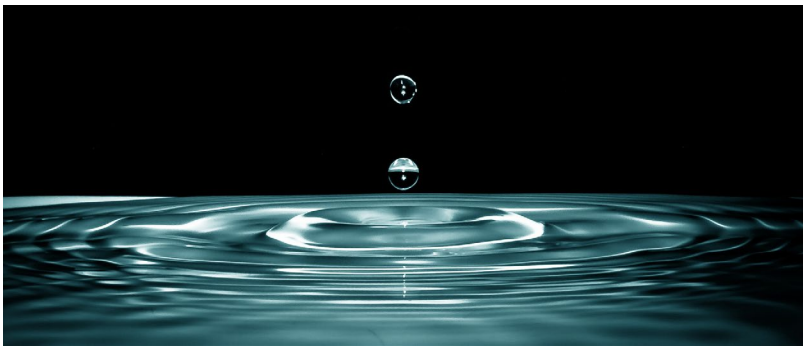
Name: _____ #: _____

Games, Nature, & Experiments
Water Mix

Estimated Time: 20 - 30 minutes
Age Range: 6th - 8th grade
What you need: 1 clear straw, 2 cups, 2 different colors of food coloring, water, stovetop or microwave, ice cubes (optional)



New Words:
A **chemical change** occurs when two substances mix together and form a new substance.
A **convection current** is a circular movement of particles by which heat is transferred throughout a liquid or a gas.
Composition is the way in which a whole or mixture is made up.
The **density** of a substance is its mass per volume.
An **experiment** is a scientific process that tests a question or theory
Mass is a measure of the amount of matter in an object.
A **molecule** is a group of atoms bonded together. Many molecules can make up substances like water (water contains water molecules).
An **observation** is something you notice, such as a trait or a behavior of an object.
A **phase change** occurs when changing the temperature and/or pressure of a substance causes it to change from one phase of matter to another (freezing water changes it from a liquid to a solid).
A **physical change** occurs when two substances are mixed together and do not form a new substance. The internal structure and composition of the substance do not change.
The **scientific method** is the process that scientists use to test hypotheses and conduct experiments.
A **solution** is a mixture of at least two substances in which the particles of the substances are of atomic or molecular size.
Viscosity refers to the thickness of a fluid.
When observing an unknown substance's smell, you should safely **waft**, or gently wave air toward your nose using a hand.

Background Information:

When a liquid is heated up, the **molecules** that it is made of move more quickly and spread further apart. Because of this, hot or warm liquids are less **dense** than cold or cool liquids. When hot and cold liquids are combined they form a **convection current**, in which the more dense water sinks and the less dense water rises. Assuming that the **composition** of the two liquids is the same, this convection current mixes the liquids until the solution reaches a uniform temperature and density. By adding food coloring to the liquid, we are able to observe the convection current more closely.

Besides observing the convection current created in this **experiment**, you will also look for evidence of **chemical changes** and **physical changes**. Physical changes do not change the identity (composition) of a substance, whereas chemical changes do.

One type of physical change is a **phase change**, which affects the phase of matter a substance is in (solid, liquid, or gas). For example, freezing water would be a physical change, where the molecules of water do not change chemically, but become slower moving because they are colder. The water changes from liquid to solid, but the molecular composition is the same.

To determine whether a chemical change has taken place, there are certain clues you can look for. Production of light, heat, or of a new gas or solid can all be signs of a chemical change. You can also look for permanent color changes, or try **wafting** a substance to see if a new odor (smell) has been produced.

Today we are going to use the **scientific method** to do an experiment.

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Think about the following questions:

What do you think will happen if hot and cold water are layered in a clear straw so that cold water is below the hot water?

Why do you think this will happen?

What if we flip the straw so that the hot water lies above the cold water? Will the result be the same or different from what you stated above? Why?

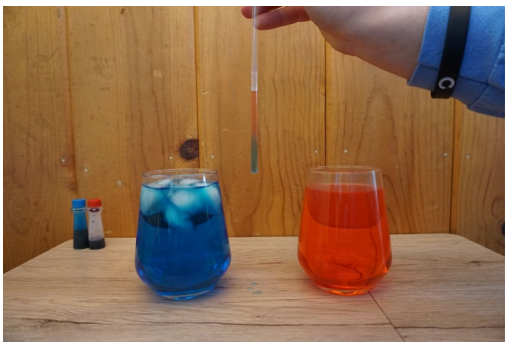
Instructions:

1. Fill the two glasses with water.

2. Put a few drops of food coloring into one of the glasses of water. Put a few drops of the other color into the other glass of water. Observe how quickly the food coloring spreads in each glass.

   Did the food coloring spread through each glass of water at the same speed or different speeds?

3. Choose one of the glasses of water to be heated up in the microwave (red glass). The water can also be heated on a stovetop and poured back into the glass. The other glass can either remain at room temperature or ice cubes can be added (blue glass).



4. Take the clear drinking straw and place it into the glass of warm water. Cover the end of the straw that is not in the water with your thumb or index finger. Take care to keep the straw upright. Keeping your finger on the opening, transfer the straw into the cold/room temperature glass of water. Quickly release and replace your finger. Notice how the water level rises as the cold water pushes the hot water further up the straw. Observe the boundary between the hot and cold water.

5. With your finger still covering the opening, flip the straw so that the end that is covered by your finger is on the bottom, leaving the open end pointing upwards. Observe the boundary between the hot and cold water.

6. Write down your **observations** about what happened during steps 4 and 5.

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Scientific Method

What will happen if hot and cold water are layered in a clear straw so that cold water is below the hot water? What if we flip the straw so that the hot water lies above the cold water?

Hypothesis:

If _____, then _____

because _____.

Data Collection/Observations:

_____
_____
_____

Analysis:

What happened when you collected the hot and cold water into the straw? Was your original prediction correct?

_____
_____
_____

Did anything change when you inverted the straw so the hot water was at the bottom? Why or why not?

_____
_____
_____

What chemical changes did you notice? What makes these chemical changes?

_____
_____
_____

What physical changes did you notice? What makes these physical changes?

_____
_____
_____

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Are there any other conclusions that you can make based on your observations?

_____

_____

_____

Conclusion:

What was the result of the experiment? Was your hypothesis correct? Why or why not?

_____

_____

_____

Think of some ways you could do this experiment differently to change the speed at which the water mixes. How would this experiment be different if we used a liquid that is more viscous than water? Less?

_____

_____

_____

Sources:

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