



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 5 Science

Unit 3 Instructionally-embedded Assessment Task:

“Fresh Water by the Numbers”

Earth Systems and the Solution of Water Problems

January 2023

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SIPS Grade 5 Unit 3 Instructionally-embedded Assessment Task

Grade 5	Unit 3	Instructional Segment 1	Task Title: Fresh Water by the Numbers
NGSS Performance Expectations Code(s) and Description(s)			
Code	Description		
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.]		
Acquisition Goals Number(s) and Descriptions(s)			
Number	Description		
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 Statements			
<ul style="list-style-type: none">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.			

Source Documentation and Information Resources References (e.g., publications, websites, citations, images, videos, etc.) Please include source name, description, citation, and a link to its original location below. Include additional rows as needed.	Licensing: Please mark an “X” under the appropriate licensing. If resource is not under a creative commons (CC) license, please attempt to find a source with CC licensing. If you are unable, please select other and provide additional information about the source in the source documentation section.							
	<i>CC0/ Public Domain</i>	<i>CC BY</i>	<i>CC BY- SA</i>	<i>CC BY-NC</i>	<i>CC BY- NC-SA</i>	<i>CC BY- ND</i>	<i>CC BY- NC-ND</i>	<i>Other</i>
BrainPop Video: Water Supply, The Mysteries of Life <ul style="list-style-type: none"> • BrainPop: Water Supply - YouTube [https://www.youtube.com/watch?v=CnSPkMI7UyU] 								X
Source: <ul style="list-style-type: none"> • How Much Water is There on Earth? U.S. Geological Survey (usgs.gov) [https://www.usgs.gov/special-topics/water-science-school/science/how-much-water-there-earth] 	X							
Source Data for Prompt 2 - Pie Graph: What is the Big Deal? <ul style="list-style-type: none"> • SPC Water, Sanitation and Hygiene: Water Distribution (pacificwater.org) [http://www.pacificwater.org/pages.cfm/water-services/water-demand-management/water-distribution?printerfriendly=true] Credit: U.S. Geological Survey Department of the Interior/USGS, Gleick, P. H., 1996: Water resources. In Encyclopedia of Climate and Weather, ed. by S. H. Schneider, Oxford University Press, New York, vol. 2, pp.817-823. © 2023 SPC Water, Sanitation and Hygiene. All rights reserved.								X

Teacher Administration Guide

Introduction

- Educators developed the accompanying classroom task to align to one or more aspects of the NGSS Performance Expectation(s) (PEs) to determine where students are in their learning at a specific point in time during an instructional sequence. Educators will need to make intentional decisions about when and how to use this task based on their students' learning needs, the purpose of giving the task, and the intended use of the evidence gathered.
- This task is designed to measure students' ability to integrate the dimensions and demonstrate their knowledge, skills, and abilities as represented by NGSS Performance Expectation **5-ESS2-2**. By administering this task, educators can gather and evaluate evidence to make accurate and meaningful judgments about students' science learning and determine how instruction may need to be adjusted along an instructional sequence to best support students.
- The phenomenon addressed in a phenomenon-based scenario is most of the Earth's water is salt water and the remaining freshwater is primarily found in snowcaps, glaciers, and groundwater (ESS2.C: The Roles of Water in Earth's Surface Processes). A group of friends is 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 use while on their trip. One friend plans to research and share findings about this topic in order to prepare for the trip and learn information about the types, distribution, and availability of Earth's water.
- In this task, students figure out that there is a limited supply of fresh water as compared to salt water found in Earth's reservoirs, and that of those freshwater reservoirs, a limited amount is available for human use. They figure out how the distribution and amount of freshwater affects the amount and uses of fresh water by humans. Students gather and use multiple and varied sources of data about Earth's water and represent obtained or provided data using different types of graphs.

