CENTRAL FLORIDA ASSESSMENT COLLABORATIVE

Individual Test Item

Specifications

Marine Science 2

2014

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**Table of Contents**

I. Guide to the Individual Benchmark Specifications ..................................................................... 1

Benchmark Classification System............................................................................................... 1

Definitions of Benchmark Specifications ................................................................................... 3

II. Individual Benchmark Specifications ........................................................................................ 4

**I. Guide to the Individual Benchmark Specifications**

Content specific guidelines are given in the *Individual Benchmark Specifications* for each course. The *Specifications* contains specific information about the alignment of items with the NGSSS and the Florida Standards. It identifies the manner in which each benchmark is assessed, provides content limits and stimulus attributes for each benchmark, and gives specific information about content, item types, and response attributes.

**Benchmark Classification System**

Each NGSSS benchmark is labeled with a system of letters and numbers.

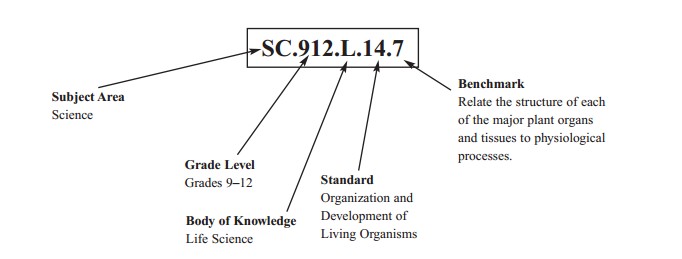
 The two letters in the *first position* of the label identify the **Subject Area**.

 The number(s) in the *second position* represents the **Grade Level**.

 The letter in the *third position* represents the **Strand** or **Body of Knowledge.**

 The number in the *fourth position* represents the **Standard**.

 The number in the *last position* identifies the specific **Benchmark**.



Each MAFS benchmark is labeled with a system of letters and numbers.

 The four letters in the *first position* of the label identify the **Subject**.

 The number(s) in the *second position* represents the **Grade Level**.

 The letter(s) in the *third position* represents the **Category**.

 The number in the *fourth position* shows the **Domain**.

 The number in the *fifth position* identifies the **Cluster**.

 The number in the *last position* identifies the specific **Benchmark**.



**Definitions of Benchmark Specifications**

The *Individual Benchmark Specifications* provides standard-specific guidance for assessment item development for CFAC item banks. For each benchmark assessed, the following information is provided.

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| **Reporting Category** | is a grouping of related benchmarks that can be used to summarize and report achievement. |
| **Standard** | refers to the standard statement presented in the NGSSS or in the Florida Standards. |
| **Benchmark**  **Also Assesses** | refers to the benchmark statement presented in the NGSSS or standard statement in the Florida Standards. In some cases, two or more related benchmarks are grouped together because the assessment of one benchmark addresses another benchmark. Such groupings are indicated in the Also Assesses statement.  refers to the benchmarks that are closely related to the benchmark (see description above) |
| **Item Types**  **Cognitive**  **Complexity** | are used to assess the benchmark or group of benchmark.  ideal level at which item should be assessed. |
| **Benchmark Clarifications** | explain how achievement of the benchmark will be demonstrated by students. In other words, the clarification statements explain what the student will do when responding to questions. |
| **Content Limits** | define the range of content knowledge and that should be assessed in the items for the benchmark. |
| **Stimulus Attributes** | define the types of stimulus materials that should be used in the items, including the appropriate use of graphic materials and item context or content. |
| **Response Attributes**  **Content Focus** | define the characteristics of the answers that a student must choose or provide.  defines the content measured by each test item. Content focus addresses the broad content and skills associated with the examples found in the standards, benchmarks, or benchmark clarifications. |
| **Sample Items** | are provided for each type of question assessed. The correct answer for all sample items is provided. |

**II. Individual Benchmark Specifications**

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| **Reporting**  **Category** | Earth & Space Science |
| **Standard** | Earth Structures |
| **Benchmark**  **Number** | SC.912.E.6.5 – Marine Science 2 Honors ONLY |
| **Benchmark** | Describe the geologic development of the present day oceans and identify commonly  found features. |
| **Also Assesses** | SC.912.N.2.5 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.  SC.912.E.6.4 Analyze how specific geologic processes and features are expressed in  Florida and elsewhere. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | Moderate |
| **Benchmark**  **Clarification** | Students will describe the geologic development of the present day oceans. Students will  identify commonly found features in the oceans.  Students will 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.  Students will explain that competing interpretations 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.  Students will analyze how geologic processes and features are expressed in Florida and elsewhere.  Students will summarize the movement of continents from Pangaea to present day continents, as well as the development of the present day oceans from Panthalassa.  Students will describe ocean floor features such as trenches, mid-ocean ridges, rift valleys, seamounts, abyssal plains, and the continental shelf. |
| **Content Limits** | Items will not assess previously held theories of continental drift.  Items will not assess the biological impacts of the geological development of the present day oceans and its features. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | inner core, outer core, mantle, mesosphere, lithosphere, asthenosphere, crust, density, ocean basin, sea floor spreading, paleomagnetism, Alfred Wegener, continental drift, Henry Hess, Pangaea, Panthalassa, plate tectonics, sonar, convection currents, convergent, divergent, transform fault, plate boundaries, mid-ocean ridge, trench, rift valley, seamount, abyssal plain, abyssal hill, subduction, hotspot, guyot, deep sea fan, hydrothermal vent, submarine canyon, Ring of Fire, continental shelf, continental slope, continental rise, active margin, passive margin |
| **Sample Item** | According to the theory of seafloor spreading, where and how is new seafloor formed?  A) at trenches where magma is pushed up from the lithosphere  B) at trenches where magma is pushed up from the asthenosphere  C) at the mid-ocean ridges where magma is pushed up from the lithosphere  D) at the mid-ocean ridges where magma is pushed up from the asthenosphere  Correct Answer: D |

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| **Reporting**  **Category** | Earth & Space Science |
| **Standard** | Earth Structures |
| **Benchmark**  **Number** | SC.912.E.6.6 – Marine Science 2 Honors ONLY |
| **Benchmark** | Analyze past, present, and potential future consequences to the environment  resulting from various energy production technologies. |
| **Also**  **Assesses** | SC.912.N.1.7 Recognize the role of creativity in constructing scientific  questions, methods and explanations. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will analyze past, present, and potential future consequences to the  environment resulting from various energy production technologies.  Students will recognize the role of creativity in constructing scientific questions, methods, and explanations. |
| **Content**  **Limits** | Items will not assess the conservation of natural resources.  Items will not assess how natural resources are formed. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | renewable resources, nonrenewable resources, sustainability, ocean thermal energy conversion, anthropogenic impacts, ocean acidification, pollution, eutrophication, anoxic conditions, hypoxic zones, stormwater runoff, sewage, sludge, dispersant, biological magnification, dioxins, polychlorinated biphenyls (PCBs), heavy metals, thermal pollution, extinction, endangered, threatened, conservation, Exclusive Economic Zones (EEZs), marine protected areas, habitat restoration, artificial reefs |
| **Sample Item** | Fossil fuels, such as coal and natural gas, are an important resource used for  energy production. They are formed from the remains of once living things and when they are burned, release gases into the atmosphere. Which is the **most** important reason to find alternative sources of energy?  A) Mining fossil fuels harms the animals that live nearby.  B) Fossil fuels are nonrenewable and cannot be replaced.  C) When fossil fuels are mined, it leaves huge holes in the earth.  D) Burning fossil fuels releases pollutants that can damage the environment.  Correct Answer : D |

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| **Reporting**  **Category** | Earth & Space Science |
| **Standard** | Earth Systems & Patterns |
| **Benchmark**  **Number** | SC.912.E.7.2 |
| **Benchmark** | Analyze the causes of the various kinds of surface and deep water motion  within the oceans and their impacts on the transfer of energy between the poles and the equator. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer  s |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will analyze the causes of the surface motion and deep water motion  within the oceans.  Students will analyze their impacts on the transfer of energy between the poles and the equator. |
| **Content**  **Limits** | Items will not assess the differences between western boundary currents and  eastern boundary currents.  Items will not assess how humans utilize ocean currents.  Items will not assess El Niño Southern Oscillation.  Items will not assess the amount of heat transfer.  Items will not assess the boundary layers of the ocean. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | Coriolis effect, prevailing winds, upwelling, downwelling, Ekman spiral, ocean conveyor belt, gyre, centrifugal force, gravity, tides, spring tides, neap tides, tidal range, tide tables, semidiurnal, diurnal, mixed-semidiurnal, high, low, ebb, flood, rise, fall, tidal cycle, tidal bore, wave, wavelength, frequency, period, crest, trough, tsunami, swell, wave, reinforcement, constructive, destructive, wave breaks |
| **Sample Item** | Thermohaline circulation drives the ocean's overall circulation. What causes  thermohaline circulation?  A) decreases in water density  B) decreases in water salinity  C) increases in water density  D) increases in water temperature  Correct Answer: C |

