representations, work together to establish criteria for assessing their work, such as: seasonal murals/dioramas show • 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)	

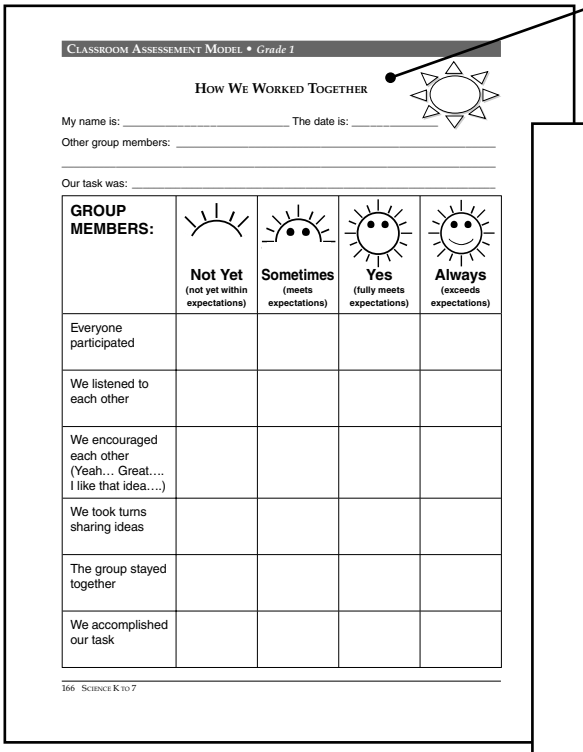
SCIENCE K TO 7 163

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.

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 ASSESSEMENT MODEL • *Grade 1*

HOW WE WORKED TOGETHER

My name is: _____ The date is: _____

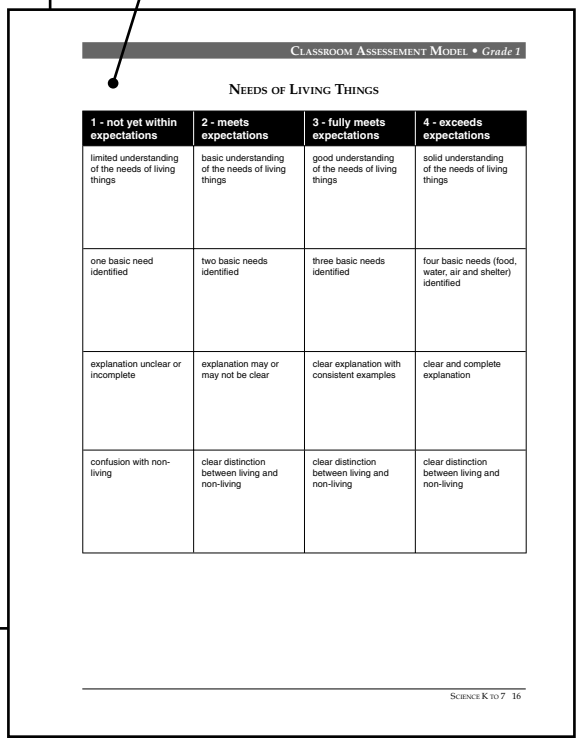
Other group members: _____

_____

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				

166 SCIENCE K TO 7

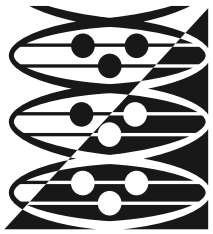


CLASSROOM ASSESSEMENT MODEL • *Grade 1*

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

SCIENCE K TO 7 16



Classroom Assessment Model

Grade 3

Assessment Overview Table for: Grade 3

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 *		
	Average # of hours				K	U & A	HMP
Processes Of Science	Integrated	Integrated	Integrated	2		1	1
Life Science	25-30	• group presentation • science journal • demo • written report • oral summary	33⅓ %	3	1	2	
Physical Science	25-30	• science journal • quiz • drawing • model	33⅓ %	3	1	1	1
Earth And Space Science	25-30	• written report • demo • science journal • chart • presentation • letter	33⅓ %	3	2	1	
Totals	75-90		100 %	11	4	5	2

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

Grade 3: Processes of Science

Key Elements: Processes of Science

Estimated Time: integrate with other curriculum organizers

Questioning

Raising good questions requires looking at an object or event in thoughtful ways. As they develop and learn new perceptions, students ask a variety of useful and necessary questions (e.g., I wonder... or... What causes...? How does...?). Learning to ask questions is a fundamental scientific skill, as not every question can be tested in science. How students learn to ask good science questions starts with distinguishing between what is certain and can be proven to be true, and what is uncertain and cannot yet be explored. Students begin by identifying simple science-related questions that can be tested, discussed, and answered. Allowing a variety of questions helps guide further observations and suggests explorations for students' curiosity and wonder.

Measuring and Reporting

Simple measurement requires the use of basic tools such as rulers, clocks, beakers, thermometers, and scales. The process of measuring involves comparing something to standard and non-standard units. These units are arranged on a scale that extends from least to most (e.g., coldest-hottest, shortest-tallest, lightest-heaviest). Previous skills of classifying, sorting, interpreting, and recording are used to quantify objects and amounts. When the appropriate forms and units of measure are understood, students can make precise measurements using different tools. In this way, objects can be compared with other objects using the standard units (length, mass, time, temperature, volume, etc.). Reporting what was measured and recorded is a careful science skill requiring precision and exactness. Reporting this type of data is done in many ways, but always done diligently.

