Earth Science CR

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
5	Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)		
5.3	Human activity is dependent upon and affects Earth's resources and systems		
5.3.A	Earth's materials are limited natural resources affected by human activity		
5.3.A.a	Predict local and/or global effects of environmental changes when given a scenario describing how the composition of the geosphere, hydrosphere, or atmosphere is altered by natural phenomena or human activities	The World's Water	Section 3, Part K
5.3.A.b	Recognize how the geomorphology of Missouri (i.e., different types of Missouri soil and rock materials such as limestone, granite, clay, loam; land formations such as Karst (cave) formations, glaciated plains, river channels) affects the survival of organisms		
6	Composition and Structure of the Universe and the Motion of the Objects Within It		
6.1	The universe has observable properties and structure		

Earth Science CR

6.1.B	The Earth has a composition and location suitable to sustain life		
6.1.B.a	Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment	Astronomy	Section 1, Part B
7	Scientific Inquiry		
7.1	Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking		
7.1.A	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation		
7.1.A.a	Formulate testable questions and hypotheses	Intro to Earth Science	Section 2, Part E
7.1.A.b	Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment	Intro to Earth Science	Section 2, Part F
7.1.A.c	Design and conduct a valid experiment		

Earth Science CR

7.1.A.d	Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature)		
7.1.A.e	Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies	Intro to Earth Science	Section 2, Part C
7.1.A.f	Acknowledge there is no fixed procedure called "the scientific method", but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations	Intro to Earth Science	Section 2, Part C
7.1.A.g	Evaluate the design of an experiment and make suggestions for reasonable improvements		
7.1.B	Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations		
7.1.B.a	Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders)		
7.1.B.b	Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the		

Earth Science CR

	nearest degree Celsius, time to the nearest second		
7.1.B.c	Determine the appropriate tools and techniques to collect, analyze, and interpret data		
7.1.B.d	Judge whether measurements and computation of quantities are reasonable		
7.1.B.e	Calculate the range, average/mean, percent, and ratios for sets of data		
7.1.B.f	Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)		
7.1.C	Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) light of evidence (data) and scientific principle (understandings)		
7.1.C.a	Use quantitative and qualitative data as support for reasonable explanations (conclusions)		
7.1.C.b	Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)		

Earth Science CR

7.1.C.c	Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions)		
7.1.C.d	Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)		
7.1.D	The nature of science relies upon communication of results and justification of explanations		
7.1.D.a	Communicate the procedures and results of investigations and explanations through:		
7.1.D.a.1	oral presentations		
7.1.D.a.2	drawings and maps		
7.1.D.a.3	data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)		
7.1.D.a.4	graphs (bar, single, and multiple line)		

Earth Science CR

7.1.D.a.5	equations and writings		
7.1.D.b	Communicate and defend a scientific argument		
7.1.D.c	Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)		
8	Impact of Science, Technology and Human Activity		
8.1	The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs		
8.1.B	Advances in technology often result in improved data collection and an increase in scientific information		
8.1.B.a	Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)	Astronomy	All of Section 3

Earth Science CR

8.2	Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time		
8.2.A	People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations		
8.2.A.a	Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups		
8.2.A.b	Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology		
8.2.B	Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity		
8.2.B.a	Identify and describe how explanations (laws/principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., cell theory, theories of spontaneous generation and biogenesis, theories of extinction, evolution theory, structure of the cell membrane, genetic theory of inheritance)	Astronomy	Section 1, Parts A-C
8.2.B.b	Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)		

Earth Science CR

8.3	Science and technology affect, and are affected by, society		
8.3.B	Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology		
8.3.B.a	Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges)		
8.3.B.b	Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research)	Earth's Environment	Section 3, Parts A-D
8.3.B.c	Analyze and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks), benefits, and factors (i.e., social, political, economic, ethical, and environmental) affecting progress toward meeting major scientific and technological challenges (e.g., limitations placed on stem-cell research or genetic engineering, introduction of alien species, deforestation, bioterrorism, nuclear energy, genetic counseling, use of		

Earth Science CR

	alternative energies for carbon fuels, use of pesticides		
8.3.C	Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent		
8.3.C.a	Identify and evaluate the need for informed consent in experimentation		
8.3.C.b	Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment)		
8.3.C.c	Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution on aquatic plants)		
8.3.D	Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible		
8.3.D.a	Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an "eye witness", a scientist speaking within or outside his/her area of expertise)		
8.3.D.b	Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society		