

MarineLab Programs & Florida Next Generation Sunshine State Standards

Science - Grades 9 - 12

Listed below are benchmarks from the Florida Next Generation Sunshine State Standards and the MarineLab units which cover those benchmarks. A description of each MarineLab unit is at the end of the document.

STANDARD / BODY OF KNOWLEDGE / DOMAIN	FL.SC.912.N.	Nature of Science														
BENCHMARK / BIG IDEA / STRAND	SC.912.N.1.	The Practice of Science - A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.														
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.N.1.1.	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:														
	SC.912.N.1.1.1.	Pose questions about the natural world														
		<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Astronomy/Plankton Tow</td> <td style="width: 50%;">Mangrove ecology</td> </tr> <tr> <td>Cassiopeia Culturing Lab</td> <td>Rodriguez Key zonation</td> </tr> <tr> <td>Coral Reef Ecology</td> <td>Sea Turtle Stranding Activity</td> </tr> <tr> <td>Everglades Hydrology</td> <td>Seagrass ecology</td> </tr> <tr> <td>Field Identification of Reef Fish</td> <td>Sponge Spicule Identification</td> </tr> <tr> <td>Invertebrate Diversity</td> <td>Water Quality Lab</td> </tr> <tr> <td colspan="2">Keys Habitats - Introduction and Summary</td> </tr> </table>	Astronomy/Plankton Tow	Mangrove ecology	Cassiopeia Culturing Lab	Rodriguez Key zonation	Coral Reef Ecology	Sea Turtle Stranding Activity	Everglades Hydrology	Seagrass ecology	Field Identification of Reef Fish	Sponge Spicule Identification	Invertebrate Diversity	Water Quality Lab	Keys Habitats - Introduction and Summary	
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	SC.912.N.1.1.2.	Conduct systematic observations														
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	SC.912.N.1.1.6.	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)		
		Astronomy/Plankton Tow	Mangrove ecology	
		Cassiopeia Culturing Lab	Rodriguez Key zonation	
		Coral Reef Ecology	Sea Turtle Stranding Activity	
		Everglades Hydrology	Seagrass ecology	
		Field Identification of Reef Fish	Sponge Spicule Identification	
		Invertebrate Diversity	Water Quality Lab	
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	SC.912.N.1.1.7.	Pose answers, explanations, or descriptions of events		
		Astronomy/Plankton Tow	Mangrove ecology	
		Cassiopeia Culturing Lab	Rodriguez Key zonation	
		Coral Reef Ecology	Sea Turtle Stranding Activity	
		Everglades Hydrology	Seagrass ecology	
		Field Identification of Reef Fish	Sponge Spicule Identification	
		Invertebrate Diversity	Water Quality Lab	
	SC.912.N.1.1.8.	Generate explanations that explicate or describe natural phenomena (inferences)		
		Astronomy/Plankton Tow	Mangrove ecology	
		Cassiopeia Culturing Lab	Rodriguez Key zonation	
		Coral Reef Ecology	Sea Turtle Stranding Activity	
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	SC.912.N.1.1.10.	Communicate results of scientific investigations, and		
		Sea Turtle Stranding Activity		
	SC.912.N.1.1.11.	Evaluate the merits of the explanations produced by others.		
		Astronomy/Plankton Tow	Mangrove ecology	Field Identification of Reef Fish
		Cassiopeia Culturing Lab	Rodriguez Key zonation	Invertebrate Diversity
		Coral Reef Ecology	Sea Turtle Stranding Activity	Sponge Spicule Identification
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STANDARD / BODY OF KNOWLEDGE / DOMAIN	FL.SC.912.P.	Physical Science
BENCHMARK / BIG IDEA / STRAND	SC.912.P.8.	Matter - A. A working definition of matter is that it takes up space, has mass, and has measurable properties. Matter is comprised of atomic, subatomic, and elementary particles. B. Electrons are key to defining chemical and some physical properties, reactivity, and molecular structures. Repeating (periodic) patterns of physical and chemical properties occur among elements that define groups of elements with similar properties. The periodic table displays the repeating patterns, which are related to the atom's outermost electrons. Atoms bond with each other to form compounds. C. In a chemical reaction, one or more reactants are transformed into one or more new products. Many factors shape the nature of products and the rates of reaction. D. Carbon-based compounds are building-blocks of known life forms on earth and numerous useful natural and synthetic products.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.P.8.11.	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
		Water Quality Lab
BENCHMARK / BIG IDEA / STRAND	SC.912.P.10.	Energy - A. Energy is involved in all physical and chemical processes. It is conserved, and can be transformed from one form to another and into work. At the atomic and nuclear levels energy is not continuous but exists in discrete amounts. Energy and mass are related through Einstein's equation $E=mc^2$. B. The properties of atomic nuclei are responsible for energy-related phenomena such as radioactivity, fission and fusion. C. Changes in entropy and energy that accompany chemical reactions influence reaction paths. Chemical reactions result in the release or absorption of energy. D. The theory of electromagnetism explains that electricity and magnetism are closely related. Electric charges are the source of electric fields. Moving charges generate magnetic fields. E. Waves are the propagation of a disturbance. They transport energy and momentum but do not transport matter.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.P.10.5.	Relate temperature to the average molecular kinetic energy.
		Water Quality Lab
STANDARD / BODY OF KNOWLEDGE / DOMAIN	FL.SC.912.L.	Life Science
BENCHMARK / BIG IDEA / STRAND	SC.912.L.14.	Organization and Development of Living Organisms - A. Cells have characteristic structures and functions that make them distinctive. B. Processes in a cell can be classified broadly as growth, maintenance, reproduction, and homeostasis. C. Life can be organized in a functional and structural hierarchy ranging from cells to the biosphere. D. Most multicellular organisms are composed of organ systems whose structures reflect their particular function.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.14.4.	Compare and contrast structure and function of various types of microscopes.
		Astronomy/Plankton Tow Sponge Spicule Identification Cassiopeia Culturing Lab