Administration Guidelines

- One (1) class period
- Segment 1 Lesson: "A Globe Full of Water"
- Students individually complete a series of prompts reflecting the following chain of sensemaking:
 - Students review and obtain data related to Earth's water from multiple informational 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) and then 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 to describe the importance of fresh water to humans.
 - Students use presented data related to the distribution of fresh water on Earth to create a graph (i.e., bar or line).
 - Students use presented data to create a model to show the distribution of freshwater reservoirs on Earth to illustrate and then describe the limited amount of fresh water readily available to

humans for their use as compared to the number of freshwater reservoirs that are not readily available for human use (i.e., ice caps, glaciers, permanent snow, glaciers).

Accessibility Considerations

Providing a range of accessibility considerations in the task (e.g., multiple ways of representing information, multiple types of supports, multiple ways in which students respond) promotes equity and fairness across a wide range of students who may be at different points in their science learning. In turn, these considerations can promote student interest and engagement in the tasks resulting in a more complete and accurate collection of evidence of students' science learning.

Accommodations for students with a disability or Multilingual Learners that are part of their on-going instructional programs are to be provided during the administration of this task. Accommodations should be consistent with those provided in students' daily instructional strategies and assessment opportunities, including assistive technology devices if appropriate. These accessibility considerations and accommodations enable accurate inferences about student learning and inform meaningful adjustments to planning and instruction.

Ancillary Materials

- Computer for students to view a video individually or in small/large group(s) for Prompt 1
 - [BrainPop: Water Supply - YouTube](https://www.youtube.com/watch?v=CnSPkMI7UyU) (The Mysteries of Life)
[https://www.youtube.com/watch?v=CnSPkMI7UyU]

Instructions for Administering the Performance Task or Implementing the Research Task, Design Project, or Lab

- Preview the video, “The Mysteries of Life” and identify and pre-teach any general academic vocabulary words or domain-specific vocabulary words (e.g., potable water, glaciers, snow pack, aquifer). Students should have access to and document the meaning of the vocabulary words to support their interpretation and understanding of the video's content.
- Show **to 01:31** of the video which highlights water fit for human use, amounts of salt water and fresh water, and where fresh water is found on Earth. Be sure to enable Closed Captions [CC].
- Direct students to have available **Data Table 1. Distribution of Water on Earth** so that they can complete the prompt while watching the video.
- Provide crayons, markers, or pencils to create graphs.

Scoring Guidance

- A prompt-specific scoring rubric indicates scoring criteria for each prompt or activity across a range of score points.
- Student exemplars represent high-quality responses that align to full-point rubric scores. The exemplar responses are intended to assist educators' understanding of the nature and expectations of each prompt when applying the scoring rubric. Note the exemplars serve as examples of high-quality responses, and students may respond with equally relevant, scientifically accurate responses and ideas that meet the expectations of a full-point rubric score. In general, the exemplar response associated with the highest score point in the rubric meets expectations and is scientifically accurate, complete, coherent, and consistent with the type of student evidence expected as described in the rubric.

- The approximate scoring time for each student per prompt is:
 - Prompt 1 will require approximately one minute.
 - Prompt 2 Part A & Part B will require approximately one minute.
 - Prompt 3 will require approximately 30 seconds.
 - Prompt 4 Part A & Part B will require approximately one minute.

Student Task

This task is about the types and distribution of water on Earth.

Task Scenario

A group of friends is looking forward to a summer trip. They plan to hike and camp in the desert for a week. During the summer, temperatures of more than 100 degrees Fahrenheit are common in the desert. That's hot! And it doesn't rain very often.

Sources of fresh water are limited in the desert. The friends know they need to plan to carry a lot of fresh water for drinking and cleaning. Making good decisions about how they use water is critical so that their water lasts for the whole trip.

About 71 percent of the Earth's surface is covered by water. This makes the group of friends wonder just how much of this fresh water can be used by humans. They decide to research to learn about different types of water on Earth. Maybe their research will help them think about how to use water on their trip and every day.

Prompt 1 – Gather and Organize Data

Use information from *Earth's Water Reservoirs* and the video, "The Mysteries of Life," to complete **Data Table 1**.

