

## Table of Contents

<b>COMPETENCY 1.0</b>	<b>UNDERSTAND THE BASIC SCIENTIFIC PRINCIPLES OF EARTH AND SPACE SCIENCES....</b>	<b>1</b>
Skill 1.1	Understand the role of energy in Earth systems.....	1
Skill 1.2	Understand the transfer and measurement of heat and the laws of thermodynamics as they relate to Earth systems .....	2
Skill 1.3	Understand the structure of atoms and compounds, and their interrelationships in the solid, liquid, and gaseous components of Earth systems.....	4
Skill 1.4	Understand nuclear reactions and their products as they relate to the Earth and Space Sciences .....	5
Skill 1.5	Understand fundamental biological, chemical, and physical processes as they apply to the study of Earth and Space Sciences.....	7
Skill 1.6	Understand the patterns, interrelationships, and intrarelationshps of matter and energy .....	13
<b>COMPETENCY 2.0</b>	<b>UNDERSTAND TECTONICS AND INTERNAL EARTH PROCESSES .....</b>	<b>15</b>
Skill 2.1	Understand plate tectonics, including the history of its development as a unifying theory .....	15
Skill 2.2	Understand the processes by which Earth's crust is deformed .....	17
Skill 2.3	Understand earthquakes and how they provide information about Earth.....	19
Skill 2.4	Understand the origin and effects of Earth's magnetic field.....	21

**COMPETENCY 3.0      UNDERSTAND EARTH MATERIALS AND SURFACE PROCESSES ..... 23**

Skill 3.1	Understand the characteristics of minerals and rocks and the methods used to identify them.....	23
Skill 3.2	Understand the cycling of Earth materials .....	29
Skill 3.3	Understand the processes of rock weathering and soil formation .....	30
Skill 3.4	Understand sedimentary processes and how rocks are formed from these processes .....	34
Skill 3.5	Understand igneous processes and how rocks are formed from these processes .....	35
Skill 3.6	Understand metamorphic processes and how rocks are formed from these processes .....	36
Skill 3.7	Understand the interrelationships between civilization and Earth materials as resources .....	36
Skill 3.8	Understand the processes by which a landscape evolves .....	40
Skill 3.9	Recognize and interpret geologic features as represented by photographs and topographic and geologic maps .....	41
Skill 3.10	Understand the interrelationships between civilization and natural hazards.....	43

**COMPETENCY 4.0 UNDERSTAND THE HISTORY OF THE EARTH AND ITS LIFE-FORMS ..... 44**

Skill 4.1 Understand the principle of uniformitarianism ..... 44

Skill 4.2 Understand the basic assumptions behind stratigraphic correlation..... 44

Skill 4.3 Understand how rocks provide a record of Earth’s history ..... 46

Skill 4.4 Understand Earth’s origin, including the formation of the atmosphere and hydrosphere..... 48

Skill 4.5 Understand how time is measured ..... 53

Skill 4.6 Understand paleontology, including the origin of life, development of life, and use of the fossil record ..... 56

**COMPETENCY 5.0 UNDERSTAND EARTH’S ATMOSPHERE AND HYDROSPHERE..... 59**

Skill 5.1 Understand the structure of the water molecule as it relates to its special properties ..... 59

Skill 5.2 Understand the paths that water follows as it moves through the water cycle and the energy transfers that accompany this movement..... 60

Skill 5.3 Understand the origin, distribution, and variation of climate ..... 62

Skill 5.4 Understand the systematic development and movement of weather patterns and phenomena..... 64

Skill 5.5 Understand the interrelationships between civilization and the atmosphere and hydrosphere..... 68

Skill 5.6 Understand the processes by which water moves on and beneath Earth’s surface ..... 72

Skill 5.7 Understand glaciers and ice ages ..... 74

Skill 5.8 Understand the physical and chemical characteristics and processes of the oceans..... 80

Skill 5.9 Understand the interrelationships between the waters of the oceans and the solid Earth..... 83

<b>COMPETENCY 6.0</b>	<b>UNDERSTAND ASTRONOMY .....</b>	<b>85</b>
Skill 6.1	Understand the characteristics and consequences of Earth's Moon .....	85
Skill 6.2	Understand the relationships between Earth, the Moon, and the Sun .....	86
Skill 6.3	Understand the characteristics of and relationships between the components of the solar system in terms of composition, size, and motions .....	88
Skill 6.4	Understand the internal and surface processes of planetary bodies and their natural satellites .....	91
Skill 6.5	Understand the characteristics of stars and the processes that occur within them .....	94
Skill 6.6	Understand the structure of the Milky Way and other galaxies .....	95
Skill 6.7	Understand the hypotheses that relate to the origin and development of the universe .....	96

<b>COMPETENCY 7.0</b>	<b>UNDERSTAND THE HISTORY AND NATURE OF SCIENCE .....</b>	<b>98</b>
Skill 7.1	Understand scientific methods of problem solving .....	98
Skill 7.2	Understand the importance of the application of Earth and space sciences to everyday life .....	99
Skill 7.3	Understand the historical development of science and the contributions made by major historical figures as well as members of cultural/ ethnic groups .....	100
Skill 7.4	Understand the use of various measurement systems.....	101
Skill 7.5	Compile, evaluate, and interpret data, and analyzing errors .....	102
Skill 7.6	Understand the proper methods involved in using laboratory and field materials and equipment in a safe and appropriate manner, and in conducting safe field experiences.....	103
Skill 7.7	Understand the appropriate use of equipment/instruments for measurement and observation in Earth and space sciences .....	105
Skill 7.8	Understand computer and related technologies as they apply to investigative activities .....	109
Skill 7.9	Understand issues associated with the use and production of various energy sources .....	110
<b>Sample Test.....</b>		<b>112</b>
<b>Answer Key .....</b>		<b>123</b>
<b>Rationales for Sample Questions.....</b>		<b>124</b>