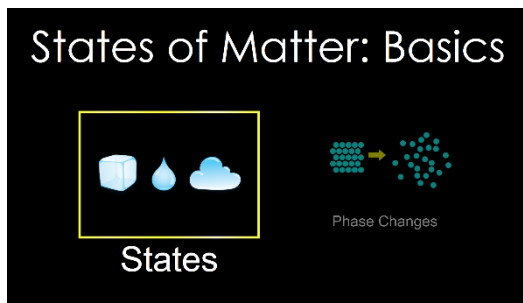


## Molecules in Motion Exploration

### Instructions:

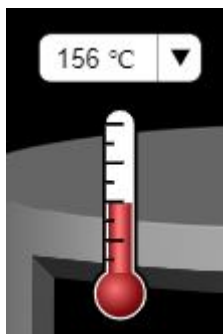
- 1) Go to: [https://phet.colorado.edu/sims/html/states-of-matter-basics/latest/states-of-matter-basics\\_en.html](https://phet.colorado.edu/sims/html/states-of-matter-basics/latest/states-of-matter-basics_en.html)
- 2) Select “States”



- 3) Select “Water” as your molecule type and “Gas” as your state of matter found on the right side of the screen.

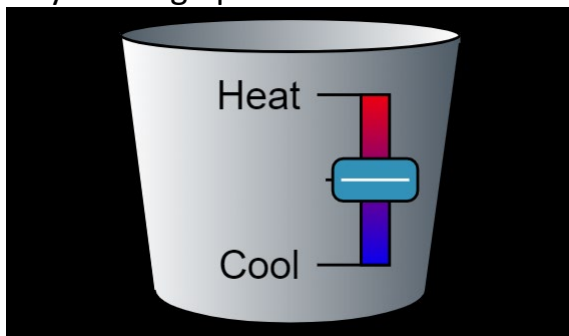


- 4) Make sure to change the temperature to Celsius (°C) by opening the drop-down menu above the thermometer.



5) Each of the red and white structures is a water molecule. Water can change into gas form at  $100^{\circ}\text{C}$  and above so at  $156^{\circ}\text{C}$  the molecules you are seeing are in gas form. Observe how the water molecules are behaving.

6) Increase the temperature by heating up the molecules. Move the “Heat/Cool” scale up.

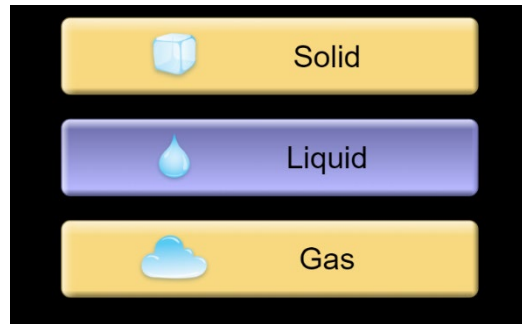


<b>How does adding more heat make the water molecules behave?</b>	
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7) Decrease the temperature by cooling off the molecules. Move the “Heat/Cool” scale down. Notice the thermometer begins to go down.

<b>What do you observe happening to the molecules as heat is removed?</b>	
<b>Are the molecules moving closer together farther apart?</b>	
<b>Are the molecules moving faster or slower? Why?</b>	

8) Select liquid as your state of matter. Below 100°C the water molecules begin to change from a gas to a liquid.



<b>What do you notice about the structure of the liquid water molecules?</b>	
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9) Try decreasing the temperature by using the “Heat/Cool” scale.

<b>Do the molecules move closer together or farther apart as heat is removed?</b>	
<b>Are the molecules moving faster or slower? Why?</b>	

10) Select solid as your state of matter. At 4°C liquid water molecules begin to change into solid water molecules. The more common name is ice!



<p><b>What do you notice about the structure of the solid water molecules?</b></p>	
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11) Try decreasing the temperature by using the “Heat/Cool” scale.

<p><b>In their ice form are the molecules closer together or farther apart than they were in liquid form?</b></p>	
<p><b>Thinking about what you’ve observed, do you think an ice cube will float or sink in a cup of water?</b></p>	
<p><b>Which state of matter has the fastest moving molecules; gas, liquid, or solid?</b></p>	
<p><b>Which state of matter has the slowest moving molecules; gas, liquid, or solid?</b></p>	
<p><b>What causes water to change from solid to liquid to gas?</b></p>	
<p><b>Thinking about what you observed, how does this affect water moving through the water cycle?</b></p>	