Grade 3 Processes of Science

Prescribed Learning Outcomes	Suggested Achievement Indicators
It is expected that students will:	*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:*
• ask questions that foster investigations and explorations relevant to the content	❑ ask a question specific to the content elements (e.g., "I wonder...?"; "What causes...?"; "What do I need to use to...?; "How is _____ the same as _____?") ❑ ask questions that demonstrate a range of thinking skills (e.g., "What happens if ___?"; "Can you find a way to _____?"; How is _____ both good and bad for _____ [the environment]?"; "What reason do you have for _____?")
• measure objects and events	❑ correctly use standard or non-standard units where appropriate (e.g., hand spans or metre stick) to develop quantitative descriptions ❑ place objects/observations on appropriate scales (e.g., lightest to heaviest; shortest to longest; weakest to strongest; closest to farthest) ❑ accurately record observations using charts and diagrams (e.g., Venn diagrams, compare/contrast charts) and standardized formats (e.g., Know, Want-to-Know, Did, Learned) to report results of measurements ❑ apply appropriate scales for several events (e.g., day, night; seasons)

GRADE 3 LIFE SCIENCE: PLANT GROWTH AND CHANGES

Key Elements: Life Science

Estimated Time: 25 – 30 hours

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

Plant Growth and Changes

The study of plants focuses on their characteristics, needs, and growth patterns. Through investigation and experimentation with a variety of plants, students determine the needs, structures, and adaptations of plants. Observing, measuring, and recording growth gives students the opportunity to understand the life cycle and different ways that plants can reproduce. Students also investigate plant uses, harvesting methods, and other relationships of plants to other living things.

Vocabulary

food, energy, root, stem, leaf, flower, pollen, seed, fruit, adaptation, life cycle, garden, harvest

Knowledge

- plants can reproduce in different ways (sexually from seed, or asexually from cuttings, bulbs, or tubers)
- the basic parts of plants include roots, stems, and leaves, which are adapted to the conditions in their environment
- plants carry on a variety of life processes
- plants need light, water, air, and nutrients to grow
- plants' characteristics change throughout their life cycle

Skills and Attitudes

- make inferences about a plant's environment from its characteristics
- demonstrate a sense of responsibility and caring for plants and for the environment

Grade 3 Life Science: Plant Growth and Changes

Prescribed Learning Outcomes

It is expected that students will:

- compare familiar plants according to similarities and differences in appearance and life cycles

Suggested Achievement Indicators

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

- ❑ classify several types of familiar plants and explain the sorting method, with teacher support
- ❑ accurately illustrate the life cycle of a flowering plant
- ❑ identify characteristics that remain constant and those that change throughout the life cycle of a flowering plant
- ❑ conduct experiments to compare conditions needed for healthy plant growth (e.g., water, light, soil)

Planning for Assessment	Suggested Assessment Activities
• Start a word wall of plant vocabulary	• introductory activity—no corresponding assessment
• Provide plant samples for students to observe. Have them identify the basic parts. Focus students' observations by posing these questions: - What are the basic parts of a plant? - What is the function (purpose) of each part?	• Have students use journals to sketch plants and label main parts. Drawings should include and explain: roots, stems, leaves, flowers, pistil, stamen, ovule, pollen, seeds, and fruit.
• Set up a plant observation centre where students sort and classify plants. Have students explain the method used and then re-sort and re-label the groups. Plants should be provided that show a variety of roots, leaves, flowers, and seeds.	• In small groups, have students select two plants and use a Venn diagram to compare how they are the same and different. Students may prefer to draw the parts of each plant to show the differences. • Have students explain what criteria they used to sort and classify (e.g., roots: long/short, thick/thin; leaves: smooth/jagged edges, fat/thin shape).
• Have students in groups conduct experiments on plant growth using seeds, cuttings, tubers and shoots. Students could - vary growing conditions (e.g., light, water, soil, temperature) to see what is needed for healthy plant growth - predict the effects of changes in growing conditions - make observations (e.g., measure plant growth) and use notes and/or diagrams to record these	• As students test conditions for plant growth, look for evidence that they are able to - use appropriate measuring instruments (e.g., rulers, measuring cups, timepieces) - record changes - describe their observations accurately - pose questions about what they see - use charts graphs or other organizers for data collection - show what they have learned by communicating findings to peers.

continued next page

Plant Growth and Changes (continued)

Planning for Assessment	Suggested Assessment Activities
• Obtain pictures of the parts of a plant's life cycle, create four sets of pictures, and place in envelopes in random order. Ask teams of students to organize the parts into the proper life cycle sequence, from beginning, middle, and end. Discuss. Ask students - What characteristics stay the same over this plant's life cycle? - What characteristics change the same over this plant's life cycle?	• Ask students to complete a life cycle diagram in their journals. Review with students criteria for a good journal entry (e.g., clean diagrams, complete vocabulary use, correct sequencing). See also the assessment tool (**My Science Journal)** provided at the end of this grade.

Recommended Learning Resources

- Activities of Plants
- Below Zero
- Cycle of Life/Recycle Handbook for Educators
- The Budding Botanist (AIMS Activities)
- Forests in Focus
- Hands-on Science (Growth and Changes in Plants)
- The Marsh: Nature's Nursery
- Once Upon a Seashore
- One Two Tree
- Plant Parts
- Primarily Plants (AIMS Activities)
- Salish Sea
- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
- Seeds and Plants
- Watch It Grow!
- What Are Plants?

Grade 3 Life Science: Plant Growth and Changes

Prescribed Learning Outcomes

It is expected that students will:

- describe ways in which plants are important to other living things 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 the needs of common plants and animals, and provide a detailed description as to how they meet those needs
- ❑ illustrate ways that plants and animals depend on each other, using drawings, charts, and/or Venn diagrams
- ❑ prepare a detailed report on ways plants are important to the environment, giving examples

Planning for Assessment	Suggested Assessment Activities
• Brainstorm as a class to review the basic needs of plants and animals (e.g., air, water, food, sex, adaptations).	• Have students in small groups construct Venn diagrams to compare and contrast needs of local plants and animals and how needs are met. Develop criteria with students for peer assessment (e.g., "One thing I learned from my partner's work was..."; "My partner used these important science words: ..."; "My partner drew diagrams to help make things clear.").
• Conduct a walking field trip to look for connections among plants and other living things. Have students - look for evidence of how humans can show respect for plants - infer why some plants are more abundant than others - suggest how plant resources can be conserved - infer from evidence what and how other living things depend on plants (e.g., chewed leaves, nests).	• Ask students to complete a journal entry listing as many observations as they can on how living things depend on plants. Encourage students to organize observations (written or pictorial) in chart form. For example, divide a journal page into several sections (e.g., food, shelter, camouflage, recreation) and label/draw or write on each section. See also the assessment tool, "My Science Journal."

continued next page

Plant Growth and Changes (continued)

- **Recommended Learning Resources**
  - Activities of Plants
  - Below Zero
  - The Budding Botanist (AIMS Activities)
  - Cycle of Life/Recycle Handbook for Educators
  - Forests in Focus
  - Hands-on Science (Growth and Changes in Plants)
  - The Marsh: Nature's Nursery
  - Once Upon a Seashore
  - One Two Tree
  - Plant Growth
  - Plant Parts
  - Primarily Plants (AIMS Activities)
  - Project WET
  - Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
  - Seeds and Plants
  - Watch It Grow!
  - What Are Plants?

