

**Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project**

**Grade 5 Science**

**Unit** **3 Task 2 Specification Tool & Verification of Alignment**

**Earth Systems and the Solution of Water Problems**

**September 2023**

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 SIPS Grade 5 Unit 3 Task 2 Specification & Verification of Alignment

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| **Grade: 5** | **Unit: 3** | **Task Number: 2** | **Task Title: Searching for Freshwater**  |
| **NGSS Performance Expectations** |
| **5-ESS2-1** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]**5-ESS2-2** Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]**5-ESS3-1** Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment. |
| **Phenomena or Phenomena-rooted Design Problem** |
| * Formation of freshwater springs as related to the interaction of two of Earth’s spheres.
 |
| **Scenario/Context/Situation/Boundaries** |
| * The scenario introduces an example of the interaction of Earth’s spheres along a hiking trail and the phenomenon of the formation of a freshwater spring.
* Graphics and descriptions of various habitats are used as the basis for identification of interactions among Earth’s spheres.
* Distribution of Earth’s surface freshwater sources is used to support a description of the phenomenon of freshwater springs.
 |
| **Variable Features to Shift Complexity or Focus** |
| * Complexity of scientific concept(s).
* Domain-specific vocabulary and definitions.
* The types of interaction between components of Earth’s spheres.
* Context includes, but is not limited to:
	+ Movement of water into and through aquifers.
	+ Volumes/percentages of various reservoirs worldwide.
	+ Volumes/percentages of freshwater reservoirs.
* Type of model showing how Earth’s systems interact.
* Type of model showing how Earth’s systems interact in a specific event.
* Format of "real-world" phenomenon under investigation: image, data, text, combination.
* Number, type, and complexity of representations of models, tables, graphs, and/or data sets.
 |
| **General Description of Task/Chain of Sensemaking**  |
| * Students identify the components of Earth systems (hydrosphere, biosphere, geosphere, atmosphere) in the scenario. **[Prompt 1, Part A: 5-ESS2-1, KSA1]**
* Students identify and describe interactions and components in a single system in the scenario. **[Prompt 1, Parts B & C: 5-ESS2-1, KSA2]**
* Students identify and describe interactions and components between two systems using a description of a stream environment. **[Prompt 2: 5-ESS2-1, KSA4]**
* Students graph and communicate information to describe the proportions and distributions of water on Earth to explain the importance of freshwater springs to specific habitats. **[Prompt 3: Parts A & B: 5-ESS2-2 & 5-ESS3-1, KSA1, KSA2]**
* Students identify and describe components of a model to show the interaction of two of Earth’s systems related to the formation of a freshwater spring. **[Prompt 4, Parts A & B: 5-ESS2-1, KSA4, KSA3]**
* Students use the model to support a description of how Earth’s spheres interact which lead to the formation of the freshwater spring. **[Prompt 4, Part C: 5-ESS2-1, KSA6, KSA4]**
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| **Targeted PE-related KSAs**  |
| **5-ESS2-1, KSA1:** Identify the components of each Earth system (Hydrosphere, Biosphere, Geosphere, Atmosphere.**5-ESS2-1, KSA2:** Identify and describe interactions and components in a single system.**5-ESS2-1, KSA4:** Identify and describe interactions and components between two systems.**5-ESS2-1, KSA3:** Develop a model of a provided example to describe the relevant components of the system.**5-ESS2-1, KSA6:** Complete a model that describes how two systems are interacting.  |
| **Cross-performance Expectations Related KSAs to Target** |
| **5-ESS2-2 & 5-ESS3-1, KSA1**: Graph and use quantitative information to describe proportions between the reservoirs of water on Earth.  |
| **Student Demonstrations of Learning**  |
| * Correctly identifies and describes relevant interactions of components within a system.
* Describes a phenomenon that includes the interaction of two systems.
* Correctly identifies and describes relevant interactions between components of two systems.
* Analyzes a bar chart/graph accurately showing percentages of the distribution of freshwater on Earth.
* Describes a claim you could make about water on Earth supported with information from completed charts.
 |
| **Work Products** |
| * Complete a graph.
* Complete a model.
* Constructed response.
 |
| **Application of Universal Design for Learning-based Guidelines to Promote Accessibility (**[**https://udlguidelines.cast.org/**](https://udlguidelines.cast.org/) **)**  |
| **Multiple Means of Engagement** | **Multiple Means of Representation** | **Multiple Means of Action & Expression** |
| * Context or content.
* Age appropriate.
* Appropriate for different groups.
* Makes sense of complex ideas in creative ways.
* Vary the degree of challenge or complexity within prompts.
 | * Provide visual diagrams and charts.
* Make explicit links between information provided in texts and any accompanying representation of that information in illustrations, equations, charts, or diagrams.
* Activate relevant prior knowledge.
* Highlight or emphasize key elements in text, graphics, diagrams, and formulas.
* Use outlines, graphic organizers, unit organizer routines, concept organizer routines, and concept mastery routines to emphasize key ideas and relationships.
* Give explicit prompts for each step in a sequential process.
 | * Solve problems using a variety of strategies.
* Sentence starters.
* Embed prompts to “show and explain your work.”
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| **SIPS Assessments Complexity Framework Components** |
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| **Prompt** | **A.1** Degree and nature of sense-making about phenomena or problems | **B.1** Complexity of the presentation | **B.2** Cognitive demand of response development | **B.3** Cognitive demand of response production |
| Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| **1 Part A** | **X** |  |  | **X** |  |  |  | **X** |  | **X** |  |  |
| **1 Parts B & C** |  | **X** |  | **X** |  |  |  | **X** |  |  | **X** |  |
| **2** | **X** |  |  | **X** |  |  |  | **X** |  |  | **X** |  |
| **3**  |  | **X** |  |  | **X** |  |  |  | **X** |  | **X** |  |
| **4 Part A** |  | **X** |  | **X** |  |  |  | **X** |  | **X** |  |  |
| **4 Parts B & C** |  | **X** |  | **X** |  |  |  |  | **X** |  | **X** |  |