Earth's Water

Earth's water is everywhere. It is above the Earth in the air and clouds. It is on the surface of the Earth in rivers, oceans, ice, plants, living organisms, and underground.

Most of the water on the Earth's surface is salt water. Salt water makes up about 97 percent of all water. Freshwater reservoirs on Earth are supplied by water falling from the sky. This water can move into streams, rivers, lakes, and underground. These reservoirs provide people with the water they need to live.

You may see water on the Earth's surface such as lakes, glaciers, and ice caps. But there is much more fresh water stored underground. Water from rain and snowfall soaks into the ground to refill aquifers. Aquifers are layers and areas of rocks below ground. The water fills all the spaces between the rocks. This type of reservoir is referred to as groundwater.

Source: [How Much Water is There on Earth? | U.S. Geological Survey \(usgs.gov\)](https://www.usgs.gov/learn/earth-science/earth-science-101/earth-science-101-101)

Data Table 1. Water on Earth

Category	Percent	Type of Water	Description of Water
Salt water on Earth	_____ %	_____	salty water
Fresh water on Earth	_____ %	1. icebergs	1. _____ _____
		2. _____	2. large rivers of ice
		3. snowcaps	3. _____ _____
		4. rivers	4. _____ _____
		5. _____	5. water with land around it
		6. aquifers	6. _____ _____
		7. reservoirs	7. large, human-made lakes

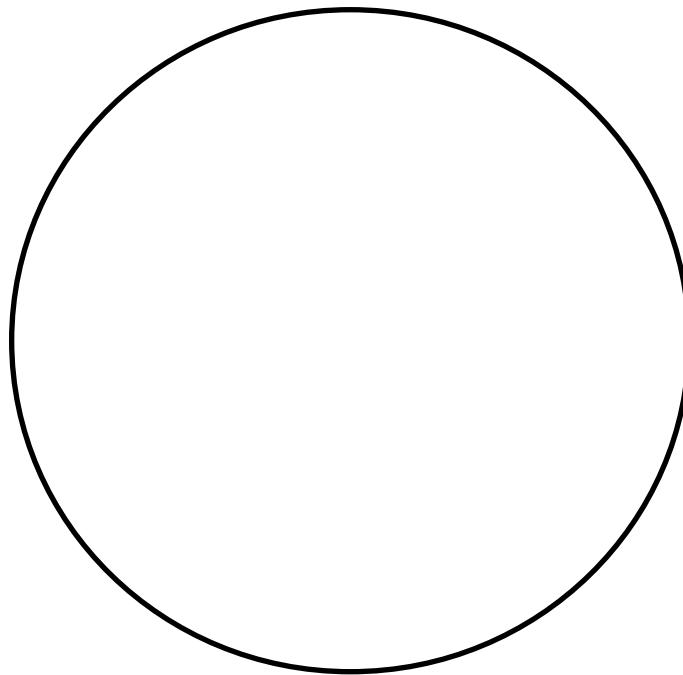
Prompt 2

Part A. Represent Data Using Graphs

Draw a pie chart on **Graph 1** to show the percentage distribution of salt water and fresh water on Earth. Use **Data Table 1** to complete the pie chart. Your graph must include:

- A title
- Shading to represent the percent of fresh water
- Shading to represent the percent of salt water
- Labels for each shaded part telling the type of water reservoir **AND** its percentage distribution

Graph 1. _____



Part B. Interpret Data from a Pie Chart

The amount of salt water on Earth is (circle one) **greater than** **less than** the amount of fresh water on Earth.

The amount of fresh water that humans use is important because _____

Prompt 3 – Interpret Data to Create a Graph

Data in Table 2 shows the estimated distribution of freshwater on Earth. In the table, “Other” fresh water represents 1% of Earth’s fresh water and includes soil moisture, ground ice, lakes, and rivers.