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| **Reporting**  **Category** | Earth & Space Science |
| **Standard** | Earth Systems & Patterns |
| **Benchmark**  **Number** | SC.912.E.7.3 |
| **Benchmark** | Differentiate and describe the various interactions among Earth systems,  including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere. |
| **Also Assesses** | SC.912.E.7.8 The scientific theory of the evolution of Earth states that  changes in our planet are driven by the flow of energy and the cycling of matter through dynamic interactions among the atmosphere, hydrosphere, cryosphere, geosphere, and biosphere, and the resources used to sustain human civilization on Earth. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will differentiatethe interactions among the Earth systems,  including atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.  Students will describevarious interactions among Earth systems, including atmosphere, hydrosphere, cryosphere, geosphere, and biosphere. |
| **Content**  **Limits** | Items will not assess the theory of evolution. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | hydrosphere, atmosphere, biosphere, carbon cycle, water cycle, nitrogen cycle, nitrogen fixation, biogenous sediments, phosphorous cycle |
| **Sample Item** | Short Answer  The carbon cycle is one of the processes by which materials are reused in an ecosystem. This process cycles carbon between the atmosphere, land, water and organisms. Explain how carbon is transferred from land (geosphere) to water (hydrosphere).  Sample Full-Credit Response  Carbon is found on land in the form of limestone (calcium carbonate) Through weathering processes, predominately water erosion, the carbon in limestone is dissolved. The dissolved carbon from limestone becomes part of the runoff from the land to the ocean. |

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| **Reporting**  **Category** | Earth & Space Science |
| **Standard** | Earth Systems & Patterns |
| **Benchmark**  **Number** | SC.912.E.7.4 |
| **Benchmark** | Summarize the conditions that contribute to the climate of a geographic area,  including the relationships to lakes and oceans. |
| **Also Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | Moderate |
| **Benchmark**  **Clarification** | Students will summarize the conditions that contribute to the climate of a  geographic area, including the relationships to lakes and oceans.  Students will describe how heat capacity affects the climate of a geographic area.  Students will summarize how the hydrological cycle, El Niño Southern Oscillation and currents affect the climate of a geographic area. |
| **Content**  **Limits** | Items will not assess how to measure heat capacity.  Items will not assess the heat capacity of other substances besides water.  Items will not assess how to study ocean currents. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | rotation, revolution, axis, tilt, climate, El Niño Southern Oscillation (ENSO), La Niña, hurricane, cyclone, typhoon, pressure, greenhouse effect, climate change, fronts, depressions, sea breeze, land breeze |
| **Sample Item** | How does the California Current affect the climate of California?  A) It creates eddies to redistribute heat and provide cooler temperatures.  B) It carries cool water from the north pole to provide cooler temperatures.  C) It carries warm water from the equator to provide warmer temperatures.  D) It carries cold water from the deep ocean to provide cooler temperatures.  Correct Answer: B |