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| **Rubric Considerations** |
| * Accuracy of the graph (including the scale).
* Accuracy of the model.
* Sophistication of the explanations.
* Completeness and accuracy of response.
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| **Assessment Boundaries** |
| * Assessment is limited to the interactions of two systems at a time.
* Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.
 |
| **Common Alternate Conceptions** |
| * **5-ESS2-1**
	+ There has been life on Earth since its formation.
	+ The Earth does not change.
	+ Hydrosphere includes only liquid water.
* **5-ESS2-2**
	+ Most water on Earth is freshwater.
	+ Most freshwater is available for human use.
* **5-ESS3-1**
	+ Local behavior can only lead to local consequences (or that global behavior can only lead to global consequences).
	+ Humans have total control over Earth’s systems.
	+ Local waste disposal is a termination stage in the cycling of Earth’s matter (i.e., once it’s in the garbage can, the waste disappears).
	+ All naturally occurring substances in Earth are good and all substances added to Earth by humans are bad.
 |
| **Possible Technical Terms for Task**  |
| * atmosphere, hydrosphere, geosphere, biosphere, ecosystem, mountain, rock, soil, sediment, salt water, fresh water, lakes, rivers, groundwater, glaciers, oceans, freshwater spring, aquifer
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| **Common Core State Standards for Literacy** |
| **Reading Informational*** **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. **(5-ESS3-1)**
* **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. **(5-ESS2-1, 5-ESS2-2, 5-ESS3-1)**
* **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. **(5-ESS3-1)**

**Writing*** **W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work and provide a list of sources. **(5-ESS2-2, 5-ESS3-1)**
* **W.5.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. **(5-ESS3-1)**
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| **Common Core State Standards for Mathematics** |
| **Mathematical Practice** * **MP.2** Reason abstractly and quantitatively. **(5-ESS2-1, 5-ESS2-2, 5-ESS3-1)**
* **MP.4** Model with mathematics. **(5-ESS2-1, 5-ESS2-2, 5-ESS3-1)**
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| **Task Notes** |

 SIPS Assessments Complexity Framework

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| **Component** | **Complexity** |
| **Low** | **Moderate** | **High** |
| **Connections to Curriculum and Instruction** | **A.1 Degree and nature of sense-making** **about phenomena or problems** | * Requires one or two dimensions
* One dimension may have a greater degree of emphasis than another
* Requires previously learned ideas or concepts
 | * Requires integration of two dimensions in the service of sense-making
* Requires integration of same or different combinations of dimensions as represented in the PE bundle
* Requires a combination of previously learned ideas or concepts and newly presented information
 | * Requires integration of three dimensions in the service of sense-making
* Requires integration of same or different combinations of dimensions as represented in the PE bundle
* Requires a combination of previously learned ideas or concepts and newly presented information
 |
| **Characteristics of the Tasks** | **B.1 Complexity of the presentation**  | * The amount and type of information provided in the scenario supports limited simple connections among ideas or concepts
* Provides few, simple graphics/data/models
* Includes definitions or examples
* Phenomenon or problem presented in a concrete way with high level of certainty
 | * The amount and type of information provided in the scenario supports multiple evident connections among ideas or concepts
* Provides graphics/data/models
* Limited use of definitions or examples
* Phenomenon or problem presented with some level of uncertainty
 | * The amount and type of information provided in the scenario supports multiple and varied complex connections among ideas or concepts
* Provides complex graphics/data/models
* Phenomenon or problem presented with high-degree of uncertainty
 |
| **B.2 Cognitive demand of response development** | * Requires well-defined set of actions or procedures
* Requires a connection or retrieval of factual information
* Response requires a low level of sophistication with routinely encountered well-practiced applications
 | * Requires application of ideas and practices given cues and guidance
* Requires drawing relationships and connecting ideas and practices
* Response requires a moderate level of sophistication with typical but relatively complex representation of ideas and application of skills
 | * Requires selection and application of multiple complex ideas and practices
* Requires high degree of sense-making, reasoning, and/or transfer
* Response requires a high level of sophistication with non-routine or abstract representation of ideas and application of skills
 |
| **B.3 Cognitive demand of response production** | * Responses include selection from a small set of options presented as text (e.g., word, short phrase) or other formats (e.g., a simple graphic or process)
 | * Responses include one or more sentences or a paragraph, a moderately complex graphic, or multiple steps in a simple or moderately complex process
 | * Responses include multiple paragraphs, multiple graphics of at least moderate complexity, or multiple steps in a complex process
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