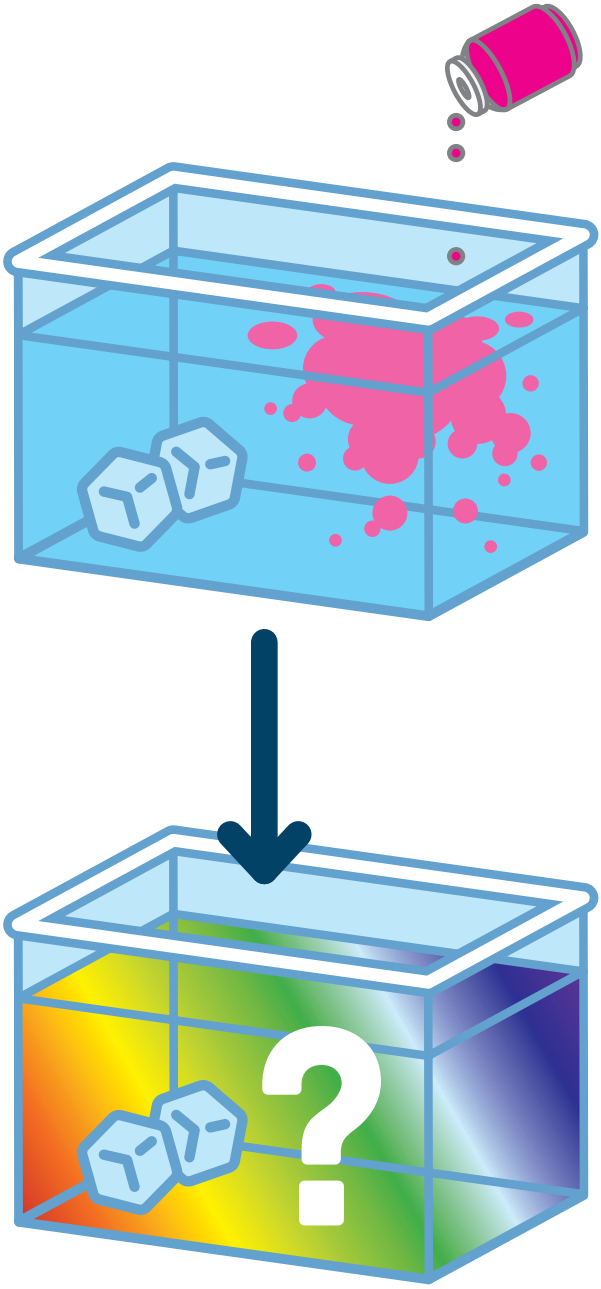
CURIOSITY AT HOME

THUNDERSTORM IN A TUB

Thunderstorms are a form of weather seen all over the world. They are localized storms that usually include heavy rain and lightning that makes the loud crashing noise we call thunder! In this experiment, you will demonstrate the beginning stages of a thunderstorm by observing the mixing of warm and cool temperatures.



MATERIALS

- Water
- Ice cube tray
- Liquid food coloring (or liquid watercolors)
- Clear plastic tub (size of a shoebox)
- Method for heating water
- Colored pencils, crayons or markers (optional)
- Something to write with
- Science notebook or paper

PROCEDURE

- Freeze some ice cubes with blue dye mixed into them. You will need 2 ice cubes for each round of the activity. We recommend freezing at least 4 so you can try this twice, with the option to make more for additional rounds of the activity.
- Once your ice cubes are frozen, fill your tub with lukewarm (not too hot!) water.
- Drip 4–5 drops of red dye into one side of the tub and do not mix it.
- Next, place 2 blue ice cubes in the opposite side of the tub. Do not stir or disturb the water. Observe over time how the different colors behave. What do you notice? Record observations in your science notebook.

  TIP: The two colors should stay distinct and not mix to form purple water instantly. If you are getting purple water very quickly, your warm water may be too hot, melting your ice cubes too fast. Your water should feel warmer than the room, but cool enough that you can keep your fingers in it. Eventually it will mix and make purple water but it should be a slow process.

Experiment continued on next page...

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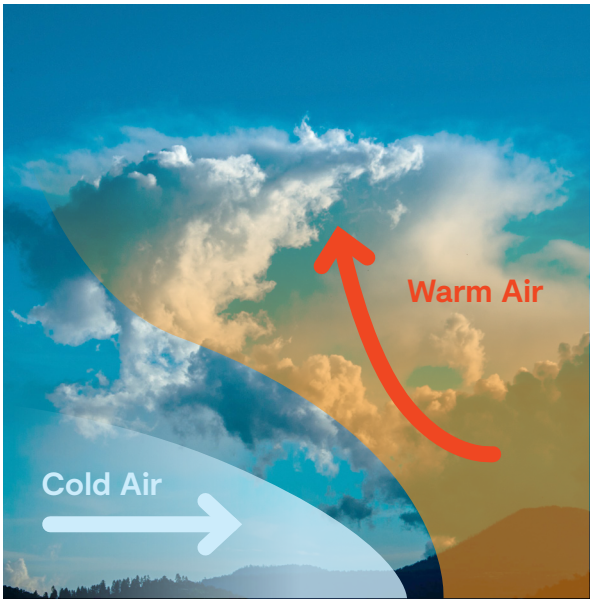
TRY THIS

