

Science - Earth Science

Idaho Department of Education Content Standards	Objective	Sub Objectives	Task Analysis	Essential Vocabulary	Sample Assessments	Resources
Cognitive level codes: • B: Memorize • C: Perform procedures • D: Demonstrate understanding • E: Conjecture, generalize, prove • F: Solve non-routine problems, make connections	Bloom's Equivalent • B = Knowledge • C = Comprehension • D = Comprehension • E = Application and Analysis • F = Synthesis					
Standard 1: Nature of Science						
Goal 1.1: Understand Systems, Order, and Organization	8-9.ES.1.1.1 Explain the scientific meaning of system, order, and organization. (648.01a)	• Explain the scientific meaning of system, order, and organization.	• Define the scientific meaning of system. • Recognize the order and organization within a scientific system i.e. the universe, the solar system, the Earth system (the Earth's spheres), Earth-Moon system, the Earth-Sun system	System • Order • Organization • Universe • Galaxies • Solar System • Space		
	8-9.ES.1.1.2 Apply the concepts of order and organization to a given system. (648.01a)	• Apply the concepts of order and organization to a given system.	• Define system. • Describe the organization of the universe . • Explain how the universe is organized into various systems (star systems, Earth-Moon system, Earth-Sun system). • List the different spheres that make up the Earth system (biosphere, geosphere, atmosphere, hydrosphere). • Describe the spheres which make up the Earth's systems.	System • Order • Organization • Universe • Galaxies • Solar System • Biosphere • Geosphere • Atmosphere • Hydrosphere • Galaxies • Solar System • Space		
Goal 1.2: Understand Concepts and Processes of Evidence, Models, and Explanations	8-9.ES.1.2.1 Use observations and data as evidence on which to base scientific explanations. (648.02a)	• Use observations and data as evidence on which to base scientific explanations.	• List and define the two types of observations. • Recognize examples of scientific hypotheses. • Use qualitative and quantitative observations to create a hypothesis. • Record data. • Draw conclusions based on scientific observation and data collection. • Formulate a conclusion.	Observations • Qualitative • Quantitative • Data • Conclusion • Hypothesis		
	8-9.ES.1.2.2 Develop models to explain concepts or systems. (648.02b)	• Develop models to explain concepts or systems.	• Define model. • Recognize situations when scientists need to use models (atoms, the solar system, etc). • Explain how scientific models can be used to represent concepts or systems that cannot be observed directly. • Apply the use of a scientific model in solving a problem.	Model		
	8-9.ES.1.2.3 Develop scientific explanations based on knowledge, logic, and analysis. (648.02c)	• Develop scientific explanations based on knowledge, logic, and analysis.	• Recall topic specific knowledge. • Develop scientific explanations based on knowledge, logic, and analysis.	Scientific Method		
Goal 1.3: Understand Constancy, Change, and Measurement	8-9.ES.1.3.1 Measure changes that can occur in and among systems. (648.03b)	• Measure changes that can occur in and among systems.	• List ways to measure changes in a system. • List tools and methods used to measure changes in the universe (telescopes, electromagnetic radiation, satellites, space craft). • Define electromagnetic radiation. • Explain ways electromagnetic radiation is used to gather information about space. • List tools and methods used to measure changes in the spheres of the Earth system (seismograph, seismometer, satellites, cameras, submersibles, barometer, thermometer, etc.)	Electromagnetic Radiation • Telescope • Wavelength • Spectrum • Doppler Effect • Seismograph • Seismometer • Satellite • Camera • Magnitude • Volcano • Submersible • Barometer • Thermometer		

