PROPERTIES of WATER STATIONS

PART II. Station #7
Water is a SOLVENT
Warm up

What does it mean to dissolve something? If you're not sure how to answer, think about some things that you've added to water and explain what happens.

PART II. Station #8
Water is a SOLVENT
Vocab: Definition Station

Water is the best solvent because it dissolves more substances than any other solvent known!

Solute= a substance that is dissolved. (example- salt)

Solvent= a substance that dissolved the solute. (example- water)

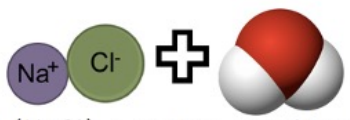
Solution= A mixture that involves both a solvent and a solute. (example- salt water)

PART II. Station #8
Water is a SOLVENT
Real Life Applications

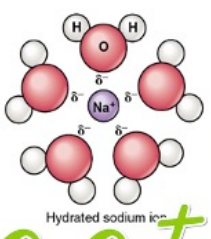
In each scenario, determine the solvent, solute, and solution (see vocab if unsure):

- Coffee flavors (from coffee grounds) and water to make coffee
- Sugar and water to form nectar for hummingbird feeders
- Free oxygen is dissolved in bodies of water such as rivers, lakes, etc. (This is the oxygen that fish use to breathe).

PART II. Station #9
Water is a SOLVENT
Illustration Station

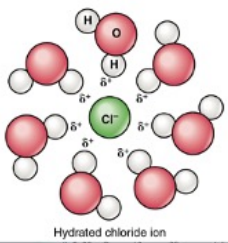


Salt (NaCl) + water = salt water



Hydrated sodium ion

Water pulls apart salt molecules (NaCl) into Na+ and Cl- and surrounds the ions.



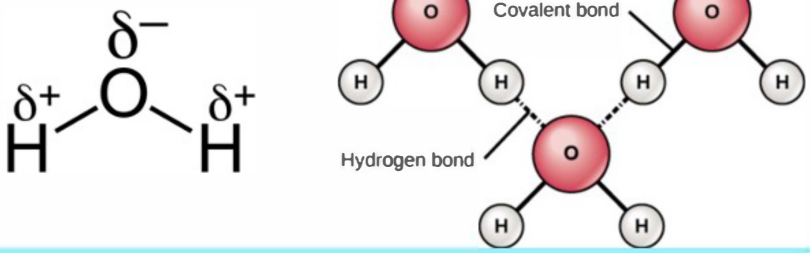
Hydrated chloride ion

biology roots

32 Stations- Editable

PROPERTIES of WATER

PART I. Station #4
Water is POLAR
ILLUSTRATION STATION



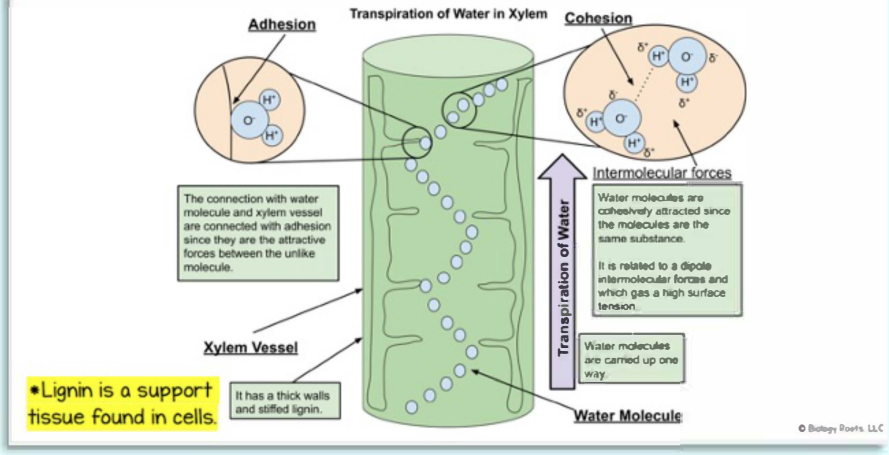
PART II. Station #10
Water is a SOLVENT
Real Life Applications

In each scenario, determine the solvent, solute, and solution (see vocab station if unsure):

- Coffee flavors (from coffee grounds) and water to make coffee
- Sugar and water to form nectar for hummingbird feeders
- Free oxygen is dissolved in bodies of water such as rivers, lakes, etc. (This is the oxygen

Covers polarity, solutions, capillary action, surface tension (adhesion, cohesion), and specific heat capacity.