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| **Reporting**  **Category** | Earth & Space Science |
| **Standard** | Earth Systems & Patterns |
| **Benchmark**  **Number** | SC.912.E.7.9 |
| **Benchmark** | Cite evidence that the ocean has had a significant influence on climate change  by absorbing, storing, and moving heat, carbon, and water. |
| **Also**  **Assesses** | LA.910.4.2.2 The student will record information and ideas from primary  and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will cite evidence that the ocean has had a significant influence on  climate change by absorbing, storing, and moving heat, carbon, and water.  Students will identify the impacts of surface currents, deep ocean circulation, and the ocean conveyor belt. |
| **Content**  **Limits** | Items will not assess how to measure heat capacity.  Items will not assess the heat capacity of substances other than water.  Items will not assess how climate change is measured.  Items will not assess the effects of climate change. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | hydrogen bonds, covalent bonds, polarity, density, solvent, climate change, thermocline, pycnocline, latent heat, evaporation, condensation, melting, freezing, sublimation, heat capacity, climate, absorption, atmosphere, ocean conveyor belt, deep ocean circulation, currents, greenhouse effect, upwelling, downwelling, Ekman spiral, gyre |
| **Sample Item** | How does carbon absorption by the ocean affect global climate?  A) Carbon absorption does not have any effect.  B) Carbon absorption increases global temperature.  C) Carbon absorption increases the warming of the atmosphere.  D) Carbon absorption decreases the warming of the atmosphere.  Correct Answer: D |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.4 |
| **Benchmark** | Describe changes in ecosystems resulting from seasonal variations, climate  change and succession. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | Moderate |
| **Benchmark**  **Clarification** | Students will describe potential changes in marine ecosystems resulting from  seasonal variations, climate change and/or succession. |
| **Content**  **Limits** | Items will not assess specific knowledge of seasonal variations, climate change, or succession. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | rotation, revolution, axis, tilt, climate, El Niño Southern Oscillation (ENSO), La Niña, hurricane, cyclone, typhoon, pressure, greenhouse effect, climate change, fronts, depressions, sea breeze, land breeze, gyre, centrifugal force, gravity, Coriolis effect, prevailing winds, upwelling, downwelling |
| **Sample Item** | La Niña results in an accumulation of cold water in the central and eastern  Pacific Oceans. This causes changes to weather patterns, ocean currents, and disruption of ecosystems.  Which is **most** likely to be a result of La Niña?  A) Predator-prey relationships change as prey species become predators.  B) Gene mutations allow organisms to adapt to changes in the affected areas.  C) Decreases in phytoplankton due to more carbon dioxide in the affected areas.  D) Some populations decrease in affected areas while others experience an increase.  Correct Answer: D |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.5 |
| **Benchmark** | Analyze how population size is determined by births, deaths, immigration,  emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will analyze how population size is determined by births, deaths,  immigration, and emigration.  Students will describe limiting factors (biotic and abiotic) that determine carrying capacity, specifically: light, nutrients, salinity, temperature, competition, and predation. |
| **Content**  **Limits** | Items will not discuss biotic and abiotic factors that are not limiting. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | habitat, community, population, abiotic factor, biotic factor, limiting resource, nonlimiting resource, ecosystem, herbivore, carnivore, omnivore, commensalism, mutualism, symbiosis, parasitism, competition, carrying capacity, ecological niche, predation, prey, primary producer, consumer, food chain, trophic level, food web, apex predator |
| **Sample Item** | If a population grows larger than the carrying capacity of the environment,  which of these is **most** likely to happen?  A) The birth rate will fall.  B) The birth rate will rise.  C) The death rate will fall.  D) The death rate will rise.  Correct Answer: D |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.7 |
| **Benchmark** | Characterize the biotic and abiotic components that define freshwater systems,  marine systems and terrestrial systems. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | Moderate |
| **Benchmark**  **Clarification** | Students will describe the biotic and abiotic factors that define marine  systems.  Students will specifically describe the abiotic factors of temperature, salinity, pH, amount of sunlight, ocean currents, wave action, and sediments within marine systems. |
| **Content**  **Limits** | Items will not address freshwater or terrestrial systems. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | photic zone, aphotic zone, disphotic zone, electromagnetic spectrum, salinity, halocline, density, layering, Law of Constant Proportions, salt, parts per thousand, parts per million, pycnocline, buoyancy, thermocline, latent heat, evaporation, condensation, melting, freezing, sublimation, biotic factor, abiotic factor, pH, wavelength, light, current, wave action, sedimentation |
| **Sample Item** | Which abiotic factor might influence the health of a coastal ecosystem?  A) an increase in the fish population  B) a change in the salinity of the water  C) a change in the bacteria in the water  D) a decrease in the phytoplankton population  Correct Answer: B |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.10 |
| **Benchmark** | Diagram and explain the biogeochemical cycles of an ecosystem, including  water, carbon, and nitrogen cycle. |
| **Also Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | Moderate |
| **Benchmark**  **Clarification** | Students will explain the biogeochemical cycles of marine ecosystems.  Students will analyze the movement of matter through biogeochemical cycles. |
| **Content Limits** | Items will not focus on terrestrial ecosystems unless they directly impact marine ecosystems. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | Matter, biogeochemical cycle, water cycle, nitrogen cycle, carbon cycle, nitrogen fixation, biogenous sediments, phosphorous cycle |
| **Sample Item** | Which describes a significant role that the oceans play in the movement of carbon through the ecosystem?  A) Carbon dioxide is absorbed by deep-sea sediments.  B) Carbon dioxide is released by the shells of marine animals.  C) Carbon dioxide is used by phytoplankton during photosynthesis.  D) Carbon dioxide is taken in by marine bacteria during decomposition.  Correct Answer: C |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.11 |
| **Benchmark** | Evaluate the costs and benefits of renewable and nonrenewable resources,  such as water, energy, fossil fuels, wildlife, and forests. |
| **Also**  **Assesses** | SC.912.N.1.5 Describe and provide examples of how similar investigations  conducted in many parts of the world result in the same outcome. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will evaluate the costs and benefits of renewable and nonrenewable  resources.  Students will describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. |
| **Content**  **Limits** | Items will not assess renewable or nonrenewable resources from outside the oceans unless they directly impact the marine environment. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | fishery, overfishing, stock, maximum sustainable yield, by-catch, mariculture, aquaculture, aquarium trade, desalination, pesticide, global distillation, renewable resources, nonrenewable resources, sustainability, ocean thermal energy conversion, anthropogenic impacts, ocean acidification, pollution, eutrophication, anoxic conditions, hypoxic zones, stormwater runoff, sewage, sludge, dispersant, biological magnification, dioxins, PCBs, heavy metals, thermal pollution, extinction, endangered, threatened, conservation, EEZs, marine protected areas, habitat restoration, artificial reefs, watershed, ecological footprint, ecosystem |
| **Sample Item** | What are the benefits of using tidal or wave power instead of fossil fuels?  A) Tidal and wave power are renewable.  B) Tidal and wave power produce toxic waste.  C) Tidal and wave power initial costs are very low.  D) Tidal and wave power can be harnessed anywhere in the ocean.  Correct Answer: A |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.13 |
| **Benchmark** | Discuss the need for adequate monitoring of environmental parameters when  making policy decisions |
| **Also Assesses** | SC.912.N.4.1 Explain how scientific knowledge and reasoning provide an  empirically based perspective to inform society's decision making. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will discuss the need for adequate monitoring of environmental  parameters when making policy decisions.  Students will explain how scientific knowledge and reasoning provide an empirically based perspective to inform society's decision making. |
| **Content**  **Limits** | Items will not assess treaties or laws already in existence.  Items will not assess student knowledge of specific areas and issues. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | fishery, overfishing, stock, maximum sustainable yield, by-catch, mariculture, aquaculture, aquarium trade, desalination, pesticide, global distillation, renewable resources, nonrenewable resources, sustainability, ocean thermal energy conversion, anthropogenic impacts, ocean acidification, pollution, eutrophication, anoxic conditions, hypoxic zones, stormwater runoff, sewage, sludge, dispersant, biological magnification, dioxins, PCBs, heavy metals, thermal pollution, extinction, endangered, threatened, conservation, EEZs, marine protected areas, habitat restoration, artificial reefs, watershed, ecological footprint, ecosystem, oil spill |
| **Sample Item** | Coastal wetlands are home to a wide variety of plant and animal life. It  would be important for the government to monitor a wetland area adjacent to a residential area in order to prevent what?  A) diversity in organisms  B) hunting  C) sewage pollution  D) trespassing  Correct Answer: A |