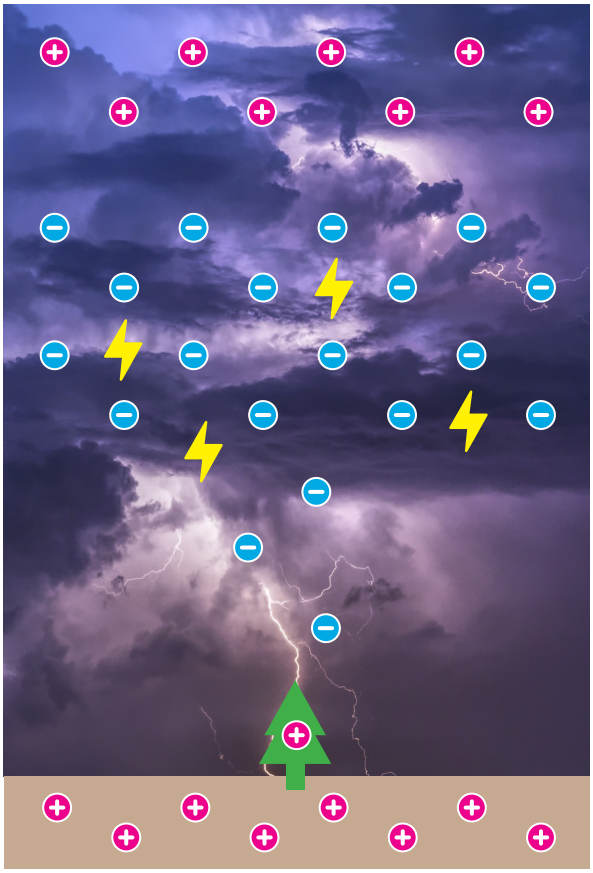
- If you are able to, film the experiment and then play it in slow motion or speed it up. What do you notice about the colors at these different speeds?
- Get a piece of paper and some coloring utensils. Can you draw what you just saw happening? Be sure to use arrows to show the direction the different water temperatures are moving.
- Can you describe what is happening in the tub in your own words? Write down some key things that you notice and guess what those might represent in a real thunderstorm.



DID YOU KNOW

This is a simple model of the first stage of a thunderstorm. In your tub, the cold (blue) water sinks and pushes the warm (red) water up. The same thing happens in a real thunderstorm with cold and warm air. When a colder wind higher in the atmosphere reaches warm air next to the ground, the cold air sinks to the ground in a strong wind called a **downdraft** and pushes the warmer air **upwards** making an updraft. That's why we often feel a strong cold wind before a thunderstorm, it's the downdraft!

When the hot air is cooled down, the moisture in the air condenses, forming rain droplets. Eventually, the cloud becomes too heavy and water falls as rain droplets. Sometimes, they get cooled down so fast they form little ice pellets called hail! The **thunder** we hear in storms comes from **lightning**, which is an electric current formed by the rain and hail droplets rubbing against each other in the cloud. As they rub together, they make parts of the cloud (usually the bottom) more negatively charged, building up **electricity**. When the negatively charged cloud comes close to something on earth, like a building or a tree, the negative charges try to escape the cloud by jumping toward the earth. When the negative charge tries to get to earth, it releases energy, which we see as lightning. This is similar to the shock you feel when you rub your feet on the carpet and touch something. The energy in lightning is so powerful that it creates a loud bang that echoes in the clouds creating thunder.



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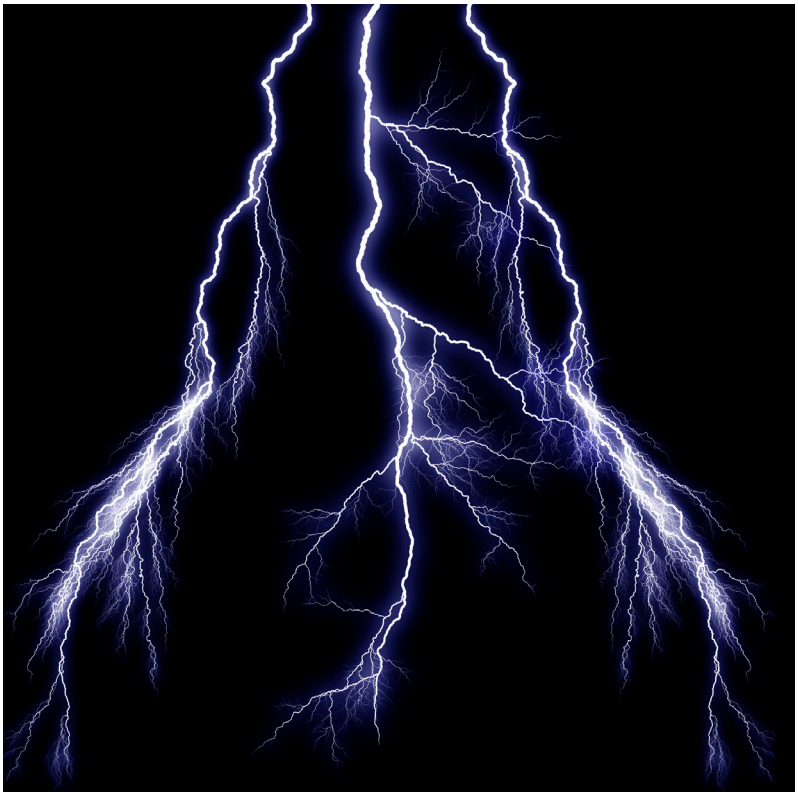
6–8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Is there another way you could show the heating and cooling effects of a thunderstorm? Design another way to model this and try it out.
- How fast did the water move in your experiment? Remember, real updrafts can be up to 90mph. Why do you think storms are able to move faster than your experiment?
- Next time you see a thunderstorm, calculate how far away the center of the storm is by counting the seconds between the lightening and the thunder. Take the number of seconds and divide by 5 to determine the number of miles away the storm is. For example if you count 10 seconds between lightning and thunder, the storm is 2 miles away.
- Check out weatherwizkids.com for cool facts and try your hand at some of the weather quizzes.



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