Grade 3 Life Science: Plant Growth and Changes

Prescribed Learning Outcomes

It is expected that students will:

- describe how plants are harvested and used throughout the seasons

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 and illustrate different methods of harvesting (e.g., mechanized, by hand)
- ❑ research and report on how BC Aboriginal peoples use plants for food, medicine, and products

Planning for Assessment	Suggested Assessment Activities
• Find examples of how different plants (e.g., trees, berries, grains, herbs, sea plants) are harvested (e.g., logged, picked, by combine) at various times of the year.	• Have students report their findings using charts, diagrams, illustrations, brochures, including the name of plant, location, use, season, harvested and/or planted, and method of harvesting. Consider assessment criteria such as - student self-checks that all required parts are included (e.g., name of plant, use, season, method of harvest) - student organizes information clearly and appropriately for chosen format (e.g., chart: headings labelled, all columns completed; report: table of contents, index, captions for diagrams) - student demonstrates ability to use resources to find relevant science information.
• Organize field trips, guest speakers, or hands-on activities to have students investigate the use of plants for food, medicine, clothing, furniture, paper, shelter, tools, etc. within a variety of cultures and communities (in historical and contemporary contexts).	• In the case of guest speakers, look for evidence that students: - have generated or asked appropriate and relevant questions - were respectful - understood the relationship between the physical world and the spiritual world - understood the concept of community - understood traditional vs. non-traditional usage. • Use LAPS: **L**isten, **A**sk yourself questions, **P**icture (draw) what you hear, **S**ummarize (retell) what students heard/learned.

continued next page

Plant Growth and Changes (continued)

Planning for Assessment	Suggested Assessment Activities
• Ask students to respond to a First Nations story on how Aboriginal plants are/were used.	• Have students complete compare/contrast charts or journal entries based on the story. A compare/contrast chart could examine then/now uses; a journal entry could relate how the story is important to the listener in terms of a personal experience. Consider focusing students on "Science in Everyday Life" or "Science in My Life."

Recommended Learning Resources

- The Budding Botanist (AIMS Activities)
- Forests in Focus
- Hands-on Science (Growth and Changes in Plants)
- One Two Tree
- Plant Parts
- Primarily Plants (AIMS Activities)
- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
- Seeds and Plants
- Watch It Grow!
- What Are Plants?

GRADE 3 PHYSICAL SCIENCE: MATERIALS AND STRUCTURES

Key Elements: Physical Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have examined the shapes of various structures and tested the materials for those structures.

Materials and Structures

The study of materials and structures begins with the examination of the shape, components, and function of natural and human-built structures. Students investigate and experience the design process as they select and use materials suitable to the task at hand, manipulate and test materials, and build structures. Students discover that the strength and other characteristics of structures they build are linked to the properties of the materials they use, and to the particular way the materials are configured and joined.

Vocabulary

strength, balance, structure, materials, force, gravity, tension, compression, flexible, dome, arch, triangle, pyramid, cylinder, load , fasteners, design, construction

Knowledge

- a structure is any supporting framework that is built to hold a load or enclose a 'space'
- geometric shapes and forms are concepts used to understand and describe natural and human-built structures
- structures are built to withstand the loads and forces acting on them without breaking.
- forces on structures can push, pull, stretch, squeeze, and bend the structure to move
- flexible structures allow some forces to move the structure without breaking
- stable structures are able to support greater loads
- strength and stability can also be achieved by adding width and mass, and by layering materials
- braces hold two or more structures together
- stability of a structure is related to its design (height, width, and base) and to its construction (materials and fasteners); buildings that are short and wide are usually more stable than objects that are tall and narrow
- folding, bending, or bracing can strengthen materials
- most stable structures contain triangle arrangements of the construction materials
- fasteners are used to join materials together

Skills and Attitudes

- recognize geometric shapes and forms
- demonstrate curiosity
- use problem-solving strategies in building simple structures
- use simple tools safely and carefully to build structures
- accept failures as part of engineering discovery
- question, measure, and report procedures and results

Grade 3 Physical Science: Materials and Structures

Prescribed Learning Outcomes

It is expected that students will:

- describe shapes that are part of natural and human-built structures (e.g., domes, arches, pyramids)

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 domes, triangles, arches, pyramids, cylinders in natural and human-built structures
- ❑ illustrate local structures using detailed diagrams, and accurately sort their characteristics (e.g., shapes, components)

Planning for Assessment	Suggested Assessment Activities
• Take a walk through the schoolyard and around the immediate neighbourhood to observe natural and human-build structures. Have students look at examples of structure/ shapes occurring in nature. Examples: bees'/ wasps' nests, seashells, ant/termite hills, birds' nests, houses, etc. Pose the following reflection questions to help students determine what they know about structures - What types of shapes are most common in our environment? - What types of flexible shapes are common? - How do you think structures are made strong and stable?	• Establish criteria for journal entries. Consider whether students - list several observations - use more than one sense - draw quick diagrams as reminders or references - use science language appropriate to topic (e.g., shape words for structure: triangle, oval, cylinder). • Have students make journal entries in an "Engineering Design Book" including sketches. They can assess their own work using a rating scale. Discuss with students the following possible criteria - I used pictures and words to tell about things I learned. - I thought about what I wanted to tell before I put it down. - I told what I learned clearly in words and pictures. - I used the new science words I learned. - I put down important information on shapes and structures.
• Develop a Science Centre. Ask students to collect samples of similar structures found in nature or human-built environments (e.g., bird's nests and baskets, umbrellas and mushrooms, egg shapes and domes, beehives and brick wall) for the Centre. Identify the shapes of each—dome, triangle, arches, weave—and describe reasons why these shapes are important to the collected structures.	• Have students choose an object, identify its basic shape, and build a representative model of the object using modelling clay, straws, toothpicks, etc. Ask students to identify and label these shapes using geometry vocabulary (e.g., triangle, circle, square). Consider the extent to which students can - pick out the main shapes of the structure - count accurately how many of the shape are in the structure (e.g., how many Δs in a swing set) - identify the number of lines, points, and angles are in each shape - determine which is the most important shape in the structure and guess why.

