Geography 10

Guide

NOVA SCOTIA
NOUVELLE-ÉCOSSE

1996

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Geography 10

Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

Geography 10

Curriculum Guide No. 143
1996

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Geography Grade 10

GEO 10

Teaching Guide No. 143
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Introduction

COURSE DESCRIPTION

The grade 10 geography course deals with physical geography. The course is divided into two sections: the Graphic Environment, and the Physical Environment.

Throughout Part A, "The Graphic Environment", students are helped to develop an understanding of and practical experience in constructing, using, and interpreting some of the image, map and graph skills commonly used by geographers to analyse the environment.

Part B, "The Physical Environment", deals with the various land, ocean, and atmospheric processes that are at work sculpting the face of Earth, as well as illustrating that Earth's ecosystems are in delicate balance and require careful global stewardship.

Part A — The Graphic Environment

Unit 1: Data Collection
Unit 2: Data Processing and Representation
Unit 3: Data Interpretation and Utilization

Part B — The Physical Environment

Unit 1: Geographic Perspective
Unit 2: Land Environment
Unit 3: Ocean Environment
Unit 4: Atmospheric Environment
Unit 5: Spaceship Earth

Geography Grade 10 in the High School Program

The Grade 10 Physical Geography Course is a foundation for the senior high geography program. The skills, techniques, and content provided through this course will, as background, best prepare students to complete effectively the Grade 11 Canadian Thematic and Regional Geography course and the Grade 12 Global Geography course. Student enjoyment and the degree of future success in the senior high geography program will be enhanced through the completion of this first level geography course, Physical Geography 10.

RATIONALE FOR THE STUDY OF PHYSICAL GEOGRAPHY

The latter decades of the twentieth century have revealed to humans, more clearly than ever before, that ours is an interdependent world. This interdependence comes in a variety of disguises, one of the most notable being the cohesiveness of the global environment.

The impact that our decisions inevitably have on the environment requires us to have a thorough knowledge and understanding of the landscape, the oceanscape, the atmosphere, and the processes within them at work on the planet. Humans must be particularly vigilant in striving to understand their place on Earth and within these processes. Human development is an integral part of the natural world. Humanity chooses to change the face of the landscape to suit its special needs; under other circumstances, humanity itself adapts to better meet the constraints of more challenging environments.

Throughout this relationship we must strive to identify right and wrong action, to foster values and attitudes that will encourage positive action, helping to ensure the continuity of Earth as a habitable planet. A study of physical geography addresses these goals.

Physical geography describes and applies spatial information. On the one hand, it studies

the physical features of the planet: the lands, the seas, the air, their patterns of distribution, and the dynamic forces of formation and modification. Because it is not solely a study of these physical components, physical geography also involves systems of information gathering, processing, representation, and application. Implicit within the pursuit of these objectives is the practice of skills, the use of tools, and the application of methods.

Landscape formation and geographic information gathering are the focus of the physical geography curriculum. It has inherent value for a wide variety of students in Nova Scotia. Physical geography is one very concrete opportunity for all students to validate their knowledge of their physical community in reference to self.

Our everyday lives are directly linked to the physical environment. Ice conditions in the Gulf of Saint Lawrence, monster storms of the North Atlantic's hurricane season, the ravages of earthquakes, satellite weather maps on the supper time television news, bar graphs describing desertification, all of these geographic realities regularly confront the media-consuming young Nova Scotian. To engage in geographic study will enable them not only to become more "geographically literate" by becoming better users of geographic information and better appliers of geographic knowledge and skills.

Broad Curriculum Outcomes

Upon completion of this course it is expected that students will be able to

- demonstrate a knowledge of the planet's three major physical components: the atmosphere, the sea, and the land
- recognize and identify basic landforms
- demonstrate a knowledge of the planet's natural regions, their distribution, and spatial relationships
- demonstrate a knowledge and understanding of the dynamic forces that both form and modify the physical components of the Earth
- demonstrate an understanding that geographic ideas and explanations have evolved over time and that these processes continue today
- demonstrate a variety of scientific methods used in geographic studies
- demonstrate field studies methods and other means of collecting geographic data
- analyse maps, graphs, photos, images and other forms of geographic data representation
- portray, by some illustrative method, the information collected about a geographic phenomenon or environment
- exhibit an awareness of humanity's relationship with the natural environment
- develop and demonstrate a perspective of the planet as fragile where policy and development decisions have a global impact
- recognize and operate within the five themes of geography

PROGRAM ADAPTATIONS AND IPPS

Curriculum must be adapted to meet the varying rates, patterns, and needs of all students from elementary through senior high school.

Some students will be able to reach provincial outcomes through changes in teaching strategies, classroom organization and evaluation techniques. When these changes are not sufficient for a student to meet designated outcomes, an individual program plan must be developed.

The *Special Education Policy Manual (1996)* further elaborates on program adaptation:

Teaching practice necessarily includes the use of a variety of teaching strategies to enable students to meet or to extend their learning beyond the designated outcomes. The manipulation of additional variables, such as time, classroom organization, and evaluation techniques will also be necessary to meet individual student needs. Provided the designated outcomes are not substantially altered, these procedures do not require an individual program plan, although specific changes should be documented in the student's cumulative file, e.g., oral evaluation in place of written evaluation, curriculum compacting.

When the manipulation of instructional variables is not sufficient to address student needs in the context of the prescribed curriculum, the program planning team is responsible for the development of an individual program plan. Program plans should be developed in the context of the broad curriculum outcomes for each core program. For students whose special needs include non-academic areas, the individual program plan should detail the outcomes involved and the supports and services needed to enable the student to reach these outcomes. (See Special Education Policy Manual, 1996).

The Five Themes of Geography

Adated from National Geography Standards: Geography for Life. Geography Education Standards Project (1994)

There are many definitions of geography, but in simple terms, it is the study of Earth as the home of humankind. The discipline of geography considers the planet itself (physical geography) and the ways in which humans interact with it (human geography).

Geography is a particular way of looking at Earth and not simply an inventory of its contents. This viewpoint rests on a number of fundamental and interlocking concepts. Geographic concepts are reference points and guides in our inquiry into the nature of our world. Key concepts emerging from the traditions of the discipline include (1) location, (2) place, (3) human-environmental interaction, (4) movement, and (5) region. Because these geographic concepts have influenced the organization of Nova Scotia's geography curriculum, and since they can provide direction and meaning to the inquiring student, this introduction to the course provides a description of each concept. Examples from the course study units are cited to illustrate these concepts.

Note to teachers: The Global Geography guide uses slightly different themes to gain a geographic perspective. The themes used in this guide are based on the five themes of geography recognized by the National Geographic Society. A sixth theme, culture, is often used by geographers to explain the world in geographic terms.

LOCATION

Everyone and everything occupies a place on Earth. Each localized phenomenon can be described in reference to an Earth grid, absolute location, and reference to other phenomenon, relative location. "Where is it?" is an important geographic question. The geographer also seeks to answer such locational questions as "Why is it there?" and "What is the importance of it being there?" Physical Geography 10 should enhance a student's ability to determine and describe location and to understand the significance of location.

Illustrative Example

Most major urban centres of the world are located along coastal areas or on waterways. The defensive site origin of Halifax on the slope of a glacial drumlin beside a deep, ice-free harbour serves as a good example.

Key Ideas

A. Absolute Location

latitude/longitude

- 44N 63W
- specific address
- Black Cultural Centre,
  1149 Main Street
  Dartmouth, NS

B. Relative Location

- Use of land marks, e.g.,one mile past the sports centre
- Time reference, e.g., about ten minutes from here along route one.
- Compass direction, e.g., travel in a northwest direction until you reach the highway.

Learning Opportunities

- Trace the path of a hurricane by using specific grid references.
- Locate notable volcanoes using grid references.

- Use computer programs (*Where in the World is Carmon San Diego*) to establish both absolute and relative locations.
- Use angular bearings to establish relative location of features on a map.
- Construct a map of your route to school using major landmarks.
- Identify the origin of ethnic groups by referencing place names on a map.
- Use pictures or points of reference to "Name That City."
- Survey students to gain their perspective on location.

PLACE

Place is defined or distinguished by physical and human characteristics. The physical domain comprises a number of spheres that give character and dimension to place. Overlapping spheres (biosphere, lithosphere, atmosphere, hydrosphere) figure prominently in the description of landforms, climate, water bodies, and ecological systems. More basic traits of size, population trends, patterns, and economics identify the complexity of relationships between people and the environment. Human characteristics also illustrate the nature of place - the validity, realness and essence of place are contributed to through a recognition of culture, religion, and ethnic diversity.

Illustrative Example

A light steady drizzle fell as Annu watched the bustle of activity in the market place. Delicious aromas of coffee filled the air as people chatted and laughed in the courtyard. A continuous flow of goods from the ships along the dock kept pace with market transactions.

Illustrative Example

British Columbia has a mean annual rainfall of 2500 millimetres. These climatic conditions allow for the growth of a temperate rainforest along the coast.

Learning Opportunities

- Using a series of overlays, construct a model design of a specific place. Include physical features (lakes, rivers, mountains), cultural features, (parks, schools), and transportation routes (rail, airports, power lines).
- Create an overlay depicting climate, soils, vegetation and agriculture.
- Design a map using isohyets to depict precipitation and isotherms to depict temperature.
- Use double bar graphs to illustrate climatic traits.
- Use a double line graph to show the flow of water from rivers to lakes and analyse input fluctuations.
- Describe the cultural identity of the place
- Construct a choropleth map of population density.
- Construct population pyramids, by age and gender.

HUMAN/ENVIRONMENTAL INTERACTION

In its broadest sense, the environment refers to the total mix of physical and biotic phenomena on, within, and surrounding the planet. Humans both live in and form part of Earth's environment. Humans act upon and change the environment as they use it. Similarly, the environment exerts real influence on humans and their activities. The effects of interaction between humans and their environment, together with responsible planet management, are fundamental components of this physical geography course.

Human/environmental interaction consists of three basic concepts:

- Dependence

Gold mining is a primary industry in Africa.

- Adaptation
  Canadians adapt to the harsh climate by wearing warm clothing.
- Modification
  Canals were constructed to divert water from rivers to irrigate the desert.

Illustrative Example

The industrial build-up in the Great Lakes Lowlands has produced much wealth for the region. The Lakes have met industrial and urban demands for power, for transportation, for coolants, and for waste disposal. The region now bears grim signs that the environment has been harmed by human actions. International agreements between Canada and the United States on the use of the Lakes have attempted to rectify this problem.

Learning Opportunities

- Identify ways humans adapt to their physical environment (e.g., climate/landforms).
- Poll students to see how they have adapted to the school environment, and how the school environment has adapted to them.
- Examine lifestyles and note the differences in adaptations to similar climate and landforms.
- Generate a chart of economic activities of a selected city or province.
- Create a bar graph ranking occupations.
- Locate environmental disasters on a map, using symbols to depict the nature of the disaster.
- Describe changes to the environment related to an oil spill.
- Use a series of case studies to monitor problems related to ozone depletion.
- Record and evaluate changes to the planet as a result of the greenhouse effect.
- Examine policies and technology transferred from the developed nations to developing nations and record unintended effects.
- Examine changing attitudes on "renewable resources".
- Use *PC Globe* to gather information to study the relationship between people and the topography.

MOVEMENT

Movement is the lifeline connecting all facets of communication and planetary interdependence. Goods and people are moved along a vast transportation corridor that links the world. Ideas, fashion, and architecture are part of a web that radiates to all parts of the globe. Human beings criss-cross the world, impacting cultures and initiating societal changes.

What moves?
- people
- ideas
- goods
- architecture
- fashion
- foods

Illustrative Example

The concept of Perestroika and Glasnost revolutionized the Soviet Union, leading, in part, to the demise of the communist regimen and the Soviet Union. The idea of "freedom and liberty for all" was also expressed by the people of Germany as the Berlin Wall fell.

Learning Opportunities

- Construct a ystems flow chart of exports around the globe.
- Design a flow chart for peak traffic periods.
- Illustrate the transportation routes of Air Canada.
- Develop a map depicting migration routes by ethnic background.

- Compare architectural styles across the globe. How many styles are reflected in Nova Scotia in architecture?
- Use the yellow pages to analyse the impact of food styles on western culture.
- Use an organizer to represent how media transport ideas.
- Use charts to determine the number of countries that export Coca-Cola.
- Use the Internet to travel the world.
- Discuss the source countries of food styles.

Region

A region is a distinctive part of Earth defined according to some particular criterion or set of criteria. As such, the concept of region is a construct people use to comprehend similarities and differences on the planet's surface. The distinctive character of a region may be based on uniformity within a physical landscape (rainforests), or the resource base (Corn Belt), or its political structure (European Economic Community). Geography students should be encouraged to see broad patterns of similarities and differences, which in turn, will provide manageable and meaningful sub-divisions for focussed inquiry.

Illustrative Example

The Far North is one of Canada's least developed and most challenging environments. A vast and sparsely populated region, it holds great potential for future exploitation because of its immense resource base. The possible negative impacts development may have on the fragile environment of the Far North illustrate the need to have a good understanding of physical processes before development takes place.

Learning Opportunities

- Plot the major biomes of the world on a map.
- Use a map of Canada to depict the physical regions.
- Identify regions within your school building and school yard.
- Map the pop cultures within your school.
- Use the concept of "cultural interpretation of space" to show physical boundaries of space between people as they interact within Canada's context.
- Locate ethnic regions within a city (e.g., Toronto).
- Identify regions of seismic activity.
- Examine patterns of regional development.
- Select an event (historical, environmental, etc.) and use this event as a vehicle to present the five themes in geography.
- Discuss a notable volcano in terms of the five themes.

Essential Graduation Learnings and Geography Grade 10

In 1994, the Atlantic provinces invited the public to contribute, through various provincial consultative processes, to the selection of the abilities and the areas of knowledge that they considered essential for students graduating from high school. Following consultation, essential graduation learnings were identified for all students in the Atlantic provinces. It is recognized that provinces may add additional essential graduation learnings as appropriate.

Essential graduation learnings provide a consistent vision for the development of a coherent and relevant core curriculum. The essential graduation learnings statements offer students clear goals and a powerful rationale for school work. They help ensure that provincial education systems' missions are met by design and intention. The essential graduation learnings statements are supported by curriculum outcomes. Both are described below.

Essential Graduation Learnings are statements describing the knowledge, skills, and attitudes expected of all students who graduate high school. Achievements of the essential graduation learnings will prepare students to continue to learn throughout their lives. These learnings describe expectations, not in terms of individual school subjects, but in terms of knowledge, skills, and attitudes developed throughout the curriculum. They confirm that students need to make connections and develop abilities across subject boundaries if they are to be ready to meet the shifting and ongoing demands of life, work, and study today and in the future. Essential graduation learnings are cross-curricular, and curricula in all subject areas are focussed to enable students to achieve the learnings. Essential graduation learnings serve as a framework for the curriculum development process.

Curriculum outcomes statements articulate what students are expected to know and be able to do in particular subject areas. These outcomes statements also describe the expectations at a particular grade level. Through the achievement of curriculum outcomes, students demonstrate the essential graduation learnings.

Graduates from the public schools of Atlantic Canada will be able to demonstrate knowledge, skills, and attitudes in the following essential graduation learnings:

Aesthetic Expression

"Graduates will be able to respond with critical awareness to various forms of art and to be able to express themselves through the arts."

GEO 10 students will be able to, for example,

- use various art forms within the graphic environment (e.g., sketches, geopoems) to present ideas, perceptions, and feelings
- construct collages that represent and delineate perspectives within the cultural mosaic
- demonstrate an understanding of ideas, perceptions, and feelings of others by modelling role-playing scenarios (e.g., environmental meetings to determine cause of contaminated water)
- recognize that experiential education through cultural resources (e.g., theatres, museums, galleries, libraries, cinemas) is a valid extension of classroom activity (e.g., examine rocks and minerals at a local museum or view geographic phenomenon, (e.g. tornadoes in cinema format.)

CITIZENSHIP

"Graduates will be able to assess social, cultural, economic, and environmental interdependence in a local and global context."

GEO 10 students will be able to, for example,
- demonstrate an understanding of the impact of pollution on watersheds and the implications for local communities
- represent political, social, and economic interdependence in a tourist region through graphs, charts, etc.
- demonstrate an understanding of issues pertaining to deforestation of the rainforests from a local and global perspective
- demonstrate an understanding of desertification on the global level.

COMMUNICATION

"Graduates will be able to use the listening, viewing, speaking, reading, and writing modes of language(s) and mathematical and scientific concepts and symbols, to think, learn and communicate effectively."

GEO 10 students will be able to, for example,
- view maps, satellite images or air photos to interpret human relationship
- use the specific language of geography to describe the effects of the atmosphere on land-sculpting processes

PERSONAL DEVELOPMENT

"Graduates will be able to continue to learn and to pursue an active healthy lifestyle."

GEO 10 students will be able to, for example,
- demonstrate an understanding of the rationales for becoming members of environmental organizations.
- evaluate the effectiveness of environmental programs operating in the community.
- demonstrate social skills by working in groups to achieve a collaborative goal

PROBLEM SOLVING

"Graduates will be able to use the strategies and processes needed to solve a wide variety of problems, including those requiring language, and mathematical and scientific concepts."

GEO 10 students will be able to, for example,
- use air photos, satellite images, geological maps, etc., to select a site for nuclear waste
- create an imaginary island and solve the problems of land use distribution
- use Spearman's rank correlation coefficient strategy to establish the mathematical relationship between infant mortality and access to safe drinking water, or GDP per capita and level of Co^2 emissions

TECHNOLOGICAL COMPETENCE

"Graduates will be able to use a variety of technologies to demonstrate an understanding of technology applications, and apply appropriate technologies for solving problems."

GEO 10 students will be able to, for example,
- conduct a data search on volcanoes, using a variety of computer technology (e.g., ProQuest, electronic encyclopaedias, Internet)
- demonstrate a competency in software programs (e.g., *Sim City, PC Globe*)
- analyse the impact of technology on the workplace by generating a number of graphs and interpreting the data
- examine the expression, "It's a small world", in reference to the rapid transfer of knowledge via satellite

Assessment

A FRAMEWORK FOR ASSESSMENT

Assessment is the process of gathering information about a student's knowledge and skills. Effective assessment should

- promote learning
- use multiple sources of information
- provide fair, valid, and reliable information
- empower the learner

The assessment program should reflect the *full range* of student learning in Physical Geography 10; therefore, assessment involves the use of a *variety* of information-gathering activities and strategies that

- allows teachers to address students' diverse backgrounds, learning styles, and needs
- allows students a variety of opportunities to demonstrate their learning

This variety of assessment activities and strategies should

- enable teachers to assess student performance on specific tasks
- provide information about *how* students learn as well as *what* they learn
- take into consideration students' abilities both to learn and to *apply* their learning
- enable teachers to observe overall performance
- provide multiple indicators of student performance
- reflect course emphasis on hands-on, active learning
- enable students to discover their own interests, strengths, and weaknesses in geography-based curriculum
- engage students in assessing, reflecting upon, and improving their own learning
- encourage students to take responsibility for their own growth
- engage students in assessing their own and others' teamwork skills in group projects
- recognize the applicability of multiple intelligence

Purposes

Information about student performance may be used by teachers, students, and others for a variety of purposes that include the following:

- making instructional decisions
- monitoring student progress
- improving, reinforcing, and extending student learning
- making judgments about student achievement
- communicating with students, parents and other audiences to describe student progress and report on student achievement
- setting goals for future learning
- evaluating program effectiveness
- exploring instructional strategies for students who require additional planning to meet outcomes.

Focus on Outcomes

The focus on outcomes requires that teachers

- continually assess individual students' progress in relation to provincial or individual program plan outcomes
- use appropriate resources and strategies to facilitate and improve each student's learning
- ensure that students have a clear understanding of learning outcomes of what they are expected to *know* and *be able to do*
- make assessment criteria explicit in advance of assessment activities to ensure that students (and their parents/guardians) have a clear understanding of how learning will be assessed
- discuss with students, at frequent intervals, their progress toward achievement of outcomes

- use assessment results to guide any instructional changes needed to enable students to achieve expected learning outcomes
- periodically review individual program plans

Balance

Assessment must take into account *all* aspects of learning and expected outcomes of learning in Physical Geography (GEO 10).

One important outcome of the Geography 10 program, for example, is that students should be able to *use* a geographic perspective to solve real-world problems. Assessment activities should reflect this *hands-on* emphasis on active learning in GEO 10. For example, since 40 to 50 percent of the course time involves hands-on co-operative learning experiences, assessment should be reflective of the same experiences.

Similarly, weighing of marks for assignments, projects, test/examination items, etc., must correspond to the relative importance of specific curriculum outcomes of the GEO 10 course.

Assessment and Instruction

Assessment should be considered an integral, routine part of ongoing classroom and lab activity, not an interruption of it. Assessment is part of the learning process, not an event at the conclusion of instruction.

Effective teachers
- use assessment at the beginning of instruction to determine students' prior knowledge
- use assessment during instruction to help them adjust their teaching based on the learning needs of their students
- make assessment criteria explicit to serve as a focus for both instruction and assessment
- plan assessment strategies at the same time as instruction to ensure that assessment activities are compatible with instructional approaches
- help students to develop habits of higher-order, reflective, and critical thinking through the use of appropriate questions
- use assessment results to reflect on the effectiveness of their instructional methods
- participate in "individualized education/program planning" in a team context

Reporting

Assessment reports should be clear, accurate, and of practical value to students and their parents/guardians in guiding follow-up. To stimulate and reinforce improved performance, reports should be accurate and balanced in their descriptions of strengths and weaknesses of students so that strengths can be built upon and problem areas addressed.

The focus should be on learning outcomes and the types of performance that represent and promote achievement of, or progress toward, achievement of those outcomes.

ASSESSMENT ACTIVITIES AND STRATEGIES

Using performance assessment, teachers are able to observe directly the *application* of knowledge and skills. Performance assessment in geography related studies focuses on the *process* as well as the *product*. It involves
- presenting students with a cartographic problem, project, or investigation
- observing what students do and say, watching for selected/particular characteristics, and making anecdotal records
- interviewing students during or after the task, problem, project, or investigation
- developing and applying criteria to assess student performance (using scoring tools

such as rubrics, rating scales, task-specific guides, checklists)
- developing criteria for product assessment to provide students with a clear focus on requirements and expectations to guide their work
- examining what students produce and applying criteria to assess what they actually know and can do
- identifying future instructional and learning needs
- relating performance to what is known about the student's special needs and abilities

Observations of a student's classroom performance and completion of tasks, together with student-teacher reflection on the learning involved, can provide specific information for assessment of progress that can be used by teachers to design and revise instructional approaches and by students to improve, reinforce, and extend their learning.

Performance assessment gives information about a student's ability to
- use geographical-related concepts, skills, and language
- raise questions
- reason logically
- think flexibly, changing strategies when a particular approach does not work
- actively accomplish complex and significant tasks
- use prior knowledge, recent learning, and relevant skills
- use software applications for a range of purposes
- apply skills to interpret new situations
- design and conduct environmental investigations
- work with partners or small groups
- persist, concentrate, and work independently
- solve realistic or authentic problems

Problem Solving

Projects and investigations involve explorations of geographic concepts and perceptions that help students to make connections to other curricular areas, and to pose and solve real-world problems. Projects and investigations give information about a student's ability to
- identify and define a problem
- create a plan
- test and revise a plan
- collect, record, and organize needed information
- discuss, review, revise, explain, and report solution(s)

Projects and investigations allow students to demonstrate their
- creativity and initiative
- group participation skills in leadership and co-operation
- persistence and thoroughness
- flexibility and open-mindedness
- willingness to go beyond the problem/task

Listening and Observing

Listening to students, observing them as they function in the classroom and lab, and making sense of what they say and do provide daily opportunities for informal assessment.