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	8-9.ES.1.3.2 Analyze changes that can occur in and among systems. (648.03b)	<ul style="list-style-type: none"> Analyze changes that can occur in and among systems. 	<ul style="list-style-type: none"> List ways to measure changes in a system. Describe the changes that occur within the systems. Dramatize the possible impacts of the changes within the system. Analyze changes that can occur in and among systems. (i.e. global warming, ocean currents, climate and weather patterns, pollution, geological changes, sea level changes, floods, etc.) Examine the impact of the changes on living things. 	Global Warming • Ocean Currents • Tsunami • Climate • Weather • Pollution • Earthquake • Volcano • Altitude • Air Pressure		
	8-9.ES.1.3.3 Measure and calculate using the metric system.	<ul style="list-style-type: none"> Measure and calculate using the metric system. 	<ul style="list-style-type: none"> Recall the basic units of length, solid and liquid volume, and mass in the metric system. Describe the tools used to measure basic metric units. Model the use of use of metric measurement in the collection of scientific data. Apply appropriate metric prefix in collection of scientific data. Solve a basic metric conversion problem. 	kilo- • hecto- • deca- • deci- • centi- • milli- • Metric system • Volume • Density • Mass		
Goal 1.4: Understand the Theory that Evolution is a Process that Relates to the Gradual Changes in the Universe and of Equilibrium as a Physical State	No objectives in Earth Science.					
Goal 1.5: Understand Concepts of Form and Function	No objectives in Earth Science.					
Goal 1.6: Understand Scientific Inquiry and Develop Critical Thinking Skills	8-9.ES.1.6.1 Identify questions and concepts that guide scientific investigations. (649.01a)	<ul style="list-style-type: none"> Identify questions and concepts that guide scientific investigations. 	<ul style="list-style-type: none"> Recognize a scientific problem (i.e. global warming, pollution, etc). Identify questions and concepts that guide the scientific investigation of the problem. 	Scientific Problem • Scientific Investigation		
	8-9.ES.1.6.2 Utilize the components of scientific problem solving to design, conduct, and communicate results of investigations. (649.01b)	<ul style="list-style-type: none"> Utilize the components of scientific problem solving to design and conduct a scientific experiment. Utilize the components of scientific problem solving to communicate results of investigations. 	<ul style="list-style-type: none"> Recall the steps of the scientific method. Describe the steps of the scientific method. Construct a situation requiring the use of the scientific method. List the experimental controls. List the experimental variables. Construct and conduct a scientific experiment. Summarize methods used to communicate scientific data (graphs, charts, tables). Report results from an experiment using graphs, charts, or tables. 	Scientific Method • Scientific Problem • Observation • Hypothesis • Experiment • Theory • Conclusion • Data • Control • Independent Variable • Dependent Variable • Line Graph • Bar Graph • Circle Graph		
	8-9.ES.1.6.3 Use appropriate technology and mathematics to make investigations. (649.01c)	<ul style="list-style-type: none"> Use appropriate technology and mathematics to make investigations. 	<ul style="list-style-type: none"> Recognize and apply metric units in global scientific communication. Apply appropriate metric prefix in collection and communication of scientific data. Identify the appropriate use of technology (computers, balances, thermometers, etc) in conducting scientific investigations. 	Technology • Scientific Investigation • Data, • kilo- • hecto- • deca- • deci- • centi- • milli- • Metric system		
	8-9.ES.1.6.4 Formulate scientific explanations and models using logic and evidence. (649.01d)	<ul style="list-style-type: none"> Formulate scientific explanations and models using logic and evidence. 	<ul style="list-style-type: none"> Gather data from a scientific investigation. Summarize data into a conclusion. Construct a model to explain results of scientific investigation. 	Conclusion • Scientific Method • Model		

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	8-9.E.S.1.6.5 Analyze alternative explanations and models. (649.01e)	<ul style="list-style-type: none"> Analyze alternative explanations and models. 	<ul style="list-style-type: none"> Gather data from a scientific investigation. Summarize data into a conclusion. Construct a model to explain results of scientific investigation. Compare and contrast explanations using various models. 	Scientific Method • Conclusion • Data • Model		
	8-9.E.S.1.6.6 Communicate and defend a scientific argument. (649.01f)	<ul style="list-style-type: none"> Communicate and defend a scientific argument. 	<ul style="list-style-type: none"> Gather data from a scientific investigation. Summarize data into a conclusion. Construct a model to explain results of scientific investigation. Compare and contrast explanations using various models. Present a definitive argument based on a scientific investigation. 	Data • Scientific Investigation • Conclusion • Model		
	8-9.E.S.1.6.7 Explain the differences among observations, hypotheses, and theories. (649.01g)	<ul style="list-style-type: none"> Explain the differences among observations, hypotheses, and theories. 	<ul style="list-style-type: none"> Define quantitative observation, qualitative observation, hypothesis, and theory. Discuss the difference between a hypothesis and a theory. Explain how observations are used to create a hypothesis. 	Quantitative Observation • Qualitative Observation • Hypothesis • Theory		
Goal 1.7: Understand That Interpersonal Relationships Are Important in Scientific Endeavors	No objectives in Earth Science.					
Goal 1.8: Understand Technical Communication	8-9.E.S.1.8.1 Analyze technical writing, graphs, charts, and diagrams. (658.02a)	<ul style="list-style-type: none"> Analyze technical writing, graphs, charts, and diagrams. 	<ul style="list-style-type: none"> Summarize methods used to communicate scientific data (technical writing, graphs, charts, and diagrams). Report results from an experiment using technical writing, graphs, charts, or diagrams. Interpret scientific data from technical writing, graphs, charts, and diagrams. 	Technical Writing • Line Graphs • Circle Graphs • Bar Graphs • Diagram • Experiment • Scientific Data		
Standard 2: Physical Science						
Goal 2.1: Understand the Structure and Function of Matter and Molecules and Their Interactions	No goals or objectives in Earth Science.					
Goal 2.2: Understand Concepts of Motion and Forces	No goals or objectives in Earth Science.					
Goal 2.3: Understand the Total Energy in the Universe is Constant	No goals or objectives in Earth Science.					
Goal 2.4: Understand the Structure of Atoms	No goals or objectives in Earth Science.					
Goal 2.5: Understand Chemical Reactions	No goals or objectives in Earth Science.					

