

Investigating the Properties of Water Student Handout

Gather Evidence to determine what characteristics of a water molecule make it unique.

Claims, Evidence, and Reasoning

While completing each of the following activities, record your claims, evidence, and reasoning for each activity in the graphic organizer. Write a claim for each activity, and use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to include drawings from your lab activities as evidence.

1. Place a drop of water on a table and observe its shape. Then, write a claim about why the water forms a drop instead of spreading out on the table. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

2. Using a pipette, slowly drop water onto a penny until the penny won't hold any more water. Then, write a claim about why the water behaved the way it did. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

3. Place one drop of water on a piece of wax paper. Draw a diagram of the water droplet from the side perspective. Place a toothpick in soap and dip it into the water droplet. Then, write a claim about the effect the soap had on the water. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

4. Fill a plastic cup $\frac{3}{4}$ full of water. Place an ice cube in the plastic cup. Draw a diagram of the plastic cup, ice, and water from the side perspective. Then, write a claim about why the ice behaved the way it did. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

5. Fill a plastic cup $\frac{3}{4}$ full of water. Sprinkle some salt into the plastic cup. Then, write a claim about why the water and salt behaved the way they did. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

6. Fill a plastic cup $\frac{3}{4}$ full of water. Observe how the water clings to the sides of the plastic cup and seems to climb up the sides of the beaker. Then, write a claim about why water behaves this way. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to include any properties of water that you have demonstrated in this activity.

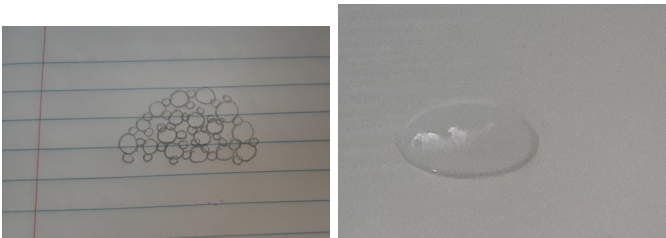
7. One unique property of water is that it absorbs a lot of heat before it gets hot. Therefore, water is important in a car's radiator as a coolant. This unique property also helps regulate the rate at which atmospheric air changes temperature, which is why the temperature change between seasons is gradual rather than sudden, especially near the oceans. Make a claim about how this unique characteristic of water helps in regulating cell temperature and maintaining homeostasis. Use evidence from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

Investigating Properties of Water

Directions: Use the following graphic organizer to help you organize your thoughts when responding to each activity throughout the lab. (NOTE: COMPLETE the graphic organizer per activity)

#1

Place a drop of water on a table and observe its shape. Then, write a claim about why the water forms a drop instead of spreading out on the table. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

<p>Claim:</p> <p><i>The water forms a round top because it sticks to itself. This is called cohesion.</i></p>	<p>Evidence: (include drawings)</p> 
<p>Reasoning:</p> <p><u>The evidence shows:</u></p> <p><i>That water is sticking to itself which doesn't allow it to spread all over the table.</i></p> <p>I know (relevant scientific facts and concepts that help answer the question):</p> <p><i>I know that water sticks to itself (cohesion) and that cohesion causes different substances to have a round edge when placed in a container or on a flat surface.</i></p> <p>I can apply (ideas that connect the claim and evidence):</p> <p><i>I can apply that cohesion or the water molecules sticking to themselves is the reason why the water droplet has a round top and doesn't spread all over the table.</i></p> <p>Therefore, I can conclude that:</p> <p><i>Cohesion is the reason that the water forms a droplet and doesn't spread all over the table.</i></p>	

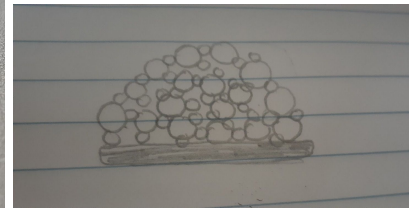
#2

Using a pipette, slowly drop water onto a penny until the penny won't hold any more water. Then, write a claim about why the water behaved the way it did. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

Claim:

I think the water behaved this way because it stuck to the penny then continued to stick on to itself. This is adhesion and cohesion.