Systematic, ongoing listening to and observation of students provides information about students'
- thinking processes
- preferred learning styles
- persistence
- attitudes toward geographic themes and standards
- feelings about themselves as learners and as participants in the learning process
- specific areas of strength and weakness
- development and understandings of concepts, procedures and routines

- attitudes toward legal and ethical aspects of textual information (e.g., copyright, plagiarism, privacy of information)
- independent problem-solving abilities
- work habits
- social development (e.g., ability to work collaboratively and co-operatively)

Similarly, interviews and conferences with students are valuable sources of such information. Teachers may find it helpful over time to use checklists, questions, and/or learning logs to focus and guide observation, interviews, conferences, and record keeping.

Oral and Written Communication Tasks

Oral and written communication are important aspects of assessment in geography-related studies, involving students in talking and writing, both for self-clarification and for communication with others.

Oral communication tasks, for example, may require students to

- define problems, tasks
- describe and explain procedures or strategies
- articulate their thought processes
- synthesize and summarize their own or their group's thinking
- reflect on their learning processes and experiences

Focussed writing tasks should address a range of purposes and audiences and include a variety of forms. Such tasks may include

- learning logs/journals (e.g., what I did, what I learned, what questions I still have)
- a variety of ways to organize and record information (e.g., note making, generating charts, outlining, semantic mapping, creating summaries)
- reports of investigations
- explanations of the steps/processes used in solving a problem
- responses to open-ended questions
- written argument that requires thoughtful inquiry unique to a geographic perspective
- communicating orally through audio and visual media
- writing independently to support one's view using factual details
- revising and editing written work to achieve one's purpose
- expressing ideas in correct sentences in one's own words
- maintaining well-written notebooks and class records

For students with special needs, adaptations in oral and written communication may be necessary.

For example:

- the writing of a student with learning disabilities may be enhanced by the use of a word processor with a spell check feature
- oral communication may entail the use of sign language for students who are hearing impaired
- some students with physical and disabilities may need to use a voice synthesizer

Students should make appropriate use of strategies for oral and written expression by:

- using word processing programs to create and manipulate text by revising, editing, and proofreading as appropriate to the writing task
- using spreadsheet and data bases to create, analyse, synthesize, evaluate, and communicate information
- using appropriate applications to enhance the presentation of written texts
- using e-mail and other technology applications (as available) to communicate with a variety of audiences
- speaking to the topic in discussion
- orally defending one's point of view
- delivery of information in oral presentations with the aid of prepared notes

In responding to and assessing student writing, teachers should consider appropriate comments and assessment criteria in terms of the writer's learning style and needs, the nature and requirements of the writing task, its purpose, and its intended audience.

Criteria to assess/respond in student writing which may include clarity (of meaning), content (ideas, information), organization, use of appropriate form and style (to suit a particular audience or a specific purpose), use of language structures for clear and correct writing (sentence and paragraph construction, spelling, punctuation), and placement of self in the real-world learning and presentation.

Questioning

Effective questioning allows teachers to identify what the student knows and what the student needs to learn. Effective high-level, open-ended questions challenge students to use cognitively complex skills to *think*.

The kinds of questions teachers ask send powerful messages about what they really value. Questions and tasks that demand higher-level thinking demonstrate to students that teachers value this type of thinking. Questions and tasks that require students to *apply* their skill and knowledge to new situations (such as interpreting landform features through the use of false color composites) develops higher-order thinking. For example, "Evaluate the impact of global warming on a planetary scale," elicits higher-order thinking than does the task, "List problems related to global warming."

Every effort must be made to encourage students to develop higher-order thinking through the use of appropriate questions and tasks. For example, students may be asked to

- devise an evacuation scenario for a seismic region
- use James Bay as a model to predict the consequence of a similar project in the province
- visualize the state of the planet by the year 2020
- identify patterns of land use by examining aerial photos
- compare and contrast characteristics of Venus and Earth
- construct a map of their routes to the school
- evaluate the expression "humans, the polluters" as it pertains to their daily experiences
- develop a model of sustainable development for a village in Brazil's tropical rainforest

Open-ended questions require students to respond to questions or solve problems to which a variety of successful responses are possible. Open-ended questions give information about a student's ability to

- organize and interpret information
- make generalizations
- clarify and express their own thinking
- write for a given audience
- understand basic concepts
- demonstrate originality/creativity

Students whose reasoning is based on immediate, concrete experience may have difficulty making the extensions and generalizations that are necessary in responding to open-ended questions. Direct questioning for knowledge and comprehension would be an appropriate alternative for these students.

Questions for oral and written response should include those that require the student to

- compare
- demonstrate understanding of definitions, e.g., *ecosystem, asthenosphere*
- interpret, e.g., *topographic maps*
- evaluate, e.g., *humans' impact on local and global bodies of water*
- explain relationships,e.g., *the atmosphere on a particular ecosystems*

- think reflectively, e.g., *What do I know now that I didn't know before? What can I do now that I couldn't do before?*
- make connections, e.g., *How does this new learning relate to previous learning? How can I apply this new learning to other situations?*
- apply his/her skill and knowledge to new situations,e.g., *using appropriate safety procedures during an earthquake drill*
- demonstrate that he/she has internalized new concepts,e.g.,explain processes which form the rock cycle
- select the most appropriate application(s),e.g., for the use of remote sensing imagery

Tests

Testing is only one means of collecting assessment data. A test measures achievement at a specific point in time. Tests play a minor role in the total assessment program and should be used in appropriate balance with other assessment practices. This will ensure that students have frequent and varied opportunities to demonstrate their level of performance in relation to the stated outcomes of the geography grade 10 course or the Individual Program Plan.

Tests should be designed to encourage thinking and problem solving rather than memorization and recall of factual information. Test items signal what the teacher considers to be important in the course content.

Accommodations to meet the special needs of students may have to be made in test design (objective versus open-ended), presentation (oral versus written) and delivery (time allocation).

Questions on tests should be framed so that they are relevant, clear, and specific. As with other assessment procedures, teachers should refer to geography outcomes in developing test items. For example, selected-response formats (multiple choice, true-false, matching) have limitations in measuring learning outcomes in geography. Instead of assessing the *application* of knowledge and higher-order skills in meaningful, real-world situations, selected-response items tend to assess knowledge of factual information and the application of basic skills in isolated, decontextualized ways.

Self-Assessment

In the process of learning, students need various forms of feedback about their work from their teacher and their peers. However, students learn best when they have frequent opportunities to assess their own learning and performance.

Student self-assessment promotes the development of
- metacognitive ability (the ability to reflect critically on one's own reasoning and problem solving)
- ownership of learning
- independence of thought

Enhancing students' abilities to assess their own progress is an important goal of the assessment program in physical geography. Students need frequent opportunities to reflect on what they *know* and *can do* and what they *need to learn next*. When students are engaged in applying criteria for self-assessment (and for peer-assessment), they begin to internalize elements of quality and performance standards that can lead to significant improvements in the quality of their work and learning.

Self-assessment activities include the use of
- questionnaires (e.g., following a collaborative activity or project to determine how well the group functioned as a team and how well the individual student participated and contributed to the effectiveness of the process/product)
- learning logs/journals

- periodic reflective writing or group discussion to identify ways in which students have demonstrated progress toward achievement of learning outcomes
- peer feedback (e.g., giving constructive comments on one another's work helps students develop their sense of standards for their own performance)
- student-teacher interviews and conferences
- collaborative course planning involving students in identifying their own strengths and weaknesses, forming options for future learning experiences, and making decisions about what they will do to meet their learning goals

Teachers can use student self-assessments over time to determine

- whether there is change and growth in students' attitudes, understanding, and achievement
- whether students' beliefs about their performances correspond to actual performances
- whether the students and the teacher have similar views of expectations and criteria for assessment

A Note About Unit Outline Format

This document is divided into **two** major divisions:

Part A — The Graphic Environment
Part B — The Physical Environment

Part A, "The Graphic Environment", includes the various methods and skills of data collection, representation, and interpretation that can be used to describe the various aspects of Earth's physical environment.

Part B, "The Physical Environment", deals with the various land, ocean, and atmospheric processes that are at work sculpting the face of Earth, as well as illustrating that Earth's ecosystems are in delicate balance and require careful global stewardship.

The broad subdivision of this course into the graphic and physical environment is for explanatory convenience only. Both aspects of the course may be taught in an integrated fashion and, indeed, teachers are encouraged to do so.

For example, the study of riverscapes could be taught by making use of satellite images, aerial photographs, topographical maps, and profile or section drawings. The application of these graphic skills in this manner would not only help the student understand riverscape processes more fully, but would also provide the opportunity for continued practice and reinforcement in graphic skill development.

Graphic skill development should be closely related to the context of unit topics. The degree of difficulty in new skill development should progress from the relatively simple (section drawing) to the more complex (infra-red satellite image interpretation) and unit sequencing should take notice of this.

Teachers may wish to develop certain skill units separately, but should be aware that greater student understanding takes place when students are given practical experience in data collection, representation, and interpretation in conjunction with the study of physical environment topics.

Both the order of unit completion and the depth of coverage of each unit are left to the discretion of the teacher. That said, the final unit on planet management must be taught as the conclusion to the year. It is an important unit that not only ties the course together, but reinforces appropriate student attitudes and values.

Suggested Time Allotment Guidelines

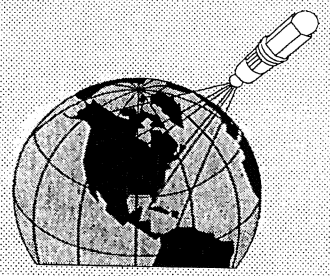
A suggested time frame for each section is given below. Bearing in mind that Part A and Part B are easily integrated, and that teachers will prefer to apply different emphases and approaches to the course, it must be understood that these time allocations will obviously vary.

Part A	**Time**
Unit 1	4 hours
Unit 2	26 hours
Unit 3	8 hours
Total Part A	38 hours
Part B	
Unit 1	5 hours
Unit 2	36 hours
Unit 3	7 hours
Unit 4	18 hours
Unit 5	6 hours
Total Part B	72 hours
Total Part A and Part B	110 hours

Geography Grade 10

PART A

Unit 1—Data Collection



Unit 1 Data Collection

GENERAL CURRICULUM OUTCOME (GCO)

Students will demonstrate the ability to view the world in spatial terms using a full range of data collecting techniques within the graphic environment.

Background

Geographic data and information gathering can be achieved either in the field directly, or indirectly from secondary sources. Field observation provides students with a hands-on approach to their studies and a "direct feel" for the environment. Secondary sources such as topographical maps, aerial photos, satellite images, and census material also provide a wealth of geographic information and are readily available for general use. The work of this unit is introductory and will be more fully developed in Unit 2.

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Remote Sensing — Gathering Information at a Distance

Students will be able to explain how geographers create a holistic view of Earth through remote sensing such as satellite imagery, aerial photography, and other sensors.

Sample Indicators

- explore a variety of technologies (e.g., satellites, air photos and sonar)
- analyse the effectiveness of each technology as a tool for monitoring the world
- compare and contrast the use of air photographs and satellite images
- demonstrate an understanding of the varied uses of the Hubble telescope
- evaluate uses of radar and sonar
- explore advantages and disadvantages of data collection in the field and from a distance

2. Field Techniques—Gathering Information Close at Hand

Students will explain how geographers use field techniques such as surveying landscape, sampling the landscape, recording land use.

Sample Indicators

- demonstrate competency in the use of surveying techniques, (e.g., transit, sextant)
- set a map
- collect weather data (rainfall measurements/pressure/humidity)
- use data retrieval methods to extract information from the field
- analyse soil samples

Unit 1: Data Collection

Specific Curriculum Outcome 1: Students will be able to explain how geographers create a holistic view of the earth through remote sensing such as satellite imagery, aerial photography, and other sensors.

Satellite Imagery

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Remote Sensing LandSat Program • black and white images • color images • false color composite Applications of remote sensing: conducting resource surveys, crops and forests, early warning of disasters, flood control, ice break up, and weather patterns.	Introduce the session with a collage style display of satellite imagery intended to capture student interest. Students should be free to investigate the images for a designated time frame. The teacher may wish to encourage students to decode the imagery through a series of "geographic questions." (e.g., Note the colors. Are they true colors? How are the images made?) Purpose is to illustrate the phrase,"Remote Means Far Away". This will help cement ideas, concepts, and terminology. Use advance organizers to present key concepts. Small group brainstorming activity on the applications of satellite imagery. Students will generate a list using paper charts. Each group will share their findings with the class and post the chart paper on the wall. Bring the session to closure using student predictions for future uses of satellites and trends in data collection. Invite a guest speaker to discuss basic features of and benefits of satellite imagery. Display and discuss examples of satellite imagery (contact Canada Centre for Remote Sensing, Ottawa).	*Radarsat* V9091 (LRT), video dubbing 28:00 min *Survey's Mapping and Remote Sensing Sensor* V1381 (LRT), video dubbing 19:04 min Videos can be obtained from Canada Centre for Remote Sensing, Ottawa See also Curriculum Links at LRT http://www.library.ns.ca/lrt/ for internet resources Remote Sensing Display, College of Geographic Sciences Museum of Natural History, display on Remote Sensing *National Geographic*, June 1995 *Canadian Geographic*, "Remote Sensing: Satellite Picture of Earth" September 1975 (See also December 1986 and January 1987)

Unit 1: Data Collection

Specific Curriculum Outcome 1: Students will be able to explain how geographers create a holistic view of Earth through remote sensing such as satellite imagery, aerial photography, and other sensors.

Aerial Photography

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Air photos • vertical • oblique	Create a display entitled "data collection". Arrange vertical and oblique air photos reflecting a variety of uses (e.g., land use, coastal processes, relief). Beside each air photo, place interpretive information (e.g., cross sections, land use maps, charts, spreadsheets) to demonstrate how air photos are essential to geographic inquiry and data collection. Introduce the points of the topic, aerial photographs and data collection, through a mini-lecture. Use aerial photographs as models to predict geographic phenomena (e.g., flood risk areas, landslides). Use graphic organizers to compare and contrast satellite images and aerial photos.	Department of Natural Resources supply air photos or photocopies for sale. Check regional listings. Note: Air photos can be made into overhead transparencies. College of Geographic Sciences, RR#1 Lawrencetown, Nova Scotia, B0S 1M0 Telephone (902) 584-2226 College of Geographic Sciences Campus Nova Scotia Community College http://www.nscc.ns.ca/cogs/home.htm Aerial slides and local area (COGS) *The Canadian Landscape* • variety of air photos and stereograms NASA Canadian Space Agency hhtp:www.space.gc.ca:7100/ Canadian Space Agency English/French web site *Canadian Geographic*, "What Aerial Photographs Do For Us" August/September 1976

Unit 1: Data Collection

Specific Curriculum Outcome 1: Students will be able to explain how geographers create a holistic view of Earth through remote sensing such as satellite imagery, aerial photography, and other sensors.

Other Sensors

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Hubble Telescope Canadian Applications Radar Radarsat Synthetic Aperture Radar (SAR) Sonar	Student Presentations: Divide the class into groups and assign one of the following topics: hubble telescope, radar, Radarsat, sonar. Each group can create a visual display and give an oral report on function and application. Teachers may wish to provide in-class materials as a time-saving measure. The focus of the activity is to highlight data collection sources. This topic may also be handled through a "jigsaw" co-operative learning activity.	*Mapping the Ocean Floor* (video dubbing) V7790 (LRT) Contact BIO for guest speaker. Videos — *Radarsat*, V9091 (video dubbing) (LRT) *Eyes of the Universe* V1748 (video dubbing) 11:00 min (LRT) Contact Atlantic Space Resource Centre, Barrington Street, Halifax
Application of sensors to the ocean environment.	Show a video on one or several of the topics (e.g., hubble telescope, Radarsat) Invite a guest speaker to demonstrate the use of one of the above sensors. (e.g., Mapping Halifax Harbour — guest speaker from BIO)	"Canadian Space Resource Centre - Atlantic Region" http://apwww.stmarys.ca/space/ Radar Remote Sensing Imagery of Coastal Regions on CD-ROM *Radarsat*, V9091 (video dubbing) (LRT) Contact NASA for literature on Hubble http://www.nasa.gov/ Internet access to photographs from Hubble

Unit 1: Data Collection

Specific Curriculum Outcome 2: Students will be able to explain how geographers use field techniques such as surveying landscape, sampling the landscape, recording land use.

Surveying the Landscape

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Direct Sensing Setting a map Transit Sextant	For setting or orienting a map for work in the field, refer to exercises in *Geographic Understandings*, page 12. Simulation game with compass: Arrange pylons on a field to create a maze for orienteering. The simulation helps to prepare students for actual work in the field. Check with a physical education teacher for compasses and other material. Invite a local surveyor to demonstrate the use of field equipment (e.g., transit).	St. Mary's University, Geography Department (survey techniques) *Surveys, Mapping, and Remote Sensing Section*, V1381 (LRT) 19:00 min *Geological Survey of Canada,* V0249 (LRT) Local surveyor's company *Canadian Geographic*, March 1975 February/March 1977 October/November 1978 April/May 1982 December 1991 *Geographic Understandings*, page 12

Unit 1: Data Collection

Specific Curriculum Outcome 2: Students will be able to explain how geographers use field techniques such as surveying landscape, sampling the landscape, recording land use.

Sampling the Landscape

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Direct sensing Techniques of studying landscape systems. 1. Primary methods 2. Secondary methods 3. Tertiary methods Landscape systems Collection of weather data.	Brainstorm the advantages and disadvantages of data collection in the field and from a distance. Explore techniques of studying landscape systems. • primary—field study (sketching, collecting samples, recording observations, etc.) • secondary—sources of information (air photos, maps, diagrams, etc.) • tertiary—information complied from secondary sources (texts, encyclopaedias, etc.) Field trip: Plan a local field trip to incorporate techniques of studying the landscape. Use *Earth Dynamics*, page 68, as a guide. Visit your local weather station to observe information gathering techniques.	*Earth Dynamics,* Teacher's Resource, page 67 STATS CANADA *Earth Dynamics*, "Field Study," page 68 *Earth Dynamics*, "Collecting Weather Data," pages 78-83 Local weather office

Unit 1: Data Collection

Specific Curriculum Outcome 2: Students will be able to explain how geographers use field techniques such as surveying landscape, sampling the landscape, recording land use.

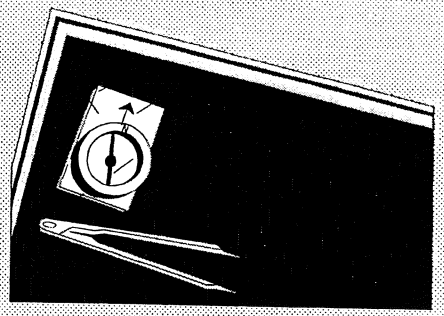
Recording Land Use

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Recording land use	Organize geographic information obtained in the field: "Recording land use can take a number of interesting formats. Use one or several of the examples given below or provide your own." • Use data obtained in the field to generate land use maps. • Create choropleth maps of vegetation types or soil types (see *Geographic Understandings*, page 185). • Design a map to indicate interesting geographic phenomena (e.g., fault zones around Briar Island, folds at the Ovens Park, etc.) • Compare photos over various time spans to examine vegetation succession, changes in land use. Create a display to depict data recorded in a specific area. Include not only the satellite imagery and air photos, but also the interpretative information from recording land use (e.g., choropleth maps, graphs, timelines). A written summary may be included.	*Contour Connection*, (LRT) V9294 30:00 min *Outside the Classroom: Geography*, (LRT), video dubbing, V7405 20:00 min

Geography Grade 10

PART A

Unit 2—Data Processing and Representation



Unit 2 Data Processing and Representation

GENERAL CURRICULUM OUTCOME (GCO)

Students will gather, organize, display and interpret graphic information in a spatial context.

Background

To be used effectively, satellite images, aerial photos, maps, and graphs require students to develop certain skills. Extracting information from maps and photos, and/or visually displaying information graphically often portrays complex spatial distributions more vividly. For example, creating 3-D topographic models, Z-charts, sketch diagrams, stereo images, and other products are both creative and informative activities that help to develop useful data-processing and representation skills.

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Image reading and Interpretation

Students will be able to demonstrate basic image/photo interpretation skills using high/low obliques, vertical, and stereo images, false color composite, and other satellite imagery.

Sample Indicators

- extract information from satellite images and air photos
- describe in written form or orally what she/he learns from studying these data forms
- select either air photos or satellite imagery as the most appropriate means of studying a selected activity
- provide advantages of the use of air photos
- identify the main uses of satellite imagery
- relate features on the ground to false color imaging

2. Map Reading and Construction

Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Sample Indicators

- describe phenomena reported on a map (e.g., use dot maps to make statements about population densities)
- prepare sketches or models of human features and physical features of the landscape
- view maps, pictures and video images to collect geographic information to observe relationships between climate and vegetation
- use area data to create choropleth maps
- use isolines to map physical data such as elevation and rainfall
- prepare overlays of different kinds of geographic information to create a geographic information system (e.g., a base map, a vegetation map, contour map, or a land use map of a region)
- organize materials for a multimedia report (e.g., maps, diagrams and pictures)

3. Graphs, Charts, and Tables

Students will be able to organize and interpret quantitative data in graph, chart, and table form.

Sample Indicators

- construct a multiple line graph according to geographic standards
- use data to construct a scatter graph
- interpret population pyramids
- generate and interpret flow charts (e.g., traffic model)
- survey and analyse data using tables or spreadsheets
- use Spearman's Rank Correlation Coefficient to establish the mathematical relationship between given criteria
- analyse a choropleth map

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 1: Students will be able to demonstrate basic image/photo interpretation skills using high/low obliques, vertical, and stereo images, false color composite, and other satellite imagery.

Air Photos and Stereo Images

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
High obliques Low obliques Vertical Stereopairs	This section provides the opportunity for advanced work through independent study. Representatives from the College of Geographic Sciences can be used as resource (guest speakers). Lesson on air photos—Introduce the topic through demonstrating oblique and vertical air photos. In small groups, have students outline characteristics. Bring the lesson to closure through teacher lecture. Practice orienting maps and air photos by using the following activities from *Geolab Book #2* • Geolab #33 — oblique aerial photos, page 65 • Geolab #34 — vertical aerial photos, page 68 Stereopairs. The use of stereopairs and 3D glasses is an effective and exciting means of interpreting geographic information. *Canadian Landscape,* third edition, provides numerous opportunities to challenge students' skill levels. Using the Thompson map and air photo in *Canadian Landscape*, pages 50–53 • name the features associated with the letters on the air photo • have students use stereoscope glasses to draw a profile from O to E • draw a cross section profile of the same area from the map • overlap the images and discuss findings	College of Geographic Sciences (COGS) *Geolab Book #2* *Canadian Landscape*
Scale of aerial photos	Calculate the scale of an aerial photograph using *Geolab Book #2,* Geolab 35 "Scale on the Vertical Aerial Photos," page 71	
Applying knowledge	Project: (Use a Z-Chart, three pieces of bristol board "hinged" to form a Z, or basic bristol board style). Use topographic maps and air photos to do a complete analysis of the local area.	

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 1: Students will be able to demonstrate basic image/photo interpretation skills using high/low obliques, vertical, and stereo images, false color composite, and other satellite imagery.

