

# Geology 12

*Outcomes*

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## Geology 12

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# Geology 12

## Specific Curriculum Outcomes

Students will be expected to

### The Nature of Geology (10%)

#### YOU AND GEOLOGY

- demonstrate an understanding of the nature of geology and what makes it unique as a science (360-2)
- give examples of how geology is interconnected and integrated with other sciences (360-3)
- describe and give examples of the major themes that unite the study of geology (360-4)
- demonstrate an understanding of how geological processes and resources impact our daily lives (360-1)
- provide examples of the relevance of mining to everyday materials used in our lives (117-5)
- communicate questions, ideas, and intentions, and receive, interpret, understand, support and respond to the ideas of others (215-1)

#### THE GEOLOGISTS

- describe and give examples of how geologists study the earth (360-9)
- illustrate how science attempts to explain natural phenomena (115-2)

#### EARTH SYSTEMS

- describe and give examples of interrelationships between Earth's spheres (360-6)
- explain how a knowledge of geology might influence our decisions about how we use Earth's resources (360-7)
- identify questions to investigate that arise from practical problems and issues (212-1)
- define and delimit problems to facilitate investigation (212-2)
- identify some sources and types of geological information needed to examine issues of a societal/environmental nature (360-8)
- synthesize information from multiple sources and make inferences based on this information (215-3)

### Earth Materials (20%)

#### CRYSTALLOGRAPHY

- construct a definition for a mineral and a rock and identify the features that characterize each (361-1)
- explain and give examples of basic chemical building blocks and atomic structures (atom, element, molecule, compound) (361-2)
- explain external crystal shape in terms of internal atomic arrangement (361-4)
- identify examples where scientific understanding was enhanced or revised as a result of the invention of a technology (116-1)

- identify examples where technologies were developed based on scientific understanding (116-3)

### **MINERALOGY**

- classify common minerals according to their chemical and physical characteristics (330-3)
- compile and organize data, using appropriate formats and data treatments to facilitate interpretation of the data (213-5)

### **PETROLOGY**

- classify and identify rocks according to their structure, texture and mineral composition (361-11)
- relate the formation of igneous, sedimentary and metamorphic rocks to the rock cycle (361-13)
- apply and assess alternative theoretical models for interpreting knowledge in a given field (214-6)

## **Internal Processes (20%)**

### **EARTH'S INTERIOR**

- describe theories and evaluate the limits of our understanding of earth's internal structure (330-1)
- identify questions to investigate that arise from practical problems and issues (212-1)
- select and integrate information from various print and electronic sources or from several parts of the same source (213-7)
- identify and describe science and technology-based careers related to the science they are studying (117-7)
- identify instances in which science and technology are limited in finding answers to questions or the solution to problems (118-7)

### **PLATE TECTONICS**

- explain the roles of evidence, theories and paradigms in the development of scientific knowledge (114-2)
- explain how a major scientific milestone revolutionized thinking in the scientific communities (115-3)
- apply and assess alternative theoretical models for interpreting knowledge in a given field (214-6)
- explain how data support or refute the hypothesis of plate tectonics (214-12)
- describe examples of Canadian contributions to science and technology (117-10)
- explain the plate tectonic theory (362-6)

### **FORCES AND STRUCTURES**

- illustrate how science attempts to explain natural phenomena (115-2)
- describe the various forces (compressional, tensional, shear) which operate in the Earth and how these forces create faults, folds and mountains (362-3)
- describe the geologic activity associated with plate boundaries and relate this to the rock cycle (362-7)

## Surface Processes (20%)

### WEATHERING

- demonstrate a knowledge of WHMIS standards by selecting and applying proper techniques for handling and disposal of lab materials (213-9)
- communicate questions, ideas and intentions, and receive, interpret, understand, support and respond to the ideas of others (215-1)
- distinguish between weathering and erosion (363-1)
- describe the process of soil formation and identify the factors involved in the development of different soil types (363-4)

### EROSION

- compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a technology (118-1)
- work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise (215-6)
- describe and explain the processes by which running water, glaciers, wind and waves cause erosion (363-6)

### DEPOSITION

- propose a course of action on social issues related to science and technology, taking into account human and environmental needs (118-9)
- develop, present and defend a position or course of action based on findings (215-5)
- compare and contrast particle size, shape, and degree of sorting in fluvial, glacial and aeolian deposits (363-10)
- relate weathering, erosion and deposition of sediment to the rock cycle (363-5)

## Historical Geology (15%)

### GEOLOGICAL PRINCIPLES

- explain how scientific knowledge evolves as new evidence comes to light (115-6)
- select and integrate information from various print and electronic sources or from several parts of the same source (213-7)
- synthesize information from multiple sources or from complex and lengthy texts and make inferences based on this information (215-3)
- determine the relative ages of different formations using the principles of uniformitarianism, superposition, original horizontality, original lateral continuity, cross-cutting relationships, and inclusions (364-2)

### THE FOSSIL RECORD

- explain and describe the process of fossil formation (364-5)
- identify and describe science and technology-based careers related to the science they are studying (117-7)
- describe examples of Canadian contributions to science and technology (117-10)

**GEOLOGICAL TIME**

- define and differentiate between relative and absolute age dating (364-1)
- illustrate the geologic time scale and compare it to human time scales (332-4)
- communicate questions, ideas and intentions, and receive, interpret, understand, support and respond to the ideas of others (215-1)
- determine absolute age using the principles of radioactive decay (364-4)

**Environmental Geology (15%)****GEOLOGICAL HAZARDS**

- distinguish between scientific questions and technological problems (115-1)
- construct arguments to support a decision or judgement, using examples and evidence and recognizing various perspectives (118-6)
- identify questions to investigate that arise from practical problems and issues (212-1)
- propose alternative solutions to a given practical problem, identify the potential strengths and weaknesses of each, and select one as the basis for a plan (214-15)
- identify multiple perspectives that influence a science-related decision or issue (215-4)
- identify examples of geological hazards that impact on human settlement and ways in which humans have attempted to minimize the impact of these hazards (365-1)
- identify factors which influence people to live in geologically hazardous areas (365-3)
- apply geological knowledge to the analysis of a local environmental issue or problem (365-9)
- compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a technology (118-1)
- propose a course of action on social issues related to science and technology, taking into account human and environmental needs (118-9)
- provide examples of how science and technology are an integral part of their lives and their community (117-5)
- describe the functioning of domestic and industrial technologies, using scientific principles (116-5)

**RESOURCE ISSUES**

- demonstrate an understanding that Earth's systems are complex and cyclic and that the Earth operates chiefly as a closed system (365-4)
- demonstrate an understanding of what is meant by a renewable and non-renewable resource and the concept of sustainable development (365-5)
- describe the functioning of domestic and industrial technologies, using scientific principles (116-5)
- identify and describe science and technology-based careers related to the science they are studying (117-7)
- select and use apparatus and materials safely (213-8)
- identify stratigraphy as a key element of environmental geology and describe some technologies used to acquire stratigraphic data (365-6)
- work cooperatively with team members to develop and carry out a plan and troubleshoot problems as they arise (215-6)
- apply geological knowledge to the analysis of a local environmental issue or problem (365-9)
- use library and electronic research tools to collect information on a given topic (213-6)
- propose a course of action on social issues related to science and technology, taking into account human and environmental needs (118-9)

**WASTE MANAGEMENT**

- compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a technology (118-1)
- evaluate a personally designed and constructed device on the basis of criteria they have developed themselves (214-16)
- identify and describe the environmental problems associated with waste disposal and management (365-8)
- apply geological knowledge to the analysis of a local environmental issue or problem (365-9)