



Investigations in Environmental Science Correlation to the Maryland Core Learning Goals, 9-12

Goal 1: Skills And Processes

The student will demonstrate ways of thinking and acting inherent in the practice of science. The student will use the language and instruments of science to collect, organize, interpret, calculate, and communicate information.

Expectation & Indicators	Location/Page where Indicator is found
1.1 The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science	
1.1.1 The student will recognize that real problems have more than one solution and decisions to accept one solution over another are made on the basis of many issues	
1.1.2 The student will modify or affirm scientific ideas according to accumulated evidence	
1.1.3 The student will critique arguments that are based on faulty, misleading data or on the incomplete use of numbers	
1.1.4 The student will recognize data that are biased	
1.1.5 The student will explain factors that produce biased data (incomplete data, using data inappropriately, conflicts of interest, etc.).	
1.2 The student will pose scientific questions and suggest investigative approaches to provide answers to questions.	
1.2.1 The student will identify meaningful, answerable scientific questions	
1.2.2 The student will pose meaningful, answerable scientific questions	

1.2.3 The student will formulate a working hypothesis.	
1.2.4 The student will test a working hypothesis.(
1.2.5 The student will select appropriate instruments and materials to conduct an investigation	
1.2.6 The student will identify appropriate methods for conducting an investigation (independent and dependent variables, proper controls, repeat trials, appropriate sample size, etc.).	
1.2.7 The student will use relationships discovered in the lab to explain phenomena observed outside the laboratory	
1.2.8 The student will defend the need for verifiable data	
1.3 The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately	
1.3.1 The student will develop and demonstrate skills in using lab and field equipment to perform investigative techniques	
1.3.2 The student will recognize safe laboratory procedures	
1.3.3 The student will demonstrate safe handling of the chemicals and materials of science	
1.3.4 The student will learn the use of new instruments and equipment by following instructions in a manual or from oral direction.(
1.4 The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication	
1.4.1 The student will organize data appropriately using techniques such as tables, graphs, and webs (for graphs: axes labeled with appropriate quantities, appropriate units on axes, axes labeled with appropriate intervals, independent and dependent variables on correct axes, appropriate title).	

1.4.2 The student will analyze data to make predictions, decisions, or draw conclusions	
1.4.3 The student will use experimental data from various investigators to validate results	
1.4.4 The student will determine the relationships between quantities and develop the mathematical model that describes these relationships.	
1.4.5 The student will check graphs to determine that they do not misrepresent results	
1.4.6 The student will describe trends revealed by data	
1.4.7 The student will determine the sources of error that limit the accuracy or precision of experimental results	
1.4.8 The student will use models and computer simulations to extend his/her understanding of scientific concepts	
1.4.9 The student will use analyzed data to confirm, modify, or reject a hypothesis	
1.5 The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation	
1.5.1 The student will demonstrate the ability to summarize data (measurements/observations).	

1.5.2 The student will explain scientific concepts and processes through drawing, writing, and/or oral communication	
1.5.3 The student will use computers and/or graphing calculators to produce the visual materials (tables, graphs, and spreadsheets) that will be used for communicating results	
1.5.4 The student will use tables, graphs, and displays to support arguments and claims in both written and oral communication	
1.5.5 The student will create and/or interpret graphics. (scale drawings, photographs, digital images, field of view, etc.)	
1.5.6 The student will read a technical selection and interpret it appropriately	
1.5.7 The student will use, explain, and/or construct various classification systems.	
1.5.8 The student will describe similarities and differences when explaining concepts and/or principles	
1.5.9 The student will communicate conclusions derived through a synthesis of ideas	
1.6 The student will use mathematical processes	
1.6.1 The student will use ratio and proportion in appropriate situations to solve problems	

1.6.2 The student will use computers and/or graphing calculators to perform calculations for tables, graphs, or spreadsheets	
1.6.3 The student will express and/or compare small and large quantities using scientific notation and relative order of magnitude	
1.6.4 The student will manipulate quantities and/or numerical values in algebraic equations	
1.6.5 The student will judge the reasonableness of an answer	
1.7 The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology	
1.7.1 The student will apply the skills, processes, and concepts of biology, chemistry, physics, or earth science to societal issues.	
1.7.2 The student will identify and evaluate the impact of scientific ideas and/or advancements in technology on society	
1.7.3 The student will describe the role of science in the development of literature, art, and music.(
1.7.4 The student will recognize mathematics as an integral part of the scientific process.(
1.7.5 The student will investigate career possibilities in the various areas of science	

1.7.6 The student will explain how development of scientific knowledge leads to the creation of new technology and how technological advances allow for additional scientific accomplishments	
---	--

Goal 6: Environmental Science

The student will demonstrate the ability to use the scientific skills and processes (Core Learning Goal 1) and major environmental science concepts to understand interrelationships of the natural world and to analyze environmental issues and their solutions.