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BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.14.7.	Relate the structure of each of the major plant organs and tissues to physiological processes.
		Astronomy/Plankton Tow Mangrove ecology Everglades Hydrology Seagrass ecology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.14.53.	Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.
		Astronomy/Plankton Tow Mangrove ecology Everglades Hydrology Seagrass ecology
BENCHMARK / BIG IDEA / STRAND	SC.912.L.15.	Diversity and Evolution of Living Organisms - A. The scientific theory of evolution is the fundamental concept underlying all of biology. B. The scientific theory of evolution is supported by multiple forms of scientific evidence. C. Organisms are classified based on their evolutionary history. D. Natural selection is a primary mechanism leading to evolutionary change.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.15.2.	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
		Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.15.3.	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
		Coral Reef Ecology Mangrove ecology Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.15.6.	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
		Astronomy/Plankton Tow Mangrove ecology Invertebrate Diversity Cassiopeia Culturing Lab Rodriguez Key zonation Seagrass ecology Coral Reef Ecology Sea Turtle Stranding Activity Everglades Hydrology Field Identification of Reef Fish Sponge Spicule Identification
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.15.7.	Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.
		Astronomy/Plankton Tow Keys Habitats - Introduction and Summary Cassiopeia Culturing Lab Mangrove ecology Coral Reef Ecology Rodriguez Key zonation Seagrass ecology Everglades Hydrology Sea Turtle Stranding Activity Invertebrate Diversity Field Identification of Reef Fish Sponge Spicule Identification
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.15.14.	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
		Keys Habitats - Introduction and Summary