Evidence: (include drawings)



Reasoning:

The evidence shows:

That the water stuck on to the penny and onto itself because it had a round top which is the result when water sticks to itself.

I know (relevant scientific facts and concepts that help answer the question):

I know water has the ability to stick to other things(adhesions) and if it didn't have this ability it wouldn't have stuck on to the penny and I also know when water sticks to itself on a flat surface itself on a flat surface it has a round top.

I can apply (ideas that connect the claim and evidence):

I can apply that water's ability to adhere to things allowed it to adhere to the penny and its ability to cohere to itself allowed it to create a round edge which stopped the water from going off of the sides of the penny.

Therefore, I can conclude that:

Adhesion is the reason water stuck to the penny and cohesion is the reason the water didn't flow from the side.

#3

Place one drop of water on a piece of wax paper. Draw a diagram of the water droplet from the side perspective. Place a toothpick in soap and dip it into the water droplet. Then, write a claim about the effect the soap had on the water. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

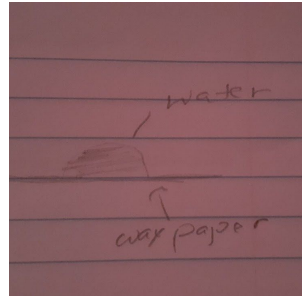
Claim:

I think the soap stopped the water molecules from sticking to each other which caused the drop of water to spread all over the paper.

Evidence: (include drawings)



I didn't have wax paper so I colored some normal paper with a crayon made of wax and placed the drop.



Reasoning:

The evidence shows:

That the water was adhering to itself and when the soap made contact it spread all over the paper.

I know (relevant scientific facts and concepts that help answer the question):

I know that soap lowers the water tension which has a big roll in water sticking to itself and I also know that soap weakens the hydrogen bonds that stick the water molecule together.

I can apply (ideas that connect the claim and evidence):

I can apply that soap's ability to weaken hydrogen bonds in water caused the water to spread all over the paper.

Therefore, I can conclude that:

Soaps cause water from cohering as strongly so that is why the water drop spread after making contact with soap.

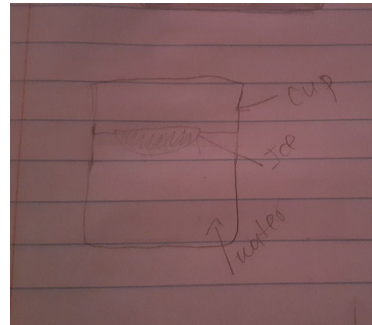
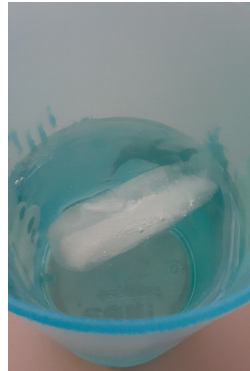
#4

Fill a plastic cup $\frac{3}{4}$ full of water. Place an ice cube in the plastic cup. Draw a diagram of the plastic cup, ice, and water from the side perspective. Then, write a claim about why the ice behaved the way it did. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

Claim:

I think the ice floated to the top because the ice was less dense than water.

Evidence: (include drawings)



Reasoning:

The evidence shows:

That the ice floated to the top.

I know (relevant scientific facts and concepts that help answer the question):

I know that water is denser than ice because the hydrogen bonds of water expand when frozen.

I can apply (ideas that connect the claim and evidence):

I can apply that the ice floated to the top, since the ice is less dense than water. The same reason oil floats on top of water because water is denser than oil.

Therefore, I can conclude that:

Ice is less dense than water and that is why it floated to the top of the water.

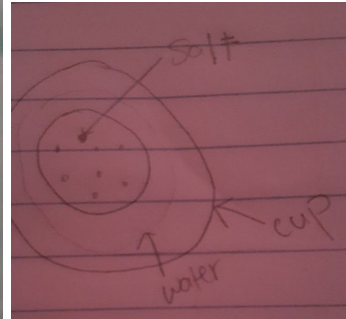
#5

Fill a plastic cup 3/4 full of water. Sprinkle some salt into the plastic cup. Then, write a claim about why the water and salt behaved the way they did. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

Claim:

The salt sunk into the bottom of the cup because it is denser than water.