Cohesion/ Adhesion
ILLUSTRATION STATION

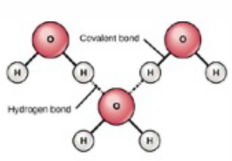


PART V. Station #31
High Specific Heat Capacity
Model Station

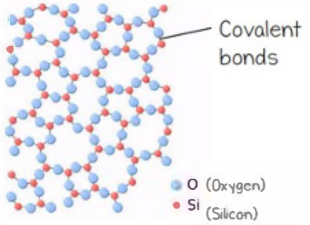
•Do not attempt this until you have completed all of Part IV (Heat capacity). If this station is crowded, move on to another station and come back later.

Notice under the heat lamp there is a bowl of water and a bowl of sand of equal volumes.

Both the bowls have been exposed to the heat equally for the same amount of time. Make a prediction about the temperatures, THEN use the thermometers provided to measure the temperature.



Using the diagrams of a water molecule (left), and a sand molecule (right), explain why there is a difference in heat capacity.



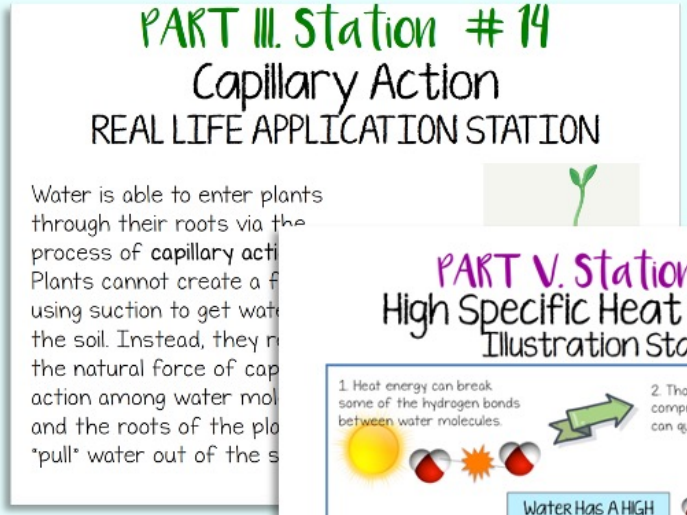
© Biology Roots, LLC

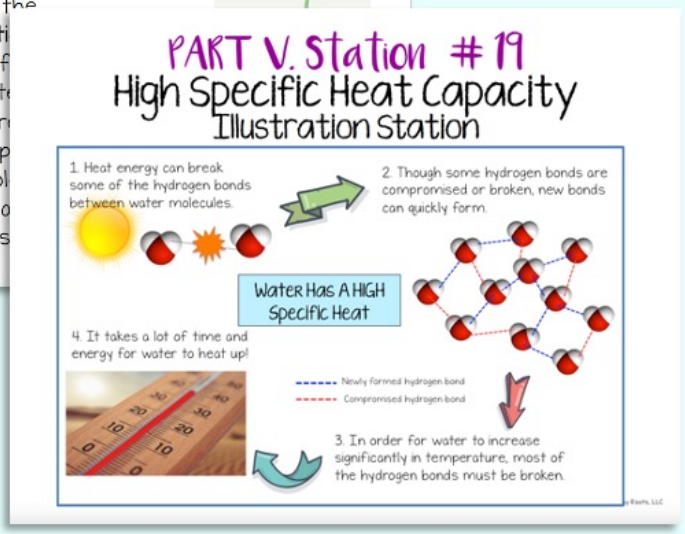
22 Stations- Editable

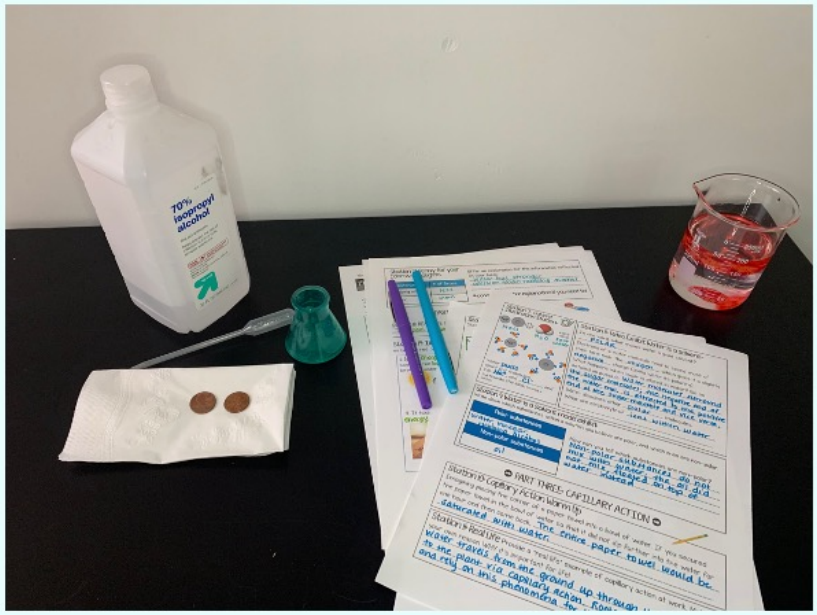
PROPERTIES of WATER

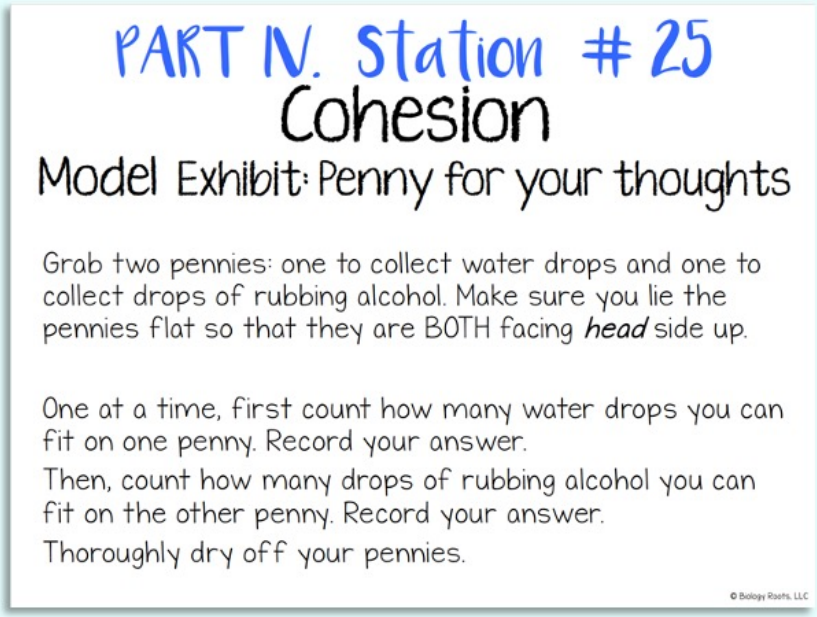
Stations Include:

- Warmups
- Illustrations
- Videos
- Models
- Real Life Connections





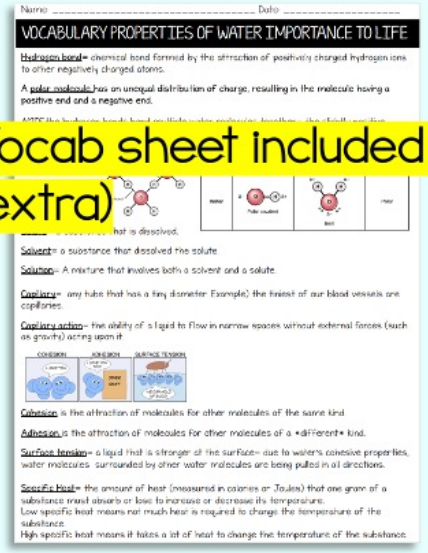




22 Stations- Editable

PROPERTIES of WATER

- Digital version available
- Editable
- Answer key included
- Extended version included
- Materials list included



Vocab sheet included (extra)

Divided into 5 sections. Tackle one or two sections a day, or cover the entire set in one class.