Air photos and stereo images

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Air photo interpretation: • tone • texture • shape • pattern • land use	Interpretation of texture, tone, pattern, and land use. The following Geolabs will provide students with an opportunity to explore their interpretive skills. *Geolab Book #2* • Geolab #37, *Appearance of Objects on Aerial Photos*– pages 74-75 • Geolab #38, *Patterns on Aerial Photos*– pages 76-77 • Geolab #40, *Land Use Identification*– pages 80-81 Select a variety of maps and air photos to allow students to construct land use maps. Have students predict future land use conflicts.	*Geolab Book #2*
Case Study	Project: (Z-Chart or basic bristol board style). Use topographic maps and air photos to do a complete analysis of the local area. Include the following items: • physical features (cross section) • settlement patterns • land use • economic activities • cultural aspects • interesting features Invite a guest speaker from COGS or Geomatics or a local planner to involve students in a case study of land use in a local area.	Geomatics, PO Box 310, Amherst, NS Department of Municipal Affairs

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 1: Students will be able to demonstrate basic image/photo interpretation skills using high/low obliques, vertical, and stereo images, false color composite, and other satellite imagery.

False color composite and other satellite imagery

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Remote sensing	Introduction: Using slides or air photos, give a mini-lecture on the history of remote sensing.	
	Construct a well-labelled diagram to clearly illustrate the process of image making.	
LandSAT Multi-spectral scanner Thematic mapper Electromagnetic energy	Use a prism to illustrate how white light is split into the primary colors of visible light. Label the area of visible light on the electromagnetic spectrum. Mini-lecture on the electromagnetic spectrum.	
	Divide the class into small groups to research and present a project on the units of the electromagnetic spectrum (e.g., wave types, wave lengths, intensity)	
	Exercises on electromagnetic radiation, *Geographic Understandings,* pages 101–102	*Geographic Understandings*
Electromagnetic spectrum bands	Explore the bands. Identify bands and predict what bands are most appropriate for interpretation of geographic features. *Geolab Book #2*, Geolab 44, *Introduction to Black and White Satellite Images*, pages 88–89.	*Geolab Book #2*, pages 88–89
alse color composite	False color satellite imagery. Introduce the concept of "false color" with mini-lecture. Expand the lesson with activities using false color satellite imagery. • False colour composites, *Geolab Book #2*, Geolab 43 • "Introduction to Colour Satellite Images," pages 88–89 • "False Colour," *Geographic Understandings*, page 103	
	Using a jigsaw technique, have students peer teach applications for satellite imagery. • forestry • farming • mining • hydrology • ice tracking • environmental monitoring • geology • military	*Looking at Earth* P. Strain and F. Engle Turner Publishing, Inc. Atlanta, 1992 ISBN 1-87865-16-3

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 1: Students will be able to demonstrate basic image/photo interpretation skills using high/low obliques, vertical, and stereo images, false color composite, and other satellite imagery.

False color composite and other satellite imagery

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
	Follow-up exercises on "Applications of Remote Sensing," *Geographic Understandings*, page 106	*Geographic Understandings*
Applying your knowledge	Applying your knowledge: Case Study "Athabasca Oil Sands," pages 88–92 Obtain satellite images of hurricanes from your local weather office and examine features of the storm. Predict future storm paths and weather conditions. Using satellites as a model, prepare a report based on synthesis of information. (e.g., write a synopsis of weather conditions in the Atlantic region)	*Geolab Book #2* *Canadian Landscape* (Third Edition)

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Topographic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Introduction to maps A. history of maps B. map types C. atlas/topographic Mental mapping: • students' route to school • students' route to mall • map of school building on grounds What is geographically significant? Map of local area.	Develop a mini-lesson with numerous displays of maps to introduce types of maps. Invite a guest speaker to discuss map making, past and present. Construct a mental map of any of the given options. Exchange maps to assess readability, and compare student maps to real maps of the region. Brainstorm to generate a list of map criteria. Students will refine the original mental map, incorporating features discussed and the five basic map requirements. A. title B. scale C. direction arrow D. border, margin or frame E. legend	Check local area for guest speaker College of Geographic Sciences (COGS), Lawrencetown, Nova Scotia Department of Natural Resources provides maps and air photos for sale.
Selecting topographic map using the National Topographic Map series index.	Map activity, "Introduction to Maps," *Geolab Book #2*, Geolab #1. Activities on map selection from the National Topographic Map series. Exercises may be taken from "The Use of Topographic Maps" (Teacher's Edition, pages 4–5, answers, page 55, "Reading Topographic Maps"). Obtain atlas, outline maps and co-ordinates of a hurricane and plot the route of the hurricane using latitude and longitude. Practice work with the military grid using *Geolab Book #2*, Geolab 16, "Grid References," page 31.	*Geolab Book #2* Co-ordinates and maps may be obtained from local weather offices. *Geolab Book #2*

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Topographic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Symbols	Symbols are the language of maps. Identify symbols by using the following activities: *Geographic Understandings*, "Activities," pages 3, 7 "Map Symbols," pages 20–22 *Geolab Book #2*, "Map Symbols", pages 27–29	*Geographic Understandings* *Canadian Geographic* February 1975 October/November 1979 April/May 1981 December 1981/January 1982 August/September 1982
Scale conversion: • Direct scales to RFs • RFs to vertical scale • RFs to linear scale • Linear scale to RFs	The following activity provides basic instruction in map scale. *Geolab Book #2*, "Introduction to Map Scales," page 7. Scale conversions. Use the following exercises to develop skills in conversion of scales.	December 1982/January 1983 April/May 1983 February/March 1988 December 1989/January 1990 December 1990/January 1991 May/June 1992 September/October 1993
Scale straight line/curved line distances.	*Geolab Book #2*, Geolab 3, "Map Scale Conversion", pages 8–9 *Geographic Understanding*, "Finding Lengths and Distances," pages 17-18	
Scale and measurement of area.	*Geographic Understandings*, "Measurement of Area," pages 18-20 *Geolab Book #2*, Geolab 14, "Area on Maps," page 26	*Canadian Landscape* The National Topographic System, p. 3
Map Direction: • compass rose • angular bearings	*Geolab Book #2*, Geolab 4, "Map Directions," page 10	
Map Scales and Angular Bearings	*Geolab Book #2*, Geolab 5, "Angular Bearing"	*Geolab Book #2*, "Reading Topographic Maps"

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Topographic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
	The following activities combine the map reading skills and provide a good assessment of student skill levels: *Geolab Book #2*, Geolab #6, "Cross Country Race," pages 12-13 *Geolab Book #2*, Geolab #7, "Bay of Biscay Rescue," pages 14-15 Create your own rescue at a remote location (e.g., Alert Boxtop 22 Hercules aircraft crash, oil rig evacuation off Sable Island). Students will evaluate the feasibility of solutions.	*Direction* LRT, Video Dubbing V0075 10:00 min. from the *Geography Skills Series* *Geolab Book #2* *Crash a the Top of the World* Readers Digest, June 1993 *Geography Skills Series*, Direction, LRT, Video Dubbing *The use of Topicgraphic Maps in Geography*, John Trites, 127 Lawrence Road RR #1 Berwick NS
The three Norths True bearing Magnetic bearing Grid bearing Conversion bearings Declination change	Applying knowledge of the three Norths, use the following exercises: *The Use of Topographic Maps in Geography*, (Teacher's Edition), "The Three Norths," pages 51–54 *Geographic Understandings*, "Bearing Conversion," pages 13-17 "Declination Change," page 11	*Geographic Understandings*
Relief Shading Spot heights Benchmarks	Relief Introducing relief. Develop a mini-lecture using a number of maps to depict types of relief. Reinforce the concept of relief with related exercises *Geolab Book #2*, Geolab 9, "Spot Heights and Contours," pages 17–19 Activity: slice a potato to illustrate contour lines and contour interval.	*Contour Connection* LRT, Video dubbing, V9294

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2 Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Topographic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Contours and landforms Profile Drawing • Cross section profiles • Vertical exaggeration • Slope	Identify contour features on maps (Exercises in *Reading Topographic Maps*) Build or draw your own contour map using specific criteria. Exercises on contours *Geolab Book #2*, Geolab 8, "Map Elevation," page 16, *Geographic Understandings*, "Contour and Landform," pages 28–30 Review rules for contour drawing. These rules will provide the student with tips to number contours. (e.g., contour lines have the same elevation on either side of river) Generate a number of cross sections across different landscapes. Mystery between the contours—an exercise on relief taken from Geography Labs Inc. *Geolab Book #2*, Geolab 11, pages 20–21 Locate interesting maps, e.g., Mount St. Helens before and after eruption. Have students draw profiles, on bristol board, to reflect the changes in the profile of the volcano. Build a model of a contour map using styrofoam or cardboard. Activities on gradients and slopes: *Geolab Book #2*, Geolab 12, "Gradients and Slopes," pages 22–23 *Geolab Book #2*, Geolab 13, pages 24–25	Select any topographic map to illustrate the key concepts. *Direction*, LRT, from the *Geography Skills Series*, Video Dubbing V0075 10:00 min. "Crash at the Top of the World" *Readers Digest*, June, 1993 *Geolab Book #2* *Geographic Understandings*

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Topographic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Putting it all together	*Geolab Book #2,* Geolab 17 "Treasure Hunt," pages 32–33 *Reading Topographic Maps*, "Map of Grimsby," page 105 Project: Select a map from *The Canadian Landscape* and write an interpretative essay. Include the following: (A) cultural information • economic activity • ethnicalities and nationalities represented in settlement • settlement patterns • reasons for settlement (B) physical information • elevation/contour textures • rivers and shorelines (C) climate (D) land use (trends/changes) Project: Create a map using specific criteria and compare the final product to a professional map of the area.	**Key Resource** *The Use of Topographic Maps in Geography*, Teacher's Edition, John Trites, 127 Lawrence Road, RR#1 Berwick, NS B0P 1E0 *The Canadian Landscape*, "Interpreting Topographic Maps," pages 24–26 Possible maps from *Canadian Landscape,* e.g., Annapolis Royal Stoney Creek Winnipeg

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Geologic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Plate boundaries • opening faults • closing faults • transform faults	Mini-project: "Searching for Gold." Use a geologic map of Nova Scotia to: 1. label • opening boundary • closing boundary • transform boundary 2. comment on features formed by such boundaries. 3. select and map gold-bearing rocks (relate gold formation to plate boundaries). 4. discuss possible causes of gold formations across the province. 5. select the best place to search for gold. This project can be adapted to include coal/tin/gypsum mining appropriate to local areas. Field trip to the Ovens and/or trip to gold mine. Make a Z chart on gold formation and mining in Nova Scotia. Include chart, maps, diagrams techniques for mining, etc. Invite a local geologist to help students interpret local geology. Develop a simulation to present issues related to mining and the environment. • arsenic/environment • open pit mining/lowering water temperature • tin mining/settlement ponds.	Department of Supply & Services, Nova Scotia Nova Scotia Government Book Store, *Gold History* and *Development of Coal in Nova Scotia* "Geological Map of Nova Scotia", Museum of Natural History, Halifax *National Atlas of Canada*, third edition Web Site: *URL:http://www-nais.ccm.emr.ca* Tour the Rio Algom Mines, Yarmouth County See also: 2 videos: *Real Tin* (LRT) video dubbing V9778 20:00 min *Rio Algom Tin Mine* (LRT) video dubbing V9720 30:00 min.

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Thematic Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Thematic maps 1. vegetation 2. flood risk 3. population 4. parks 5. economics	In small groups, examine a number of thematic maps and discuss • types of information • purpose • scale • contrast topographic maps and thematic maps • develop a definition of thematic maps Evaluate map usage in solving international political conflicts • George's Bank dispute • St. Pierre et Miquelon boundary • Quebec/Labrador border	*Geolab Book #2* *Canada and the World*, second edition, Student and Teacher's edition
Exploring thematic maps at different scales	Activities on a variety of thematic maps. *Geolab Book #2*, Geolab 21 • "Recreation Capability Map," pages 40–41 *Geolab Book #2,* Geolab 23 • "Wild Life" waterfowl maps, pages 44–45 • Forest Capability Maps, *Geolab Book #2*, Geolab 25, pages 48–49	*Fisheries Atlas* (Geomatics, Amherst, Nova Scotia) Available in school libraries.
Constructing a thematic map	Develop maps through computer programs (e.g., CADD)	

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Sketches

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Sketching a map	Practicing skills, *Geolab Book #2*, Geolab 18, "Sketch Maps," page 34 1. Locate your home/neighborhood on a map. Sketch this section to make a mini-map. 2. Sketch a map of your favorite landscape using data at a variety of scales and from a variety of sources (topo maps, air photos, satellite images, fieldwork) 3. Using an air photo, draw a land use map (recreational, agricultural, industrial, residential, forestry) 4. On a grid, sketch your favorite scene again, detailing each feature and its approximate scale. 5. Map sketching. Project a slide on the board and draw • water bodies • cultural features • vegetation boundaries	*Geolab Book #2*, Derry, Horner, 1981, McGraw-Hill Ryerson Ltd. *Geographic Understandings*

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 2: Students will be able to select an appropriate map style (topographic, geologic, thematic, etc.) and use it to gather, organize, and display information in sketch or model form.

Models

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Models	Model Project: Use an overhead to project a seismic map on a piece of bristol board. Place the bristol board over wood and saw out individual plates. Fit the puzzle together. Label • volcanoes, drill holes • earthquakes • subduction zones • mid ocean ridge • plates • transform fault Place tomato sauce under plates and push down to simulate volcanic eruptions.	*Geolab Book #3*, Geolab 1, seismic map, page 5.

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 3: Students will be able to organize and interpret quantitative data in graph, chart, and table form.

Graphs, Line and Scatter

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Statistics Data Graphs Polygraph	Possible activities to demonstrate students' understanding of the graphic environment are suggested below: The following activities are taken from Geolab Book #2: *Geolab Book #2* Geolab 47 Line graphs, pages 96–97 *Geolab Book #2* Geolab 48 "Bargraphs and Histograms," pages 98–99 Geolab 49, "Climate Graphs," pages 100–101 Geolab 50, " Climate Graphs" Geolab 52, "Piegraphs," page 106 Geolab 55, "Scatter," pages 108–109 Use data sets of your choice to graph detail. Place emphases on technique, not data. Assignment: Construct two related pictographs representing information of interest. The data is shown in graphic form within the picture. The two pictographs are then placed side-by-side on ½ sheet of bristol board. For example of pictograph, see *Geolab Book I*, Geolab 53, page 107.	*Geolab Book #2* *Geolab Book #2* *Corel 4/Corel Chart* Spreadsheet *Canada and the World*, second edition, Prentice-Hall

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 3 Students will be able to organize and interpret quantitative data in graph, chart, and table form.

Charts, Flow Charts, Systems, and Diagrams

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Flow chart	Students will portray quantitative data using charts and diagrams. **Activity #1** Flow maps (charts). Construct a sample traffic flow. **Activity #2** Construct a systems diagram flow map to illustrate Canadian exports and imports using data from *Canada and the World*, "Canada Thematic - Trade and Aid."	*Geolab Book #2* *Geographic Understandings* *Canada and the World,* (second edition, Teacher's Resource)
System diagram flow chart	Construct a systems diagram map of air routes.	

Unit 2: Data Processing and Representation

Specific Curriculum Outcome 3: Students will be able to organize and interpret quantitative data in graph, chart, and table form.

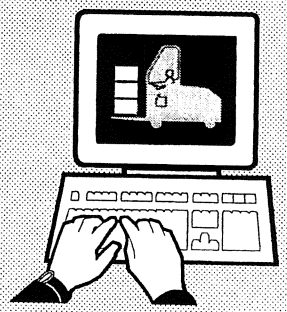
Tables

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Data sheets	Use data tables to interpret and manipulate information (e.g., use a Spearman's Rank Correlation Coefficient to establish the relationship between $C0_2$ emissions and GNP).	*Tide Tables* (NS Government Book Store)
Tables exercise	Perform a number of tidetable exercises.	*Geographic Understandings Geolab Book #2*
Graphs	Graph exercises: • Construct a climate graph of Canada. • Graph peak flow periods of rivers and make inferences about erosion levels. • Depict water distribution using pie graphs. • Use a double bar graph to depict precipitation patterns over time. • Graph rising water levels in Halifax Harbor from 1700 to present.	Geography Labs Inc. Physical Geography Series

Grade 10 Physical Geography

PART A

Unit 3—Data Interpretation and Utilization



Unit 3 Data Interpretation and Utilization

GENERAL CURRICULUM OUTCOME (GCO)

Students will be expected to demonstrate a knowledge of data interpretation, analysis, and utilization through the application of data to recognise patterns and suggest reasons for patterns of spatial organization of physical phenomena.

Background

There is a pattern, regularity, and reason to the location of physical and human phenomena. Understanding patterns of spatial organization enables students to answer three fundamental geographic questions: Why are these features located in these places? How did they get there? Why are these patterns significant? Asking and answering these basic questions enable students to begin to think in spatial terms. Thinking in spatial terms means having the ability to describe and analyse the spatial organization of people, places and environments on Earth's surface. Thinking in spatial terms is central to becoming geographically literate.

SPECIFIC CURRICULUM OUTCOME (SCO)

1. Analysing Information to Recognise Pattern

Students will be expected to analyse geographic information using comparative mapping techniques and strategies, and geographic information systems to recognise patterns and to make decisions about the nature of the information.

Sample Indicators

- use aerial photos over various time frames to measure changes observed
- interpret spatial patterns and physical features using aerial photos
- construct a land-use map based on information obtained from aerial photos
- contrast settlement patterns within a region
- create a map of regions based on landform information
- analyse trends using data from census tracts

Unit 3: Data Interpretation and Utilization

Specific Curriculum Outcome 1: Students will be expected to analyse geographic information using comparative mapping techniques and strategies, and geographic information systems to recognise patterns and to make decisions about the nature of the information.

Comparative Mapping/Recognition of Patterns

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Vegetative succession Ground verification Change Pattern Analysis	The intent of this section is to adopt skills for the purpose of building a total picture of geographic phenomena. Making inferences and drawing conclusions, evaluating geographic reasoning, and using quantitative methods of analysis are central to the theme of the unit. The following activities assist students to analyse geographic information: • Compare photos of the same area but from different time periods. Measure the changes over time. • Use an early air photo of a familiar area to examine land use changes. • Determine relationships between and within regions through the use of choropleth maps. • Case study. Analyse a region using a variety of media (e.g., texts, maps, aerial photos, audio-visual, etc.). Transfer the information to graphic form. Include a written summary of geographic information obtained.	Geomatics, Department of Municipal Affairs Department of Natural Resources *Geography Skills Series: Map Symbols* (LRT) V0070 video dubbing 10:00 min. *Geography Skills Series: Map Grids* (LRT) V0071 video dubbing 10:00 min. *Geography Skills Series: Theme Maps* (LRT) V0077 video dubbing 10:00 min.

Unit 3: Data Interpretation and Utilization

Specific Curriculum Outcome 1: Students will be expected to analyse geographic information using comparative mapping techniques and strategies, and geographic information systems to recognise patterns and to make decisions about the nature of the information.

Geographic Information Systems (basic land use)

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Data • meterological • census • consumer	Use of technology: Use computer programs to model information (e.g., create a map of political boundaries.) Analyse census data, graph and/or choropleth any topic (e.g., economic regions). Make inferences about trends and patterns observed. Visit Lawrencetown, College of Geographic Sciences, Re: G.I.S.	STATS Canada Publications *Census, 1986 - Canada's Farm Population* *Census, 1986 - The Inner City in Transition* *1981 Census of Canada Metropolitan Atlas Series* (Halifax) *World Prospects,* Prentice - Hall Canada, Inc. 1994

Unit 3: Data Interpretation and Utilization

Specific Curriculum Outcome 1: Students will be expected to analyse geographic information using comparative mapping techniques and strategies, and geographic information systems to recognise patterns and to make decisions about the nature of the information.

Environmental Management

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Resource management Canada land inventory Zoning Criteria Lobby groups Sieve mapping Model	Geography, Environment, Management and Politics: Students are encouraged to systematically assess geographic information and to generate solutions to public concerns on environmental management. The following activities reinforce this concept: • Use growth performance data to establish a land use plan scenario for a municipality (visit municipal planning office). • Based on a set of criteria, do a landfill search (visit municipal planning office). • Attend public hearings on local planning issues (e.g., landfill). • Predict and solve problems related to the location of an industrial park (e.g., transport infrastructure).	*Sim City*, Computer Software MSDOS, MAC - Nova Scotia School Book Bureau Municipal Planning Offices. Obtain information on growth performance data and landfill site selection siting criteria from Municipal Planning Office. *Internal Organization of Rural/Urban Areas,* List of Authorized Instructional Materials *The State of Canada's Environment* Government of Canada - 1996 Update ISBN 0-660-14237-6 (kit and CD-Rom available) http://www.doe.ca *World Resources: A Guide to The Global Environment*

Unit 3: Data Interpretation and Utilization

Specific Curriculum Outcome 1: Students will be expected to analyse geographic information using comparative mapping techniques and strategies, and geographic information systems to recognise patterns and to make decisions about the nature of the information.

Case Studies

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Classifications • land uses • settlements Development Land Reserves	Geography and Politics: Select random by-laws made in municipal documents and justify them (e.g., flood zones). Teachers are encouraged to investigate information, using a variety of sources, to evaluate decisions made with respect to (A) Northumberland Strait Crossing (B) Tar Ponds Recovery Program Case Studies: Generate local case studies on environmental management (e.g., tar ponds, tidal power plant, Margaree River). Community and Ecology: There is a saying, "Don't bite the hand that feeds you." Many communities which are adversely affected by industrial production are First Nations Lands faced with the challenge of coming into conflict with the industry that helps sustain the community. Such was the case in the 1990s when the Pictou Landing First Nation was battling Scott Paper for polluting the waters of the Northumberland Strait and the connecting shoreline. Explore: • residential/industrial land use conflict • government responsibility to communities • the role of industry and its responsibility to the community Examine historical records of African Canadian communities. Plot settlements on a map. Discuss each settlement in terms of its physical location and choice of site. Use a Venn organizer to examine advantages and disadvantages of site. Trace and plot relocation of African Canadian communities and assess the advantages and disadvantages of each new site, drawing inferences to economic viability, and physical location.	*County of Kings Zoning By law Planning for the '90s.* Contact Kentville Municipal Office. Solid Waste Management Project *Planet Earth: A Physical Geography*, Birchall et al Nelson, 1993 "The Gaspereau Valley of Kings County, Nova Scotia", by Hugh Millward (St. Mary's University) *The Dynamic Landscape*, Readman and Mayers, Copp Clark Longman, 1994 Black Cultural Centre, Dartmouth http://www.nstn.ca/bccns/

Grade 10 Geography

PART B

Unit 1—Geographic Perspective

Unit 1 Geographic Perspective

Part B — The Physical Environment

GENERAL CURRICULUM OUTCOME (GCO)

Students will be expected to formulate a geographic perspective of physical systems that recognizes changing trends in time.

Background

Physical processes create, maintain, and modify Earth's physical features and environments. Because the physical environment remains the essential background upon which all human activity is rooted and acted out, the geographically literate person knows and is able to demonstrate an understanding of the processes that have shaped our physical environments and the resultant effects on human and animal communities.

Physical processes are generally categorized according to four organizers:

- forces operating in the atmosphere (e.g., climate and meteorology)
- forces operating in the lithosphere (e.g., plate tectonics, erosion, and soil formation)
- forces operating in the hydrosphere (e.g., the circulation of the oceans and the water or hydrologic cycle)
- forces operating in the biosphere (e.g., ecosystems, animal, and plant communities)

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Geographically Speaking

Students will be expected to view events from a geographic perspective by defining the nature and scope of geographic phenomena using the five themes of geography: place, location, region, human-environment interaction, and movement.