continued next page

Materials and Structures (continued)

Recommended Learning Resources
- Below Zero
- Build It Up
- Hands-on Science (Materials and Structures)

Grade 3 Physical Science: Materials and Structures

Prescribed Learning Outcomes

It is expected that students will:

- compare the effects of different materials, shapes, and forces on the strength and stability of different structures

Suggested Achievement Indicators

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

- ❏ describe and demonstrate construction techniques (e.g., joint construction, strengthening, and stabilizing) using given materials
- ❏ conduct a variety of experiments to test and compare the strength of different structures (e.g., arches, domes, and triangles)
- ❏ accurately measure and report the effects of various forces (e.g., compression, tension, load) on different structures

Planning for Assessment	Suggested Assessment Activities
• Brainstorm several methods for joining two similar pieces of material at their ends (e.g., two straws or two sticks). Have students try some of the brainstormed methods and compare the strength of these various materials when fastened with different methods (e.g., glue, string, tack, tape). • Have students identify variables that will affect an investigation of which fasteners are better for building model structures. In small groups, have students carry out the investigations, record the steps they followed, and record their observations and the conclusions based on their results.	• Ask students these investigative questions about the materials and fasteners - Which materials are easier to joint? - What types of materials and fasteners are rigid and don't allow parts to move? - Which fasteners and materials are flexible and can move or rotate? - What combination of fasteners and materials work best? - Why are some fasteners better suited for some materials than others? • Use an assessment checklist for Investigating Materials and Fasteners. Ensure that the student - makes predictions for rigid, or flexible purposes - develops and carries out a plan - later describes the steps followed - makes and records relevant observations - orders the materials according to strength - draws a conclusion based on observations - works cooperatively.

continued next page

Materials and Structures (continued)

Planning for Assessment	Suggested Assessment Activities
• Use eight sheets of newspaper to roll into eight construction tubes; (best done around a stick, then remove stick). Construct a pyramid with these and 1 meter of masking tape. • After constructing identical tent structures no bigger than 30cm (e.g., triangle, square, pentagon, dome, arch, cube covered in paper), have groups of students test their structures for weakness. They can test for compression with a small load (film cans filled with plasticene make good standardized weights), and tension with elastic stretching pull. Explore ways to improve stability (e.g., better braces, tighter joint fasteners, more triangles). Predict and record results. (Warning: students should avoid testing to the breaking point.)	• For completed newspaper structures, assess by asking - What did you do to get your paper to support itself? - Did your structure (pyramid) stay together when moved or carried? - What joint system worked best for a strong and stable structure? • Have students draw their structures and record predictions, then do tests record the results in their Design Journals. Assess their ability to suggest improvements, such as - add more braces - add more of the same shape - use a greater variety of shapes - make the structure simpler by removing material. - using different fasteners. *continued next page*

Materials and Structures (continued)

Planning for Assessment	Suggested Assessment Activities
• Have students use various materials (e.g., toothpicks, plastic straws, newspaper, cardboard) to make bridges, towers or geometric solids. Test each with various objects according to your main purpose (e.g., to hold a 2 kg load). The quantities of materials should be limited and specified for project construction. Various fasteners may be chosen, but if white glue is used, more success is expected. Allow proper drying time. • Project Ideas – best done in class time - Landing Pad (easy level): build a structure with a 10 x 10 cm base and a height of between 10 and 15 cm high. Can your structure hold a two Kilo weight? - Tallest Tower (medium skill level): build a tall tower with a 5 cm x 5 cm base and is more than 30cm tall. Can you tower stay together when a wind blows or if moved? - Covered Bridge (hard): build a 30cm bridge which is covered in paper and can hold a small weight. The bridge has to carry itself across two desks 25 cm apart. Can your bridge hold 4 film cans filled with plasticene? (approx. 0.5 Kilos)	• After building a 30cm tent structure, students generate criteria for group assessment (e.g., What works? What would we improve? How well did we work together?). Note: to standardize building structures, the materials must be limited by number of pieces or total weight. • Model Project Assessment (1) Landing Pad for helicopters (easy) - A landing pad was built - Base size and height fits within range - Correct number of pieces - Uses joint fasteners explored in class - Holds half weight without breaking - Holds full weight and mostly stays together - Holds 2 Kilo weight successful (2) Tallest Tower (medium) - tower was built and stays together - 30cm high or taller - correct base size - tower stays together when air fan blows - tower stays together when moved and set down - structure uses flexible construction - uses the joint fasteners explored in class (3) Covered Bridges (hard): - a covered bridge was built - looks like a model bridge - is between 27 and 30cm in length - materials and fasteners allowed are used - bridge holds together across 25 cm gap - elastic hook is in middle and hold weight - bridge holds more weight without breaking - bridge holds four weight cans and does not break
Recommended Learning Resources • Below Zero • Build It Up • Hands-on Science (Materials and Structures)	

Grade 3 Physical Science: Materials and Structures

Prescribed Learning Outcomes

It is expected that students will:

- conduct investigations into ways to improve the strength and stability of structures

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 techniques for improving strength and stability (e.g., reinforcing, bundling, and bracing)
- ❑ describe and apply a variety of material-strengthening techniques and methods to improve the design and stability of a given structure (e.g., build a bridge or tower that supports a given load)

