

# Marine Science 1 (#2002500)

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## Course Standards

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<a href="#">SC.912.N.1.1:</a>	<p>Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:</p> <ol style="list-style-type: none"><li>1. <b>Pose questions about the natural world,</b> (Articulate the purpose of the investigation and identify the relevant scientific concepts).</li><li>2. <b>Conduct systematic observations,</b> (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).</li><li>3. <b>Examine books and other sources of information to see what is already known,</b></li><li>4. <b>Review what is known in light of empirical evidence,</b> (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).</li><li>5. <b>Plan investigations,</b> (Design and evaluate a scientific investigation).</li><li>6. <b>Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),</b> (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage).</li><li>7. <b>Pose answers, explanations, or descriptions of events,</b></li><li>8. <b>Generate explanations that explicate or describe natural phenomena (inferences),</b></li><li>9. <b>Use appropriate evidence and reasoning to justify these explanations to others,</b></li><li>10. <b>Communicate results of scientific investigations, and</b></li><li>11. <b>Evaluate the merits of the explanations produced by others.</b></li></ol>
<a href="#">SC.912.N.1.2:</a>	<p>Describe and explain what characterizes science and its methods.</p> <p><b>Clarifications:</b> Science is characterized by empirical observations, testable questions, formation of hypotheses, and experimentation that results in stable and replicable results, logical reasoning, and coherent theoretical constructs. Florida Standards Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.</p>

<p><b><u>SC.912.N.1.3:</u></b></p>	<p>Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.</p> <p><b>Clarifications:</b> Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrolled conditions. Florida Standards Connections: MAFS.K12.MP.2: Reason abstractly and quantitatively; MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others</p>
<p><b><u>SC.912.N.1.4:</u></b></p>	<p>Identify sources of information and assess their reliability according to the strict standards of scientific investigation.</p> <p><b>Clarifications:</b> Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories. Strict standards of science include controlled variables, sufficient sample size, replication of results, empirical and measurable evidence, and the concept of falsification. Florida Standards Connections: LAFS.910.RST.1.1 / LAFS.1112.RST.1.1.</p>
<p><b><u>SC.912.N.1.5:</u></b></p>	<p>Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.</p> <p><b>Clarifications:</b> Recognize that contributions to science can be made and have been made by people from all over the world.</p>
<p><b><u>SC.912.N.1.6:</u></b></p>	<p>Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.</p> <p><b>Clarifications:</b> Collect data/evidence and use tables/graphs to draw conclusions and make inferences based on patterns or trends in the data. Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them.</p>
<p><b><u>SC.912.N.1.7:</u></b></p>	<p>Recognize the role of creativity in constructing scientific questions, methods and explanations.</p> <p><b>Clarifications:</b> Work through difficult problems using creativity, and critical and analytical thinking in problem solving (e.g. convergent versus divergent thinking and creativity in problem solving). Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; and MAFS.K12.MP.2: Reason abstractly and quantitatively.</p>
<p><b><u>SC.912.N.2.1:</u></b></p>	<p>Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).</p> <p><b>Clarifications:</b> Science is the systematic and organized inquiry that is derived from observations and experimentation that can be verified or tested by further investigation to explain natural phenomena (e.g. Science is testable, pseudo-science is not; science seeks falsifications, pseudo-science seeks confirmations.)</p>

<p><b><u>SC.912.N.2.4:</u></b></p>	<p>Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.</p> <p><b>Clarifications:</b> Recognize that ideas with the most durable explanatory power become established theories, but scientific explanations are continually subjected to change in the face of new evidence. Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.</p>
<p><b><u>SC.912.N.2.5:</u></b></p>	<p>Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.</p> <p><b>Clarifications:</b> Recognize that scientific questions, observations, and conclusions may be influenced by the existing state of scientific knowledge, the social and cultural context of the researcher, and the observer's experiences and expectations. Identify possible bias in qualitative and quantitative data analysis.</p>
<p><b><u>SC.912.N.3.1:</u></b></p>	<p>Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.</p> <p><b>Clarifications:</b> Explain that a scientific theory is a well-tested hypothesis supported by a preponderance of empirical evidence. Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; and, MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.</p>
<p><b><u>SC.912.N.3.5:</u></b></p>	<p>Describe the function of models in science, and identify the wide range of models used in science.</p> <p><b>Clarifications:</b> Describe how models are used by scientists to explain observations of nature. Florida Standards Connections: MAFS.K12.MP.4: Model with mathematics.</p>
<p><b><u>SC.912.N.4.1:</u></b></p>	<p>Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.</p> <p><b>Clarifications:</b> Recognize that no single universal step-by-step scientific method captures the complexity of doing science. A number of shared values and perspectives characterize a scientific approach. MAFS.K12.MP.1: Make sense of problems and persevere in solving them, and MAFS.K12.MP.2: Reason abstractly and quantitatively.</p>

