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Three-Dimensional Analysis of Selected NECAP Science Assessment Items

Three-Dimensional Learning, as contained within the NGSS, includes the instruction and assessment of NGSS Content, Science and Engineering Practices and Crosscutting Concepts together to help students make sense of phenomena.

The following examples of NECAP Science Assessment released items have been color- coded to indicate the alignment of each assessment item with NGSS principles.

- Content (Disciplinary Core Ideas) are indicated in Yellow (content).
- Science and Engineering Practices are indicated in Blue (practices).
- Crosscutting Concepts are indicated in Green (concepts).

Grade 4 Example: NECAP 2013 Released Item—Science Inquiry Task #8

8. Look at the pictures of the pollinators below.

Bee Butterfly Hummingbird

Based on what you have learned in your investigation about the textures of materials (concepts), describe what makes these animals good pollinators (content). Use evidence from your investigation (practices) to support your answer.

Annotation: This item is asking students to apply their knowledge of structure and functions to construct an explanation about what makes a good pollinator.

NECAP Target: **LS1-4**—Identify and explain how the physical structures of an organism allow it to survive in its habitat.

NECAP Inquiry Construct**: #12**—Use evidence to support and justify interpretations and conclusions or explain how the evidence refutes the hypothesis.

NGSS Disciplinary Core Idea (content): **LS4-1** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

NGSS Science and Engineering Practices (practices): **Constructing Explanations and Designing Solutions**—Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).

NGSS Crosscutting Concepts (concepts): **Structure and Function**—Different materials have different substructures, which can sometimes be observed. Substructures have shapes and parts that serve functions.

Grade 8 Example: NECAP 2013 Released Item— Constructed Response #1

1. Write a possible explanation (practices) about why ocean temperatures along the East Coast of the United States are warmer than ocean temperatures along the West Coast (concepts) in locations at approximately the same latitude. Include **one** piece of information from the article and/or what you know about ocean currents (content) in your explanation.

Annotation: This item is asking students to apply their knowledge of convection in ocean current systems to offer an explanation about the regional differences in climate.

NECAP Target: **ESS1-2**—Explain the role of differential heating or convection in ocean currents, winds, weather and weather patterns, atmosphere, or climate.

NECAP Inquiry Construct**: #2**—Construct a coherent argument in support of a question, hypothesis, prediction.

NGSS Disciplinary Core Idea (content): **MS-ESS2-6** Develop and use a model to describe how unequal heating and rotation of the earth cause patterns in atmospheric and oceanic circulation that determines regional climates.

NGSS Science and Engineering Practices (practices): **Constructing Explanations and Designing Solutions**—Construct an explanation for a natural phenomenon.

NGSS Crosscutting Concepts (concepts): **Systems and System Models**—Systems may interact with other systems; they may have sub-systems and be part of larger complex systems.

Grade 11 Example: NECAP 2013 Released Item— Constructed Response #4

4. Based on the data the students collected, identify the ecological relationships (content) among the sea otters, sea urchins, and kelp. Explain what these relationships (practices) indicate about the flow of energy (concepts) in the marine ecosystem of the Aleutian Islands.
Annotation: This item is asking students to apply their knowledge about food webs to offer an explanation about the relationship among those organisms, specifically addressing the flow of energy in that system.

NECAP Target: **LS2-3 (9-11)** Using data from a specific ecosystem explain relationships or make Predictions about how environmental disturbance (human impact) affects the flow of energy or cycling of matter in an ecosystem.

NECAP Inquiry Construct: **#12**—Use evidence to support and justify interpretations and conclusions or explain how evidence refutes the hypothesis.

NGSS Disciplinary Core Idea (content)**: HS-LS2-3** Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

NGSS Science and Engineering Practices (practices): **Constructing Explanations and Designing Solutions**

NGSS Crosscutting Concepts (concepts): **Energy and Matter** —Energy drives the cycling of matter within and between systems.