Planning for Assessment	Suggested Assessment Activities
• Have students explore ways to fold and combine paper to make it stronger. (Fold into an accordion, make rolls and glue, combine layers or make sandwich layers with folded and rolled paper.) Use a standard load mass to test the strength of each paper configuration. Students describe each paper configuration they used and record the mass it supported. Look for ideas such as the following - folding the paper so that it has pleats (accordion-like) - layering the paper - rolling the paper.	• To assess understanding, ask students - What did you do to get your paper to support a greater load? - How do we use this information in our everyday lives? (e.g., corrugated cardboard)
• Give groups of students the following challenge: Build a bridge that spans 30cm and supports a given mass (e.g., a container of marbles), using only paper and masking tape. Name the bridge. • Have students examine photographs of local or famous bridges. Challenge them to use some of their new engineering knowledge to tell what shapes they see and how these affect bridge function.	• Have students - draw a design plan (blueprint) - identify shapes used to increase strength and stability - explain how materials were improved to increase strength and stability - pick one thing they would change about their bridges and do it. Establish assessment criteria with students. Consider - What mass do we predict our bridges will be able to support? - How did the shapes and materials we used make the bridge stronger? More stable?

Recommended Learning Resources

- Below Zero
- Build It Up
- Hands-on Science (Materials and Structures)

Grade 3 Earth and Space Science: Stars and Planets

Key Elements: Earth and Space Science

Estimated Time: 25 – 30 hours

By the end of the grade, students will have understood various components of the solar system and explained the significance of celestial objects for Aboriginal peoples.

Stars and Planets

This study focuses on the characteristics of stars and planets. Students describe the physical characteristics and components of the solar system: the Sun, planets, moons, comets, asteroids, and meteors. They observe and explain how the relative positions of the Earth, Moon, and the Sun are responsible for the moon phases, eclipses, tides and phenomena such as the cycle of day and night and the yearly cycle of the seasons. They observe and identify familiar patterns of stars and constellations. Students also explore the significance of celestial objects to indigenous peoples.

Vocabulary

seasonal cycle, day/night, sun, star, planet, meteor, comet, orbit, moon, axis, rotate, solar system, Milky Way, galaxy, constellation

Knowledge

- stars are made of burning gases
- the Sun is a star
- other stars are in the sky all the time, but are invisible because the Sun is too bright during the day
- the energy from the Sun is essential for life on Earth (either directly or indirectly)
- planets do not make their own light, but reflect light
- planets revolve around a star
- moons revolve around planets
- comets, asteroids, and meteors are smaller bodies also revolving around stars
- the cycle of day and night is a result of the Earth's rotation about its axis
- the Earth revolves around the Sun once a year
- constellations are groups of stars (humans have imagined pictures and names for these groups)
- the position of these constellations appears to change over the year because our planet travels in a very large orbit around the Sun
- celestial objects have a special significance to Aboriginal peoples

Skills and Attitudes

- demonstrate curiosity about space
- maintain an astronomy journal
- identify patterns based on recorded observations
- identify questions based on recorded data
- distinguish between scientific and cultural information

Grade 3 Earth and Space Science: Stars and Planets

Prescribed Learning Outcomes

It is expected that students will:

- describe characteristics and movements of objects in our solar system

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:

- ❑ prepare a detailed report on the unique features (e.g., location, size, temperature, appearance, length of day) of the planets, asteroids, comets, the Sun, and moon
- ❑ illustrate the solar system (the Sun, nine planets, moons, asteroids, comets, and meteors) using accurate drawings, diagrams, collages, models, electronic presentations, and/or group role play
- ❑ complete a detailed model, with explanations, showing that the Sun is the centre of the solar system, and that it is the source of energy for the Earth

Planning for Assessment	Suggested Assessment Activities
• To represent their understanding of the unique properties of planets, have students research and create a travel brochure to convince people to visit. Provide several sample brochures. Have students complete a draft layout, edit, and present their final brochures.	• To assess the content of student brochures, determine whether or not they have included: - location - size - composition - atmosphere - appearance - unique features/attractions - temperature - gravity - moons - length of day and year - length of traveling time from Earth - distance from the Sun. • To assess how well students have written to communicate their ideas and information, use Assessing a Postcard or Travel Brochure—Teacher Observations (from the BC Performance Standards; Quick Scale).
• Have students use a globe, a flashlight, and a small ball to demonstrate the day and night positions of the Earth, Sun, and moon.	• When students are demonstrating the day and night positions of the Earth, Sun, and moon, look for evidence that they - correctly show the position of Sun, moon, and Earth, in order - use light to demonstrate day and night - show the rotation of the Earth - show that the Earth revolves around the Sun.

continued next page

Stars and Planets (continued)

Planning for Assessment	Suggested Assessment Activities
• Have students role play the positions of the planets around the Sun to show the order and distances of the planets. Relative sizes can be represented with common spherical household objects (e.g., peppercorn, orange, basketball) or cardboard cut-outs done to scale (teacher-made).	• Have students write a journal entry about the activity. Entries could address - "I found____ interesting because ____." - "I was surprised about _____ because ____." - "I want to know about _____." See also the sample assessment tool (**My Science Journal**) provided at the end of this grade.

Recommended Learning Resources
- Our Amazing Sun
- Our Solar System
- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
- Stars and Planets (Pan Canadian Science Place)

Grade 3 Earth and Space Science: Stars and Planets

Prescribed Learning Outcomes

It is expected that students will:
- compare familiar constellations in seasonal skies

Suggested Achievement Indicators

The follow 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 and accurately label the name of constellations on a constellation map
- ❑ create a chart that records how constellations change position in the sky at different times of the year

Planning for Assessment	Suggested Assessment Activities
• Obtain a copy of a northwest seasonal constellation map. Provide students with photocopies of the map with the names of the constellations removed. Ask them to label the ones they can identify. • Tape a copy of a specific constellation on top of foil. Place on cardboard. Poke holes through and place the foil on an overhead. Then have students make a foil-punctured, labelled print of a constellation of their choice.	• When students are demonstrating knowledge of a few constellations, look for the ability to - identify the Big Dipper - notice that Polaris/North Star stays in one spot as all other stars in constellations rotate left to right about Polaris - notice that the position of Orion changes as the season changes.
• Have students read a number of stories about celestial bodies (from Greek myths to Aboriginal traditional stories) and use a graphic organizer to compare commonalities in stories.	• Using charts, T-charts, etc., look for evidence of students' ability to record similarities among the stories they have chosen to compare (e.g., characters, animals, themes such as war or morality).