Sample Indicators

- define geography
- chart the various fields of disciplines under the umbrella of geography
- use the themes in geography to evaluate and portray a specific event (cultural, historical, and/or environmental)

2. Landscape Change

Students will be expected to demonstrate an understanding of how long-term and short-term physical processes influence the landscape and the human response and adaptation to these processes.

Sample Indicators

- recognize and describe a geological calender
- create a cosmic clock/calender
- compare lengths of time required to form deltas versus the birth of a volcanic cone
- cite examples of human preparation, such as earthquake drills, for catastrophic events
- evaluate procedures (volcanic, floods and hurricanes) of early warning systems
- evaluate how seasonal landscape change influences the migration of people

3. Search for Explanations - Changing Views of Reality

Students will be expected to demonstrate an awareness of how changing perspectives of the world are dictated by culture, experience, and the impact of technology.

Sample Indicators

- explain how our view of Earth's shape and structure has changed historically
- recognize implications that arise from the view of Earth holding infinite resources
- explain how radio telescopes have changed our view of the universe and Earth's position in it
- examine changing trends in transportation and technology and the impact on relative location

Unit 1: Geographic Perspective

Specific Curriculum Outcome 1: Students will be expected to view events from a geographic perspective by defining the nature and scope of geographic phenomena using the five themes of geography: place, location, region, human-environment interaction, and movement.

What is Geography?
Five Themes of Geography

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
"Geography"	This unit provides an opportunity to explore the many sub-disciplines of the field of geography. Introduction: Brainstorm the facets of geography and build a working definition. Mini-project: "What is geography?" Create a scrapbook from magazine and newspaper articles that reflect geographic content. Analyse the articles and report on the many topics associated with geography. Use the information to answer the question, "What is geography?" Class discussion and group work: Divide the class into groups. Distribute articles to each group that reflect aspects of geography. Have each group report on its articles. Results may be put on the board. Ask students to determine how this activity has expanded their knowledge of geography.	*Earth Dynamics*, "Elements of Physical Geography," pages 4–5 *Earth Dynamics, Teacher's Resource*, exercise 1.2, "What is geography?" Daily newspapers/magazines
Five themes of geography • location • place • human interaction • movement • region	Introduction to the five themes of geography: Five theme mini-lectures. Select slides for identification of the five themes. Create transparency overlays to depict the five themes. Discuss any natural disaster in terms of the five themes (e.g., Chernobyl)	See Five Themes of Geography, page 7 in Geography Grade 10 Guide Halifax Chronicle Herald data file on CD-ROM

Unit 1: Geographic Perspective

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding of how long-term and short-term physical processes influence the landscape and the human response and adaptation to these processes.

Geologic Time: Long-Term/Short-Term

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Geologic time ▸ era ▸ epoch ▸ scale - time line	Generate a geological time scale in ratio to a 24-hour period. Discuss the impact of humankind in reference to time frame. (See *Earth Dynamics,* Chapter 19, for procedure.) Direct groups to produce a large (4m) chart showing significant geological events. Add diagrams to depict key happenings in each era. The chart must be drawn to scale and diagrams may be formal "academic depictions" or in cartoon format. Identify events significant to Nova Scotia.	*Earth Dynamics,* Teacher's Resource, page 71 *Earth Dynamics,* "Geological Record", "Geological Time Scale," pages 147-152 *Canada and the World,* Prentice Hall, (second edition), 1995

Unit 1: Geographic Perspective

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding of how long-term and short-term physical processes influence the landscape and the human response and adaptation to these processes.

Human Response and Adaptation

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Human response and adaptation	Group work 1. Each group of three will brainstorm, using advanced organizers, ways in which we respond and adapt to our environment. At closure, each group will write their findings on the board. Discussion to follow. 2. Case Studies: Using case studies, demonstrate how human interaction (dependence, adaptation, modification) is illustrated in the following: ▸ hurricanes and survival ▸ volcanoes and survival ▸ earthquake-proof building ▸ flood-plain settlement, etc. Landscape Study A. Local Landscape Study. Pose questions. Why is it the way it is (e.g., Peggy's Cove)? Why do we live in flood risk areas (e.g., Truro, Antigonish)? B. Global Landscape Study. Pose such questions as, "Predict why people continue to live in high risk areas, (e.g., California and San Andreas Fault)."	*Earth Dynamics*, "Elements of Physical Geography," pages 4–5 *Earth Dynamics, Teacher's Resource*, exercise 1.2, "What is geography?" *GAIA: An Atlas of Planet Management* *Atlas of the Environment* Emergency Measures Organization (EMO) Flood risk maps — see local office of the Department of the Environment

Unit 1: Geographic Perspective

Specific Curriculum Outcome 3: Students will be expected to demonstrate an awareness of how changing perspectives of the world are dictated by culture, experience, and the impact of technology.

Geocentric Heliocentric Solar System
Flat Earth to Spherical Earth

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Geocentric Heliocentric Flat Earth to spherical Earth	Create a word splash (advanced organizer) to introduce terminology. Predict meanings. Provide an article with terminology for students to check predictions. Watch a video to examine the historical perspectives of our place in the solar system. Develop a time line to illustrate the changing perspectives of viewing our solar system. Mark events and key players (e.g., Copernicus).	*Cosmic Zoom*, (LRT) video dubbing V0577 8:00 min. *Galileo: The Challenge of Reason*, (video dubbing, (LRT) V8912 26:00 min. Vasca da Gama /History Internet NASA *Cosmos* magazine Planetarium, St. Mary's University

Unit 1: Geographic Perspective

Specific Curriculum Outcome 3: Students will be expected to demonstrate an awareness of how changing perspectives of the world are dictated by culture, experience, and the impact of technology.

Solid to Not-So-Solid Earth

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Wegener challenges contemporary perspectives about Earth. A theory is born	Small group discussion with advanced organizers. How did scientists view Earth at the beginning of the nineteenth century? Each group will write findings on a sheet of paper that moves from group to group according to the advanced organizer, "graffiti exercise". Discuss findings. Introduce the concept of continental drift/shifting plates through a multimedia presentation. Discuss (a) historical background (b) development of hypothesis (c) hypothesis (theory) (d) proof of hypothesis (e) scientific response to hypothesis Posing Questions: What evidence might one ponder to envisage a moving continent? (e.g., volcanoes, earthquakes) Problem Solving: Where does old sea floor go? Draw a diagram to illustrate your hypothesis/prediction.	*Earth Dynamics* "Continental Drift", Geography Labs Incorporated *National Geographic* articles See also: *Ice and Sand* (LRT) video dubbing V0501 56:30 min. *Lithoprobe, Probing the Earth* (LRT) video dubbing V0246 6:00 min. *Plate Tectonics: The Puzzle of the Continents* (LRT) video dubbing V1443 20:00 min. *Living Machine: Plate Tectonics* V0882 (LRT) video dubbing 30:00 min.

Unit 1: Geographic Perspective

Specific Curriculum Outcome 3: Students will be expected to demonstrate an awareness of how changing perspectives of the world are dictated by culture, experience, and the impact of technology.

Infinite to Finite Resources

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Renewable Non-renewable (finite) Sustainable	Graphic organizer: Make a graphic organizer (e.g., Venn Diagram) to compare and contrast renewable and non-renewable resources. Co-operative Learning Strategy: Using the "jigsaw" strategy, circulate articles pertaining to the concepts listed below. (Students will move to expert groups to learn concepts and then to home groups to teach concept). • Are humans a threat to their environment? • Changing view of renewable resources—theory of super abundance to present day philosophy. • National Park Movement to protect unique ecosystems • Towards a sustainable future	*Strands In the Web*, Pippin Publishing, 1994 *Canadian Geographic*, "Our Biggest and Oldest Trees .... And the Effort to Save Them." June/July 1988

Geography Grade 10

PART B

Unit 2—Land Environment

Unit 2 - Land Environment

GENERAL CURRICULUM OUTCOME (GCO)

Students will be expected to demonstrate an understanding of the forces that create and erode landform topography.

Background

Physical processes have shaped and maintained the land environment. The geographically informed person can pose and answer certain fundamental questions: What does the surface of Earth look like? How have its features been formed? What is the nature of these features and how do they interact? How and why are they changing?

This is the first of three units that identifies and describes the key physical features of the planet. It not only deals with the surface of Earth as portrayed through topography and landscape, it also studies the forces beneath, within, and upon the surface that create those landscapes. It examines human response, positive and negative, to the land and the forces that act upon it.

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Creating the Land: Origins in Earth's Structure

Students will be expected to demonstrate an understanding of the composition of the planet Earth, its structure and the interior forces of tectonics and results of shifting plates which have shaped the evolution of the planet's physical characteristics and features.

Sample Indicators

- construct a cross section of Earth
- use models to illustrate the changing densities of Earth
- identify key terminology associated with the Earth's structure
- demonstrate the concept of isostasy using models
- identify areas of isostatic rebound around Canada

2. Creating the Land: Plate Tectonics and the Evaluation of the Planet

Students will be expected to demonstrate knowledge of the changing face of Earth's surface, and, of the forces that keep Earth in motion.

Sample Indicators

- identify the key concepts of Wegener's theory of continental drift
- demonstrate co-operative abilities by constructing Pangaea from paper designs given to each member of the group
- identify plate boundaries on a map (mid-ocean ridges, subduction zones, and transform fault)
- analyse the concept of the "conveyor belt system"
- use paleomagnetism and magnetic polarity reversals as proof of plate tectonics
- identify features found at plate boundaries
- construct a model of a seismic map

3. Creating the Land: Earth Movements and Mountain Building

Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

Sample Indicators

- examine the pattern of earthquake distribution and location
- relate earthquakes to plate boundaries and faults
- use terminology (P-, S-, L-Wave, focus epicenter, etc.) to develop an essay on earthquake activity
- construct a cross-section of a mountain fold and identify its parts
- identify a variety of faults
- construct a model of the Afar Triangle (African Rift Valley)
- plot epicenters of earthquakes
- measure the magnitude of earthquakes
- evaluate the San Andreas Fault using the five themes of geography
- use cross sections and angle of repose to identify volcanic cones
- compare and contrast volcanic eruptions
- identify regions of volcanic activity
- plot notable volcanoes
- examine the nature and composition of lava and pyroclastic materials

- depict plutonic features through models
- design an evacuation plan for a natural disaster (e.g., earthquake, volcano)

4. Creating the Land: Rocks and Minerals

Students will be expected to recognize and explain the forces generating rock building processes, classify rocks and minerals, and describe the uses of rocks in the daily lives of humans.

Sample Indicators

- chart the processes of rock formations
- construct a model of the rock cycle
- identify characteristics of each rock type
- use Moh's hardness scale to identify minerals
- identify rock specimens
- examine the principle of uniformitarianism
- evaluate uses of rocks (e.g., Industrial)
- classify rocks used in building sites in local areas

5. Weathering, Slope, and Soils

Students will be expected to describe the processes involved in weathering, mass wasting, and soil erosion.

Sample Indicators

- define types of physical and chemical weathering
- use illustrative techniques to model chemical weathering (e.g., nail in coke can)
- articulate the differences between physical and chemical weathering
- provide examples of mass wasting (e.g., landslides, soil creep, etc.)
- assess the impact of mass wasting on human settlement
- explore and identify mass wasting in the immediate area
- construct a diagram of a soil profile

6. River and River Landscapes

Students will be expected to recognize and describe the features associated with rivers, and the effects of rivers on human and physical landscapes.

Sample Indicators

- use geomorphic cycle (upper, middle, and lower sections of a river) to demonstrate the impact of erosion and deposition
- design a drainage basin
- recognize drainage basins on topographic maps
- identify drainage patterns on topographic maps
- design river systems and flow dynamics inquiries in the field
- create a river profile using statistics gathered in the field
- identify river features
- examine the impact of human settlement on deltas
- recognize the river processes are slow in nature as compared to other geographic phenomenon (e.g., earthquakes and volcanoes)
- measure the growth of deltas (e.g., Po Delta) and the erosion of falls (e.g., Niagara Falls)
- design an impact model of river systems on karst topography
- assess the negative impact of human settlement on river systems
- use case studies to explore pollution of major rivers
- examine water diversion schemes and environmental response

7. Ice and Ice Landscapes

Students will be expected to demonstrate an understanding of glacial processes and the subsequent impact on the physical environment.

Sample Indicators

- explore a brief history of the Pleistocene Epoch
- suggest possible causes of ice ages
- examine glacial mechanics (formation-movement)
- locate examples of glacial erosion in the field

8. Waves and Coastal Landscapes

Students will be expected to demonstrate an understanding of coastal landscape features shaped through the action of waves, and the implications for human-environment interaction.

Sample Indicators

- demonstrate the motion of waves in a laboratory model
- illustrate the impact of wind velocity, wind duration, fetch, and seismic activity on wave size
- identify types of wave erosion
- explore features of wave erosion on coastal landscapes in a field trip
- identify examples of wave depositional features
- examine the impact of long shore drift along a coastline and the subsequent impact on coastal structure
- describe the beach as a river of sand
- study coastline types (emergent, submergent, longitudinal)
- use topographic maps, air photos, and stereo glasses to identify coastal processes and features
- describe the formation of coral
- construct a model to depict coral reefs
- explore human use of atolls in reference to atomic testing and the implications for the ocean environment
- initiate an impact study on human settlement of coastal areas

Unit 2: Land Environment

Specific Curriculum Outcome 1: Students will be expected to demonstrate an understanding of the composition of the planet Earth, its structure and the interior forces of tectonics and the results of continental drift which have shaped the evolution of the planet's physical characteristics and features.

Earth's Structure

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Crust Mantle Core Density Discontinuity Diverging/converging plates (lithosphere, asthenosphere, isostasy, moho, Sial, Sima, Pangaea)	This is a dynamic section that lends itself to a multi-media approach. A variety of concrete hands-on activities are designed to stimulate student interest. • Ask geographic questions to initiate a lesson on Earth's structure (e.g., What is the structure of Earth? How do we know? How does activity within Earth cause changes on the surface? • A lesson may begin with an advanced organizer predicting the maing of selected terminology from the *Earth Revealed* video series. Stop the video periodically in order to assess predictions. • The following are a variety of short exercises and experiments to illustrate Earth's structure: ▸ use oil and food coloring in water to demonstrate density ▸ demonstrate the three stages of matter by using ice cubes ▸ label key elements of Earth's structure ▸ use a web-advanced organizer to display concepts ▸ diagram seismic waves to illustrate changes in density ▸ *Geolab Book #3*, Geolab #1, "The Earth's Structure" ▸ Activity - *Layers of the Lithosphere*, Teacher's Resource	*Geolab Book 3,* (Seismic map of the world) AH Stahler *Physical Science* "The Earth Revealed Series" • *Earth's Interior* V1625 (LRT) video dubbing 28:00 min. • Plate Tectonics V1626 (LRT) video dubbing 28:00 • Mountain Building and Growth of Continents V1627 (LRT) video dubbing 28:00 min. • Earth's Structure V1628 (LRT) video dubbing 28:00 min. *Earth Scientists* V0247 (LRT) video dubbing 18:00 min. *Five Billion Years* V8880 (LRT) video dubbing 7:00 min. *Living Machine: Continental Tectonics and the Earth's Interior* V0883 (LRT) video dubbing 30:00 min. *Earth Dynamics*, chapter 20, pages 153-156 *Earth Dynamics "Structure of the Lithosphere,"* pages 153-156 *Earth Dynamics*, Teachers Resource, pages 72-74

Unit 2: Land Environment

Specific Curriculum Outcome 1: Students will be expected to demonstrate an understanding of the composition of the planet Earth, its structure and the interior forces of tectonics and results of continental drift which have shaped the evolution of the planet's physical characteristics and features.

Plate Tectonics

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Modern evidence of plate tectonics • mid-ocean ridges • rift valleys • plate boundaries • features location at plate boundaries • subduction zone • mountains • earthquakes • volcanoes	This unit reviews continental drift as viewed by Wegener and updates the theory with respect to present technology which supports the concept of plate tectonics . Using prior knowledge: Brainstorm the concept of Wegener's theory of continental drift. Simulations: Draw Pangaea on an orange and then peel the orange to create a simulation of plates. Using different media sources (articles, filmstrips, videos) find evidence to support the theory of continental drift • jigsaw fit • geological time scale • fossils • geologic features (mountains, rock formation)	Aerial photo of Brier Island (Department of Natural Resources) - Federal or Provincial *Physical Geography Processes in Diagram Masters 1.3.1.4* *Physical Geography Series,* Geology Series—Physical Geography Labs Incorporated *Geolab #3,* "Plates Apart" "Beyond the Ocean Frontier," V0252 (LRT) video dubbing 8:00 min. *Earth Dynamics*, Teachers Resource

Unit 2: Land Environment

Specific Curriculum Outcome 2: Students will be expected to demonstrate knowledge of the changing face of Earth's surface, and, of the forces that keep the Earth's surface in motion.

Continental Drift/Plate Tectonics

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
	Introduce plate tectonics with an illustrative video. Have students generate a list of key terms and concepts from the video. A word splash would be an interesting technique at this time. Mini-lecture: Using a variety of visual materials discuss the significance of major concepts. Briefly overview: • mid-ocean ridges • plate movement • subduction zones • earthquake zones • volcanic zones • transform fault (African Rift Valley Fault) Create a seismic map with all features of plate tectonics mentioned above. The following activities are useful to illustrate plate movement, interaction, and resulting land from features: *Geolab Book #3*, Geolab 1/Earth Structure and Seismic Map "Mountain and Plate Boundary" *Earth Dynamics, Teachers Resource, #24* *Geolab Book #3*, Geolab 2, "Plates Together" Labs on plate boundaries are available from the Physical Geography Labs Incorporated Program.	Aerial photo of Brier Island *Appalachian Story* V9988 (LRT) video dubbing 50:00 min. Scotia with Morocco, LRT Geological Map of Nova Scotia, available from Museum of Natural History *Beyond the Ocean Frontier* V0252 (LRT) video dubbing 08:00 min. *Plate Tectonics: Revolution in Science,* (LRT) video dubbing V0356 28:00 min. *Plate Tectonics: The Puzzle of Continents,* (LRT) video dubbing V1443 20:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 2: Students will be expected to demonstrate knowledge of the changing face of Earth's surface, and, of the forces that keep the Earth's surface in motion.

Continental Drift/Plate Tectonics

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Palaeomagnetism Magnetic polarity reversals Dating of sea floor Plotting movements of continents	Mini-lecture and/or demonstration of present day evidence that proves plate tectonics (e.g., paleomagnetisms, magnetic polarity reversal) Explain the "convey belt mechanism of plate tectonics through diagrams." Refer to *Earth Dynamics*. Case Study: Use Nova Scotia as a case study to highlight plate tectonics. Trace our evolution by using the Appalachian Story Video that links Nova Scotia's to Morocco. Hypothesize how this came to be. Mini-project: Using your knowledge of plate tectonics answer the following question: "Did Madagascar once belong to Africa?" If you were a young scientist, what evidence might you ponder to prove or disprove the question? Be sure to draw inferences from present day activity in Africa and clues found at specific plate boundaries.	Library resources, ProQuest, etc. *Earthquakes in Canada* (LRT) video dubbing V0250 16:00 min. *The Appalachian Story* (LRT) video dubbing V9988 50:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(A) Diastrophism

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Diastrophism • fold • anticline • syncline • fault • normal • reverse • rift valleys • overthrust • strikeslip - or transform	It is recommended that this section on folding and faulting precede earthquake and volcanoes. Fold mountains form as a direct result of tectonic activity along plate boundaries. Select several or all of the following activities to understand the formation and nature of folds: • Define Diastrophism (refer to *Earth Dynamics*, 175-78 • Illustrate how folding occurs. Plot fold mountains on a map and discuss how fold mountains are related to plate movement • Draw a well-labelled diagram to illustrate the part of a fold • *Geolab Book #3*, Geolab #7 "Folding in the Appalachian" • The Appalachian Story (Video)	*Earth Dynamics* *Earth Dynamics*, Teacher Resource *Physical Geography Processes In Diagrams* Geolab Book #3 Geologic Map of Nova Scotia *The Appalachian Story* V9988 (LRT) video dubbing 50:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(A) Diastrophism

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
	Define fault and discuss the relationship between faults, plate boundaries and diastrophism. The following activities will aid in the student's understanding of fault. Select several or all. • Identify and describe a variety of fault types (Physical geography processes in diagram 1.8, *Earth Dynamics*, page 180) • Select a variety of slides or pictures that illustrate faults. Trace and label the fault. • Examine a geologic map of Nova Scotia to locate local faults. (e.g., Glooscap Fault or Briar Island Fault) Hypothesize the cause of the fault. • Geolab Book #3, Geolab #6 - "The San Andreas Fault" • Research a major fault (e.g., African Rift Valley, Death Valley). Use the graphic environment to show the fault type and formation. In essay format, discuss the significance of the fault to the region. (e.g., impact on topography, human settlement).	*Geolab Book #3* Earth Dynamics

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(B) Earthquakes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Earthquake • focus • epicentre • P and S waves • Richter scale • shadow zone • seismology • tsunami • ring of fire • Mercalli modified scale	Introduction to earthquakes: Plot notable earthquakes on a map using latitude/longitude. In small groups, have students predict relationships among patterns of instability, plate boundaries, and position. As terminology is key to the understanding of earthquake activity it is essential to review terminology. This may be achieved in a variety of ways from teacher - directed lessons to peer teaching of specific terms. Select several or all of the following activities to build a repertoire of lesson strategies that highlight the concepts associated with the terminology: • measure and record earthquakes using the Richter Scale (Physical Geography, Geography Labs Inc.) • locate the epicentre of an earthquake in the Middle East (Physical Geography, Geography Labs Inc.) • Establish the "San Andreas Fault Line" by plotting specific quake towns. (Physical Geography, Geography Labs Inc.) • Examine the "San Andreas Fault" and view it as only one fault among a series of faults. Draw and label other important faults in the zone. • Examine faults across Nova Scotia using a geology map. • Research articles on local earthquakes. Discuss findings. • Research technology for predicting earthquake and volcanoes. • Research building codes used to earthquakes, proof a house. • Construct a model of a house based on specific earthquake codes.	Geography Labs Inc. *Physical Geography in Diagrams*, "Tectonic Map #1.2" *Geolab Book 3* *Natural Disasters*, Part 1 and *Physical Geography,* Geography Lab Inc. *Physical Geography*, Geography Labs Inc.

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(B) Earthquakes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Case Study	Library Research: Select a city in a tectonic zone or along a major fault (e.g., Vancouver, Tokyo, San Francisco). Examine strategies/readiness/evacuation plans. Develop an evacuation scenario for a major city. (Apply knowledge from research articles)	Library Research—ProQuest (magazine), encyclopaedias, books, etc. Vertical files in library.