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| **Reporting**  **Category** | Organisms/Populations/Ecosystems |
| **Standard** | Interdependence |
| **Benchmark**  **Number** | SC.912.L.17.16 |
| **Benchmark** | 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. |
| **Also**  **Assesses** | SC.912.N.1.3 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.  SC.912.N.4.2 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. |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity Level** | High |
| **Benchmark**  **Clarification** | Students will discuss or recognize large-scale environmental impacts resulting  from human activity, including waste spills, oil spills, run off, greenhouse gases, ozone depletion, and surface and ground water pollution. |
| **Content**  **Limits** | Items will not address potential parameters for policy decisions regarding large-scale environmental impacts from human activity. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | Fishery, overfishing, stock, maximum sustainable yield, by-catch, mariculture, aquaculture, aquarium trade, desalination, pesticide, global distillation, renewable resources, nonrenewable resources, sustainability, ocean thermal energy conversion, anthropogenic impacts, ocean acidification, pollution, eutrophication, anoxic conditions, hypoxic zones, stormwater runoff, sewage, sludge, dispersant, biological magnification, dioxins, PCBs, heavy metals, thermal pollution, extinction, endangered, threatened, conservation, EEZs, marine protected areas, habitat restoration, artificial reefs, watershed, ecological footprint, ecosystem, oil spill, waste spill, greenhouse gases, ozone depletion, ground water pollution, run off |
| **Sample Item** | Select Response –  Greenhouse gases have environmental impacts on marine ecosystems. Which  of the following environmental impact is NOT a result of greenhouse gases?  A) cooling of arctic waters  B) coral bleaching  C) global warming  D) sea level rise from glacial melting  Correct Answer: A  Short Response -  What are the effects of oil spills on the marine environment?  Correct Answer:  Oil spills harm the marine environment in a number of ways. Oil is toxic to marine species that ingest the oil directly or through their food. Oil can clog the feeding mechanisms of benthic and planktonic animals, which may result in the death of these organisms. Oil can kill birds and mammals such as sea otters by damaging their means of insulation, which results in death of the organisms by exposure. Oil can cover coastlines making them uninhabitable to marine organisms and reducing species diversity. |