Recommended Learning Resources
- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
- Stars and Planets (Pan Canadian Science Place)

Grade 3 Earth and Space Science: Stars and Planets

Prescribed Learning Outcomes

It is expected that students will:

- demonstrate awareness of the special significance of celestial objects for Aboriginal peoples

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:

- ❑ generate specific questions in response to an Aboriginal story focusing on celestial objects (e.g., stars, moon, planets, comets, eclipses) and illustrate answers using detailed drawings
- ❑ write their own stories, complete with picture, on a celestial object (e.g., how the moon came to be; why the sun is so hot)

Planning for Assessment	Suggested Assessment Activities
• Have an Aboriginal speaker to share stories of local celestial events. Ask the speaker to focus on how astronomy affected community location, migration, ceremony, agricultural cycles, etc.	• Have students write a thank you letter to the speaker stating at least one thing they learned. • In a follow-up discussion, consider the extent to which students understand - Aboriginal values and beliefs associated with celestial objects - how celestial objects may have influenced Aboriginal cultures - the role of Aboriginal Elders in their communities - the concept and meaning of respect in Aboriginal cultures.
• Ask students to develop their own stories, complete with pictures, or a dramatization of a celestial object (e.g., how the moon came to be; why the Sun is so hot).	• Look for evidence of complete ideas on how something came to be. Criteria could include - title - developed characters - clear plot line (beginning, middle, end).

Recommended Learning Resources

- Science Detective™ Beginning: Higher-Order Thinking, Reading, Writing in Science
- Stars and Planets (Pan Canadian Science Place)

MY SCIENCE JOURNAL

This assessment tool can be used with any activity where students are asked to use their journals.

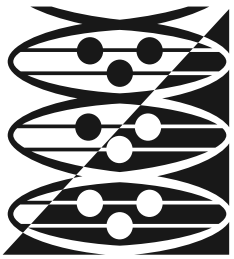
	1 (not yet within expectations)	**2** (meets expectations)	**3** (fully meets expectations)	**4** (exceeds expectations)
Mechanics (date, title, diagrams, labels, organization)	rarely uses dates, titles, labels; diagrams do not include science concepts and not supported by writing	uses dates, titles, labels; diagrams usually include science concepts and are supported by writing	consistent attention to details and appropriate use of diagrams	complete attention to details, plus very clear organization
Science content	rarely uses scientific vocabulary; little or no recording of scientific observations or ideas	occasionally uses scientific vocabulary; some recording of scientific observations or ideas	appropriate and relevant use of most key science words; general understanding of scientific ideas; reasonable observations and reporting of results	appropriate and relevant use of science vocabulary; complete understanding of scientific ideas; detailed observations and reporting of results
Reflective thought (I know/I wonder/I can)	rarely reflects on what has been learned; has trouble expressing thoughts	sometimes reflects on what has been learned; needs to be reminded to "think about thinking"	usually reflects on work, expressing wonder	always reflects on work, expressing wonder and a clear sense of accomplishment

Teacher:

4 = exceeds expectations
3 = fully meets expectations
2 = meets expectations
1 = not yet within expectations

Student:

4 = best expectations
3 = quite good
2 = okay
1 = needs to be better



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.

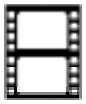
MEDIA ICONS KEY

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.

Audio Cassette

CD-ROM

DVD



Film

Games/Manipulatives

Kit

Multimedia

Music CD

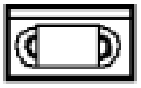
Print Materials

Print Series

Record

Slides

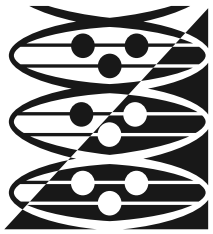
Software



Video

Video Series

Web Site



LEARNING RESOURCES

Grade 3

SCIENCE – GRADE 3
GRADE COLLECTION

Current as of March 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
	Plant Growth and Changes	*Materials and Structures*	*Stars and Planets*
Comprehensive Resources			
There are no comprehensive resources for Grade 3 Science			
Additional Resources – Print			
Below Zero	✓	▒	
The Budding Botanist (AIMS Activities)	▒		
Build It Up (Pan Canadian Science Place)		▒	
Cycle of Life/Recycle Handbook for Educators	✓		
Forests in Focus	▒		
Hands-On Science: Growth and Changes in Plants	▒		
Hands-On Science: Materials and Structures		▒	
Once Upon a Seashore	✓		
Primarily Plants (AIMS Activities)	▒		
Project WET	✓		
Salish Sea	✓		
Science & Technology 3: Plant Growth	✓		
Science Detective™ Beginning: Higher-Order, Thinking, Reading, Writing in Science	▒		▒
Stars and Planets (Pan Canadian Science Place)			▒
Watch It Grow! (Pan Canadian Science Place)	▒		
Additional Resources – Video/DVD			
Activities of Plants	✓		
The Marsh: Nature's Nursery	✓		
Our Amazing Sun			✓
Our Solar System			✓
Plant Parts	✓		
Seeds and Plants	✓		
What Are Plants?	✓		

▒ Indicates satisfactory to good support for the majority of the learning outcomes within the curriculum organizer.
✓ Indicates support for one or more learning outcomes within the curriculum organizer.
Indicates minimal or no support for the prescribed learning outcomes within the curriculum organizer.

	Life Science	Physical Science	Earth and Space Science
	Plant Growth and Changes	***Materials and Structures***	***Stars and Planets***
Additional Resources – Software/CD-ROM			
One Two Tree	✓		

Activities of Plants

General Description:
This 14-minute video and teacher's guide covers the plant life cycle. It is a thorough investigation of photosynthesis, pollination, and fertilization. It is visually stimulating and uses scientific vocabulary appropriate for this age.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

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

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

Telephone: (604) 324-7752

Fax: (604) 324-1844

Toll Free: 1-800-884-2366

Price: $26.00

ISBN/Order No: SC0330

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:
www.env.gov.bc.ca/hctf/wild.htm

Price: $25.00 with workshop

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

Copyright: 2003

Year Recommended in Grade Collection: 2005

The Budding Botanist (AIMS Activities)

General Description:
Book investigates plant life through numerous hands-on activities that integrate math, science, language arts, and social studies. Detailed support materials accompany each project.

