Post Program Prompts:

3rd Grade:

The Marine Science Afloat Field Trip for 3rd grade covers the disciplinary core ideas of these Next Generation Science Standards; 3-LS1-1, 3-LS2-1, 3-LS4-2, 3-LS4-3, 3-ESS2-1, 3-ESS2-2. By utilizing the following prompts in post trip activities the science & engineering practices, core ideas and crosscutting concepts of each of these standards will be fulfilled.

Use with Workbook page 6/slide7:

1. Pick an animal you learned about while on your Marine Science Afloat Field Trip. Create a drawing/diorama/3D model of this animal. Include the following information:

Life Cycle (birth, growth, reproduction, death), lives solitary or in a group, how it obtains food & what it eats, defense mechanisms, how this animal adjusts to changes in its environment

What happens if global warming changes this animals' habitat a lot? Can it survive? (3-LS1-1. 3-LS2-1, 3-LS4-2, 3-LS4-3)

Use with Workbook page 9-12/slides 10-12:

2. Represent your water quality data in tables and/or graphical displays. What patterns can you find? Are these patterns related to our weather? How do these patterns and weather compare to another region of the world? (3-ESS2-1, 3-ESS2-2)

4th Grade:

The Marine Science Afloat Field Trip for 4rd grade covers the disciplinary core ideas of these Next Generation Science Standards; 4-LS1-1, 4-LS1-2, 4-ESS3-1. By utilizing the following prompts in post trip activities the science & engineering practices, core ideas and crosscutting concepts of each of these standards will be fulfilled.

Use with Workbook page 6/slide7:

1. Pick an animal you learned about while on your Marine Science Afloat Field Trip. Create a drawing/diorama/3D model of this animal. Include the following information:

What kind of sense receptors does this animal have? Does it have the same 5 senses humans do? Do they have more? Less? What other specialized structures does this animal have in order to grow, survive, reproduce and perform other behaviors in its habitat? (4-LS1-1, 4-LS1-2)

Use with Workbook pages 11-12/slide 12:

2. Create a map of where our energy and fuels derived from natural resources comes from (oil, coal, natural gas). Illustrate with arrows, words and drawings how extracting them and using them affect the environment? Are these resources renewable? What are alternatives to these nonrenewable resources? (4-ESS3-1)

5th Grade:

The Marine Science Afloat Field Trip for 5rd grade covers the disciplinary core ideas of these Next Generation Science Standards; 5-PS3-1, 5-LS1-1, 5-LS2-1, 5-ESS3-1. By utilizing the following prompts in post trip activities the science & engineering practices, core ideas and crosscutting concepts of each of these standards will be fulfilled.

Use with Workbook page 13-14/slide 13:

1. Create a Puget Sound food web (including at least 20 plants/algae & animals) with the sun at the center of this food web. Each connecting line represents the transfer of energy from one thing to the next. Label each link in the food web as a producer, herbivore, omnivore, carnivore, scavenger or decomposer. How is a decomposer linked to a producer? What 4 things do producers need in order to grow? (5-PS3-1, 5-LS1-1, 5-LS2-1)

Use with Workbook pages 11-12/slide 12:

2. How do human activities (agriculture, industry, everyday life) affect the land, vegetation, streams, ocean, air and even outer space? Design a project to help reduce the effect of a specific human activity affecting the environment. Create some kind of visual (poster, banner, pamphlet, etc.) What is the project? How will it help the environment? What actions will you take? How do you share this information with other people so they can take the same actions? (5-ESS3-1)

Middle School (6-8):

The Marine Science Afloat Field Trip for Middle School (6-8) covers the disciplinary core ideas of these Next Generation Science Standards ; MS-LS1-5, MS-LS1-6, MS-LS1-8, MS-LS2-1, MS-LS2-3, MS-LS2-4, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5. By utilizing the following prompts in post trip activities the science & engineering practices, core ideas and crosscutting concepts of each of these standards will be fulfilled.

Use with Workbook pages 9 & 10/slides 10-11:

1. What season is there typically more phytoplankton growth? Why? What other factors affect the growth of phytoplankton? Use your water quality data along with data from the water quality database to predict long term phytoplankton abundance. (MS-LS1-5, MS-LS1-6) How might a shift in phytoplankton abundance affect the animals within its food web. Is there a limit to access to resources? Demonstrate by constructing a model. (MS-LS2-4, MS-LS2-1)

Use with Workbook page 6/slide 7:

2. Pick an animal you learned about while on your Marine Science Afloat Field Trip. Create a drawing/diorama/3D model of this animal. Include the following information:

   What kind of sense receptors does this animal have? Does it have the same 5 senses humans do? Do they have more? Less? What other specialized structures does this animal have in order to grow, survive, reproduce and perform other behaviors in its habitat? (4-LS1-1, 4-LS1-2)

   Gather information from multiple appropriate sources (including your onboard experience) and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS1-8)

Use with Workbook page 13-14/slide 13:

3. Build a Puget Sound food web, including at least 30 plants/algae & animals, indicating types of Producers, Consumers (herbivores, Omnivores & carnivores) and decomposers. Include how matter and energy is transferred and how nutrients (poop & dead stuff) are recycled back into the aquatic environment. (MS-LS2-3)

Use with Workbook pages 11-12/slide 12:

4. Choose a human activity that is affecting the environment. How does increased human populations and per-capita consumption by partaking in this activity impact Earth's systems? Design a method to monitor and minimize the human impact of this activity on the environment. (MS-ESS3-3, MS-ESS3-4, MS-ESS3-5) Use empirical evidence and scientific reasoning to construct your argument for your solution to the problem.