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| **Reporting**  **Category** | Physical Science |
| **Standard** | Matter & Energy Transformations |
| **Benchmark**  **Number** | SC.912.L.18.12 |
| **Benchmark** | 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. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | Moderate |
| **Benchmark**  **Clarification** | Students will identify that water is a unique molecule and necessary for  life because of its specific and unique properties.  Students will relate how the cohesive behavior of water gives it unique and special properties that contribute to its usefulness in plant life and animal life.  Students will relate how the density change in freezing is essential to life on this planet.  Students will explain how water is able to dissolve many substances making it an essential molecule for life.  Students will understand the polar nature of a water molecule and how it relates to its special properties. |
| **Content**  **Limits** | Items will not assess hydrogen bonding, the freezing point of water, or  other specific conceptual or numerical values of water. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | atom, molecule, hydrogen bonds, covalent bonds, cohesion, adhesion, surface tension, capillary action, polarity, density, solvent, climate change, thermocline, pycnocline, latent heat, evaporation, condensation, melting, freezing, sublimation, heat capacity, climate, absorption, salinity, salt, parts per thousand, parts per million, buoyancy |
| **Sample Item** | Scientists are trying to understand how surface tension affects gas exchange  between the ocean and the atmosphere. This is important because it affects how quickly the oceans take up which substance?  A) carbon dioxide  B) hydrogen  C) nitrogen  D) oxygen  Correct Answer: A |