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Spectrum Educational Supplies Ltd. (Ontario)*
125 Mary St.
Aurora, ON L4G 1G3
Telephone: (905) 841-0600
Fax: (905) 727-6265
Toll Free: 1-800-668-0600
Web Address: http://www.spectrumed.com

Price: $35.95

ISBN/Order No: 1-881431-40-1/08164

Copyright: 1993

Year Recommended in Grade Collection: 2005

Build It Up (Pan Canadian Science Place)

General Description:
A 32-page user friendly student booklet which is clear, concise and meets Grade 3 prescribed learning outcomes. The teacher's guide has some useful information and activities, and is easy to use. Teachers may buy the accompanying kit items from publisher or may buy them separately. A *Program and Assessment Guide*, as well as an *Integrating Science and Language Guide* are also available for teacher's use.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Scholastic Canada/Les éditions Scholastic*
175 Hillmount Road
Markham, ON L6C 1Z7
Telephone: (905) 887-7323
Fax: (905) 887-1131
Toll Free: 1-800-268-3860/1-800-625-858
Web Address: www.scholastic.ca

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

ISBN/Order No: Student Text: 0-7791-0028-X
Teacher's Guide: 0-7791-3499-0

Copyright: 2000

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

Forests in Focus

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

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Wild BC*

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

Telephone: (250) 356-7111

Fax: (250) 952-6684

Toll Free: 1-800-387-9853

Web Address:
www.env.gov.bc.ca/hctf/wild.htm

Price: $26.00
$22.00 with workshop

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

Copyright: 1999

Year Recommended in Grade Collection: 2005

Hands-On Science: Growth and Changes in Plants

Author(s): *Lawson, J. et al.*
General Description:
This 76-page teacher's guide offers activities, experiments, diagrams and background knowledge for the study of plants. It does not cover the prescribed learning outcomes for Grade 3 thoroughly, but is an easy to use and age appropriate resource that uses excellent scientific investigation.

Caution: *Poor quality binding/cover, paper and visuals.*

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Portage & Main Press*

100 - 318 McDermot Avenue
Winnipeg, MB R3A 0A2

Telephone: (204) 987-3500

Fax: 1-866-734-8477

Toll Free: 1-800-667-9673

Web Address:
www.portageandmainpress.com

Price: $22.00

ISBN/Order No: 1-894110-88-9

Copyright: 2001

Year Recommended in Grade Collection: 2005

Hands-On Science: Materials and Structures

Author(s): *Lawson, J. et al.*
General Description:
This teacher guide offers nine activities that support all of the physical and process prescribed learning outcomes for Grade 3. They are well organized, age appropriate, and use scientific methods. Assessment and foundation skills are covered in the first half of the resource.

Caution: *Poor quality binding, cover, paper and visuals.*

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Portage & Main Press*

100 - 318 McDermot Avenue
Winnipeg, MB R3A 0A2

Telephone: (204) 987-3500

Fax: 1-866-734-8477

Toll Free: 1-800-667-9673

Web Address:
www.portageandmainpress.com

Price: $22.00

ISBN/Order No: 1-894110-57-9

Copyright: 2001

Year Recommended in Grade Collection: 2005

The Marsh: Nature's Nursery

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

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

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Magic Lantern Communications (Ontario)*

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

Telephone: (905) 827-2755

Fax: (905) 827-2655

Toll Free: 1-800-263-1717

Price: Not available

ISBN/Order No: Not available

Copyright: 1988

Year Recommended in Grade Collection: 2005

Once Upon a Seashore

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

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *BCTF Lesson Aids Service*

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

Telephone: (604) 871-2182

Fax: (604) 871-2295

Toll Free: 1-800-663-9163

Web Address:
http://www.bctf.bc.ca/lessonaids

Price: Not available

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

Copyright: 2001

Year Recommended in Grade Collection: 2005

One Two Tree

General Description:
A cross-curricular CD-ROM learning resource which teaches young learners about trees. It offers in-depth information while allowing for integration of math, language arts, and art. Games can be played independently or with a partner. Animated real footage of animals, as well as photographs of various stages of tree parts growth (buds, leaves, etc.) add to the interest of the activity. Extensive teacher support package is provide.

System Requirements:
Macintosh: Power PC; 8 to 16 Mb RAM; Colour Monitor with SVGA Graphics (256 colour and 640 x 480 screen resolution), 4x CD-ROM Drive, 8 bit Sound Card, Quick Time 2
Windows: IBM Pentium PC, 8 to 16 Mb RAM, Colour Monitor with SVGA Graphics (256 colour and 640 x 480 screen resolution), 4x CD-ROM Drive, 8 bit Sound Card, Quick Time 2

Grade Level:

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

Supplier: *Icon Media Productions Inc.*

19165 Loyalist Parkway
RR3
Consecon, ON K0K 1T0
Telephone: 613-399-3957
Fax:
Web Address: www.iconmedia.net

Price: Windows CD: $32.00
Macintosh CD: $32.00

ISBN/Order No: Not available

Copyright: 2002

Year Recommended in Grade Collection: 2005

Audience: *General*

Category: *Student, Teacher Resource*

Our Amazing Sun

General Description:
This 25-minute video examines many aspects of the star that is the center of our solar system, the Sun. It examines all aspects and activity of the Sun and its far reaching effects, especially on Earth. Aboriginal historical perspectives of the Sun are included. Visuals are current and close-up photography reveals fascinating phenomena occurring on the Sun's surface. The scope and depth of topic go beyond this age level, but presentation is clear and easily understood. Script is included for follow-up. Support material includes questions, simple activities, and a glossary.