<p><b><u>SC.912.N.4.2:</u></b></p>	<p>Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.</p> <p><b>Clarifications:</b> Identify examples of technologies, objects, and processes that have been modified to advance society, and explain why and how they were modified. Discuss ethics in scientific research to advance society (e.g. global climate change, historical development of medicine and medical practices). Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them, and MAFS.K12.MP.2: Reason abstractly and quantitatively.</p>
<p><b><u>SC.912.E.7.9:</u></b></p>	<p>Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.</p> <p><b>Clarifications:</b> Explain how the oceans act as sources/sinks of heat energy, store carbon dioxide mostly as dissolved HCO<sub>3</sub><sup>-</sup> and CaCO<sub>3</sub> as precipitate or biogenic carbonate deposits, which have an impact on climate change.</p>
<p><b><u>SC.912.L.14.6:</u></b></p>	<p>Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.</p>
<p><b><u>SC.912.L.15.13:</u></b></p>	<p>Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.</p> <p><b>Clarifications:</b> Annually assessed on Biology EOC. Also assesses SC.912.L.15.14, SC.912.L.15.15, and SC.912.N.1.3.</p>
<p><b><u>SC.912.L.17.1:</u></b></p>	<p>Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.</p> <p><b>Clarifications:</b> Florida Standards Connections: MAFS.K12.MP.7: Look for and make use of structure.</p>
<p><b><u>SC.912.L.17.2:</u></b></p>	<p>Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.</p>
<p><b><u>SC.912.L.17.3:</u></b></p>	<p>Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.</p>
<p><b><u>SC.912.L.17.4:</u></b></p>	<p>Describe changes in ecosystems resulting from seasonal variations, climate change and succession.</p>
<p><b><u>SC.912.L.17.6:</u></b></p>	<p>Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.</p>
<p><b><u>SC.912.L.17.7:</u></b></p>	<p>Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.</p>
<p><b><u>SC.912.L.17.8:</u></b></p>	<p>Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.</p>
<p><b><u>SC.912.L.17.9:</u></b></p>	<p>Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.</p>

	<p><b>Clarifications:</b> Annually assessed on Biology EOC. Also assesses SC.912.E.7.1.</p>
<a href="#"><u>SC.912.L.17.10:</u></a>	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
<a href="#"><u>SC.912.L.17.11:</u></a>	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
<a href="#"><u>SC.912.L.17.16:</u></a>	<p>Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.</p> <p><b>Clarifications:</b> Integrate HE.912.C.1.3. Evaluate how environment and personal health are interrelated; and, HE.912.C.1.5. Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.</p>
<a href="#"><u>SC.912.L.18.12:</u></a>	<p>Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.</p> <p><b>Clarifications:</b> Annually assessed on Biology EOC.</p>
<a href="#"><u>SC.912.P.10.2:</u></a>	<p>Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.</p> <p><b>Clarifications:</b> Use calorimetry to illustrate conservation of energy. Differentiate between the different types of systems and solve problems involving conservation of energy in simple systems (Physics). Explain how conservation of energy is important in chemical reactions with bond formation and bond breaking (Chemistry).</p>
<a href="#"><u>SC.912.P.10.20:</u></a>	<p>Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.</p> <p><b>Clarifications:</b> Describe the measurable properties of waves (velocity, frequency, wavelength, amplitude, period, reflection and refraction) and explain the relationships among them. Recognize that the source of all waves is a vibration and waves carry energy from one place to another. Distinguish between transverse and longitudinal waves in mechanical media, such as springs and ropes, and on the earth (seismic waves). Describe sound as a longitudinal wave whose speed depends on the properties of the medium in which it propagates.</p>