Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project

Grade 5 Science

Unit 3 Instructionally-embedded Assessment Task Specification Tool:

"Fresh Water by the Numbers"

Earth Systems and the Solution of Water Problems

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SIPS Grade 5 Unit 3 Instructionally-embedded Assessment Task Specification Tool

Grade 5	Unit 3	Instructional Segment 1	Task Title: Fresh Water by the Numbers

Unit 3: Earth Systems and the Solution of Water Problems

Anchor Phenomenon	Problematization/Investigative Strategy for the Unit
In this unit, the anchor phenomenon is based on a glass of water filled from a source in the school. Students brainstorm where it could have come from. They discover that the faucet is actually in the *middle* of the water's path, not the beginning. The teacher can problematize this for students by setting up the general question of, "What water does our school use, what does it use it for, and where does it go? (e.g., inside the building, outside the building, etc.)?" Further details for this anchor phenomenon activity appear in the lesson, *A Glass of Water.*	The unit opening focuses on students experiencing and discussing a phenomenon that sparks their interest and curiosity. To do so, the class engages with an "anchor phenomenon" and generate questions based on that phenomenon, posting their questions to the "driving question board." Some of the questions added to the driving question board can be used by the teacher to transition into Instructional Segment 1 by framing the lessons (and segment) as a means by which to investigate and answer some of the questions that students generate based on the anchor phenomenon. Throughout the unit (e.g., at the conclusion of each instructional segment) the teacher returns to the driving question board and has students reflect on their recent learning, and which questions they can now answer based on their learning in the prior segment. Following this reflection, the teacher uses the driving question board again, this time identifying remaining unanswered (or partially answered) questions that can motivate the activities and investigations that are the focus of the next instructional segment.

Segment 1 Overview

By engaging in the practices of obtaining, evaluating, and communicating information, constructing explanations and designing solutions, using mathematical and computational thinking, and asking questions and defining problems, students learn about the distribution of water on Earth and how individual communities use science ideas to protect the Earth's resources and the environment. Students begin the unit by exploring an anchor phenomenon based on a discussion of where a glass of their school's drinking water comes from, particularly how it gets clean and ready to drink. Possible driving questions include, "Where does water go once it goes down the drain?", "Is the water we use for nearby irrigation the same water we drink in the school?", etc. This investigation is revisited in the segment as students learn more about where the glass of school water comes from and compare it to other sources of water on Earth.

Lesson Title	Lesson Description
A Globe Full of Water	In the lesson, "A Globe Full of Water," students are provided with (or research) data about freshwater supplies and distribution globally and regionally/locally. This data should illustrate that the largest sources of freshwater reserves are glaciers and groundwater. Students use the data to develop traditional graphs and/or develop other creative infographics to show where freshwater is located. Students choose one of their graphics to develop an explanation to support the argument that usable freshwater is in limited supply. This can be customized to local water supplies, such as groundwater, glacial ice, surface reservoirs, lakes, and rivers. The teacher connects this activity back to the anchor phenomenon (A Glass of Water; Where Does Our Water Come From and Where Does it Go?) to help students connect this exploration of freshwater sources to the larger phenomenon/context around the need for available sources of fresh and clean water. <u>What Students Figure Out</u> a. The largest freshwater reserves are glaciers and groundwater (CCC: Scale, Prop. & Quantity).
Formal Assessment Title	**Assessment Description**
Fresh Water by the Numbers	Students gather data from multiple sources about the global volume of freshwater reserves such as groundwater, glaciers, wetlands, lakes, and rivers, and graph that data. Students then create another illustration to communicate the data about fresh water using a different type of model (e.g., a drawing, computer graphics, drop(s) diagrams, etc.). Last, students add a representation of the glass of water (from the Unit Entrance/Hook) to connect the glass of water to the larger global water distribution.

NGSS PE(s) Code(s) & Description(s)
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.]
AG(s) Code(s) & Description(s)
A1. Use mathematics to describe and graph quantities about the distribution of water on Earth.
A3. Obtain information from multiple sources to communicate information about the sources and distribution of fresh water on Earth to illustrate that nearly all of Earth's available freshwater reserves are glaciers and groundwater.
Evidence Statement(s)
• Obtain information that supports a model that most of Earth's available freshwater reserves are in glaciers and groundwater.

- Generate representations that show the sources of Earth's fresh water.
- Use mathematics to describe the distribution of water on Earth.

Phenomenon or Phenomenon-rooted Design Problem

- The majority of Earth's water is salt water, and the remaining freshwater resources are primarily found in snowcaps, glaciers, and groundwater. Freshwater resources are very limited compared to saltwater resources.

General Scenario Description

Friends are planning a summer trip to the desert. Given their understanding of conditions and available water found in the desert, they wonder about the availability of fresh water for drinking while on their trip. They plan to research this topic to prepare for their trip and have a better understanding of the environment.

Chain of Sensemaking

- Students review and obtain data related to Earth's water resources from multiple sources (text and video).
- Students organize data in a data table related to the distribution of water on Earth (i.e., salt water and fresh water).
- Students complete a pie chart using data from the data table.
- Students interpret and describe data related to salt water and fresh water represented in the pie chart.
- Students describe the importance of fresh water to humans.
- Students use the presented data related to the distribution of fresh water on Earth to create a graph (i.e., bar or line).
- Students complete a model (i.e., glass of water) to show the distribution of all water on Earth and fresh water on Earth.
- Students explain why only a small amount of the fresh water on Earth is a resource easily used by humans for their daily needs using information from a completed model, provided data table, and completed graph.

Work Products

- Chart
- Graphs (i.e., pie chart, bar graph, or line graph)
- Constructed response
- Model

Application of Universal Design for Learning-based Guidelines to Promote Accessibility (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 l illustrations, equations, charts, or diagrams ☒ Activate relevant prior knowledge ☐ Bridge concepts with relevant and simple analogies and limited use of metaphors ☒ Highlight or emphasize key elements in text, graphics, diagrams, 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"

Targeted PE(s) Code(s) and Alternate Conception(s)

- **NGSS PE: 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, groundwater, and polar ice caps, and does not include the atmosphere.]
  - **Common Alternate Conceptions**
    - Most water on Earth is fresh water.
    - Most fresh water is available for human use.

Unit 3 Vocabulary

- Earth surface
- Reservoir
- Water resources
- Fresh water
- Salt water
- Groundwater
- Aquifer
- Glaciers
- Icebergs
- Snow pack