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: Not available

ISBN/Order No: 76814

Copyright: 2004

Year Recommended in Grade Collection: 2005

Audience: *General*

Category: *Student, Teacher Resource*

Our Solar System

General Description:
This 15-minute video and support material present the characteristics and movements of the objects in our solar system in an engaging and efficient manner. It is visually stimulating and uses abundant scientific vocabulary concisely.

Caution: *Imperial and Metric measures used.*

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Canadian Learning Company Inc.*

95 Vansittart Avenue
Woodstock, ON N4S 6E3

Telephone: (519) 537-2360

Fax: (519) 537-1035

Web Address: www.canlearn.com

Price: $39.95

ISBN/Order No: 1-2286F-1#32

Copyright: 1999

Year Recommended in Grade Collection: 2005

Plant Parts

General Description:
This video and teacher's guide are a thorough investigation of the parts of a plant and their functions with appropriate scientific vocabulary. The video is well developed and sequenced. Visuals are age appropriate, and video fosters and encourages asking questions, which is one of the Science processes for this grade.

Caution: *Support material is slightly high for Grade 3 reading and writing levels.*

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

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

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

Telephone: (604) 324-7752

Fax: (604) 324-1844

Toll Free: 1-800-884-2366

Price: $26.00

ISBN/Order No: SC0336

Copyright: 2003

Year Recommended in Grade Collection: 2005

Primarily Plants (AIMS Activities)

General Description:
Book investigates plant growth, seeds and spores, plant needs, and plant parts through 26 hands-on activities that integrate math, science, language arts, and social studies. Detailed support materials accompany each project.

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

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

125 Mary St.
Aurora, ON L4G 1G3

Telephone: (905) 841-0600

Fax: (905) 727-6265

Toll Free: 1-800-668-0600

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

Price: $35.95

ISBN/Order No: 1-881431-24-X/20124

Copyright: 1990

Year Recommended in Grade Collection: 2005

Project WET

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

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

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Wild BC*

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

Telephone: (250) 356-7111

Fax: (250) 952-6684

Toll Free: 1-800-387-9853

Web Address:
www.env.gov.bc.ca/hctf/wild.htm

Price: $30.00 with workshop

ISBN/Order No: Not available

Copyright: 1995

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

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 & Technology 3: Plant Growth

General Description:
This set includes a 42-page student booklet and teacher's guide. It is a clear and concise resource that covers the Grade 3 Life Science outcomes. The books are user-friendly for both student and teacher. Science content is well developed and processes are emphasized.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Pearson Education Canada*

26 Prince Andrew Place
Don Mills, ON M3C 2T8

Telephone: (416) 447-5101

Fax: 1-800-563-9196

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

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

Price: Not available

ISBN/Order No: Student Text: 0-201-64976-4
Teacher's Guide: 0-201-65424-5

Copyright: 2000

Year Recommended in Grade Collection: 2005

Seeds and Plants

General Description:
This 15-minute video and support material effectively covers two of the learning outcomes for plant growth and changes. It is clear, engaging, and contains extensive scientific vocabulary. Video could be used in 'chunks' or as a whole.

Audience: *General*

Category: *Teacher Resource*

Grade Level:

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

Supplier: *Canadian Learning Company Inc.*

95 Vansittart Avenue
Woodstock, ON N4S 6E3

Telephone: (519) 537-2360

Fax: (519) 537-1035

Web Address: www.canlearn.com

Price: $39.95

ISBN/Order No: 1-2288F-1#7

Copyright: 2000

Year Recommended in Grade Collection: 2005

Stars and Planets (Pan Canadian Science Place)

General Description:
The 32-page student book and 102-page teacher's guide thoroughly cover the learning outcomes for the Grade 3 Earth and Space Science curriculum. This package offers the teacher a complete program including activities, experiments, blackline masters, assessment, extensions, and clear, concise information.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Scholastic Canada/Les éditions Scholastic*

175 Hillmount Road
Markham, ON L6C 1Z7

Telephone: (905) 887-7323

Fax: (905) 887-1131

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

Web Address: www.scholastic.ca

Price: Student Text: $7.00
Teacher's Guide: $33.00
Program and Assessment Guide: $45.00

ISBN/Order No: Student Text: 0-7791-3500-8
Teacher's Guide: 0-7791-3501-6
Program and Assessment Guide: 0-7791-0091-3

Copyright: 2005

Year Recommended in Grade Collection: 2005

Watch It Grow! (Pan Canadian Science Place)

General Description:
This 32-page user-friendly student booklet and the teacher's guide cover all Grade 3 Life Science learning outcomes. Text and visuals are clear and concise. Teachers may buy the accompanying kit items from publisher or may buy them separately. A *Program and Assessment Guide,* as well as an *Integrating Science and Language Guide* are also available for teacher's use.

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

Supplier: *Scholastic Canada/Les éditions Scholastic*

175 Hillmount Road
Markham, ON L6C 1Z7

Telephone: (905) 887-7323

Fax: (905) 887-1131

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

Web Address: www.scholastic.ca

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

ISBN/Order No: Student Text: 0-7791-0025-5
Teacher's Guide: 0-7791-3498-2

Copyright: 2000

Year Recommended in Grade Collection: 2005

What Are Plants?

General Description:
This 14-minute video fully meets the requirements of Grade 3 prescribed learning outcomes for Life Science in an engaging manner that is age/grade appropriate. Visuals are colourful and will enhance investigations. The script appears at the bottom of the screen throughout video, and is followed with a summary and a follow-up quiz. Support material is appropriate.

Caution: *Script appears on screen throughout video*
Would use in segments, a lot of information is presented quickly
American accent

Audience: *General*

Category: *Student, Teacher Resource*

Grade Level:

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

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

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

Telephone: (604) 324-7752

Fax: (604) 324-1844

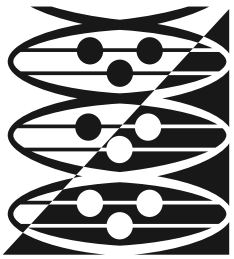
Toll Free: 1-800-884-2366

Price: $26.00

ISBN/Order No: SC0338

Copyright: 2003

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 detrivores.

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.

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.

N

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 though 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 electromagnet 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 dissolved 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.

QP 427504