Data Table 2. Distribution of Fresh Water on Earth

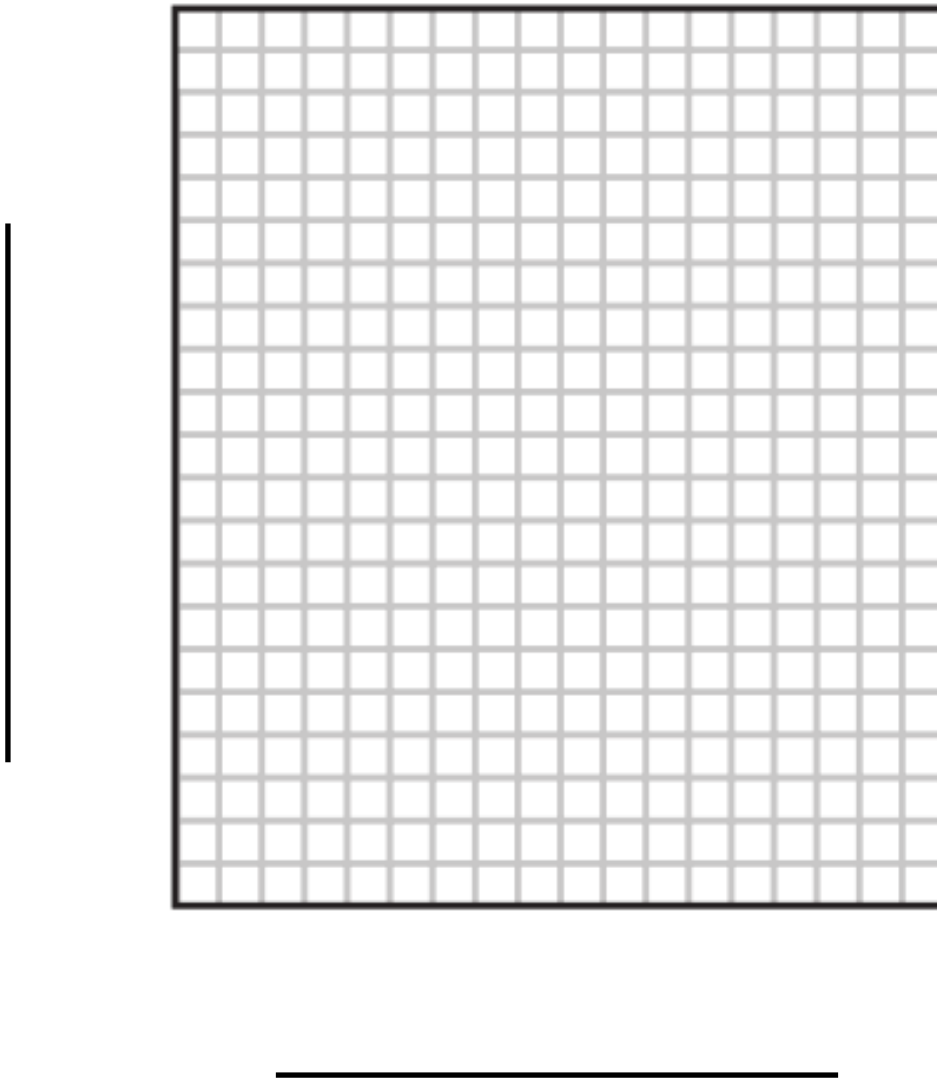
Fresh Water	Percentage of Fresh water (%)
Ice caps, glaciers, permanent snow	69
Groundwater	30
Other	1

Source: [USGS Water Science School](https://www.usgs.gov/edu/water-science-school) | | [U.S. Geological Survey \(usgs.gov\)](https://www.usgs.gov/)

Complete **Graph 2** to show the distribution of fresh water on Earth. Use **Data Table 2** to support your response. Your graph must include:

- A bar graph **OR** a line graph
- A title for the x-axis
- A title for the y-axis
- Units on the y-axis
- Labels for each type of fresh water shown on the graph

Graph 2. Distribution of Earth's Fresh Water



Prompt 4 – Explain Research Results

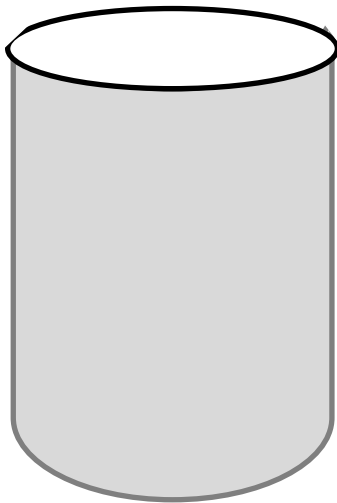
You want to share your research with your friends. You use two glasses of water to explain the results of your research.

