

Grade Level/Subject	6th
Unit	Water
Enduring Understanding	Water is essential to life on Earth.
SOL Objectives	6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include: a) water as the universal solvent; b) the properties of water in all three phase.
Title	Is There Water on Zork? (from Project WET p. 43)
Lesson Objective	Students will: <ul style="list-style-type: none"> • describe qualities that distinguish water from other clear liquids • design an investigation to test characteristics of water • analyze the efficiency and effectiveness of the investigation
Inquiry Level	3
Materials Needed	<p>Liquids to be tested: water, white vinegar, hydrogen peroxide, corn syrup, alcohol, glycerin or mineral oil, clear soda (Place liquids in separate containers, numbered 1-7. Depending upon time and grade level, use seen or fewer liquids.)</p> <p>Testing materials: Salt, pepper, sugar, baking soda, cornstarch, wax paper, aluminum foil Hot and cold water baths, ice, a scale, objects of different density, paper clips, tooth picks, food coloring, graduated cylinders, thermometers, pH strips, liquid soap</p> <p>Testing equipment: goggles, extra beakers or cups for conducting tests, eyedroppers, glass rods</p>
How is it Level	Teacher presents the question; students design and carry out the investigation.

Is There Water on Zork?

Procedure

Warm Up

Present the following situation to the class. Some students are visiting planet Zork. They are running low on water. Through remote sensing techniques, they know that water exists on Zork, but they're not sure where it is. Fortunately, they encounter some friendly Zorkians who speak English; unfortunately, their words for water, clear, and liquid are different from ours. The visiting students need to explain to the Zorkians that they are looking for water.

Have several students play the visiting students and others play the Zorkians. The class can help the Zorkians think of questions they can ask about this commodity (e.g., What does it feel like? What is it used for? Why do you need it?). Mindful that the Zorkians do not understand the words clear and liquid, the visiting students must try to describe the characteristics of water.

After a few minutes have students summarize their responses. How much do students think they know about water? Did they think it was difficult to describe water?

Ask students to list the words and phrases they used to describe water. Encourage them to use all five senses. Make a master list and post it in the classroom. This list of words and descriptions provides students with a synopsis of what they know about water. It also provides information they can use to solve the problem presented in this activity.

The Activity

Part 1

1. Tell students the Zorkians brought forth seven different clear liquids, based on the stranded travelers' descriptions.
2. Divide the class into small groups. Provide each group with samples of the clear liquids. Present students with the problem: Which of these liquids is water?
3. Based on what they know about water, have students write out several questions they have about the liquids. Ask them to brainstorm different ways to answer the questions. Display the materials they can use in the front of the room.

4. Have students develop a set of procedures to determine which liquid is water. Check the designs for safety and feasibility. TASTE TESTS ARE NOT ALLOWED! IF STUDENTS HEAT THE LIQUIDS, THEY SHOULD USE A HOT WATER BATH, LIMIT THE HEATING TIME TO THREE MINUTES, AND BE IN A WELL-VENTILATED AREA. ANY TIME A SUBSTANCE IS HEATED, GOGGLES MUST BE WORN.

5. Have students write out the questions and procedures in a table or diagram. A suggested format is provided in this activity, but students may design their own to match the needs of their investigation.

Part II

1. Students can now conduct the tests to answer the questions. Make sure they record their results or answers. These can be included in the table as well.

2. At the end of their investigations, students should draw conclusions based on their findings. If they were unable to determine which liquid was water, they should still summarize the results by indicating liquids they know are not water. Explain that the investigative process is more important than determining which liquid is water. If the investigation stimulated other questions, these should be listed in the conclusion as well.

Wrap Up and Action

Discuss the investigative process and results with students. What was the value of the conclusions? Did the investigation solve the problem? To confirm their results, students can run identical tests on a sample of tap water. If students were to repeat the activity, would they revise their procedure or alter their conclusions? If time allows, have students conduct the investigations a second time.

What do they know about water that they didn't know before? Match these discoveries to the list of words and phrases used to describe water in the Warm up. Ask students if they think the list is accurate or if descriptions should be changed or added.

Question asked	What do we know?	Procedure
Which materials dissolve in the liquid?		
Which materials float on the liquid?		
What does a drop of the liquid look like on wax paper?		
How much does the temperature change when placed in a hot water bath for three minutes? Cold water bath?		
How long does it take for ½ teaspoon of the liquid to evaporate?		
What is the pH of the liquid?		

Question asked	What do we know?	Procedure

Results	Which materials dissolve in the liquid?	Which materials float on the liquid?	What does a drop of the liquid look like on wax paper?	How much does the temperature change when placed in a hot water bath for three minutes? Cold water bath?	How long does it take for ½ teaspoon of the liquid to evaporate?	What is the pH of the liquid?
Liquid 1						
Liquid 2						
Liquid 3						
Liquid 4						
Liquid 5						
Liquid 6						
Liquid 7						

Results						
Liquid 1						
Liquid 2						
Liquid 3						
Liquid 4						
Liquid 5						
Liquid 6						
Liquid 7						

Conclusion: Substance number _____ was water because:

- _____

- _____

- _____

- _____

- _____

The other liquids were not water because