Expectation & Indicators	Location/Page where Indicator is found
6.1 The student will explain how matter and energy move through the biosphere (lithosphere, hydrosphere, atmosphere and organisms).	
<p>6.1.1 The student will demonstrate that matter cycles through and between living systems and the physical environment constantly being recombined in different ways.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ nitrogen cycle ◦ carbon cycle ◦ phosphorus cycle (rock/mineral) ◦ hydrologic cycle 	
<p>6.1.2 The student will analyze how the transfer of energy between atmosphere, land masses and oceans results in areas of different temperatures and densities that produce weather patterns and establish climate zones around the earth.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ differential heating and cooling ◦ oceanic and atmospheric circulation patterns ◦ climates and microclimates ◦ biomes 	
6.2 The student will investigate the interdependence of organisms within their biotic environment	
<p>6.2.1 The student will explain how organisms are linked by the transfer and transformation of matter and energy at the ecosystem level.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ Photosynthesis/respiration ◦ Producers, consumers, decomposers 	

<ul style="list-style-type: none"> ◦ Trophic levels ◦ Pyramid of energy/pyramid of biomass 	
<p>6.2.2 The student will explain why interrelationships & interdependencies of organisms contribute to the dynamics of ecosystems.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ Interspecific and intraspecific competition ◦ Niche ◦ Cycling of materials among organisms ◦ Equilibrium/cyclic fluctuations ◦ Dynamics of disturbance and recovery ◦ Succession: aquatic and terrestrial 	
<p>6.2.3 The student will conclude that populations grow or decline due to a variety of factors.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ Linear/exponential growth ◦ Carrying capacity/limiting factors ◦ Species specific reproductive factors (such as birth rate, fertility rate) ◦ Factors unique to the human population (medical, agricultural, cultural) ◦ Immigration/emigration ◦ Introduced species 	
<p>6.2.4 The student will provide examples and evidence showing that natural selection leads to organisms that are well suited for survival in particular environments.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ coevolutionary relationships, e.g. symbiotic relationships ◦ variation within a species increases survival potential ◦ natural selection provides a mechanism for evolution ◦ adaptations of organisms within biomes 	
<p>6.3 The student will analyze the relationships between humans and the earth's resources</p>	
<p>6.3.1 The student will evaluate the interrelationship between humans and air quality.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ ozone ◦ greenhouse gases ◦ volatile organic compounds (smog) ◦ acid rain ◦ indoor air ◦ human health 	

<p>6.3.2 The student will evaluate the interrelationship between humans and water quality and quantity.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ fresh water supply ◦ point source/nonpoint source pollution ◦ waste water treatment ◦ thermal pollution ◦ Chesapeake Bay and its watershed ◦ eutrophication ◦ human health 	
<p>6.3.3 The student will evaluate the interrelationship between humans and land resources.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ wetlands ◦ soil conservation ◦ mining ◦ solid waste management ◦ land use planning ◦ human health 	
<p>6.3.4 The student will evaluate the interrelationship between humans and biological resources.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ food production/agriculture ◦ forest and wildlife resources ◦ species diversity/genetic resources ◦ integrated pest management ◦ human health 	
<p>6.3.4 The student will evaluate the interrelationship between humans and biological resources.</p> <p>At least —</p> <ul style="list-style-type: none"> ◦ food production/agriculture ◦ forest and wildlife resources ◦ species diversity/genetic resources ◦ integrated pest management ◦ human health 	
<p>6.4 The student will develop and apply knowledge and skills gained from an environmental issue investigation to an action project which protects and sustains the environment</p>	
<p>6.4.1 Identify an environmental issue and formulate related research questions. Methods of gathering information may include:</p> <ul style="list-style-type: none"> ◦ writing letters ◦ performing a literature search 	

<ul style="list-style-type: none"> ◦ using the internet ◦ interviewing experts 	
<p>6.4.2 Design and conduct the research.</p> <p>Methods of data collection may include:</p> <ul style="list-style-type: none"> ◦ field or laboratory ◦ questionnaire/opinionnaire 	
<p>6.4.3 Interpret the findings to draw conclusions and make recommendations to help resolve the issue.</p>	
<p>6.4.4 Apply the conclusions to develop and implement an action project.</p> <p>Methods of implementation may include</p> <ul style="list-style-type: none"> ◦ physical action ◦ persuasion ◦ consumer action ◦ political action 	
<p>6.4.5 Analyze the effectiveness of the action project in terms of achieving the desired outcomes.</p>	