Part A.

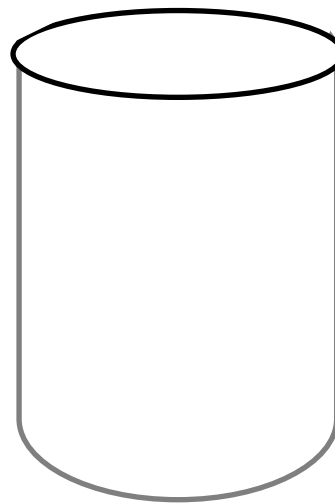
Model 1 is a full glass of water representing all the salt water and fresh water on Earth.



Complete **Model 2** to show the amount of fresh water on Earth. Use the key to represent the amount of fresh water in the model.

Model 1. Glass of Water Representing All of Earth’s Water



Model 2. Glass of Water Representing Earth’s Fresh Water



Key	
	Salt water and Fresh water
	Fresh water

Part B.

Explain why fresh water is considered a limited resource for meeting the daily needs of humans. Use information from **Data Table 2**, **Graph 2**, and **Model 2** to support your response.

Task Rubric to Evaluate Student Evidence					
Task	Score Point 0	Score Point 1	Score Point 2	Score Point 3	Score Point 4
Prompt 1	No aspect of the response is correct	Response includes correct percentage of distribution for salt water (~97%) AND fresh water (~3%)	Response includes: <ul style="list-style-type: none"> • Correct percentage of distribution for salt water (~97%) AND fresh water (~3%) • Identifies at least three (3) of the types and descriptions of water reservoirs 	Response includes: <ul style="list-style-type: none"> • Correct percentage of distribution for salt water (~97%) AND fresh water (~3%) • Identifies a total of four (4) or five (5) of the types and descriptions of water reservoirs 	Response includes: <ul style="list-style-type: none"> • Correct percentage of distribution for salt water (~97%) AND fresh water (~3%) • Identifies a total of six (6) or seven (7) of the types and descriptions of water reservoirs
Prompt 2 Part A.	No aspect of the response is correct	Pie chart includes one (1) OR two (2) of the four (4) aspects	Pie chart includes three (3) of the four (4) aspects	Pie chart includes the following aspects: <ul style="list-style-type: none"> • A title • Shading to represent the percent of fresh water • Shading to represent the percent of salt water • Labels for each shaded part telling the type of water reservoir AND its 	NA

				percentage distribution	
Prompt 2 Part B.	No aspect of the response is correct	Response includes: <ul style="list-style-type: none"> Select is “greater than” to compare the amount of salt water to fresh water OR <ul style="list-style-type: none"> Describes that fresh water is limited on Earth 	Response includes: <ul style="list-style-type: none"> Selects “greater than” to compare the amount of salt water to fresh water Describes that fresh water is limited on Earth 	NA	NA
Prompt 3	No aspect of the response is correct	Bar or line graph includes one (1) of the four (4) aspects	Bar or line graph includes two (2) of the four (4) aspects	Bar or line graph includes three (3) of the four (4) aspects	Bar or line graph includes: <ul style="list-style-type: none"> A title for the x-axis A title for the y-axis Units on the y-axis Accurate labels for each of the three types of freshwater shown on the graph Accurate representations of percentage of distribution of each type of freshwater
Prompt 4 Part A. & Part B.	No aspect of the response is correct	Response includes: <p>Part A</p> An accurate model of Earth’s fresh water	Response includes: <p>Part A</p> An accurate model of Earth’s fresh water	Response includes: <p>Part A</p> An accurate model of Earth’s fresh water	Response includes: <p>Part A</p> An accurate model of Earth’s fresh water