Materials list

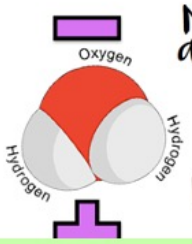
- Chromebooks/Devices for video stations
- Station 4- Magnets and nail polish (or chalk marker)
- Graduated cylinder
- Station 9- three graduated cylinders, water/vinegar; water/rubbing alcohol/ water/oil. Food coloring to mix in the vinegar and ethanol for easy observing.
- Station 11- optional graduated cylinder of water.
- Station 14- beaker, celery, food coloring
- Station 17- eye droppers, pennies, rubbing alcohol, beaker of water, paper towels/trash.
- Station 19- blue and red colored pencils or markers
- Station 21- heat lamp, bowl of sand, bowl of water (pie tins make great bowls for this station!)

PROPERTIES of WATER

PART I. Station #3
Water is POLAR
Explanation Station

Oxygen has a slightly negative charge because it is more electronegative than hydrogen. This means that the oxygen attracts electrons more strongly than hydrogen, so the electrons found in water tend to spend more time towards the oxygen.

Recall electrons have a negative charge!



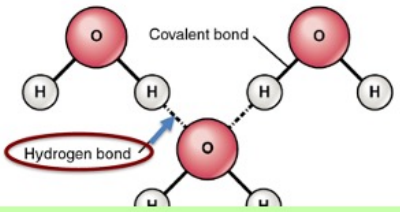
Negative end of a water molecule

Positive end of a water molecule

PART I. Station #2
Water is POLAR
VOCAB: DEFINITION STATION

Define polar and hydrogen bonding on your answer sheet.

Hydrogen bond= chemical bond formed by the attraction of positively charged hydrogen ions to other negatively charged atoms.



Extended version available: includes 10 extra stations with vocabulary and explanation stations for a complete guided lesson

PART IV. Station #2 cont.
High Specific Heat Capacity
Explanation Station

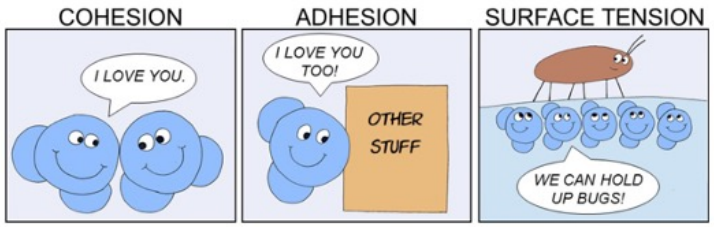
Water requires a lot of heat to raise its temperature compared to other substances- water has a HIGH specific heat capacity.

Water has many hydrogen bonds, which collectively creates a strong force. It takes a lot of energy to rearrange all those bonds so that it can heat up or change phases (freezing, boiling, etc.)

The water molecules do not easily move- this means it's going to take a lot of heat/energy to change the temperature!