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(C) Volcanoes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Plate boundaries Plumes Hawaiian Island Arch	Plot most recent and notable volcanoes. Generate your own list or use an activity in Geology Series, Geography Labs Inc. Engage students in small group discussion on patterns/location/cause. Relate volcanoes to plate interaction using the following activities: *Geolab Book 3*, Geolab #3, "Opening Boundaries," page 7 *Geolab Book #3*, Geolab #4, "Mt. St. Helens," page 8 *Geolab Book #3*, Geolab #5, "Hawaiian Volcanoes," page 11	Geology, Geography Labs Inc.
Cones: cinder, composite, shield-angle of repose Lava: Pahoehoe, Aa, Pillow Pyroclastic: (Made in Fire) volcanic bombs, pumice, ash, tuff, etc.	Use an action video to introduce volcanic cones. Identify volcanic cones by examining cross-section profiles or have students draw cross-section profiles from criteria given. Activity: Identify the characteristics of volcanic cones using any form of advanced organizer. Refer to *Earth Dynamics,* pages 183-187	*Living Machine: Plate Tectonics* V0882 (LRT) video dubbing 30:00 min. *Volcanism* V1630 (LRT) video dubbing 30:00 min. *Earth Dynamics*, p 183-187 *Earth Dynamics,* Teacher's Resource page 87

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(C) Volcanoes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Features: Cauldera, Crater Nueés ardents Topics related to volcanism: • landscapes • fissure eruptions • volcanic affects • geothermal energy • tourism • economic use of volcanic products • therapeutic use of springs • impact on human settlement • climatic conditions • gas related eruption	Research features common to volcanic eruption using textbook or library resources. • Lava: Pahoehoe, Aa, Pillow • Pyroclastic: volcanic bombs, pumice, etc. Activity: Jigsaw. Students will be given a number of articles to peer teach (e.g., impact of volcanoes on human settlement, changes to climatic condition, etc.). Share information from articles with their home group.	Various library articles

Unit 2: Land Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate an understanding of the interior forces associated with diastrophism, earth movements and mountain building.

(C) Volcanoes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Volcanism (Plutonism) • intrusive • dikes/sills • batholiths (magma) • laccoliths • necks Granite/Basalt • extrusive • cauldera • buttes (lava) • mesas • lava dome/plateaus	The following activities represent approaches to teaching plutonism: • Draw and label diagrams showing intrusive/extrusive volcanoes and landscape form - or forms. • Construct a model to illustrate the features of plutonism (intrusive volcanism). • Locate and graph plutonic features around the globe. • Small group discovery. Examine and discuss features formed as a product of extrusive volcanism. Present findings in graphic form. Project: Develop and present a multimedia report on one of the following topics: • life cycle of a volcano • case study of a volcano • discuss a volcano in terms of the five themes of geography	*Earth Dynamics*, chapter 24, pages 183-184 *Physical Geography Processes in Diagrams, #1.6* *The Earth Revealed Series:* ▸ *Earth's Interior* V1625 (LRT) video dubbing 28:00 min. ▸ *Plate Dynamics* V1626 (LRT) video dubbing 28:00 min. ▸ *Mountain Building and Growth of Continents* V1627 video dubbing 28:00 min. ▸ *Earth's Structure* V1628 (LRT) video dubbing 28:00 min. ▸ *Minerals: The Materials of Earth* V1629 (LRT) video dubbing 28:00 min. ▸ *Volcanism* V1630 (LRT) video dubbing 28:00 min. ▸ *Weathering the Soils* V1631 (LRT) video dubbing 28:00 min. ▸ *Ground Water* V1632 (LRT) video dubbing 28:00 min. ▸ *Waves, Beaches, and Coasts* V1633 (LRT) video dubbing 28:00 min. *Volcanism* V1630 (LRT) video dubbing 28:00 min. *The Science of Change* V0897 (LRT) video dubbing 10:00 min. *Geolab Book #3*, pages 7-13 Physical Geography Series 03 (volcanoes) • geography 06/07 • world issues series, energy related disaster 07/08 • int. geography set, natural disasters IPG.04 *The Appalachian Story* V9988 (LRT) video dubbing 50:00 min. *National Geographic* articles

Unit 2: Land Environment

Specific Curriculum Outcome 4: Students will be expected to recognize and explain the forces generating rock building processes, classify rocks and minerals, and describe the uses of rocks in the daily lives of humans.

Rocks and Minerals

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Minerals ▸ definition ▸ origin ▸ physical properties ▸ mineral groups • metallic • non-metallic • native elements • gemstones	Lab: An interesting approach to introducing minerals is through a hands-on activity. A mineral testing exercise using Moh's scale of hardness is an excellent example. Refer to *Earth Dynamics*, Teacher's Resource, page 78. Activity: Classifying minerals and rock activity. Refer to *Earth Dynamics*, Teachers Resource, #2.1.1 Invite a rockhound/collector to the class with his or her collection to allow students to sample a variety of specimens. Field Trip: A visit to an old mining site or local collecting area will provide the student with many hours of observation and classification of data.	*Earth Dynamics*, Teacher's Resource, #21.2, page 78 Collection of classroom display - size common minerals Kits from Canadian Geologic Survey, Ottawa *Earth Dynamics*, (Chapter 22) "Minerals in our Lives", pages 163-169 *Earth Dynamics*, Teacher's Resource, #21.1, page 77 Nova Scotia Museum Kits — (A) Mineral Identification (B) Rocks and Minerals of Nova Scotia Nova Scotia tourist map, *Natural History Map of Nova Scotia*, *Geological Highway of Nova Scotia*, (Nova Scotia Government Bookstore or Museum of Natural History) Department of Natural Resources Open Houses *Geological Highway Map of Nova Scotia* Geological sheet map of local area.

Unit 2: Land Environment

Specific Curriculum Outcome 4: Students will be expected to recognize and explain the forces generating rock building processes, classify rocks and minerals, and describe the uses of rocks in the daily lives of humans.

Rocks and Minerals

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Rocks • definition • mineral or mixture of minerals Three main classes A. Igneous • intrusive • extrusive B. Sedimentary • clastic • chemical • organic C. Cont'd on next page	Draw a diagram of the "Rock Cycle." Brainstorm the three main classes of rocks giving examples. A. Divide the class into groups and have each group research and report on the following: • formation of rock types • identifying features • industrial and commercial importance B. The group recorder will report their findings and information can be placed on charts and board for examination. C. Each group should also provide examples of their rock type (classroom size specimen collection).	Edgar Horn, prospector, Renfrew (Elmsdale) *Geological Walking Tour of the Ovens*, Local quarries, dolomite, barite, etc. *Geological Time Scale* Nova Scotia Museum Kits "Rocks and Minerals, Mineral Testing Kits" "Rocks and Minerals of Nova Scotia, "Grave Nova Scotia" *The Coal Kit*, Canadian Coal Association *Mineral Wealth of Atlantic Canada* V9731 (LRT) video dubbing 30:00 min. *Earth Dynamics* (CL21) Elements, Minerals and Rocks, pages 157-162

Unit 2: Land Environment

Specific Curriculum Outcome 4: Students will be expected to recognize and explain the forces generating rock building processes, classify rocks and minerals, and describe the uses of rocks in the daily lives of humans.

Rocks and Minerals

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
C. Metamorphic ▸ definition and origin ▸ methods of formation Metamorphic rocks of industrial and commercial importance.	Case Study: Students are encouraged to study a mining operation in Atlantic Canada. • coal— Cape Breton • tin—East Kemptville, video "Real Tin," LRT • base metals— Bathurst, New Brunswick	*Mineral Vignettes*, V9991(LRT) video dubbing 24:00 min. *Also available in French as Vignettes minerales V9992 (LRT) video dubbing 24:00 min.* Geological Map of Canada, Nova Scotia Government Book Store *The Earth Revealed Series* (1992), LRT *The Rock Cycle* V1441 (LRT) video dubbing 19:00 min. *The Rock Cycle (Marlin)* V9907 (LRT) video dubbing 30:00 min. *Uranium Mining - Do We Need It?* V8341 (LRT) video dubbing 58:00 min. *Uranium: The Nova Scotia Experience* V9984 (LRT) video dubbing 26:00 min. *Real Tin* V9778 (LRT) video dubbing 20:00 min. *Rio Algom Tin Mine* V9720 (LRT) video dubbing 30:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 5: Students will be expected to describe the processes involved in weathering, mass wasting, and soil erosion.

Slope

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Gradational Force Weathering (soil-regolith) A. Mechanical • frost shattering • thermal expansion • plant roots • salt crystal growth • exfoliation B. Chemical • oxidation (iron oxide) • hydrolysis • carbonation	The following processes are exogenic forces that sculpture the Earth's surface such as weathering, erosion , and mass wasting. All are forms of denudation but are unique by their processes. Use a Venn diagram to compare and contrast weathering and erosion. Define weathering and distinguish between mechanical and chemical weathering. Use a series of slides or pictures to identify specific types of mechanical weathering. Activity: Use the Activity 27.1. in *Earth Dynamics* Teacher's Resource to explore weathering. Chemical Weathering: The following procedures/experiments are an interesting means of understanding chemical processes of weathering: • brainstorm "what oxidizes"? • experiment with a nail to view iron oxide • discuss how beaches are formed through hydrolysis • review the chemical formula for carbonation • examine monuments/statues • tour a graveyard to examine the state of tombstones • investigate a Karst topography • generate a collage of mechanical and chemical weathering	*Earth Dynamics*, "Forces that shape the Earth," pages 201-204 *Physical Geography in Diagrams*, R. B. Bunnett, 4th Edition, "Weathering of Slope," pages 47-52 *Earth Dynamics*, Teacher's Resource *Earth Dynamics*, Teacher's Resource, page 93 *Physical Geography Series*, Geography Labs Inc. *Physical Geography Processes in Diagrams*, #2.1, #2.4

Unit 2: Land Environment

Specific Curriculum Outcome 5: Students will be expected to describe the processes involved in weathering, mass wasting, and soil erosion.

Slope

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Gradation—gravity Mass wasting ▸ rock slides ▸ avalanches ▸ mud slide ▸ solifluction ▸ soil creep	Using an advanced organizer, differentiate forms of mass wasting. Activity: Using the teacher's resource of *Earth Dynamics*, page 96, complete the activity on mass wasting. Library Research Project: Research natural disasters caused by mass wasting. Have students identify the type of mass wasting that generated each disaster. Hypothesize how the disaster could have been prevented and outline safety precautions to avoid future diasters. Examples: Frank Slides Aberfan Hong Kong Slides	*Earth Dynamics*, 1995, "The Work of Gravity," pages 206-209 *Earth Dynamics*, Teacher's Resource, #28.1, page 96 *Physical Geography Processes in Diagrams*, #2.5, #2.6 (slope) *Soil Maps of Nova Scotia and Individual Districts*

Unit 2: Land Environment

Specific Curriculum Outcome 5: Students will be expected to describe the processes involved in weathering, mass wasting, and soil erosion.

Soils

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Properties of Soil A. Horizon B. Soil composition C. Humus D. Parent material E. Moisture and air content	Activity: Draw a well-labelled diagram of a soil horizon to aid in the understanding of the properties of soils (See *Earth Dynamics*). Lab: Have students take soil samples (cores) around their homes to provide for differences sample of soils. Procedure: Expose a section profile of earth. Be sure the profile is visible. Place glue along a stick. Take the profile. Remove the stick from the profile and identify layers and soil composition Peer Teaching in groups of three. Each member of the group will find the information and report to the main group. 1. Humus and fertility of soil (Prairie - Semi Area Region) 2. Soil types and parent material (Rockies - Prairies). 3. Relate soil permeability to agriculture.	*Earth Dynamics*, "Soils," page 274 *Physical Geography Processes in Diagram Masters*, soil profile 4.4 *Earth Dynamics*, "Soils," pages 274-277

Unit 2: Land Environment

Specific Curriculum Outcome 5: Students will be expected to describe the processes involved in weathering, mass wasting, and soil erosion.

Soils

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Translocation Capillary Action Alkaline Leaching Permeability Porosity	Activating prior knowledge: Create a word splash using terminology (e.g., porosity, leaching translocation). Have student predict relationship between terms and the topic. Follow the splash activity with an article or video to reinforce the key terms and concepts.	*Earth Dynamics,* "Soils", page 280 *Earth Dynamics, Teacher's Resource* #36.1, page 122
	Soil Activities: Use the teacher's resource activity 36.1, page 122, to show the correlation between and among: a. soil type (classification) b. climate c. vegetation	*Canada and the World,* 2nd Edition, "Canada Thematic Soils," pages 31-32 "Climate," pages 31-32 "Agriculture," pages 33-34
	Analyse soil maps of Nova Scotia and the Prairies. Develop a series of overlay maps to depict the above criteria. Compare and contrast soils in terms of productivity.	*Vegetation and Soil,* (EMS) *Atlas of the Environment* *GAIA*
Desertification	Research Topic: Our Disappearing Soils Develop an essay that includes case studies and solutions. Charts, maps, and statistics will enhance the research. The same project can be facilitated by using a Z-chart or poster project.	Articles on soil depletion, *Canadian Geographic,* June/July 1987 April/May 1980

Unit 2: Land Environment

Specific Curriculum Outcome 6: Students will be expected to recognize and describe the features associated with rivers, and the effects of rivers on human and physical landscapes.

River and River Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Drainage basin/watershed • mainstream • confluence • tributary • interfluve • delta • distributary • divide • estuary	Introduction: Select one or more activities to introduce terminology. 1. Introduce the topic with a lecture. 2. Make a flow chart of the water cycle. Refer to *Earth Dynamics*, page 47. 3. Introduction cartographic exercises in which student sketch river systems that include borders and related features (e.g., divide confluence, etc.): a. simple river (local) e.g., Habitant River, Salmon Rive, etc. b. intermediate river (Local) e.g., Habitant River, Salmon River, etc. c. complex river (global) St. John, MacKenzie, Nile, etc. 4. Calculate the area of a drainage basin using topographic map and aerial photo.	Topographic map studies. Atlas 7, *Canadian Landscape* *The Physical Environment*, Inch and Stone, chapter 8, page 129 *Physical Geography Processes in Diagrams Masters,* hydrological cycle *Geography*, chapter 14, page 170 "Rivers—We Must Catch Up," *Teaching Geography*, November 1976, pages 72-73 *Earth Dynamics,* "Flows and Storage in the Water Cycle," page 47

Unit 2: Land Environment

Specific Curriculum Outcome 6: Students will be expected to recognize and describe the features associated with rivers, and the effects of rivers on human and physical landscapes.

River and River Landscape

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
The three stages of a river system ▸ upper ▸ middle ▸ lower	Note: Teachers may choose to use all or a combination of two or more of the following activities: 1. Carry out an examination of a local topographic map to draw stream cross sections. 2. Aerial photo analysis to determine the stages of a river. 3. *Geolab Book #3*, e.g., Geolab 12, page 26 4. Develop Z-charts (a three-panel folding display of the stages of a river system with text and graphic details).	*Earth Dynamics,* chapter 29, page 216 *Earth Dynamics*, Teacher's Resource "Stages in a River #29.1," page 101 Dury, G. H. "Rivers in Geographical Teaching," *Geography Magazine* 1963
Patterns e.g., • dendritic • radial • trellis • rectangular • glacial/ deranged	Identification of drainage patterns. Use one or more of the following activities: 1. Examine any aerial and/or satellite photo to identify drainage patterns. 2. Use any topographic map to illustrate drainage patterns. Have student color and trace drainage patterns. 3. In small groups, examine the relationship between drainage patterns and rock structure. 4. Conduct a numerical classification of a river system.	*Earth Dynamics*, chapter 29, pages 211-212

Unit 2: Land Environment

Specific Curriculum Outcome 6: Students will be expected to recognize and describe the features associated with rivers, and the effects of rivers on human and physical landscapes.

River and River Landscape

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Physical Effect • transport • erosion • deposition	Erosional and Deposition Select one or more of the following activities: 1. Through poster or essay format show the importance of the following items in reference to erosional patterns and depositional features: load, discharge and velocity 2. Using statistical data from research, generate a hydrograph (graph of discharge generated by river). 3. Relate the importance of discharge calculations to settlement (e.g., planning of dams, construction of flood control strategies). 4. Depositional features: Prepare diagrams that illustrate types of deltas (birds foot, arcuate, estuarine). Give examples.	Nova Scotia Museum Environmental Studies Series Environment Canada "Water Year Books" *Earth Dynamics*, chapter 29, pages 218-221 *Canadian Geographic* articles
Usage — Human Response • historical • contemporary ▸ economic ▸ demographic ▸ recreational	Usage - Human Response 1. Case study: Develop a case study on human response to water usage from both a historical and contemporary perspective. Select one of the following topics: ▸ hydroelectric — James Bay, Rafferty Dam Issue ▸ transportation ▸ water supply ▸ irrigation ▸ recreational ▸ aquaculture/fishing ▸ related land use — e.g., flood risk, *Geolab 3*, #17,	*Earth Dynamics*, pages 311-313 "Hydroelectric Development" Flood risk maps (EMO) NFB film, *River Landscapes*

Unit 2: Land Environment

Specific Curriculum Outcome 6: Students will be expected to recognize and describe the features associated with rivers, and the effects of rivers on human and physical landscapes.

River and River Landscape

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
	2. Invite a guest to speak on a variety of topics concerning rivers. Guest speakers are available from Emergency Measures Organization, Department of Natural Resources, Parks Canada. Possible topics: urban planning, pollution, water treatment. "Adopt-A-River" Project: Students choose a major river (continental, global) and conduct a study using topics below as their guides. Teachers explain the various components and organize available library/class resources to help students begin this long-term independent effort. Final submissions should be preceded by scheduled progress reports. (Including news watching and material collections, this exercise could require a 2-3 month timespan. The final stages will require 5-7 class periods). **Home project:** preparation, with text and illustrations, of an exhibition on river patterns, structure, and usage. **Field trip** (on transversalinear study): a structured study using site station, e.g., marsh, falls, oxbow, levee, etc.	▸ *From the Beginning* V8269 (LRT) video dubbing 15:00 min. ▸ *Geography and Business* V1519 (LRT) video dubbing 20:00 min. ▸ *River Habitat* V1339 (LRT) video dubbing 18:00 min. ▸ *Salmon* V1681 (LRT) video dubbing 28:50 min. ▸ *The Athabasca: A Case Study* V1478 (LRT) video dubbing 17:05 min. ▸ *The Candid Eye?* V1567 (LRT) video dubbing 110:00 min. Section from "One more River" ▸ *Burning Rivers* V1974 (LRT) video dubbing 28:00 min. ▸ *Rivers to the Sea* V0902 (LRT) video dubbing 46:05 min. *Canoe Routes of Nova Scotia*, M.R.M. S. Amherst *Atlas of the Environment* "Freshwater: Abundance: Scarcity," page 57 "Damaged Watersheds," page 81 "Freshwater Pollution, page 61 *Earth Dynamics*, "Measuring Rivers," pages 223-226

Unit 2: Land Environment

Specific Curriculum Outcome 7: Students will be expected to demonstrate an understanding of glacial processes and the subsequent impact on the physical environment.

Glaciation: Ice and Ice Related Landforms

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
What is glaciation? • past glaciation • present glaciation • classification	Option I Introduce glaciation with a motivating video (e.g., *Rise and Fall of the Great Lakes*). Introductory lecture on the history of the ice age (Pleistocene Epoch) A. chart glacial boundaries and geologic timelines. B. the approach to studying glaciation can vary. Using home and expert groups of the jigsaw cooperative learning technique, classes will research/report on the following topics. A. cause and theories B. alpine effects - erosional - depositional C. continental effect - erosional and depositional Suggested time: introduction — two classes, group work — three classes, report — two classes, summary —2 classes.	**Activity** — Teacher's Resource 32.1. *Earth Dynamics*, Teacher's Resource Continental and Alpine Glaciation 32.1, page 109 *The Physical Environment*, chapter 10, Inch and Stone, page 166 *Geography*, Knapp and Worell, chapter 17, page 203 *Discover the Earth: The Great Ice Age Video* V1439 (LRT) video dubbing 21:00 min.
What causes glaciation? • prevalent theories		Causes ▸ articles on greenhouse effect ▸ dust pollution ▸ contemporary glaciers Evidence — Pictorial exhibits. Box set of maps produced by Department of Natural Resources Holte Geophoto Resource Kit ▸ #11 Glacial Ice ▸ #1 Alpine Glacial Features of the Canadian Rockies ▸ #5 Iceland: Land of Volcanoes and Glaciers ▸ #2 Glacial Features of the Pleistocene (Top map 12H/12)

Unit 2: Land Environment

Specific Curriculum Outcome 7: Students will be expected to demonstrate an understanding of glacial processes and the subsequent impact on the physical environment.

Glaciation: Ice and Ice Related Landforms

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Continental glaciation • glacial erosion • crescent fracture • striation • roches moutonnée Till • moraines • drumlin • erratic Glacial fluvial • esker • delta kame • kame • kettle Alpine features Erosion • cirques • arête • horn • tarn Deposition • medial moraine • lateral moraine	Option 2 Activity Oriented Teaching Strategy Note: Teachers may choose the majority of the following activities or a co-ordination of two or more, etc. • multimedia presentation of glacial features. • exercises on glacial features *Geolab Book #3* • identification of glacial diagrams (see *Earth Dynamics*, Teacher's Resource 109, and *Physical Processes in Diagrams* • video: select a video that clearly illustrates glacial features (e.g., the Recent Ice Ages). Have students record examples of glacial features and comment on their impact on settlement patterns. • use a station-to-station method with maps, diagrams, and photographs to identify glacial features. Field Trip. Take a field trip to an area that has experienced maximum glacial activity (e.g., Peggy's Cove). Sketch the topography. Comment on vegetation, human settlement, etc.	*The Recent Ice Age* V0737 (LRT) video dubbing 26:00 min. *Physical Geography Processes in Diagrams Masters*, "Glacial Processes," 6.0, 6.4 "Gros Morne National Park," Parks Canada *Secrets of Ice* V1070 (LRT) video dubbing 24:50 min. *Ice and Sand* V0501 (LRT) video dubbing 56:50 min.

Unit 2: Land Environment

Specific Curriculum Outcome 7: Students will be expected to demonstrate an understanding of glacial processes and the subsequent impact on the physical environment.

Glaciation: Ice and Ice Related Landforms

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Effects and human responses ▸ drainage ▸ denudation ▸ economic benefits ▸ transportation ▸ coastal features	1. Conclude the entire glaciation section by using class discussions and lectures to deal with this subsection. 2. Home assignment: Construct a collage showing the relationship between glaciers, glacial effects on the landscape, and the tourist industry. 3. Examine a variety of maps and search for relationships between glacial drainage and the construction/location of transportation facilities. 4. Establish learning stations based on the five items listed under "Concepts." 5. Using atlases, industrial directories, etc., investigate the relationship between the location of commercial concrete companies and the materials they require (e.g., eskers/gravel sites.) 6. Examine slides, photos, maps, etc., to examine the relationship between glacial feature (e.g. finger lakes drumlens, fjords, etc.) and settlement patterns.	Articles from *Equinox*, *Canadian Geographic*, *National Geographic* — brochures on Alps, Rockies` Schultz, Gwen *Icebergs and Their Voyages* New York: Morrow, 1975 Topographic maps of Trenton, Ontario, Lunenburg, Queens and Hants counties, Gros Morne, Newfoundland, Mount Revelstoke, British Columbia *Atlas of the Environment* "The Arctic," page 177 "Antarctica," page 181 Canada Coast Guard - Icebergs *New World Below* V9920 (LRT) video dubbing 28:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 8: Students will be expected to demonstrate an understanding of coastal landscape features shaped through the action of waves, and the implications for human-environment interaction.