		<p>showing a very small, shaded area relative to the size of the glass</p> <p>OR</p> <p>Part B Response includes one (1) of the four (4) aspects</p>	<p>showing a very small, shaded area relative to the size of the glass</p> <p>AND</p> <p>Part B Response includes one (1) OR two (2) of the four (4) aspects</p>	<p>showing a very small, shaded area relative to the size of the glass</p> <p>AND</p> <p>Part B Response includes three (3) of the four (4) aspects</p>	<p>showing a very small, shaded area relative to the size of the glass</p> <p>AND</p> <p>Part B</p> <ul style="list-style-type: none"> • Describes that a limited amount of fresh water is available to meet daily needs of humans • Describes the types of freshwater • Describes the amount (percent) of available fresh water (e.g., in lakes, rivers) • Describes the amount (percent) of less available fresh water (i.e., ice caps, glaciers, and permanent snow)
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Exemplar Responses

Prompt 1

Use information from *Earth's Water Reservoirs* and the video, "The Mysteries of Life," to complete **Data Table 1**.

Data Table 1. Water on Earth

Category	Percent	Type of Water	Description of Water
Salt water on Earth	<u>97%</u>	<u>oceans</u>	salty water
Fresh water on Earth	<u>3%</u>	1. icebergs	1. <u>large pieces of frozen water or ice floating in the ocean</u>
		2. <u>glaciers</u>	2. large rivers of ice
		3. snowcaps	3. <u>snow on tops of mountains</u>
		4. rivers	4. <u>water moving through land</u>
		5. <u>lakes</u>	5. water with land around it
		6. aquifers	6. <u>underground water</u>
		7. reservoirs	7. large, human-made lakes

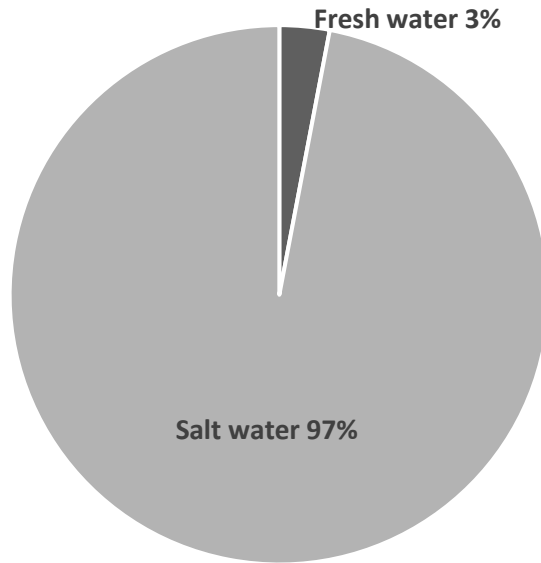
Prompt 2

Part A. Represent Data Using Graphs

Draw a pie chart on **Graph 1** to show the percentage distribution of salt water and fresh water on Earth. Use **Data Table 1** to complete the pie chart. Your graph must include:

- A title
- Shading to represent the percent of fresh water
- Shading to represent the percent of salt water
- Labels for each shaded part telling the type of water reservoir **AND** its percentage distribution