High School (9-12):

The Marine Science Afloat Field Trip for High School (9-12) covers the disciplinary core ideas of these Next Generation Science Standards; HS-LS1-5, HS-LS2-6, HS-LS2-7, HS-LS2-8, HS-LS4-5, HS-LS4-6, HS-ESS2-5, HS-ESS3-2, HS-ETS1-1-4. By utilizing the following prompts in post trip activities the science & engineering practices, core ideas and crosscutting concepts of each of these standards will be fulfilled.

Use with Workbook pages 9-10/slide 10-11:

1. Complex interactions in an ecosystem maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. (HS-LS2-6) Analyze water quality data and look for trends using models, graphs, etc. If there are changes in these trends what would happen to the populations of individual species, the emergence of new species and the extinction of others? (HS-LS4-5) Include your empirical data as well as other sources. Evaluate evidence in these sources by assessing the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.

2. Water has the exceptional capacity to absorb, store and release large amounts of energy, transmit sunlight, expand upon freezing, dissolve and transport materials, and lower the viscosities and melting points of rocks. (HS-ESS2-5) Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes (erosion, deposition and formation of landforms and sediments).

Use with Workbook pages 11-12/slide 12

3. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. (HS-LS2-7) Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. (HS-ESS3-2) Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. (HS-LS4-6)

Use with Workbook page 6/slide 7

4. Choose a species that lives in the Puget Sound. How does this species interact with other individuals of the same species to obtain food, gain protection & reproduce? Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. (HS-LS2-8)

5. Climate Change Crisis: What are ways to minimize pollution/emission of greenhouse gasses. Take into consideration scientific data and social requirements to analyze solutions to global warming. Global warming is a very large issue that affects the whole planet. How can you break this down into more manageable parts to implement systematic solutions. What might be trade-offs between your proposed solution and everyday life? Take into account constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts (Catchment Challenge). Use mathematical models or computer simulations to model impacts of your proposed solution. (HS-ETS1-1-4)

Additional Resources:

- Interactive simulations for science and math
- Water Quality Database/Graphs of Data
- Earth Echo's Water Monitoring
- NOAA National Weather Service
- Department of Energy-Natural Resources Guide
- Watershed Simulation
- Carrying Capacity Simulations
- Catchment Challenge
- Scientific Reasoning & NGSS

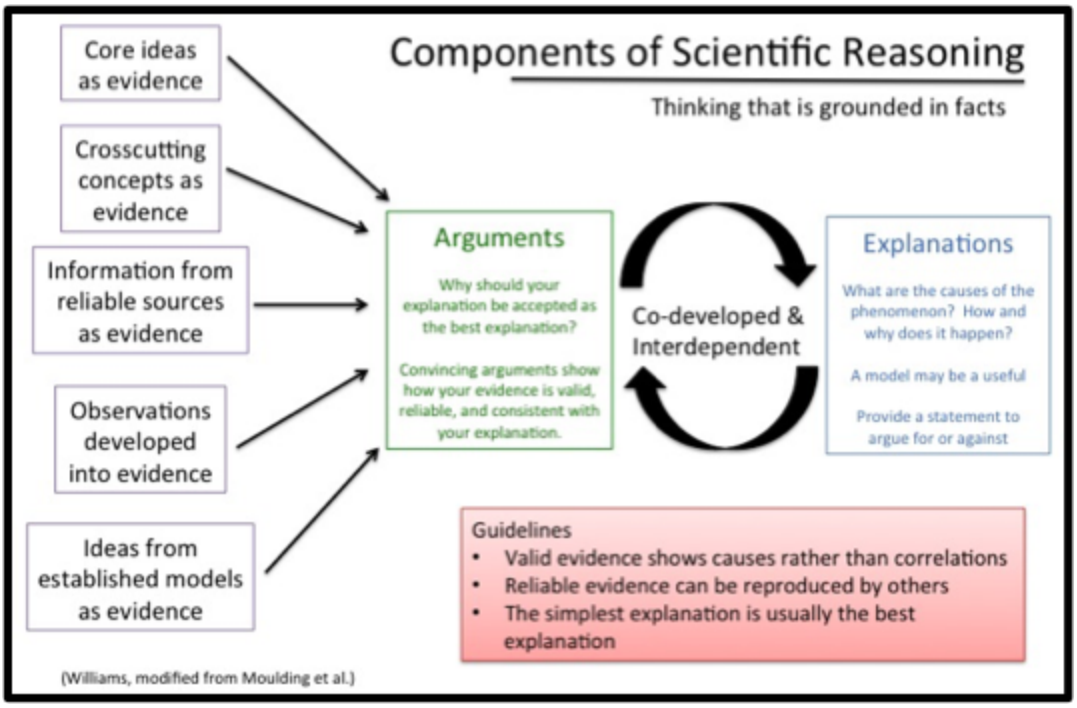

Figure 3 - Components of Scientific Reasoning (Modified from Moulding et al)