



Write It!

Write It! Station Directions

It is recommended that you have completed at least **two** of the following stations before working at this station.

- Read It!
- Explore It!
- Watch It!
- Research It!

Answer each of the task card questions on the lab sheet in **complete sentences**.

Write It!
#1

Describe what polarity means in terms of being a property of water?

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Write It!
#2

During the winter, many ponds and lakes freeze over. What properties of water allows the organisms to survive underneath the ice? Explain in detail how this happens.

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Write It!
#3

What is evaporation and how does it contribute to the survival of species?

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Assess It!

Assess It! Station Directions

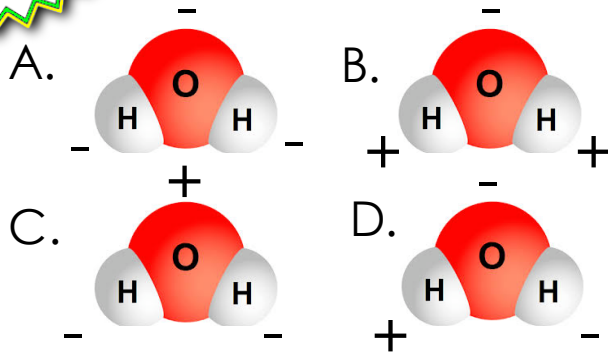
It is recommended that you have completed at least **two** of the following stations before working at this station.

- Read It!
- Explore It!
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- Research It!

Each member will answer the questions from the task cards on the lab sheet in the Assess It! section.

Assess It!
#1

Which best illustrates the electrical charge of a water molecule?



Assess It!
#2

Plants are able to use water for survival through a process called capillary action. Which property of water is responsible for this process?

- A. Density
- B. Specific Heat
- C. Evaporation
- D. Cohesion and adhesion

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Assess It!
#3

Which is a good example of the property of water called surface tension?

- A. Some organisms are adapted to walk or land on water.
- B. Plants are able to survive through capillary action.
- C. Ice is less dense than water and floats on the surface.
- D. Water evaporates on the surface of our skin to release heat.

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Assess It!
#4

Which answer best describes cohesion?

- A. Water is polar which allows molecules to bond together and 'stick' to each other.
- B. One water molecule is held to another molecule through covalent bonding.
- C. Cohesion is the property of water that allows liquid to be changed into gases.
- D. Water molecules all have a positive charge and 'stick' to each other.

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The graphic features a blue and white geometric border of triangles. In the top-left corner, there is a white starburst shape with a green and yellow border containing the text "Read It!".

Read It!

Read It! Station Directions

Each member of the group will read the passage and answer the questions from the task cards on the lab sheet in the Read It! section.

It is important to remember that the answers will come directly from the reading passage.

Read It!

Capillary Action

Even if you've never heard of capillary action, it is still important in your life. Capillary action is important for moving water (and all of the things that are dissolved in it) around. It is defined as the movement of water within the spaces of a porous material due to the forces of adhesion, cohesion, and surface tension.

Capillary action occurs because water is sticky, thanks to the forces of cohesion (water molecules like to stay close together) and adhesion (water molecules are attracted and stick to other substances).

Adhesion of water to the walls of a vessel will cause an upward force on the liquid at the edges and result in a meniscus which turns upward. The surface tension acts to hold the surface intact.

Capillary action occurs when the adhesion to the walls is stronger than the cohesive forces between the liquid molecules. The height to which capillary action will take water in a uniform circular tube is limited by surface tension and, of course, gravity.

Not only does water tend to stick together in a drop, it sticks to glass, cloth, organic tissues, soil, and, luckily, to the fibers in a paper towel. Dip a paper towel into a glass of water and the water will "climb" onto the paper towel. In fact, it will keep going up the towel until the pull of gravity is too much for it to overcome.

Capillary action is all around us every day. When you spill your glass of BubblyBerryPowerGo (which is, of course, mostly water) on the kitchen table you rush to get a paper towel to wipe it up. First, you can thank surface tension, which keeps the liquid in a nice puddle on the table, instead of a thin film of sugary goo that spreads out onto the floor.

When you put the paper towel onto your mess the liquid adheres itself to the paper fibers and the liquid moves to the spaces between and inside of the fibers.

Plants and trees couldn't thrive without capillary action. Plants put down roots into the soil which are capable of carrying water from the soil up into the plant. Water, which contains dissolved nutrients, gets inside the roots and starts climbing up the plant tissue. As water molecule #1 starts climbing, it pulls along water molecule #2, which, of course, is dragging water molecule #3, and so on.

Read It!
#1

Which best describes capillary action?

- A. Evaporation allows plants to get rid of excess heat for survival.
- B. The specific heat of water maintains an equilibrium in plants.
- C. The density of water pushes water up the stems of plants.
- D. Cohesion and adhesion allow water to move up the stem of plants and allows for survival.

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Read It!
#2

Which is not an example of capillary action?

- A. A plant obtaining water in the ground for survival
- B. A paper towel absorbing up a spill
- C. Plant absorbing CO² through stomata
- D. A mop absorbing water from puddle on the ground

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Read It!
#3

Capillary action happens when _____.

- A. gravity is stronger than adhesion
- B. adhesion to the wall is stronger than the cohesive forces between the molecules
- C. the surface tension breaks and gravity takes over
- D. adhesion to the wall is weaker than the cohesive forces between the molecules

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Read It!
#4

If water didn't have cohesive and adhesive properties which outcome is likely?

- A. Life on Earth would not exist.
- B. Plants would adapt find another source for survival.
- C. Plants wouldn't exist but humans would.
- D. Small plants could still get water, but large trees would die off.

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A white callout bubble with a jagged green and yellow border, containing the text "Watch It!".

Watch It!

Watch It! Station Directions

Each member of the group will go to the website listed on task card #1

Complete the task cards in order.

Every student will answer the questions from the task cards on the lab sheet in the Watch It! section of the lab sheet.

Watch It!
#1

YouTube <https://goo.gl/MkKy7d>

Goo.gl <https://goo.gl/5WbZzx>

URL is case-sensitive

1. Click Play on the video.
2. Answer questions from cards #2-4 on your lab sheet.



YouTube

Watch It!
#2

Describe what a hydrogen bond is.

Watch It!
#3

What is surface tension?

Watch It!
#4

List two examples from the video of how the properties of water are important to life on Earth.



Research It!

Research It! Station Directions

Each member of the group will go to the website listed on task card #1

Complete the task cards in order.

Every student will answer the questions from the task cards on the lab sheet in the Research It! section.

Research It!
#1

1. Go to <https://goo.gl/hMD3Wq>

You are going to be working with an interactive about the properties of water.

1. Read all of the facts and procedures on the left hand side and then answer the following questions.

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Research It!
#3

1. Describe the **structure** of the molecules at -20°C , 30°C , and 110°C .
2. Describe the **motion** of the molecules at -20°C , 30°C , and 110°C .

Research It!
#2

1. What is cohesion?
2. What is surface tension?
3. Describe the charge of a water molecule.

A starburst-shaped logo with a white center and a green and yellow border. The text "Explore It!" is written in blue, slanted font inside the starburst.

Explore
It!

Explore It! Station Directions

One member of the group will read the task cards in order. The group will be responsible for completing each of the tasks that are being read.

Each member of the group will then write their conclusions down on the lab sheet in the Explore It! section.

Explore It!
#1

You will be learning about a few of the properties of water in this exploration.

1. Place a penny in the center of a clean paper towel or napkin.
2. Use the pipette to add as many drops of pure water to the surface of the penny as you can. Count them as you add.

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Explore It!
#2



1. How many drops were you able to add?
2. Why do you think the water doesn't spill over the penny earlier?
3. Does flipping the coin over change the number of drops? Why?

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Explore It!
#3

Now let's try the same experiment with a different substance.

1. Place a penny in the center of a clean paper towel or napkin.
2. Use the pipette to add as many drops of soapy water to the surface of the penny as you can. Count them as you add.

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Explore It!
#4



1. How many drops were you able to add?
2. Was this less or more than the previous experiment?
3. What do you think caused this change and why?

Explore It!
#5

Although water has an overall neutral charge, the actual structure has two slightly positive Hydrogen atoms on one end and one slightly negative Oxygen atom on the other end.

This is referred to as **polarity** and allows water molecules to bond to each other through a weak link called a **hydrogen bond**.

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Explore It!
#6

There are two types of 'stickiness' happening in this experiment. The attraction between the water molecules is called **cohesion**.

The attraction of water to another polar surface (in this case the penny) is called **adhesion**.

1. Where else have you seen examples of cohesion and adhesion?

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Explore It!
#7

Cohesion allows for the hydrogen bonds on the surface of the water to create a "skin" which resists external forces. This is called **surface tension**.

Soap decreases the surface tension by changing the way the water behaves at the surface.

1. Explain the difference between cohesion and adhesion.
2. Explain what surface tension is.

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Illustrate It!

Illustrate It! Station Directions

Each member of the group will draw a quick sketch on the lab sheet that shows they understand the concept that is being taught.

Use the colored pencils and markers that are provided.

The directions for the sketch are provided on the task card at the table.

A starburst-shaped logo with a white center and a green and yellow border. The text "Illustrate It!" is written in a blue, italicized font inside the starburst.

Illustrate It!

Illustrate It! Station Directions

You will need to do the research station before completing this station.

Draw a model of 4 water molecules that are bonded together.

You will need to color code and label the covalent bonds and hydrogen bonds between the atoms and molecules.

Also label the element that each atom represent (or use a key).

If necessary, use the computer or device to help you with your model.



Organize It!

Organize It! Station Directions

It is recommended that you have completed at least **two** of the following stations before working at this station.

- Read It!
- Explore It!
- Watch It!
- Research It!

Each group will organize the cards. Each of the cards will be used. Once you are complete please have the teacher sign off on your lab sheet.

Please mix up the cards again before the next group arrives at this station.

Surface Tension	Allows water to resist an external force due to the cohesive nature of water
Cohesion	Holds water molecules together through hydrogen bonding
Adhesion	Allows water molecules to “stick” to each other and other polar substances
Polarity	Uneven distribution of the electron density in a water molecule. The hydrogen atom side of the molecules is partially positive and the oxygen side is partially negative
Melting/Freezing Point	A change in the state of matter from a liquid to a solid, or a solid to a liquid
Specific Heat Capacity	The amount of thermal energy per unit mass required to raise the temperature by one degree Celsius

Explore It!

Task Card #2:

- 1.
- 2.
- 3.

Task Card #6:

- 1.

Task Card #3:

- 1.
- 2.
- 3.

Task Card #7:

- 1.
- 2.

Write It!

Task Card #1:

Task Card #2:

Task Card #3:

Illustrate It!

Key:

Assess It!

#1 _____ #2 _____
#3 _____ #4 _____

Read It!

#1 _____ #2 _____
#3 _____ #4 _____

Research It!

Task Card #2:

- 1.
- 2.
- 3.

Task Card #3:

- 1.
- 2.

Organize It!

Watch It!

Task Card #2:

Task Card #3:

Task Card #4:
