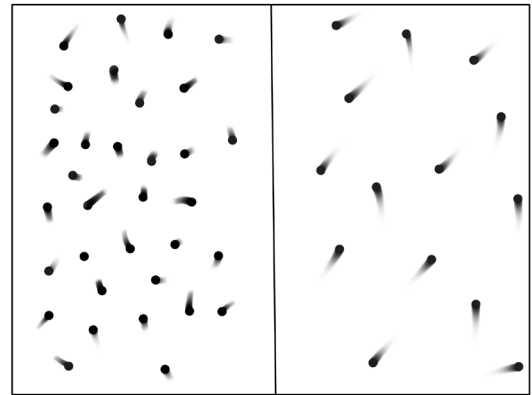


Heat and Fluids Exploration

This activity was created by Brenna.

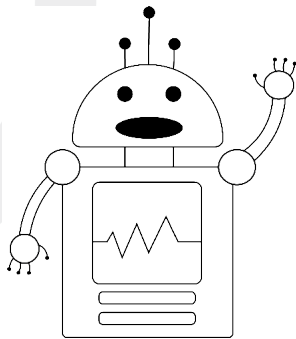
For all matter, adding heat makes the particles gain kinetic energy, so they move around more and take up more space. Hotter substances expand and are less dense than cooler ones.

Some real-world examples of this are air currents, ocean currents, and hot air balloons! Currents form when hot and cold fluids meet and interact with each other. The denser cold fluid sinks down, while the lighter hot fluids rises up. Hot air balloons work in a similar way; the hot air inside the balloon is less dense than the air around it, which lifts it up above its cooler surroundings.



Particles in a cold substance

Particles in a hotter substance



Reading instructions and completing steps in a certain order is how computers read code! Following step by step instructions to complete a task is called an algorithm.

Part One

You will need:

Two clear glass cups

A syringe (not necessary, but recommended)

Food colouring

Hot and cold water

Step 1

To begin, pour hot water into one glass until it is mostly full.

Step 2

Take cold water (just from the tap is fine), and add a few drops of food colouring, then stir until the food colouring is mixed in.

Step 3

Using the syringe, “inject” some cold water into the glass of hot water. If you don’t have a syringe, pour some cold water into the hot water while disturbing the hot water as little as possible.

Step 4

How does the cold water move and interact with the hot water?

Date: _____

Name: _____

Step 5

Now, try the opposite! Add food colouring to some hot water, and then add it to the cold water in the glass.

Step 6

What happens this time? Can you see how the different temperatures of water act?

Part Two

You will need:

A large clear container (a vase or jar works well)
2 different colours of food colouring

Hot and cold water
A clear glass

This activity will show how ocean and air currents flow and interact!

Step 1

Start by filling the container about 3/4 full with cold water. Add in a few drops of food colouring, and stir until it is all a consistent colour.

Step 2

Take some hot water in a clear glass and add in a few drops of the second colour of food colouring. Stir until its a consistent colour.

Step 3

Slowly pour the hot water into the container of cold water until it's full (it will reach the top of a jar or vase).

Step 4

Watch how the colours swirl and interact with each other! Can you see the two distinct temperatures of water?



Step 5

Leave the container to sit. Over time, the heat will transfer from the hot water to the cold water until they reach equilibrium and are the same temperature. This transfer of heat through a fluid is called convection.

Part Three

You will need:

2 clear glasses of the same size

Hot and cold water

2 different colours of food colouring

A piece of thin, hard plastic or sturdy paper

It is recommended to do this activity outside, in a sink, or over a large tray as it could get a bit messy!

Step 1

Fill a glass with cold water and add in a few drops of food colouring. Fill the second glass with hot water and add the other food colouring.

Note: Both glasses should be as full as possible, with the water rising slightly above the rim of the cup.

Step 2

Set the piece of plastic or paper on top of the glass of hot water, so it is completely covering the top. Press down so it touches the rim of the glass and creates a seal.

Step 3

Using the plastic/paper to prevent spilling, flip the glass of hot water upside down and set it on top of the cold water glass.

Step 4

Carefully pull out the plastic/paper while holding the glasses in place on top of each other.

Step 5

Ta-da! Look at how the different temperatures of water interact! There might be some mixing in the middle, but the colours should stay mostly separated.

Step 6

Repeat this process with the cold water on top instead. Notice how the water acts differently! Because cold water is denser, it will quickly sink to the bottom.