Waves and Coastal Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Waves Many of the items below in A and B can be illustrated in a field trip A Mechanics of waves • causes of waves • parts of waves • energy from waves B Direction of wave movement • influence of prevailing winds • windward and leeward side of shorelines • reflection and refraction of waves • influence of submarine features	Use chalkboard diagrams and slides to show the different parts of waves, e.g., troughs, crests, periods, etc. A simple classroom demonstration can be undertaken using a wave spring. If one is not available, use a rope. Gain permission to show a portion (clip) of a video on sport surfing where large, clearly defined waves are "captured" on film. Give a lecture using chalkboard demonstrations on introduction with diagrams and explanations of key concepts. Use a variety/series of aerial photographs to carry out a study of waves breaking on both regular and irregular coastlines/shores. Use a variety of slides to carry out a study of wave fronts. Brainstorm to examine the causes/shapes, etc., of wave fronts.	Knapp and Worell, *Geography*, chapter 18, page 219 *The Physical Environment,* Inch and Stone, chapter 12, page 205 *Earth Dynamics*, "Wave Action and Deposition," pages 252-256 *Coastal Studies in Canadian Geography*, #2 by Robert J. McCalla, Saint Mary's University *Coastal Studies in Canadian Geography #4* *Living Oceans* V0059 (LRT) video dubbing 25:00 min. *Physical Geography Processes in Diagrams* (section 7)

Unit 2: Land Environment

Specific Curriculum Outcome 8: Students will be expected to demonstrate an understanding of coastal landscape features shaped through the action of waves, and the implications for human-environment interaction.

Waves and Coastal Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
The following suggestions can be integrated with subsection D, which follows on the next page. C Types of Waves • tidal waves • tsunamis • tides as waves (tidal bores) • rogue waves • seasonal variations	Use pictures/slides/maps/shore watch to see if, in fact, there are changes in waves and wave patterns that are directly linked to seasons. Use stories from popular magazines like the *Reader's Digest* to collect data on the physical features of particular kinds of waves. Study articles from geographic journals and magazines to study the properties of types of waves, e.g., *The Canadian Geographic*, February/March 1989.	Topographic map references 11 K/16 variety of complex features 11 D/11 deposited features 21 A/2 via (La Have) 12 H/12 also for glaciation 10 0/13 Sable Island 11 P/11 fjords, rocky islands 2 E/10 islands 2 E/9 islands 21 I/15 sand bards bar built coast 11 L/4 PEI crossing 1:250,000 scale 11N Magdallen Islands *Adrift on the Gulf Stream* V0822 (LRT) video dubbing 57:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 8: Students will be expected to demonstrate an understanding of coastal landscape features shaped through the action of waves, and the implications for human-environment interaction.

Waves and Coastal Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
D Impact of Waves on Shorelines/Coastlines • breaker and spray zones • features of erosion (destructive), e.g., headlands, capes, points, islands, wave-cut terraces, sea-cliffs, sea-caves, seastacks, "flowerpots," undercutting, sea arches • features of deposition (constructive) e.g., island bars, beaches, spits, parallel bars, baymouth bars, hooks, offshore bars, wave-built terraces, tombolos, etc. (Some of these features result from the combination of wave and current action.)	**Note:** What follows is a variety of suggestions, individual items, or combinations of items are left to the teacher's discretion. Sequence photos of cottage lots, exposed coffins, from cemeteries, etc. (Longspell Road Kingsport, Medford) Seasonal, yearly, decade, etc.: Changes in features of the shoreline that can be directly linked to wave action: can be studies through slides, pictures, aerial photos, written and oral accounts, etc. Use a ripple tank in conjunction with a stream (shoreline) table to construct depositional features (e.g., bars) Identification of shoreline features through topographic and hydrographic map exercises.	*Geographical Perspectives on the Maritime Provinces*, edited by Doug Day, Saint Mary's University *Physical Geography Processes in Program Masters, Coastal Processes*, 7.1- 7.6 *Coastal Canada: West-East Comparisons*, Saint Mary's University Cotter, Charles *The Physical Geography of the Oceans* London: Hollis and Carter, 1965 *Earth Dynamics* "Wave action and Deposition," pages 250-251

Unit 2: Land Environment

Specific Curriculum Outcome 8: Students will be expected to demonstrate an understanding that coastal landscape features are shaped through the action of waves and the implications for human-environment interaction.

Waves and Coastal Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
	Create 3-D diagrams of the development of coastline features. Show slides of exceptional coastal features to illustrate and cement key concepts. Invite guest speakers — e.g., fishermen, coastguard personnel, environmental engineers, search and rescue — to discuss aspects of the ocean environment. Construct a model of coastal features.	Nova Scotia Museum Environmental Studies Series *Waves, Beaches, and Coats* V1633 (LRT) video dubbing 30:00 min. Check for news articles on coastal storms, (e.g., Bangladesh Hurricanes along the East Coast of America). Try *Hurricane: Earth's Greatest Storm* V1440 (LRT) video dubbing 20:00 min.

Unit 2: Land Environment

Specific Curriculum Outcome 8: Students will be expected to demonstrate an understanding of coastal landscape features shaped through the action of waves and the implications for human-environment interaction.

Waves and Coastal Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Coastal landscapes V Factors which influence the development of a coastline 1) Factors • prevailing winds • nature of the bedrock • vegetation • climate • massive agents of deposition (e.g., siltation) • human activity • waves 2) Types of Factors: past geologic event, e.g., glaciation, folding massive agents of deposition, e.g., siltation VI Main Types of Coastlines 1) Coastlines of Emergence a) features (e.g., raised beaches, terraces) b) causes (e.g., tectonic activity, isostasy, fluctuations in sea level	Introduction: Lecture and notes on coastal landscapes (see *Earth Dynamics)* Design a case study on factors that influence coastal formation (e.g., past of geological event — glaciation, folding, etc.). Use Bedford Institute of Oceanography resources to assist the process. Case studies: Examine case studies that reflect the impact of humankind on coastal landscapes (e.g., Arrow, Kurdistan, Irving Whale, Exxon Valdez) Study the coastline of Hudson Bay to view examples of raised beaches and emerging islands (isostatic rebound)	*Health of Our Oceans* and other related articles. Environment Canada Conservation and Protection 5th Floor, Queens Square 45 Alderney Drive Dartmouth, NS B2Y 2N6 *Coastal Canada*, Dobbs, K. Discovery Books, Toronto, 1985 *Earth Dynamics*, "The World of Waves," pages 249-253

Unit 2: Land Environment

Specific Curriculum Outcome 8: Students will be expected to demonstrate an understanding that coastal landscape are features shaped through the action of waves and the implications for human-environment interaction.

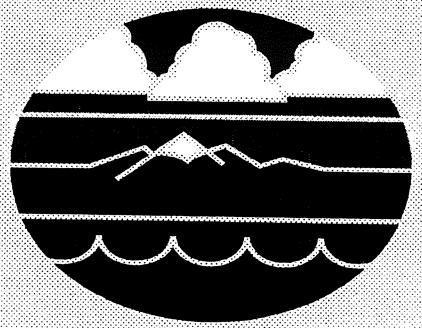
Waves and Coastal Landscapes

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
2) Coastlines of Submergence a) features, e.g., ria, fjord, submarine features b) causes, e.g., tectonic activity, etc.	Use maps of Nova Scotia to examine features related to a coastline of submergence. Activity on coastlines: *Geolab Book #3*, Geolab #14, "A Ria Coastline," pages 98-99 Refer to the video, *The Appalachian Story*, to view formation of the coastline. Construct a model to depict either coastlines of emergence or coastlines of submergence.	*Earth Dynamics*, chapter 33, page 253 *The Sea Shore World*, Costello, D. F. Thomas Y. Crowell, Publisher, New York, 1980 *The Edge of the Sea*, Carson, R. Houghton Mifflin Company, Boston 1955 *The Thin Edge: Coast and Man in Crises*, Simon, A. We., Avon Books, New York, 1979 Hydrographic sheets 4140 (Minas Basin) 4396 (Annapolis Basin) **Note**: These are only two examples. There are any number of relevant maps that can be found through Geomatics in Amherst.

Geography Grade 10

PART B

Unit 3—Ocean Environment



Unit 3 - Ocean Environment

GENERAL CURRICULUM OUTCOME (GCO)

Students will be expected to demonstrate an understanding of the complex ocean environment consisting of the interplay of tides, sea floor processes, continental margins, and their influence on climate, coastal zones, and human activity.

Background

Oceans cover more than 70% of the planet. The oceans play an important role in controlling the world's climates. Continental margins provide valuable fish and mineral resources. Coastal zones have special significance as much of the world's population lives beside or close by them. Coastlines, existing at the interface of land, sea, and air are especially vulnerable environments which can quickly be destroyed. A knowledge of the complex ocean environment - tides, sea floor processes, climatic effects, etc. - will enable students to place this huge component of planet Earth into the global context.

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Topography of the Sea Floor

Students will be expected to identify distinctive sea floor processes that form and shape the features of the submarine landscape, its features, and their effects on island formation.

Sample Indicators

- describe processes and features of the submarine landscape (module formation, sea floor spreading, hot spot, island chains)
- examine and analyse the effects of Earth's atmosphere on oceans
  (e.g., currents, tides, EL Nino effect)
- describe the human impact on the ocean balance and composition (ocean, chemistry, human exploitation, pollutants)
- analyse oceans as a global storehouse of heat, carbon dioxide and mineral

2. Tides and Currents

Students will be expected to assess the effects of the ocean's moving waters on the atmosphere of Earth and upon human activity.

Sample Indicators

- generate diagrams of neap and spring tides
- relate tidal ranges to planetary position
- design an impact study of tides on coastal navigation, harbor installations, and depositional features
- plot sites with unusually high tides that would be viable for hydroelectric power
- generate tide table exercises
- illustrate tidal bore formation through sketches
- plot and name major ocean currents
- describe the relationship between air currents (wind) and ocean currents
- design a scheme of ocean currents demonstrating the impact of the coriolis effect
- name warm and cold currents
- examine the impact of ocean current on climate (e.g., El Nino, Rainless Coastline)
- hypothesize why palm trees grow on the west coast of Ireland

Unit 3: Ocean Environment

Specific Curriculum Outcome 1: Students will be expected to identify distinctive sea floor processes that form and shape the features of the submarine landscape, its features, and their effects on island formation.

Exploration and Study

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Disciplines • oceanography • ocean geography • hydrology • marine biology	1. This subsection serves as an introduction. Lecture and discussion can be used initially. Armed with a question sheet which alerts them to points to look for, students view a video or videos, such as "Mapping The Ocean Floor."	*Mapping The Ocean Floor* V7790 (LRT) video dubbing 60:00 min. *Titanic* (LRT) video dubbing *New World Below* V9920 (LRT) video dubbing 28:00 min.
Tools • sonar remote sensing • core sampling • seismic survey • manned/unmanned submarine apparatus • S.C.U.B.A.	2. Using atlases and texts, students will conduct a homework survey of these materials to determine the dimensions of this field of study. In class, the students are divided into groups to flesh out the three subtopics. Discussion and board notes conclude the exercise. Show the National Geographic video, *Titanic,* and use it to pose questions about exploration.	*Planet Earth Series:* *Blue Planet, Accumulation of the Oceans* V0885 (LRT) video dubbing 30:00 min. *Atmosphere* V0886 (LRT) video dubbing 30:00 min. National Geographic Maps
Products of Research (See Part A, Unit 2) • maps, e.g., ocean currents, ocean winds • profiles/cross sections (seismic) • hydrographic charts • personalities	3. Presentation: Have students research and present accomplishments of one of the personalities mentioned below: • Ballarca • Cousteau • MacInnis • Picard	Hydrographic charts – marinas, gabriels, from Geomatics, PO Box 310 16 Station Street, Amherst, NS B4H 3Z5 Posters from NSF/NASA, sponsored by United States Global Ocean Flux Study Planning Office Woods Hole Oceanographic Institute Woods Hole, MA 02543

Unit 3: Ocean Environment

Specific Curriculum Outcome 1: Students will be expected to identify distinctive sea floor processes that form and shape the features of the submarine landscape, its features, and their effects on island formation.

Exploration and Study

Key Terms/Concepts	Suggested Strategies/Activities	Pupil Teacher/Resources
Case study	The Halifax area is well-equipped with ocean science research centres, private industry, and government offices (e.g., Bedford Institute of Oceanography, Dalhousie University: Oceanography Department, Federal Department of Fisheries and Oceans). Each is known to welcome inquiries about visits, guest lectures, and student project work. Select a topic of research from one of the above institutions and present a detailed explanation on what the topic shows and what tools, techniques, and processes were used to acquire the information.	*The Living Ocean* V0059 (LRT) video dubbing 25:00 min. *New World Below* V9920 (LRT) video dubbing 28:00 min. *The Plant Earth Series: Blue Planet: Circulation of the Oceans* V0885 (LRT) video dubbing 30:00 min.

Unit 3: Ocean Environment

Specific Curriculum Outcome 1: Students will be expected to identify distinctive sea floor processes that form and shape the features of the submarine landscape, its features, and their effects on island formation.

Exploration

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Sea floor spreading Core samples Sedimentation	Activity on sea floor spreading: *Geolab Book #3*, Lab #3, exercise, "Plates Apart." This activity will provide the student with a knowledge of plate movement and resulting features. Invite a guest speaker to discuss the age of the sea floor through examination of a core sample. The research department of a local oil exploration company may be a good place to find guest speakers. Case study: Research articles to highlight the Cabot Strait submarine landslides of 1929.	*Geolab Book #3* Article "Storm Below" *Discover Magazine*, November 1990 Literature and samples from biology *Hold Back the Sea* V8478 (LRT) video dubbing 30:00 min. Environment Canada, Supply and Services Canada, Ottawa, Canada, K1A 0S9

Unit 3: Ocean Environment

Specific Curriculum Outcome 1: Students will be expected to identify distinctive sea floor processes that form and shape the features of the submarine landscape, its features, and their effects on island formation.

Sea Floor Features

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Banks Ridges Sea Mounts Shelf Trenches Slope Canyons Abyssal plain Manganese nodules Sea floor striations (scours)	The following activities are useful for identification of sea floor features: • observe world maps showing continental shelf distribution • sketch and label an ocean profile • generate a cross section of the Atlantic Ocean • examine a hydrographic chart and construct a profile of the Northumberland Strait, predict problems in construction of the link • identify features using assorted maps of the ocean floor (e.g., National Geographic maps).	Fisheries map from UNESCO *Georges Bank* V8863 (LRT) video dubbing 28:00 min. *Canadian Geographic*, "Canada's New Atlas of the World's Oceans," December 1982/January 1983

Unit 3: Ocean Environment

Specific Curriculum Outcome 1: Students will be expected to identify distinctive sea floor processes that form and shape the features of the submarine landscape, its features, and their effects on island formation.

Island Development

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Forces producing islands • glacial action • volcanic action • coral development • coastal erosion • tectonic action	A mini-lecture, combined with a multimedia presentation, is an effective introductory approach. Group work: In small groups, have students investigate the generating forces behind island formation. Give examples. Brief presentations to follow. Illustrate the development of coral islands through diagrams. (Refer to *Earth Dynamics*.)	*Earth Dynamics*, *Geography Processes in Diagrams* Articles from *National Geographic* magazine

Unit 3: Ocean Environment

Specific Curriculum Outcome 2: Students will be expected to assess the effect of the ocean's moving waters on the atmosphere of Earth and upon human activity.

Ocean Tides

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Tidal frequency Tidal range (neap and spring) Tidal lag (delay) Tidal bores Tidal power	This unit lends itself to work in the field. A comparative study between Lantz and Annapolis will provide an abundance of information for a case study of Nova Scotian tides. As graphic information will be generated from the study, a poster format may provide the most effective means to display data. In the study, include the following: • use of tide tables • diagrammatic exercises section • field measurements • experiments showing the oscillating effect (bathtub effect) Field Trip: Tour the Annapolis Tidal Station.	Article "Technology: Applications Tidal Energy" from *Focus on Earth Science*, Merrill (Teacher's Edition) Set of tide tables (Nova Scotia Government Book Store)

Unit 3: Ocean Environment

Specific Curriculum Outcome 2: Students will be expected to assess the effect of the ocean's moving waters on the atmosphere of Earth and upon human activity.

Ocean Currents and Climate

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Global patterns • thermal convection • density currents • west wind drift • trades • coriolis effect • upwelling • specific currents: Gulf Stream, Labrador, Japan • mixing • tidal currents	Introduce the unit through a mapping exercise. Overlay a map of currents with a map that depicts world climates. Have students predict and draw inferences about the relationship between currents and climate. Case Studies: Conduct research on selected currents. The following formats may be useful: jigsaw, small group presentations, individual essays: • Sargasso Sea • El Nino • Gulf stream • Labrador • Kuroshio • North Atlantic Drift Local study: Investigate the impact of the Canso Causeway on the Strait of Canso current.	*Adrift on the Gulf Stream* V0822 (LRT) video dubbing 57:00 min. *Planet Earth Series: Blue Planet, Circulation of the Oceans* V0885 (LRT) video dubbing 30:00 min. Any number of articles on many of these topics, e.g., *National Geographic*, *Reader's Digest*, *Equinox*, *Canadian Geographic*

Geography Grade 10

PART B

Unit 4—Atmospheric Environment

Unit 4: Atmospheric Environment

GENERAL CURRICULUM OUTCOME (GCO)

Students will be expected to demonstrate an understanding of the complex nature of the atmospheric environment, its life sustaining function, and the delicate web of relationships which exists among the atmosphere, the biosphere and the hydrosphere.

Background

The atmospheric envelope that surrounds Earth protects and nurtures a great variety of life and controls many landscape-forming processes. Its unique mix of gases is found on no other known planetary body. In combination with solar energy, moisture, and pressure, this atmosphere creates recognizable and distinctive patterns of climate and weather conditions around the globe. Knowledge of these interacting components and patterns will help students to understand both the natural world around them and the influence of human activity upon it.

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Composition

Students will be expected to analyze the composition of Earth's unique atmospheric envelope, described through its elements and vertical zones, identifying the conditions in the atmosphere necessary for life to be sustained.

Sample Indicators

- construct a pie graph to illustrate atmospheric composition
- chart features unique to the vertical zones
- examine the life-giving characteristics of the atmosphere
- use advanced organizers to compare and contrast Earth's atmosphere to other planets

2. Solar Energy

Students will be expected to demonstrate an understanding of the complex systems resulting from the energy released from the sun.

Sample Indicators

- construct a chart of the energy budget used in a family home or in a government department
- provide criteria for temperature control and distribution
- analyse world isotherm maps
- differentiate between weather and climate

3. Atmospheric Moisture

Students will be expected to demonstrate a knowledge of the complexity of the hydrosphere as it applies to the hydrologic cycle and subsequent types/ modes of precipitation.

Sample Indicators

- design a chart to depict flow and storage within the hydrologic cycle
- use diagrams to represent the three modes of precipitation
- plot modes of precipitation on global weather charts to establish world patterns of isohyets
- identify cloud formations, discussing the significance of each

4. Atmospheric Pressure

Students will be expected to be able to relate air mass geography to weather systems, both local and globally.

Sample Indicators

- plot air masses on a map
- describe the temperature and moisture of each air mass
- establish boundaries/fronts between conflicting air masses
- describe the formation/slope/weather information of warm, cold and occluded fronts
- use symbols of weather maps to interpret weather conditions of a particular station model
- compile a synopsis of weather conditions across Canada

5. World Patterns of Climate and Biomes

Students will be expected to use climatic data to identify major climatic zones of the world.

Sample Indicators

- use the Köppen Classification System to identify climatic regions
- construct a map of climatic regions
- analyse the nature of each climatic zone
- use a case study to show the relationships between human existence and the pattern of world climates
- explore techniques of sustainable development
- describe how indigenous people adapt to their ecosystems

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 1: Students will be expected to analyse the composition of Earth's unique atmospheric envelope, described through its elements and vertical zones, identifying the conditions in the atmosphere necessary for life to be sustained.

Elements

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Atmospheric reservoir	Introduction: Brainstorm atmospheric gases and represent gas distribution through the graphic environment (e.g., pie graph, bar graph)	*Earth Dynamics*, chapter 10, page 71 *The Physical Environment*, 2nd edition, "The Atmosphere," page 61 *Geography: A Study of its Physical Elements*. "The Composition of the Atmosphere," page 37.
Atmospheric evolution	View a video on the history of Earth's atmosphere and discuss the evolution of the air envelop and its importance in the development and maintenance of life.	*The Miracle Planet Series: The Air Above* V0498 (LRT) video dubbing 56:50

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 1: Students will be expected to analyse the composition of Earth's unique atmospheric envelope, described through its elements and vertical zones, identifying the conditions in the atmosphere necessary for life to be sustained.

Vertical Zones

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Layers in the atmosphere features/altitude/density • troposphere • tropopause • stratosphere • stratopause • mesosphere • mesopause • thermosphere (ionosphere) • magnetosphere • jet stream • ozone layer • aurora borealis	Note to teachers: Use one or more of the following activities to present information on atmospheric layers. Design a word splash activity using the layers, characteristics, altitudes. Have students work in groups to predict the relationships between the terms. Provide an article or a reading, as follow-up, to assist students to check their predictions. Construct and label a "spheres" map depicting the layers and transition zones. Research and report on atmospheric characteristics of each layer.	*Earth Dynamics*, chapter 10, pages 71–73 *Earth Dynamics*, Teacher's Resource, #10.1, page 31 *Physical Elements*, "Divisions of Atmosphere," pages 37–39 "The Ozone Layer," pages 39–41 "Upper Atmospheric Circulation and Jet Streams," page 57 *Waiting on Weather* V8582 (LRT) video dubbing 29:00 min.
Pressure/density Relationship	Demonstration: Use colored jello to produce an atmospheric cross section in a glass tube or bottle. As each layer is added to the model, students should discuss the characteristics and conditions — density, temperature range, gas composition	

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 1: Students will be expected to analyse the composition of Earth's unique atmospheric envelope, described through its elements and vertical zones, identifying the conditions in the atmosphere necessary for life to be sustained.

Conditions Necessary for Life

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Atmosphere sustains life	Brainstorm the importance of the atmosphere as a "giver of life", or use an advanced organizer such as an attribute web to map attributes.	*Earth Dynamics*, chapter 10, page 71 *Earth Dynamics*, Teacher's Resource #18.1, page 68
Atmospheric change: nature and human effects A. greenhouse B. Global warming C. ozone layer - formation and destruction	Through gasses added by human activity, introduce the concept of atmospheric change. Have students list gasses and origins in human activity. Examine a case study on changes in the atmosphere. Activity: *Earth Dynamics*, Teacher's Resource, "Greenhouse Gases", #18.1. Explore an issue involving atmospheric dynamics in detail (e.g., ozone depletion). Note: This unit may also be fully integrated with Unit 5 "Spaceship Earth".	*Atlas of the Environment* "The Greenhouse Effect," page 93 "The Ozone Layer," page 97 *The Physical Geography Series,* "The Greenhouse Effect" Environmental Awareness: Case Study, "Ozone: Crises Averte," page 8 *Climate Puzzle: Past, Present, and Future* V0887 (LRT) video dubbing 30:00 min. *Climate Puzzle: The Atmosphere* V0886 (LRT) video dubbing 30:00 min. *Green House Warming* 21340 (LRT) loan video 16:00 min. *Hole In the Sky* 21061 loan video 58:00 min. *Earth Dynamics,* chapter 18, "Global Warming and Integrative Study," pages 134–141

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding of the complex systems resulting from the energy released from the sun.

Temperature Controls

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Each year Earth receives enough insulation to melt massive areas of ice caps.	Examine the dichotomy of this statement in light of present ice caps on Greenland and Antarctica Use a word splash activity or brainstorm to generate a list of factors that control temperature distribution.	
Factors that control temperature distribution • latitude • altitude • nearness to large bodies of water • prevailing winds • ocean currents • cloud cover	Use a jigsaw or another co-operative learning strategy to peer teach the factors that control temperature distribution. Activity: *Geolab Book #3*, Geolab 19, "The Atmosphere," page 40	*Geolab Book #3*

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding of the complex systems resulting from the energy released from the sun.