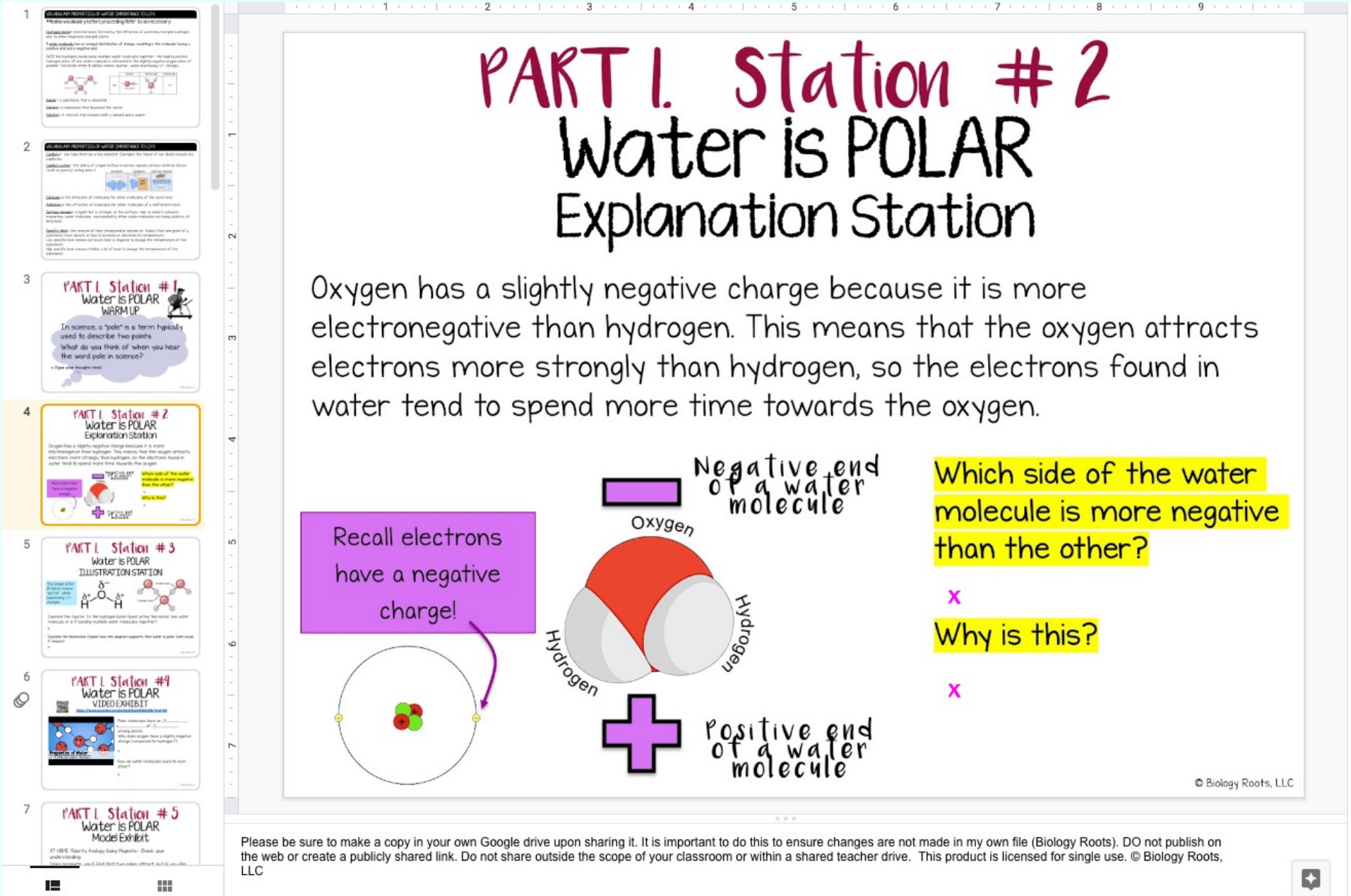
PART IV. Station #2 cont.
VOCAB

Surface tension= a liquid that is stronger at the surface- due to water's cohesive properties, water molecules surrounded by other water molecules are being pulled in all directions.



AVAILABLE AS BOTH *paperless* DIGITAL *and* TRADITIONAL *print*

Digital version on Google Slides



Student Recording Sheet Included

Name: _____ Date: _____

Properties of Water Importance to Life

➲ PART ONE: POLARITY

Station 1: Water is Polar Warm up - what do you think of when you hear the word "pole" as in polar? _____

Station 2: Vocab **Hydrogen bond**= chemical _____ formed by the _____ of _____ to other _____

Opposites attract!

Polar molecule= a molecule that has an _____ _____ of charge resulting in the molecule having a _____ end and a _____ end.