Graph 1. Distribution of Salt Water and Fresh Water on Earth



Prompt 2

Part B. Interpret Data from a Pie Chart

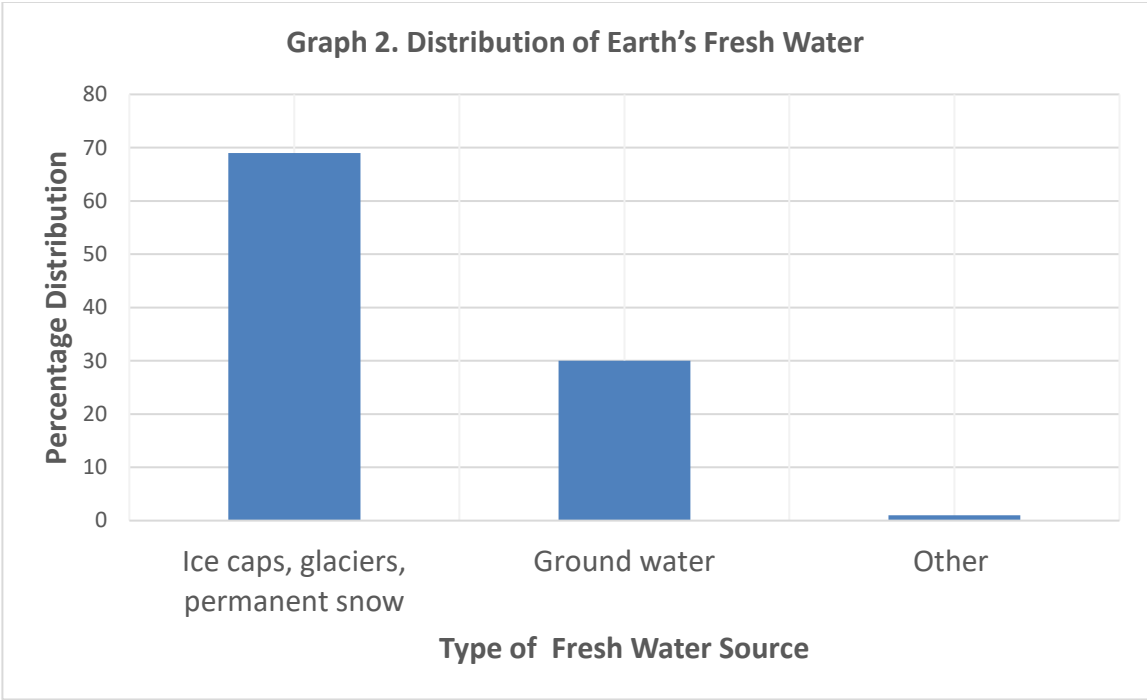
The amount of salt water on Earth is (circle one) **greater than** less than the amount of fresh water on Earth.

The amount of fresh water that humans use is important because there is not a lot of fresh water on Earth. Fresh water is a limited resource. There is a lot more salt water on Earth that humans cannot use for drinking. If fresh water is not used carefully, it may run out.

Prompt 3 Interpret Data to Create a Graph

Complete **Graph 2** to show the distribution of fresh water on Earth. Use **Data Table 2** to support your response. Your graph must include:

- A bar graph **OR** a line graph
- A title for the x-axis
- A title for the y-axis
- Units on the y-axis
- Labels for each freshwater source shown on the graph

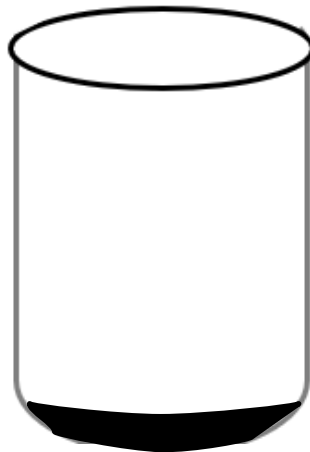


Prompt 4 – Explain Research Results

Part A.

Complete **Model 2** to show the amount of fresh water on Earth. Use the key to represent the amount of fresh water in the model.

Model 2. Glass of Water Representing Earth's Fresh Water



Part B.

Explain why fresh water is considered a limited resource for meeting the daily needs of humans. Use information from Data Table 2, Graph 2, and Model 2 to support your response.

My model shows that a very small amount of water on Earth is fresh water. Most of that fresh water is found in ice caps, glaciers, permanent snow, and groundwater which is about 99% of Earth's fresh water. Less than 1% of fresh water is found in lakes and rivers. Most of the freshwater resources are frozen and are not easily used by humans. So, there is not a lot of fresh water that humans can easily use for their needs.

Task Notes

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