Temperature Controls

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Solar energy A. radiant energy B. albedo C. greenhouse effect	Students can observe and chart the electromagnetic solar spectrum and identify high versus low energy waves. Simulation of planet and vegetation: Have students determine how the albedo would impact the planet in terms of temperature regulation. Visit a local greenhouse and chat with the owner about construction styles and materials. Examine the concept "greenhouse effect" inside the greenhouse. Mini-project: Have students build small scale greenhouses to illustrate the concept.	*Canada and the World Atlas*, Second Edition, pages 25–26 (see appendix: A,B,C,D, Which One?) *The Physical Environment*, second edition. "Reception of Solar Radiation" *The Physical Geography Series*, "Temperatures and Altitude Lab"
Energy Budget	Construct a chart depicting energy balance and reflect on results of energy gain or loss.	*Earth Dynamics*, chapter 3, pages 17–19. *Solar Sea: The Sun* V0892 (LRT) video dubbing 30:00 min.

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding of the complex systems resulting from the energy released from the sun.

World Isotherm Patterns

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Isotherms	In small groups have students observe a series of isothermal maps. • Students will brainstorm factors affecting local and global patterns • Formulate a generalization about isotherms and water bodies.	*The Physical Environment*, 2nd edition, "Distribution of Solar Energy"
Factors affecting isothermic patterns	Experiment with factors affecting heat transfer and retention, (e.g., body of water, rock, and air mass).	*Geography - A Study of Its Physical Elements* "Temperature Control," page 45 "World Distribution of Temperature and Precipitation," page 46 *Physical Geography in Diagrams*, "World Distribution of Temperature," page 124

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate a knowledge of the complexity of the hydrosphere as it applies to the hydrologic cycle and subsequent types/modes of precipitation.

Local and Global Water Cycles

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Transfer of water vapor Hydrologic Cycle • humidity • absolute • relative • condensation • dew point • sling psychrometer • hygrometer	Use a graph to explore flows and storage within the hydrologic cycle. Demonstration: Use popcans to demonstrate the concept of condensation in terms of temperature impacting the water-carrying capacity of the air. The following elements will help to build a working knowledge of concepts pertaining to humidity: • demonstrate absolute and relative humidity through map exercises • discuss the impact of relative humidity on a football player in terms of low and high relative humidity • *Geolab Book #3,* Geolab 20, "Atmospheric Humidity" Activity: *Earth Dynamics,* Teacher's Resource #4.5. *Relative Humidity*	*Earth Dynamics*, chapter 7, pages 46–48 *Earth Dynamics*, Teacher's Resource

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate a knowledge of the complexity of the hydrosphere as it applies to the hydrologic cycle and subsequent types/modes of precipitation.

Cloud Formation

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Cloud formation and classification Cloud Family a) high (cirrus) b) middle (alto) c) low (stratus) d) clouds of vertical development	Introductory lecture on the cloud family and associated weather phenomenon, using charts or slides. Small group discussions: Predict future weather events using cloud types. Explore folklore associated with clouds (e.g., red sky at night, sailors' delight). Activity: *Geolab Book #3,* Geolab #23, pages 44–45	*Earth Dynamics*, "Clouds," page 87 *Geography*, "Cloud Types and Precipitation," page 61 *Physical Geography in Diagrams*, "Clouds," pages 115–117 *Earth Dynamics,* "Weather Myths," chapter 10, page 83 Weather Station booklets (Bedford Weather Station) Cloud charts, etc. *Geolab Book #3*, Geolab #23, pages 44-45

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate a knowledge of the complexity of the hydrosphere as it applies to the hydrologic cycle and subsequent types/modes of precipitation.

Types of Precipitation

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Orographic precipitation • adiabatic rate • dew point • chinook winds • rain shadow desert	This section defines three modes of precipitation. The following activities are designed to depict key concepts for each mode: 1. Mountain adventure. Using adiabatic lapse rates to calculate: • elevation of dew point • temperature at top of mountain • temperature at bottom of mountain Refer to *Geolab Book #3*, "Lapse Rate Wet and Dry" 2. Examine isohyet maps and explain why the coast of British Columbia is a temperate rainforest while the interior ranges have arid to desert like conditions. Activity: *Earth Dynamics*, Teacher's Resource, "Comparing Winds of the World," (chinook), #4.4	*Geolab Book #3* *Earth Dynamics*, chapter 7, page 50 *Geography*, "Cloud Types and Precipitation," page 61 "Rainshadows," page 60 "Precipitation," Geolab Book #3 Geolab 23, pages 44–45 *Earth Dynamics* *Earth Dynamics,* chapter 7, page 49
Convectional rainfall • super heated ground • unequal heating • convection cell • cumulonimbus cloud	3. Draw a well-labelled diagram to explain the concept of convectional rainfall. 4. Write a geopoem to illustrate the nature and effects of convectional rainfall.	

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate a knowledge of the complexity of the hydrosphere as it applies to the hydrologic cycle and subsequent types/modes of precipitation.

Types of Precipitation

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Cyclonic or Frontal • warm front • cold front • occluded front Mapping precipitation in Canada	Generate diagrams of fronts and analyse: • causes • type of weather • clouds associated with fronts • slope Examination of three modes of precipitation in reference to the following illustrative exercises: • *Earth Dynamics, Teacher's Resource* Activity 4.6, "Comparison of types of precipitation". • On a map of Canada, establish areas particular to each mode of precipitation. • *Geolab Book #3,* Geolab #23, "Precipitation Principal Air Masses of North America." • Activity #13.1, Teacher's Resource	*Earth Dynamics*, Teacher's Resource, page 26 *Earth Dynamics*, chapter 7, page 51 *Canada and the World Atlas,* 2nd Edition, pages 27–28 *Earth Dynamics*, Teacher's Resource, #14.1, page 13.1

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 3: Students will be expected to demonstrate a knowledge of the complexity of the hydrosphere as it applies to the hydrologic cycle and subsequent types/modes of precipitation.

World Patterns of Isohyets

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Isohyets Factors affecting isohyet patterns	Small groups: Have students observe a series of isohyet maps and discuss factors affecting local and global patterns. At closure, record information on board. Mini-lecture: Provide a mini-lecture on factors affecting isohyet patterns. Activities: Plot a series of graphs to depict seasonal precipitation for selected regions. Have students hypothesize factors that account for differences.	*The Physical Environment*, 2nd edition, "Clouds," page 313 "How precipitation develops," page 314 "Forms of precipitation," page 315 "Types of precipitation," page 316–321 *Geography: A Study of Its Physical Elements*, "World distribution of Precipitation," page 67 "Fig 8.11 Average annual Precipitation," page 68 "Seasonal Distribution of Precipitation," page 69 *Physical Geography in Diagrams*. "Rainfall," page 139

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 4: Students will be expected to relate air mass geography to weather systems both local and globally.

Patterns

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
World patterns of pressure Global patterns • polar easterlies • sub-polar lows • westerlies • sub-tropical highs • NE/SE trades • equatorial low Seasonal monsoons Local patterns	The following activities are designed to explore wind systems and to relate these systems to pressure patterns: • Examine a chart depicting average world pressure patterns and relate to global wind patterns. • Identify global winds on a diagram. • Document a historical voyage's use of prevailing winds. • Examine the impact of the Coriolis effect in terms of wind direction. • Observe a series of global seasonal weather maps with isobars. Relate wind speeds and pressure differentials. Compare seasonal changes. Refer to *The Physical Environment*. Students will note that land/sea breezes and monsoons have the same pressure changes. Monsoons are seasonal, while breezes are from day to night. Local study: Research the phenomenon of the "Cheticamp Winds."	*The Physical Environment*, 2nd edition, "Pattern of yearly average," "Pressure and winds," page 295 "Seasonal pattern or pressure and winds, page 296 *Physical Geography In Diagrams*, "Pressure," page 126 "Winds," page 129 *Earth Dynamics*: "Global Wind Systems," pages 36–39 *Physical Geography in Diagrams*, "Atmosphere Pressure Winds," page 189

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 4: Students will be expected to relate air mass geography to weather systems both local and globally.

Zones

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Atmospheric pressure (zones) • Horizontal Distribution • Winds and currents, land and sea breezes	Activities: The following activities are suggested to explore atmospheric pressure: • review facts of air masses and weight. • demonstrate air flow from high to lower pressure zones by using bicycle pumps/tire tube. • *Geolab Book #3,* Geolab #19 "Atmosphere and Climate" • diagram the zone of flow between pressure systems for land and sea breezes. Have students observe a barometer over a selected time period and take readings. Discuss connections between pressure and air flow.	*Geolab Book #3* *EOA Weather Work Station,* computer program (See Authorized Software List)

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 4: Students will be expected to relate air mass geography to weather systems both local and globally.

Zones

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Air masses and the zone of contact (fronts). Pressure gradients: lows and highs Mid Latitude cyclones Tropical cyclones • hurricanes • tornadoes	Suggested activities to examine air masses and their relationship to fronts: • Depict air masses on weather maps with color. Use black to establish the boundary (front). • Examine the pattern of isobars in low and high pressure systems. • Using satellite images, have students brainstorm the characteristics of mid-latitude cyclones. Lab exercises to examine the nature of mid-latitude and tropical cyclones: • *Geolab Book #3*, "Mid-Latitude Cyclones," Geolab #22, page 43 • *Geolab Book #3,* "The Tropical Cyclone," Geolab #25, page 58 • *Geolab #3*, "The Tornado," Geolab #26, page 60 Using a Venn Diagram compare mid-latitude cyclones and tropical cyclones. Guest speaker: Invite a guest speaker from your local weather office to discuss weather phenomena.	*Earth Dynamics*, "Battles in the Sky," pages 84–86 *Hurricane: Earth's Greatest Storm* (LRT) video dubbing 20:00 min.

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 4: Students will be expected to relate air mass geography to weather systems both local and globally.

Zones

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Hurricanes • eye • vortex	Tracking a Hurricane: Obtain co-ordinates (latitude/longitude) from your local weather office on any hurricane. Special maps are available for plotting. Plot the following on the map. • co-ordinates of hurricane and times • locations (names of land mass in path) • origin of tropical depression • origin (point) of hurricane status • point where hurricane is downgraded to a tropical depression Examine information plotted on the map. In small groups, hypothesize about formation and movement of hurricanes. Draw a cross-section profile of a hurricane.	Bedford Weather Station (maps and co-ordinates of hurricane) *Earth Dynamics*, "Hurricanes," pages 95–97 *Earth Dynamics*, "Tornadoes," pages 98–103 *Hurricanes, Earth's Greatest Storm* V1440 (LRT) video dubbing 20:00 min.

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 4: Students will be expected to relate air mass geography to weather systems both local and globally.

Weather Maps

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Station models Symbols and synopsis	Note: It is suggested that teachers use an activity oriented approach. Use some or all of the following activities: Give students basic station model data and correctly draw a standard station model containing the given data. (Refer to *Geolab Book #3*) In groups of two or three, have students examine actual weather maps and interpret symbology. • Examine satellite images of developing weather systems and apply common weather, map symbols and terminology. • *Geolab Book #3*. "Weather Maps 1" Geolab 24, page 46 • *Geolab Book #3*. "Weather Maps 2" Geolab 24, page 48 • *Geolab Book #3*. "Weather Maps 3" Geolab 24, page 50 • *Geolab Book #3*. "Weather Maps 4" Geolab 24, page 52 • *Geolab Book #3*. "Weather Maps 5" Geolab 24, page 54 • *Geolab Book #3*. "Weather Maps 6" Geolab 24, page 56 Using water colors, paint a map of Nova Scotia on the blackboard. Each day have students use chalk to input weather system information. (The paint will come off with warm water.)	*Geolab Book #3* *Exploring the Atmosphere: Meteorology in Canada* V1155 (LRT) video dubbing 23:00 min.

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 5: Students will be expected to use climatic data to identify major climatic zones of the world.

Climates

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Weather climate Climatology	Using an advanced organizer (comparison/contrast), show the attributes of weather and climate. Climate classification: Using the köppen classification systems identify climate types. Activity: "The Köppen Climate Classification system," #5.2, *Earth Dynamics,* Teachers Resource Activity: "Applying the Model," 15.3, Teacher's Resource Use flash cards or slides to introduce climate. Have students explain why they made their particular selection. Create a biopoem on climate.	*Earth Dynamics,* "Weather and Climate," chapter 11, pages 74–76 *Earth Dynamics,* "Climatology," pages 108–114 *Earth Dynamics, Teacher's Resource* #15.2, page 53, #15.3, page 54

Unit 4: Atmospheric Environment

Specific Curriculum Outcome 5: Students will be expected to use climatic data to identify major climatic zones of the world.

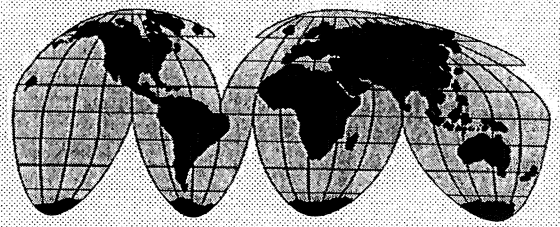
Biomes and Climatic Regions

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Biomes Climatic regions	Activity on biomes: • Define biomes through example. • On a map of the globe, identify the 14 major biomes. Examine the biomes and discuss the criteria for each biome. Select one of the major biomes and identify specific climatic regions within the Biome. **Project**: A. Select a specific climate type and discuss • characteristics • anomalies • charts for temperature and rainfall • diurnal range • patterns B. Explain criteria that create the characteristics (e.g., cloud cover in desert). C. Discuss the impact of climate on human settlement, (e.g., land use). Students may wish to use the graphic organizers or formal essay style to present this data.	*Atlas of the Environment*, "Major Biomes, Climatic Regions and Land Use," pages 11–16 *Biomes: An Introduction* (VHS loan, LRT) *Earth Dynamics,* "Climate Regions of the World" *Atlas of the Environment*, "Land Use," pages 14–16 *GAIA: An Atlas of the Planet Management* # Fertile Soil, page 22 # Tropical Forests, page 28 # World Crop Lands, page 30 # The Global Landscape, page 348

Geography Grade 10

PART B

Unit 5—Spaceship Earth



Unit 5: Spaceship Earth

GENERAL CURRICULUM OUTCOME (GCO)

Students will be expected to demonstrate an understanding of the complexity of systems that control the fragile web of life, and analyse the implications for human responsibility in sustaining the ecosystems of our environment.

Background

An astronaut's view of Earth, delicately poised like a silver blue pearl against the inky backdrop of space, highlights the fragility, beauty and unity of the plant. Its physical components and biomes form an integrated whole, *a unique system, the totality of which exceeds the sum of its parts*. As guardians of the planet, we must become informed of the interplay of the human and physical forces that have shaped, and continue to shape, its development.

SPECIFIC CURRICULUM OUTCOMES (SCO)

1. Planetary Ecosystems

Students will be expected to describe the interconnectedness of Earth's physical and biological systems.

Sample Indicators

- describe the interconnectedness of Earth's surface and biological system
- analyse feedback mechanisms
- provide examples of open and closed systems
- chart the carbon cycle

2. Planet Management

Students will be expected to demonstrate an understanding that humanity is part of the planet's physical-biological web, and that sustainability is dependent upon wise planet management systems and global co-operation.

Sample Indicators

- demonstrate the attitudes and values required for proper stewardship of the planet's finite resources and delicate ecosystems
- define categories for a sustainable future
- debate issues relevant to rainforest depletion
- prioritize criteria surrounding environmental issues (sealing, water diversion programs, ozone depletion)
- take a stand; defend a position on economic versus environmental concerns surrounding the issue of clear cutting in British Columbia
- discuss harmonizing economic and environmental concerns
- participate in environmental activities within the school
- use e-mail to address environmental issues globally
- use computer software programs to analyse environmental issues

Unit 5: Spaceship Earth

Specific Curriculum Outcome 1: Students will be expected to describe the interconnectedness of Earth's physical and biological systems.

Systems Concepts

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Systems • open system • closed system	The use of the word "system" should be familiar to students. Use diagrams to explain how systems have inputs and outputs and how they interact.	
Feedback mechanisms • positive • negative	Brainstorm words associated with systems—auto-cooling system, weather system, drainage system, fish tank system. Choose several to make diagrams to show how they are open or closed; how they are affected by positive and negative feedbacks; and what factors can help maintain or disrupt the system.	*The Living Ocean* V0059 (LRT) video dubbing 25:00 min. *Fate of the Earth: Geochemical Circles* V0894 (LRT) video dubbing 30:00 min. *Fate of the Earth: Impact of Man* V0895 (LRT) video dubbing 30:00 min. *Blue Planet: Physical and Chemical Make-Up* V0884 (LRT) video dubbing 30:00 min. Books: *Towards Tomorrow*, pages 6–17 *Elemental Geosystems*, pages 5–9 *GAIA*, pages 10–19, Resource *Earth Dynamics*, "Energy Systems In the Atmosphere," pages 26–34 *Earth Dynamics*, chapter 7, "Energy System in the Hydrosphere," pages 40–54
Equilibrium • steady-state • dynamic	Explain how small sub-systems exist within larger systems. (Refer to *Earth Dynamics*) Demonstrate how Earth is both a closed and an open system. (Refer to *Earth Dynamics*)	

Unit 5: Spaceship Earth

Specific Curriculum Outcome 1: Students will be expected to describe the interconnectedness of Earth's physical and biological systems.

Earth Systems and Hierarchies

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Earth spheres Abiotic • atmosphere • hydrosphere • lithosphere Chaos and catastrophe • complexity • trigger points • systems crash Biotic • ecosphere nested systems and hierarchies • small and large drainage basins • rock cycle	Use a venn diagram to illustrate the overlapping and interconnected nature of Earth's four major systems. Obtain topographic maps of greatly different scales to trace off river patterns to show how similar processes operate at different levels of magnitude. Examine the rock cycle, the slowest of Earth's cyclic processes. Show how melting, erosion, and metamorphism produce various types of rock, and how one class of rock may be converted to another. Examine how in a complex ecosystem such as Lake Erie, the loss of the seemingly insignificant Mayfly insect due to urban and farm pollutants caused a catastrophic loss of fish and bird life.	*Elemental Geosystems*, pages 9–10 *Living in the Environment,* Miller Junior, pages 178–179

Unit 5: Spaceship Earth

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding that humanity is part of the planet's physical-biological web, and that sustainability is dependent upon wise planet management systems and global co-operation.

Global Issues

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Global Issues • global warming • oil spills • ozone depletion pollution	Create a magazine to illustrate problems and solutions related to land, sea and air, (e.g., oil spills or global warming). All work, including pictures, cartoons, diagrams, etc., are to be student generated. Develop a case study reflecting problems and solutions relevant to one of Earth's spheres. Select at least two regions to compare and contrast situations and action taken. Be sure to use the graphic environment to enhance your study. Create a video of an environmental crisis in your area.	*Atlas of the Environment* *GAIA, An Atlas of Planet Management* *Earth Dynamics*

Unit 5: Spaceship Earth

Specific Curriculum Outcome 2: Students will be expected to demonstrate an understanding that humanity is part of the planet's physical-biological web, and that sustainability is dependent upon wise planet management systems and global co-operation.

Global Interdependence

Key Terms/Concepts	Suggested Strategies/Activities	Pupil/Teacher Resources
Ecosphere Web of life Ecosphere in peril	Create an attribute web of the ecosphere. Humankind has learned to modify the environment all too well, often placing the ecosystem at risk. Select one of the categories below for analysis. Include in the analysis: • key players • extent of problem • global concern (case studies) • sustainable solutions (case studies) Categories • rainforest depletion • oil spills • desertification • mineral extraction • species extinction Discuss changing attitudes and values as humankind moves towards global interdependence. Use e-mail and Internet to address environmental issues world-wide.	*Atlas of the Environment* *GAIA, An Atlas of Planet Management* *Earth Dynamics* Articles in *Canadian Geographic*: "Our Precious Soil is Wasting Away" April/May 1980 "Soil Erosion out of Control in Southern Alberta" June/July 1987 "Water From the Ground: Groundwater, one of our Most Vital Resources" September/October 1992 "Great Lakes Clean-up" December 1990/January 1991

Appendix A

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PERIODICALS

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2. Cosmos
3. Discover
4. Equinox
5. Geography
6. National Geographic
7. Readers Digest
8. Teaching Geography

Appendix B

Shared and Specific Skills of Geographic Education

Introduction

From a skills perspective, the teaching and learning suggestions in this guide are based upon three assumptions:

a) students in in grade 10 level have had the opportunity to develop a wide range of skills;

b) the discipline of geography requires certain skills to be learned and used; and

c) skills common to other disciplines are regularly put to use in the geography classroom.

Most of the skills in the list that follows, and the fashion in which they are organized, are derived from an Alberta source which is cited at the bottom of each page. Additions to the Alberta list come from submissions by geography teachers in Nova Scotia, and from a perusal of publications by The National Council for Geographic Education (US), the National Curriculum Council of the United Kingdom, and some social studies and geography textbooks.

While the list covers grades 9 up to and including grade 12, it is the students who obviously will display what skills they have learned. As is always the case, it becomes the teacher's responsibility to diagnose both deficiencies and competencies and to proceed accordingly.

Teachers will note that the process skills are denoted by the letters D and M. The letter D refers to developing skills, while the letter M refers to mastery of skills.

