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**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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| **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]** | | | | | |
| **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** |
| |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **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** |  | |
| **Rubric Considerations** |
| * Accuracy of the graph (including the scale). * Accuracy of the model. * Sophistication of the explanations. * Completeness and accuracy of response. |
| **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 |
| **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)** |
| **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)** |
| **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 |