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| **Reporting**  **Category** | Nature of Science |
| **Standard** | Practice of Science |
| **Benchmark**  **Number** | SC.912.N.1.1 |
| **Benchmark** | Define a problem based on a specific body of knowledge, for example:  biology, chemistry, physics, and earth/space science, and do the following:  1. Pose questions about the natural world, 2. Conduct systematic observations, 3. Examine books and other sources of information to see what is already known, 4. Review what is known in light of empirical evidence, 5. Plan investigations, 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), 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity Level** | High |
| **Benchmark**  **Clarification** | Students will define a problem based on a specific body of knowledge, for  example: biology, chemistry, physics, and earth/space science.  Students will pose questions about the natural world.  Students will conduct systematic observations.  Students will examine books and other source of information to see what is already known.  Students will review what is known in light of empirical evidence. Students will plan investigations.  Students will use tools to gather, analyze, and interpret data.  Students will pose answers, explanations or descriptions of events.  Students will generate explanations that explicate or describe natural phenomena.  Students will use appropriate evidence and reasoning to justify these explanations to others.  Students will communicate results of scientific investigations.  Students will evaluate the merits of the explanations produced by others.  Students will identify density-determining factors of water.\*  Students will interpret graphical data to determine results of scientific investigations. |
| **Content**  **Limits** | None Specified |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | May include diagrams as answer choice selections. |
| **Content Focus** | science, evidence, hypothesis, theory, law, problem, observation, information, source, empirical, investigation, analysis, interpretation, reasoning, density\*, data |
| **Sample Item** | Sydney's science teacher slowly poured three different water solutions into a glass aquarium tank.  (1) warm fresh water colored red  (2) clear, room temperature fresh water (3) cold fresh water colored blue  1. Which diagram illustrates the most likely outcome of this experiment?  A) red water solution on top of the water column, blue water solution in the middle, clear water solution at the bottom  B) red water solution on top of the water column, clear water solution in the middle, blue water solution at the bottom  C) blue water solution on top of the water column, clear water solution in the middle, red water solution at the bottom  D) clear water solution on top of the water column, red water solution in the middle, blue water solution at the bottom    Correct Answer: B  2. Which is the **best** explanation of this demonstration?  A) Blue water is denser than red water.  B) Red water is denser than blue water.  C) Cold water is denser than cold water.  D) Warm water is denser than warm water. |

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| **Reporting**  **Category** | Nature of Science |
| **Standard** | Characteristics of Scientific Knowledge |
| **Benchmark**  **Number** | SC.912.N.2.1 |
| **Benchmark** | Identify what is science, what clearly is not science, and what superficially  resembles science (but fails to meet the criteria for science). |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will identify what is science.  Students will identify what is not science.  Students will identify what superficially resembles science. |
| **Content**  **Limits** | Items will not have students defining science. |
| **Stimulus**  **Attributes** | None Specified |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | science, evidence, hypothesis, theory, law, problem, observation, information, source, empirical, investigation, analysis, interpretation, reasoning, data |
| **Sample Item** | Old stories tell of gigantic cartilaginous fish, possibly ancient sharks called  Megalodon. To prove that Megalodon still exist, what would be the most useful scientific evidence?  A) unexplained bite marks on fish  B) good photographs of the creature  C) a fresh carcass of the ancient shark  D) reliable eye witness accounts of seeing the creatures  Correct Answer: C |

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| **Reporting**  **Category** | Physical Science |
| **Standard** | Energy |
| **Benchmark**  **Number** | SC.912.P.10.2 |
| **Benchmark** | 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. |
| **Also**  **Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will identify and/or relate the difference between an open, closed, and  isolated system.  Students will be able to explain that the total energy in an isolated system is conserved and its amount never changes. |
| **Content**  **Limits** | Items will not assess energy efficiency.  Items will not assess the different types of energy. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | Law of Conservation of Energy, open system, closed system, isolated system, energy, conservation, total energy |
| **Sample Item** | According to the Law of Conservation of Energy, what happens to the energy in  an isolated system?  A) Energy is created.  B) Energy is destroyed.  C) Energy is lost to the environment.  D) Energy is transferred from one form to another.  Correct Answer: D |

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| **Reporting**  **Category** | Physical Science |
| **Standard** | Energy |
| **Benchmark**  **Number** | SC.912.P.10.20 |
| **Benchmark** | 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. |
| **Also Assesses** | None Specified |
| **Item Types** | Multiple Choice; Short Answer |
| **Cognitive Complexity**  **Level** | High |
| **Benchmark**  **Clarification** | Students will describe the measurable properties of waves and explain the  relationships among them.  Students will describe how these properties change when the wave moves from one medium to another. |
| **Content**  **Limits** | Items will not assess the causes of waves.  Items will not assess the types of waves.  Items will not assess calculation of velocity or wavelength.    Items will not assess destructive waves. |
| **Stimulus**  **Attributes** | Illustrations or diagrams may be used. |
| **Response**  **Attributes** | None Specified |
| **Content Focus** | Wave, wavelength, frequency, period, crest, trough, swell, wave reinforcement, constructive, destructive, wave break, wave height |
| **Sample Item** | What happens to the wavelength and height of a wave as it breaks on shore?  A) They both increase.  B) They both decrease.  C) The wavelength increases and the height decreases.  D) The wavelength decreases and the height increases.  Correct Answer: D |