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BENCHMARK / BIG IDEA / STRAND	SC.912.L.16.	Heredity and Reproduction - A. DNA stores and transmits genetic information. Genes are sets of instructions encoded in the structure of DNA. B. Genetic information is passed from generation to generation by DNA in all organisms and accounts for similarities in related individuals. C. Manipulation of DNA in organisms has led to commercial production of biological molecules on a large scale and genetically modified organisms. D. Reproduction is characteristic of living things and is essential for the survival of species.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.16.8.	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer. Cassiopeia Culturing Lab
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.16.14.	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction. Cassiopeia Culturing Lab Mangrove ecology Coral Reef Ecology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.16.15.	Compare and contrast binary fission and mitotic cell division. Cassiopeia Culturing Lab Mangrove ecology Coral Reef Ecology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.16.17.	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic Cassiopeia Culturing Lab Mangrove ecology Coral Reef Ecology
BENCHMARK / BIG IDEA / STRAND	SC.912.L.17.	Interdependence - A. The distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment. B. Energy and nutrients move within and between biotic and abiotic components of ecosystems via physical, chemical and biological processes. C. Human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.2.	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature. Astronomy/Plankton Tow Mangrove ecology Invertebrate Diversity Cassiopeia Culturing Lab Rodriguez Key zonation Water Quality Lab Coral Reef Ecology Sea Turtle Stranding Activity Seagrass ecology Everglades Hydrology Sponge Spicule Identification Field Identification of Reef Fish Keys Habitats - Introduction and Summary

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BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.3.	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
		Astronomy/Plankton Tow Mangrove ecology Invertebrate Diversity Cassiopeia Culturing Lab Rodriguez Key zonation Water Quality Lab Coral Reef Ecology Sea Turtle Stranding Activity Seagrass ecology Everglades Hydrology Sponge Spicule Identification Field Identification of Reef Fish Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.4.	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
		Everglades Hydrology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.5.	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
		Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.6.	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
		Astronomy/Plankton Tow Mangrove ecology Coral Reef Ecology Sea Turtle Stranding Activity Field Identification of Reef Fish Seagrass ecology Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.7.	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
		Astronomy/Plankton Tow Mangrove ecology Invertebrate Diversity Cassiopeia Culturing Lab Rodriguez Key zonation Water Quality Lab Coral Reef Ecology Sea Turtle Stranding Activity Seagrass ecology Everglades Hydrology Sponge Spicule Identification Field Identification of Reef Fish Keys Habitats - Introduction and Summary

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BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.8.	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
		Astronomy/Plankton Tow Keys Habitats - Introduction and Summary Coral Reef Ecology Mangrove ecology Everglades Hydrology Rodriguez Key zonation Field Identification of Reef Fish Seagrass ecology Invertebrate Diversity
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.9.	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.
		Astronomy/Plankton Tow Mangrove ecology Coral Reef Ecology Rodriguez Key zonation Everglades Hydrology Seagrass ecology Field Identification of Reef Fish
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.10.	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
		Astronomy/Plankton Tow Seagrass ecology Mangrove ecology Water Quality Lab
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.13.	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
		Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.14.	Assess the need for adequate waste management strategies.
		Keys Habitats - Introduction and Summary
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.15.	Discuss the effects of technology on environmental quality.
		Coral Reef Ecology Water Quality Lab Mangrove ecology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.16.	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.
		Coral Reef Ecology Sea Turtle Stranding Activity Keys Habitats - Introduction and Summary Seagrass ecology Mangrove ecology Water Quality Lab

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BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.17.	Assess the effectiveness of innovative methods of protecting the environment.
		Coral Reef Ecology Mangrove ecology
		Sea Turtle Stranding Activity Seagrass ecology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.18.	Describe how human population size and resource use relate to environmental quality.
		Sea Turtle Stranding Activity
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.19.	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
		Mangrove ecology
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.17.20.	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
		Coral Reef Ecology Everglades Hydrology Mangrove ecology Keys Habitats - Introduction and Summary
		Sea Turtle Stranding Activity Seagrass ecology Water Quality Lab
BENCHMARK / BIG IDEA / STRAND	SC.912.L.18.	Matter and Energy Transformations - A. All living things are composed of four basic categories of macromolecules and share the same basic needs for life. B. Living organisms acquire the energy they need for life processes through various metabolic pathways (primarily photosynthesis and cellular respiration). C. Chemical reactions in living things follow basic rules of chemistry and are usually regulated by enzymes. D. The unique chemical properties of carbon and water make life on Earth possible.
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.18.7.	Identify the reactants, products, and basic functions of photosynthesis.
		Water Quality Lab
BENCHMARK / DESCRIPTOR / STANDARD	SC.912.L.18.9.	Explain the interrelated nature of photosynthesis and cellular respiration.
		Astronomy/Plankton Tow Mangrove ecology
		Seagrass ecology Water Quality Lab

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