Examine the images at the station. Is the hydrogen bond found within the same/ one water molecule or is it bonding multiple water molecules together?

What is the Greek letter δ(delta) mean when expressing +/- charges? _____

Station 3: Explanation Station
Which side of the water molecule is more negative than the other?

Why is this? _____

Station 4: Illustration Station

Station 5: Video Exhibit
pause video as you write your answers

Polar molecules have an _____ _____
Why does oxygen have a slightly negative charge (compared to hydrogen?)

How do water molecules bond to each other? _____

Station 6: Water is Polar Model - Form an explanation as to how the magnets serve as an analogy to polar molecules: _____

student sheet also editable

➲ PART TWO: WATER IS A SOLVENT ➲

Station 7: Water is a solvent WARM UP ... what do you think it means to dissolve something?

Station 8: Vocab Station

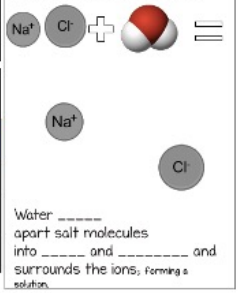
Solute	Solvent	Solution

Station 9: Explanation Station
How does water's properties make it a very good solvent?

Station 10: Real life Applications- see the descriptions at the station. Determine the solvents, solute and

Substances	Solvent	Solute	Solution
Coffee grounds, water			

Station 11: Solvent Illustration Station



...akes water a good solvent? _____
... to spend most of their time near the _____.
... charge (giving water its polarity).
...i in water? Be as detailed as possible: _____
... molecules.
What are electrolytes? _____

Station 13: Water is a Solvent model exhibit- write down which substances within a solution you believe are polar, and which ones are non-polar.

Polar substances	Non-polar substances

How can you tell which substances are non-polar? _____

➲ PART THREE: CAPILLARY ACTION ➲

Station 14: Capillary Action Warm Up
Imagining placing the corner of a paper towel into a bowl of water. If you secured the paper towel in the bowl of water so that it did not dip further into the water for one hour and then came back, _____

Station 15: Capillary Action Vocab

Capillary:	
Capillary Action:	

Station 16: Explanation Station
What properties cause water to climb up a paper towel to defy gravity?

Why is this? _____

Station 17: Real Life Provide a "real life" example of capillary action at work. Make up your own reason WHY it's important for life!

Station 18: Illustration
Sketch the figure

Station 19: Video What is a meniscus?

Why do (concave) meniscus form for water?

Why is water more attracted to glass (silicon) than itself (water)?

Station 20: Capillary Action model exhibit
Describe what you see and how you think it models capillary action: _____

(If you have not covered any stations on capillary action and are unsure, go explore and come back to this one!)

➲ PART FOUR: COHESION, ADHESION, SURFACE TENSION ➲

Station 21: VOCABULARY, VOCABULARY...

COHESION	
ADHESION	
SURFACE TENSION	

Station 22: Explanation Station
Surface tension is caused by the tightly packed water molecules at the surface of the water. Explain this phenomenon:

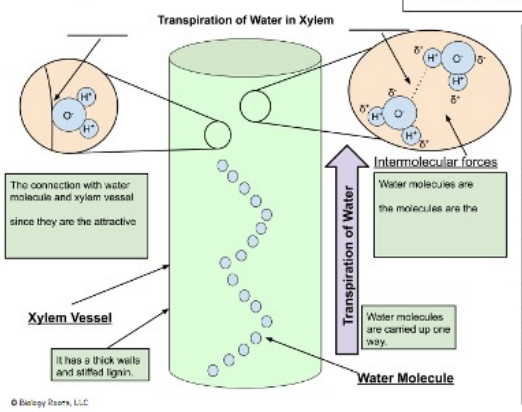
Station 25: Penny for your cohesive thoughts

Substance	# of Drops
Rubbing alcohol	
Water	

Offer an explanation for this:

come back to the explanation if you need to!

Station 23: Illustration Sketch and fill in in the missing parts of the illustration (including sketch)



Station 24: Surface Tension Video- Explain how/why surface tension occurs in water: