

 Integrate reading books about water, utilize library skills by having students research properties of water or utilize exploration skills on the internet. Journal entries, lab reports. <u>http://www.sciencedaily.com/releases/2006/06/060620171022.htm</u>

National Standards: <u>http://www.education-world.com/standards/national/index.shtml</u>

National Standards Details: NSES Content Standards for Grades 9-12:

• Standard B - Physical Science B1: Structure of Atoms; B2: Structure and Properties of Matter.

Student Objective	s and Procedures: (All 7-E's may not be present in a single lesson)
Objective:	 Sketch or construct a molecule of water demonstrating polarity and hydrogen bonding. Compare and contrast cohesion/adhesion. Give examples of life processes related to the properties (adhesion, cohesion, surface tension) and importance of water.
Focus Question:	How do the properties of water affect life?
Prerequisites / Ba	ckground Information:
• Doc	ument: Properties of Water Background Information



Timeline: 1-2 Class periods depending on instruction time

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Preparation:	٠	1 Hour
Elicit/Engage:	•	10 min
Explore:	•	1 Hour
Explain:	•	20 min
Cleanup:	•	30 min

Teacher Preparation:

 Teacher lesson plan, water information, lab set up and student response sheets are included in the link next to the engage instructions.
 Modifications: Place students in mixed ability groups or mixed learning style groups. Other modifications may be made as determined by an individual IEP.

- Interventions: Address misconceptions by explaining the difference in adhesion and cohesion. Discuss the reason water is known as the "Universal Solvent" even though it does not dissolve everything.
- Intellectual Challenges: GT students can research and present other activities that demonstrate the properties of water or research ways these properties are associated with living things.

Materials:

• Document: Properties of Water Lab Materials

Technology – Hardware: (Click boxes of all equipment needed)

Camera	🔀 Computer(s)	Digital Camera
Projection System	Television	VCR
🗌 Video Camera	Internet Connection	Other:
Technology – Software: (Click boxes on ☐ Database/Spreadsheet ☑ Internet Web Browser	of all software needed.)	Other:
Internet Resources:		

Procedures:	Teacher's Notes:
 Safety No eating or drinking in the lab Follow written & oral instructions No horse play Wear appropriate safety gear (goggles, apron, gloves) 	



Elicit

- In groups of two or three, have students discuss and write in science notebooks, illustrate what they know about the structure and properties of water.
- Share responses on the board or chart paper so that students can add to their own science notebook entries any ideas they did not already have.
- Writing Prompts:

Is water really the universal solvent?
 Can you give an example of something that does not dissolve in water?

Engage

Water:

"Ballooney" is the engagement; however, the teacher may choose any of the lab stations for a demonstration.

Explore

• Chemistry-Properties of Water Lab --teacher will choose as many as possible of the activities out of the remaining activities.

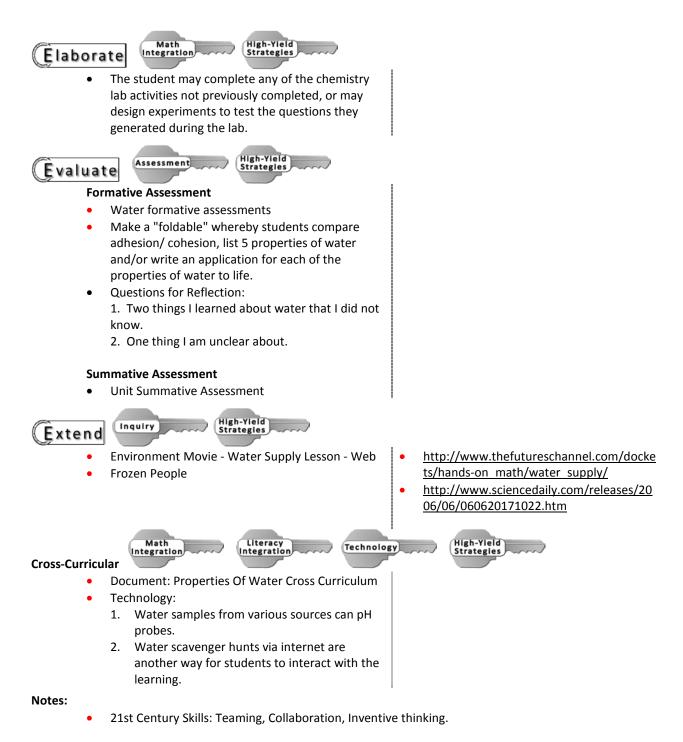
Èxplain

- Review the Properties of Water and Explanation of the Lab documents prior to the lesson.
- Review properties of water with students and discuss why these properties are important for living things (water's significance for life).
- Ask questions about lab, such as:
 - 1. Which properties of water are being demonstrated at this station?
 - 2. How is this property important for living things?
 - 3. What are some other properties of water not covered in the lab and how are they important for living things?
- Possible Misconceptions:
 - 1. Adhesion is the same as cohesion.
 - 2. Water dissolves everything.
 - 3. Water atoms expand or change when ice melts.
 - 4. A film on the surface of water does nothing to the water.
 - 5. Liquids rise in a straw because of "suction".
 - **6.** See additional misconceptions below in the provided web links.

Vocabulary

Adhesion, cohesion, polarity, surface tension, pH, capillary action, acid, base, hydrogen bonding, solvent.





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