Evidence: (include drawings)



The salt is very small and you almost can't see it but it's at the very bottom.

Reasoning:

The evidence shows:

That salt sunk to the bottom.

I know (relevant scientific facts and concepts that help answer the question):

I know that since ice is less dense than water it floats at the top. I also know since water is denser than oil, then water sinks to the bottom.

I can apply (ideas that connect the claim and evidence):

I can apply that since water is denser than ice and ice floats to the top that would mean the salt is denser so that is why salt sinks to the bottom.

Therefore, I can conclude that:

The reason salt sank to the bottom was because salt had a greater density.

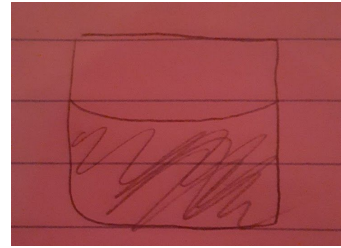
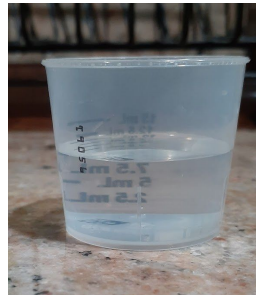
#6

Fill a plastic cup $\frac{3}{4}$ full of water. Observe how the water clings to the sides of the plastic cup and seems to climb up the sides of the beaker. Then, write a claim about why water behaves this way. Use evidence from your observations and from pp. 76 and 77 to support your claim by valid reasoning. Be sure to include any properties of water that you have demonstrated in this activity.

Claim:

I think water behaves this way because it adheres to the cup.

Evidence: (include drawings)



Reasoning:

The evidence shows:

That water is clinging to the sides of the cup.

I know (relevant scientific facts and concepts that help answer the question):

I know that cohesion causes water to have a round top and I also know that adhesion allows water to stick to other things.

I can apply (ideas that connect the claim and evidence):

I can apply that water adhered to the sides to the cup making it look like it is clinging to the sides.

Therefore, I can conclude that:

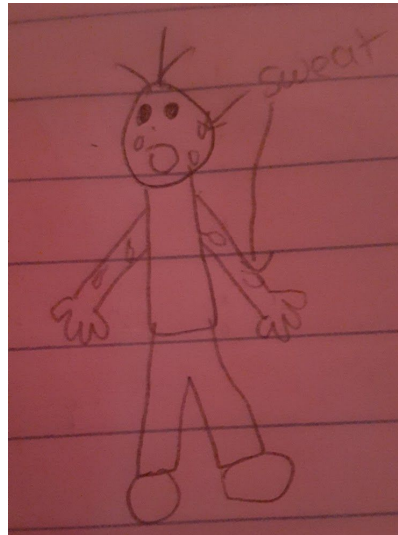
That the reason the water was clinging to the sides of the cup was because it was adhering to the sides.

#7 One unique property of water is that it absorbs a lot of heat before it gets hot. Therefore, water is important in a car's radiator as a coolant. This unique property also helps regulate the rate at which atmospheric air changes temperature, which is why the temperature change between seasons is gradual rather than sudden, especially near the oceans. Make a claim about how this unique characteristic of water helps in regulating cell temperature and maintaining homeostasis. Use evidence from pp. 76 and 77 to support your claim by valid reasoning. Be sure to name any properties of water that you have demonstrated in this activity.

Claim:

I think this characteristic of water helps regulate cell temperature and maintaining homeostasis by releasing and absorbing heat.

Evidence: (include drawings)



Reasoning:

The evidence shows:

That water can absorb a lot of heat without getting hot and it can regulate the rate at which atmospheric air changes temperature.

I know (relevant scientific facts and concepts that help answer the question):

I know that water can absorb heat and release heat. I also know that when humans get hot we release water(sweat) as a way to cool down.

I can apply (ideas that connect the claim and evidence):

I can apply that water absorbs heat without getting hot which lets aquatic life live calmly when it gets really hot, it also doesn't allow water to evaporate quickly. I also know that this allows mammals to release heat(sweat) and cool down.

Therefore, I can conclude that:

Water helps regulate the temperature of an organism's body, maintain homeostasis, maintain the temperature of bodies of water and regulate cell temperature by absorbing and releasing heat.