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Standard 3: Biology						
Goal 3.1: Understand the Theory of Biological Evolution	No goals or objectives in Earth Science.					
Goal 3.2: Understand the Relationship between Matter and Energy in Living Systems	No goals or objectives in Earth Science.					
Goal 3.3: Understand the Cell is the Basis of Form and Function for All Living Things	No goals or objectives in Earth Science.					
Standard 4: Earth and Space Systems						
Goal 4.1: Understand Scientific Theories of Origin and Subsequent Changes in the Universe and Earth Systems	8-9.ES.4.1.1 Explain the current scientific theory that suggests that the solar system formed from a nebular cloud of dust and gas. (654.01a)	<ul style="list-style-type: none"> Explain the current scientific theory that suggests that the solar system formed from a nebular cloud of dust and gas. 	<ul style="list-style-type: none"> Define nebula. Discuss the role of gravity in nebula formation. Summarize the Big Bang Theory. List evidence that the universe is expanding. 	Nebula • Big Bang Theory • Universe • Galaxy • Solar System • Star • Gravity • Doppler Effect		
	8-9.ES.4.1.2 Identify methods used to estimate geologic time. (654.01b) *Tested on 10th grade ISAT (law of superposition, radioactive decay, carbon dating, ice ages)	<ul style="list-style-type: none"> Identify methods used to estimate geologic time. 	<ul style="list-style-type: none"> Define index fossil. List the two types of dating (relative dating and absolute dating) used to create the geologic timeline. State the difference between relative and absolute dating. Summarize the law of superposition. Tell how ice cores and tree rings are used to describe past geological conditions. Explain how the Earth goes through glacial and interglacial periods. 	Index Fossil • Absolute Dating • Radioactive Dating • Relative Dating • Fossil • Ice Core • Tree Ring • Geologic Time Scale • Law of Superposition		
	8-9.ES.4.1.3 Show how interactions among the solid earth, oceans, atmosphere, and organisms have changed the earth system over time. (654.01c) *Tested on 10th grade ISAT (continental drift, global warming, heat transfer, solar heating)	<ul style="list-style-type: none"> Show how interactions among the solid earth, oceans, atmosphere, and organisms have changed the earth system over time. 	<ul style="list-style-type: none"> Label the parts of the geosphere (inner core, outer core, mantle, crust). Summarize the differences between rocks and minerals. Describe the rock cycle. Summarize the evidences of continental drift (climate, fossils, geology). Discuss the theory of plate tectonics. Explain how the movement of tectonic plates causes geological changes on Earth. Label the processes involved in the water cycle (evaporation, condensation, and precipitation). Describe how water moves throughout the Earth in the water cycle. Discuss the current distribution of water throughout the Earth system. Explain how eutrophication affects a pond or lake. 	Relative Dating, • Absolute Dating • Half Life • Fossil • Geologic Time • System • Mineral • Rock Cycle • Metamorphic Rock • Igneous Rock • Sedimentary Rock • Earthquake • Volcano • Ring of Fire • Composite Volcano • Shield Volcano • Cinder Cone Volcano • Fault Block Mountain • Folded Mountain • Focus • Epicenter • Seismograph • Primary Wave • Secondary Wave • Subduction • Mid-ocean Ridge • Convergent Boundary • Divergent Boundary • Transform Boundary • Continental Drift • Tectonic Plate • Radioactive Decay • Inner Core • Outer Core, • Mantle • Crust • Fresh Water • Atmosphere • Altitude • Water Cycle • Cycle • Salt Water • Radiation • Conduction • Evaporation • Convection • Ultraviolet Radiation • Condensation • Infrared Radiation • Ozone • Precipitation • Greenhouse Effect • Air Pollution • Eutrophication • Fossil Fuels • Air Pressure • Aquifer • Barometer • Coriolis Effect • Air Mass • Front • High-Pressure System • Low-Pressure System •		

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			<ul style="list-style-type: none"> • Recognize the structure and importance of aquifers. • List the layers of the atmosphere (thermosphere, mesosphere, stratosphere, and troposphere). • Summarize how energy is transferred through the atmosphere. • List the ways that the atmosphere makes life on Earth possible. • Explain the greenhouse effect. • Explain the connection between the greenhouse effect and global warming. • Discuss how the layers of the atmosphere are influenced by Earth's natural cycles (carbon cycle, water cycle, nitrogen cycle). • Recognize the main types of clouds (cumulus, cirrus, and stratus). • Explain the difference between weather and climate. • Describe how uneven heating of the Earth system causes changes in weather. • Describe the main types of climates and explain what factors affect them (temperature, precipitation, latitude and altitude). 	Hurricane • Climate • Rain Shadow Effect • Nuclear Fission • Uniformitarianism		
Goal 4.2: Understand Geo-chemical Cycles and Energy in the Earth System	8-9.ES.4.2.1 Explain the internal and external energy sources of the earth (654.02a)	• Explain the internal and external energy sources of the earth	<ul style="list-style-type: none"> • List the major sources of internal and external energy. • Explain how solar radiation heats the Earth's surface and atmosphere. • Discuss the process of radioactive decay within the Earth's core. • Summarize the major processes of energy transfer. 	Radioactive Decay • Inner Core • Outer Core • Mantle • Crust • Radiation • Convection • Conduction • Energy Transfer		
Standard 5: Personal and Social Perspectives; Technology						
Goal 5.1: Understand Common Environmental Quality Issues, Both Natural and Human Induced	8-9.ES.5.1.1 Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources. (656.01a) Tested on 10th grade ISAT (impact of stream degradation, logging, mining, dams, and wind turbines).	• Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources.	<ul style="list-style-type: none"> • Recognize various environmental issues. • Describe how environmental issues impact Earth's spheres. • Give examples of national and local environmental issues. • Examine the environmental impact of human use of natural resources. 	Air pollution • Water Pollution • Recycling • Global Warming • Ozone Depletion • Eutrophication • Natural Resource • Erosion • Deforestation		
Goal 5.2: Understand the Relationship between Science and Technology	8-9.ES.5.2.1 Explain how science advances technology. (655.01a) Tested on 10th grade ISAT (Discuss specific scientists whose discoveries have significance and ramifications in today's world).	• Explain how science advances technology.	<ul style="list-style-type: none"> • Define science. • Define technology. • Describe the process scientists use to solve problems. • Explain how the use of technology aids in scientific problem solving. • Discuss specific scientists whose discoveries have significance and ramifications in today's world. 	Technology • Science • Scientific Method		
	8-9.ES.5.2.2 Explain how technology advances science. (655.01a) Tested on 10th grade ISAT (Use of common methods of technology i.e. lenses, electricity, computer, etc as the foundation for items that lead students to see the role technology has in advancing science.)	• Explain how technology advances science.	<ul style="list-style-type: none"> • Define science. • Define technology. • Describe the process scientists use to solve problems. • Explain how the use of technology aids in scientific problem solving. 	Technology • Science • Scientific Method		

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	8-9.ES.5.2.3 Explain how science and technology are pursued for different purposes. (655.01b) Tested on 10th grade ISAT (The role of technology in applying science to improve some aspects of human life, and the role of science in answering questions and extending knowledge.)	<ul style="list-style-type: none"> • Explain how science and technology are pursued for different purposes. 	<ul style="list-style-type: none"> • Define science. • Define technology. • Explain why humans pursue science. • Explain why humans pursue technology. • Explain how science and technology are pursued for different purposes. 	Technology • Science • Scientific Method		
Goal 5.3: Understand the Importance of Natural Resources and the Need to Manage and Conserve Them	8-9.ES.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a) *Tested on 10th grade ISAT (geothermal, radioactivity, fossil fuel formation)	<ul style="list-style-type: none"> • Describe the difference between renewable and nonrenewable resources. 	<ul style="list-style-type: none"> • Describe what is meant by renewable and non-renewable. • List examples of renewable and non-renewable resources. • Discuss the advantages and disadvantages of renewable and non-renewable resources. 	Renewable • Non-Renewable • Resources • Nuclear Fission • Fossil Fuels • Geotherma • Hydroelectric • Air Pollution • Solar • Wind Turbine • Biomass • Water Turbine		