Social Studies	9	10	11	12
Process skills: Locating, Interpreting, Organizing (gathering and acquiring information) Locate reference materials in the library as sources of information				
1. Identify possible sources and locations of information.	D	D	M	M
2. Use the library catalogue to locate references related to all topics.	M	M	M	M
3. Locate materials, using the Dewey Decimal System.	M	M	M	M
4. Use periodical indexes such as the Canadian Periodical Index to locate information.	D	D	M	M
5. Use social sciences references including atlases, almanacs, encyclopaedias, yearbooks, and dictionaries, to obtain information.	D	D	M	M
Use reference materials to find information:				
1. Choose from a variety of references appropriate to one's purpose.	M	M	M	M
2. Use title, table of consents, index, glossary and appendix to find useful information.	M	M	M	M
3. Use chapter and section headings, topic sentences, and summaries to identify information.	M	M	M	M
4. Locate information in references, using volume letters, key words, and indexes.	M	M	M	M
Use newspapers, periodicals and pamphlets as sources of information for a study:				
1. Become aware of the wide range of periodical materials, and of their purposes and coverage.	M	M	M	M
2. Select important news items and periodical material pertinent to topics of study.	M	M	M	M
3. Organize appropriate periodical material to support class activities.	D	D	M	M
*D - Developing *M - Mastering				

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict outcomes, criticize, and analyse.	D	D	D	D
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Listen and observe to acquire information:				
1. Listen and observe with purpose and discrimination.	D	D	M	M
2. Identify a speaker's purpose.				
3. Identify key ideas in a presentation.	D	M	M	M
4. Relate information gained through listening and	D	D	M	M
observing, to that gained from other sources.	D	D	M	M
5. Reserve judgement until a presentation has been heard or observed.	D	D	M	M
6. Note ideas while listening to and observing a presentation.	D	D	M	M
Gather information from field studies, surveys, or interview:				
1. Identify the purpose of a field study, survey, or interview.	D	D	M	M
2. Plan procedures, rules of conduct, questions and determine information to be gained.	D	D	M	M
3. Develop effective interviewing procedures including the use of appropriate questions.	D	D	M	M
4. Record, correlate, summarize and organize information obtained in a suitable form.	D	D	D	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Gather information using computers, telephone, and television information networks:				
1. Operate a computer to enter and retrieve information from a variety of sources.	D	D	M	M
2. Access information through networks, data banks and online sources.	D	D	D	D
3. Use word processing programs to organize information.	D	D	M	M
Interpret Information:				
1. Translate written and printed materials into terms meaningful to oneself.	D	D	D	M
2. Select main ideas, key points, and supporting points.	M	M	M	M
3. Classify data by topic.	M	M	M	M
4. Identify and state the central issue in a topic in one's own words.	M	M	M	M
5. Hypothesize explanations and outcomes based on factual data.	D	D	M	M
6. Test hypotheses and make generalizations based on data from field studies, surveys, and interviews.	-	D	D	M
7. Recognize cause and effect of relationships.				
8. Note trends and predict what might happen.	D	D	M	M
9. Recognize there are various interpretations of data.	D	D	D	M
10. Translate data by presenting information in different forms such as maps, time lines, or diagrams.	D	D	M	M
	D	D	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Interpret graphs, charts, tables and diagrams:				
1. Obtain information from a wide variety of graphs such as line, multiple line, horizontal bar, vertical bar, and divided circle.	D	D	M	M
2. Interpret graphs, charts, and tables presented in course materials.	D	D	M	M
3. Identify relationships among data presented in graphs, charts, tables, and diagrams.	D	D	M	M
4. Relate data obtained from graphs, charts, tables, and diagrams to other data.	D	D	M	M
Interpret pictures, photographs, and cartoons:				
1. Recognize cartoons, and pictures as sources of information.	D	D	M	M
2. Determine main ideas and identify detail in pictorial material.	D	D	M	M
3. Use picture clues, titles, and captions to aid comprehension.	D	D	M	M
4. Establish relationships among elements of a visual.	D	D	D	M
5. Interpret points of view expressed in cartoons.	D	D	D	D

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Interpret visual materials such as art, television, film, and drama:				
1. Use visual materials as sources of information.	D	D	M	M
2. Describe the content of the material generally and specifically.	D	M	M	M
3. Determine the main and related ideas in visual material.	D	D	M	M
4. Identify the purpose, message and intended audience of visual communications.	D	D	M	M
5. Identify, understand, and critically evaluate the relationship among purpose, message and intended audience of visual communications.	D	D	D	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Interpret maps, globes, and air photos:				
1. Use different types of atlases.	D	M	M	M
2. Use a variety of maps for a variety of purposes.	D	D	M	M
3. Identify and use different map projections.	D	D	M	M
4. Interpret and use map legends and map symbols in	D	D	M	M
different kinds of maps.				
5. Recognize and analyse oblique and vertical air	-	D	M	M
photos.				
6. Use stereoscopes to examine air photos.	-	D	M	M
7. Recognize features shown on maps and air photos	D	D	M	M
and compare features on both.				
8. Apply the concept of scale to air photos.	-	D	M	M
9. Interpret satellite images.				
10. Interpret synoptic charts, images, or cloud patterns	D	D	M	M
from weather satellites.				
11. Recognize that relief drawing, color relief and	D	M	M	M
contour lines represent the characteristics of an				
area.				
12. Determine elevation from topographic maps.	D	D	M	M
13. Interpolate and interpret contour lines.	D	D	M	M
14. Construct a topographic profile.	D	D	M	M
15. Orient oneself to the relative location of places and	D	D	M	M
direction from place to place.				
16. Use maps with different scales.	M	M	M	M
17. Use a compass.	D	M	M	M
18. Use an azimuth's and magnetic bearings.	D	D	M	M
19. Use cardinal and intermediate directions when using	D	M	M	M
maps.				

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
21. Locate places and features, using various grid systems such as latitude and longitude, letter key systems, four-figure, six-figure references, etc.	M	M	M	M
22. Identify time zones and relate them to areas of the globe.	D	D	M	M
23. Use geographic terminology to describe physical features and geographic relationships.	M	M	M	M
24. Interpret information from a variety of maps such as thematic maps and distribution maps.	-	M	M	M
25. Identify and interpret patterns and relationships among geographic data.	D	D	M	M
26. Interpret maps including point, line, and area spatial patterns, and compare spatial patterns to propose relationships.	-	D	M	M
27. Recognize relationships among locations of cities, water bodies, continents, and countries.	D	D	M	M
28. Interpret relationships of data relative to locations of settlements, natural resources, industries, trade, etc.	D	M	M	M
29. Use sequences of maps, tables, charts, etc., to show change: e.g., population, production, distribution.	D	D	M	M
30. Develop skill in interpreting historical maps.				
31. Construct maps of an area to show geographic relationships.	D	D	D	M
32. Define and delimit a region based upon a variety of data e.g., physiographic, vegetation, political etc.	D	D	M	M
	D	D	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Understand time and chronology:				
1. Identify an event as part of a chronological series of happenings.	D	D	M	M
2. Arrange related events and ideas in chronological order.	D	M	M	M
3. Develop and use time sequence and ranking to organize material.	D	D	M	M
4. Organize historical information by making simple timelines and flow charts.	D	M	M	M
5. Relate chronology to change and continuity.	D	D	D	M
6. Interpret situations in terms of time perspective.	D	D	M	M
7. Identify immediate causes, underlying causes, and multiple causes of historical events.	D	D	D	M
8. Identify relationships among historical events.	D	D	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Organize information:				
1. Select relevant factual data for a particular purpose.	D	D	M	M
2. Record information in note form to show				
organization of ideas.	D	D	M	M
3. Make an outline of a topic from material read,				
heard, or viewed from multiple sources of data.	M	M	M	M
4. Organize material to answer questions from material				
heard, viewed, or read.	M	M	M	M
5. Sort information into categories according to given				
criteria; e.g., geographic, economic, historical,	D	D	M	M
renewable, non-renewable, etc.				
6. Compose headings or titles for information				
summarized.	M	M	M	M
7. Compile a table of contents to show order.				
8. Organize data by constructing tables, graphs and	M	M	M	M
charts; e.g., pie graphs, bar graphs, population	D	D	M	M
pyramids, etc.				
9. Organize information into a flow chart.				
10. Make maps; produce a sketch map.	D	D	M	M
	D	D	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Analysing, Synthesizing, Evaluating (Using information and ideas)				
Analyse information:				
1. Compare accounts to see if they are identical, similar, related, or unrelated.	D	D	M	M
2. Distinguish between fact and fiction, fact and opinion, and fact and value.	D	D	D	M
3. Detect bias or propaganda in information presented.	D	D	M	M
4. Identify point of view or perspective.				
5. Determine the authority and expertise of sources.	D	D	D	M
6. Examine arguments for consistency and	D	D	D	D
contradiction.	D	D	D	M
7. Distinguish between warranted and unwarranted claims.	D	D	M	M
8. Identify sources of information as primary or secondary.	D	D	M	M
9. Determine whether evidence assembled is accurate and relevant to a topic.	D	D	M	M
10. Recognize underlying assumptions of a statement or position, both stated and unstated.	D	D	D	D
11. Distinguish between hypotheses and evidence, and hypotheses and generalizations.	-	D	D	D
12. Determine values underlying a position.				
13. Separate a topic into major components according to	D	D	D	M
appropriate criteria - key issues or concepts.	-	D	M	M
14. State relationships between concepts and categories of data - identify organizing principles.				

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Synthesize information:				
1. Summarize material presented.	M	M	M	M
2. Restate major ideas of a topic in concise form.	D	D	M	M
3. Draw inferences from data.	D	D	M	M
4. State generalizations based on analysis of data.	D	D	M	M
5. Develop concepts from descriptive data.	D	D	M	M
6. Draw generalizations by recognizing relationships	D	D	M	M
between concepts.				
7. Relate significant ideas to support a point of view.	D	D	M	M
8. Formulate opinion based on critical examination of				
information.	D	D	M	M
9. Propose a new plan of action or operation, or create				
a new system.	D	D	M	M
Communication Skills (Oral, visual, and written expression)				

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict outcomes, criticize, and analyse.	D	D	D	D
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Oral:	D	D	D	M
1. Develop and use vocabulary appropriate to course content.	D	D	M	M
2. Speak to the topic in discussion.	D	M	M	M
3. Orally defend one's point of view.	D	D	M	M
4. Express one's ideas with confidence.	D	D	D	D
5. Express thoughts clearly in oral form, to an increasing variety of audiences, for a variety of purposes.	D	D	D	M
6. Communicate effectively in a variety of situations - group, panel, formal debate, seminar, forum.				
7. Deliver information in oral presentations with the aid of prepared notes.	D	D	D	M
8. Develop facility in communicating orally through audio and visual media.	D	D	M	M
Visual:				
1. Select and use an appropriate medium for presenting ideas.	D	M	M	M
2. Construct appropriate visual aids such as maps, charts, graphs, pictures, illustrations and time lines, to support ideas.	D	M	M	M
3. Produce and display models, murals, collages, dioramas, artwork, cartoons, films, slides, and videotapes to demonstrate learning.	D	D	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Written:				
1. Write ideas in correct sentences in one's own words.	D	M	M	M
2. Express ideas in clear, coherent paragraphs.	D	M	M	M
3. Write multiple paragraph compositions using	D	D	D	M
appropriate techniques for introducing, developing, and concluding a topic.				
4. Use various methods for developing a piece of writing such as reasons, examples, sequencing, and comparisons.	D	D	M	M
5. Write reports, research papers and position papers.	D	D	D	M
6. Write independently to support one's view using factual details, examples, statistics, analogies, and quotations.	D	M	M	M
7. Select role, audience, format, topic and verb forms to express ideas for various purposes.	D	D	D	D
8. Revise and edit written work to achieve one's purpose.	D	D	D	D
9. Credit quoted material using footnotes.				
10. Prepare a bibliography of sources used in research.	D	D	M	M
11. Maintain well-written notebooks and class records.	D	D	M	M
	D	D	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Participation Skills: **(interpersonal relations, group, social and political participation)** At the start of the skills section it was suggested that skills not be taught in isolation. Since this section involves personal behavior when dealing with others, attitude and skill objectives are intertwined and developed simultaneously.				
Interpersonal Relations:	D	D	M	M
1. Show respect for the rights and opinions of others.				
2. Interact with others in accordance with social rules.	D	M	M	M
3. Demonstrate willingness and ability to interact with				
others.	D	M	M	M
4. Respond voluntarily to the needs of others in				
distress.	D	M	M	M
5. Offer encouragement and approval to others.				
6. Resolve conflict through compromise and co-	D	M	M	M
operation.	D	D	M	M
7. Demonstrate the ability to disagree, when				
warranted, in an acceptable manner.	D	M	M	M
8. Display self-confidence and self-control.				
9. Develop independent work habits.	D	M	M	M
10. Seek help when required.	D	M	M	M
	D	M	M	M

Social Studies	9	10	11	12
Read to acquire information:				
1. Read materials to get literal meaning of text.	M	M	M	M
2. Adjust rate of reading to suit material and purpose.	D	D	D	D
3. Identify relevant terms and information.				
4. Use context clues to gain meaning.	D	D	D	D
5. Read for a variety of purposes - skim for facts,	D	D	D	D
answer a question, form an opinion, predict	D	D	D	D
outcomes, criticize, and analyse.				
6. Differentiate between main and related ideas.				
7. Recognize relationships including sequence, cause,	D	D	D	D
effect, space, place, and time.	D	D	D	D
8. Interpret what is read by drawing references.				
9. Summarize and organize material read.	D	D	D	D
10. Select information to fulfil one's purpose.	M	M	M	M
	D	D	D	D
Group Participation:				
1. Work effectively with others in a variety of group settings.	D	D	M	M
2. Participate in setting goals, rules, and guidelines for group work.	D	D	M	M
3. Demonstrate an ability to follow group rules, keep to the task, and abide by group decisions.	D	D	M	M
4. Accept the role of leader or follower, as the situation requires.	D	D	M	M
5. Contribute to group processes by providing supporting ideas.	D	D	D	M

Appendix C

Educating for the Respect and Dignity of All Persons

Educating for the Respect and Dignity of all Persons

In their quest for answers to the question, How did the world arrive at its physical state, geography students must deal with the influence of culture on the world's natural and human environments. To do so will involve examining values that their own culture has made them uphold. They will also have to scrutinize the values of cultures very distant and different from their own.

Geography, then, becomes a very legitimate vehicle for the study of perspective, the role of gender, anti-racism and multicultural education, and assumptions about quality of life. Dealing actively with these topics will contribute to the students' understanding of the broad scope of interdependence, and of their roles as partners accountable for the protection, promotion, and growth of the respect for and the dignity of all persons.

The Role of Perspective

Seeing the natural world as a storehouse of resources is common to all cultures. *How* the natural world is seen and *how* its properties are used to satisfy needs and wants is a matter of culture. *Who* does the seeing and *who* does the using are, likewise, often influenced by culture.

> One has only to develop a relationship between a certain place, where the land knows you and experience that the trees, the Earth and nature are extending their love and light to you to know there is so much we can receive from the Earth to fill our hearts and souls.
>
> *Inti Melasquez, Inca Sharman*

> Too many people bring suffering to the land, and the land returns its suffering to the people.
>
> *Dr. O. Soemarwoto,*
> *Institute of Ecology, Bandung, Indonesia*

> I am trying to save the knowledge that the forests and this planet are alive, to give it back to you who have lost the understanding.
>
> *Paulinho Paiakan, of the Kayapo, Brazil*

The Role of Race, Ethnicity, and Cultural Diversity

The visual image will be a frequently used resource in Grade 10 Geography. Daily lessons, minor and major case studies, will constantly take students to the four corners of the globe. In so doing, their exposure to humanity's kaleidoscope of skin tones, physical characteristics, and cultural expressions will be greatly magnified.

Stereotypes, misinformation, faulty conclusions, and a lack of knowledge all contribute to the values and attitudes that underlie racism and cultural prejudices. The identification of needs, wants, and rights that are common to all humanity; the examination of inventive and creative responses that all cultures bring to the accommodation and solution of problems; the recognition of leadership, initiative, and the willingness to take risks that characterize the human spirit worldwide; and the analysis of errors in

action and judgment that confound and hinder all societies; these are the kinds of processes that will help geography students deal more effectively with racism, ethnocentrism, and cultural domination in their own lives.

Quality of Life

Societies around the globe are beginning to see Earth as something considerably more than a shopping centre stocked to meet the needs and wants of disparate economies. They see ours as "the fragile planet," "our island home," "our spaceship Earth."

No longer can societies separated by distance and culture be seen as islands unto themselves. There are numerous indicators that testify to this interdependence: one is the state of the global environment, and another is the growth of a truly international economic system.

Conclusion

Educating for active citizenship and for the respect and dignity of all persons is an aim of Nova Scotia's public school program and is an Atlantic Provinces Education Foundation essential graduation learning. No one course bears the full responsibility for achieving this aim; rather, every opportunity from primary to grade 12, throughout all subjects, must be used to achieve it. Geography Grade 10 part of this plays a vital role in educating students as citizens of the global community.

Appendix D

Special Education Policy 2.2

Policy 2.2

Each school board is responsible for establishing a process of identification, assessment, program planning, and evaluation for students with special needs.

2.2 Guidelines

The school board is responsible for the implementation of this process; therefore, each procedural step should be documented in the school board's special education policy manual. School boards are encouraged to refer to the appropriate sections of the Department of Education and Culture's *Special Education Policy Manual*.

2.2 Sample Procedure

On the following pages is a sample outline of how a program planning process might be implemented. It is not intended as a prescribed approach, but rather as an illustration.

Identification, Assessment, and Program Planning Process

Stage 1—Screening and Identification

This stage may be initiated by a variety of people. Some children and students may come to school with a myriad of assessments and programming information from other agencies or from another school. Some students may have been in school for a number of years and their special needs may be identified at a later stage by the classroom teacher who regularly observes students in the learning situation. The planning process can be initiated at any time based on student need.

If a student has been identified as needing an individual program plan before entry to school, the team may wish to start the process at step two, "Referral to Program Planning Team," to avoid delay.

Parents are expected to be involved at the beginning of the process. Classroom teachers, parents, students and outside agency personnel and resource teachers are all possible indicators at this stage. The principal should be aware of any communication concerning students at this stage.

Stage 2—Exploration of Instructional Strategies

After a student has been identified as requiring additional planning to meet his/her needs, the classroom teacher uses available material and human resources to explore a variety of strategies in the learning process. In all schools there is a wealth of experience to draw upon. In exploring alternative methods of working with students, teachers may also wish to consult supervisors, school psychologists or other available personnel. The key at this stage is to be as creative as possible in determining a wide variety of behavioral and/or curriculum strategies to meet student needs while ensuring accurate record keeping of outcomes. Determining why a method doesn't produce the desired outcome can yield as much information as one that does. Co-operation and collaboration among professionals and parents are essential at this stage.

The identification, assessment, and program planning process may not go beyond this stage for many students as their needs may be met through ongoing evaluation and monitoring in the classroom. (Policy 2.4)

Stage 3—Referral to Program Planning Team
If the classroom teacher requires further support to meet the needs of a student, he/she may wish to refer to the program planning team.

The format of the referral depends on school and district/regional procedures. In some cases the initiator of the referral may be required to have certain types of information available for the principal in order to make an informed decision whether or not to select team members and set a date for the program planning team meeting. Information required may include anecdotal information, observation records, informal assessment, interviews with the student and involved agencies, school records, or any other information available that may be of help in program planning. Care should be taken not to use outdated or irrelevant assessment data.

Stage 4—Program Planning Team Meeting
The program planning team must ensure that the problem or difficulty facing the student and/or teachers and parents is clarified before proceeding with planning. The reason for the referral does not always match the team's clarification of the problem and careful problem solving at this stage can prevent unnecessary or inappropriate steps being taken.

Team members should be those who have responsibility for the student's learning. The team should always include the principal or vice-principal, teachers involved, and parents/guardians (see policy 2.4). These members form the core of the team. The selection of additional members depends on the needs of the student and on the personnel resources of the school district and community. In cases where there are many teachers involved, as in high school, reports can be gathered from teachers for presentation at the team meeting; however, key personnel should be present. In some cases this may include the student, especially at a high school level when career/transitional decisions are being discussed. Every attempt should be made to encourage parents to feel comfortable in presenting their views of the student's strengths and needs.

The team meeting provides an opportunity for members to come together to clarify, given all available information, the student's strengths and needs and to decide on future actions to be taken in terms of program planning. **The meeting should not be a forum for teachers, administrators, and/or other agency personnel to present a completed program for the parents.** If this is done, the parents become outsiders to the process and do not have the opportunity to affect decision making in any meaningful way. Together, the members should discuss the information each has observed and collected. Concerns should be expressed openly and information presented without judgmental rebuttal. However, in cases where differences of opinion occur, the chairperson would act as mediator in the process.

The team decides whether or not to proceed with development of an individualized program plan (IPP). The meeting may highlight the need for a change in instructional strategies or evaluation methods while maintaining the objectives of a prescribed course. (When this occurs, a statement outlining adaptation of strategies, evaluation methods while maintaining the objectives of a prescribed course.) When this

occurs, a statement outlining adaptation of strategies, evaluation methods, and support services required should be recorded in the student's cumulative file. However, when the objectives of provincially approved curriculum must be changed to meet the needs of the student, an IPP becomes necessary. An IPP may focus on behavioral as well as curriculum outcomes to address student behaviors that may inhibit learning. At this point, the chairperson designates responsibility areas to the team members to develop the individualized program plan according to the priorities, goals and approaches set at the meeting, or to collect further information if necessary.

Stage 5—Program Plan Developed
The program planning team uses information gathered to write the program plan. Those that have responsibility for implementation of parts of the plan should be involved in developing the objectives, deciding on strategies and evaluation procedures. The individual program plan should include the following components (policy 2.6):

A summary of student strengths and needs

- annual individualized outcomes (goals)
- specific individualized outcomes (objectives)
- recommend services
- responsibility areas
- review dates
- signatures

Stage 6—Implementation of Program Plan
Team members are assigned responsibility areas and monitor student progress in those areas. The teacher responsible for teaching the student is also responsible for evaluating the student's progress in that curriculum area (policies 2.5 and 2.6).

Stage 7—Monitoring
Teachers and designated team members are required to evaluate IPPs in order to assess student progress continually.

Stage 8—Review of Program Plan
The program planning team is responsible for reviewing the student's progress in the plan and meeting to discuss changes when necessary. The program plan should be reviewed at least twice annually.

Appendix E

Principles of Learning

Principles of Learning

Learning Principles
The Geography 10 program from the public school program is based on principles of learning that teachers should use as the basis of the experiences they plan for their students. These principles include the following:

1. Students construct knowledge and make it meaningful in terms of their prior knowledge and experiences.

In Geography 10, therefore, teachers have a responsibility to

- find out what students already know and can do
- create learning environments and plan experiences that build on learners' prior knowledge
- ensure that learners are able to see themselves reflected in the learning materials used in the school
- recognize, value, and use the great diversity of experiences and information students bring to school
- provide learning opportunities that respect and support students' racial, cultural, and social identity
- ensure that students are invited or challenged to build on prior knowledge, integrating new understandings with existing understandings

2. Learning is a process of actively constructing knowledge.

In Geography 10, therefore, teachers have a responsibility to

- create environments and plan experiences that foster inquiry, questioning, predicting, exploring, collecting, educational play, and communicating
- engage learners in experiences that encourage their personal construction of knowledge; for example, hands-on, minds-on science and math; drama; creative movement; artistic representation; writing and talking to learn
- provide learners with experiences that actively involve them and are personally meaningful

3. Learning is enhanced when it takes place in a social and collaborative environment.

In Geography 10, therefore, teachers have a responsibility to

- ensure that talk, group work, discussions, and collaborative ventures are central to class activities
- see that learners have frequent opportunities to learn from and with others
- structure opportunities for learners to engage in diverse social interactions with peers and adults
- help students to see themselves as members of a community of learners

4. Students need to continue to view learning as an integrated whole.

In Geography 10, therefore, teachers have a responsibility to

- plan opportunities to help students make connections across the curriculum and with the world outside and structure

activities that require students to reflect on those connections
- invite students to apply strategies from across the curriculum to solve problems in real situations

5. Learners must see themselves as capable and successful.

In Geography 10, therefore, teachers have a responsibility to

- provide activities, resources, and challenges that are developmentally appropriate to the learner
- communicate high expectations for achievement to all students
- encourage risk-taking in learning
- ensure that all students experience genuine success on a regular basis
- value experimentation and treat approximation as signs of growth
- provide frequent opportunities for students to reflect on and describe what they know and can do
- provide learning experiences and resources that reflect the diversity of the local and global community
- provide learning opportunities that develop positive self-esteem

6. Learners have different ways of knowing and representing knowledge.

In Geography 10, therefore, teachers have a responsibility to

- recognize each learner's preferred ways of constructing meaning and provide opportunities for exploring alternative ways
- plan a wide variety of open-ended experiences and assessment strategies
- recognize, acknowledge and build on students' diverse ways of knowing and representing their knowledge
- structure frequent opportunities for students to use various art forms—music, drama, visual arts, dance, movement, crafts—as a means of exploring, formulating, and expressing ideas

7. Reflection is an integral part of learning.

In Geography 10, therefore, teachers have a responsibility to

- challenge their beliefs and practices based on continuous reflection
- reflect on their own learning processes and experiences
- reflect on their own practices
- encourage students to reflect on their learning processes and experiences
- encourage students to acknowledge and articulate their learnings
- help students use their reflections to come to know themselves as learners, to make connections with other learnings, and proceed with learning