

# At-Home Weather Experiments

## How do Thunderstorms form?

**Purpose:** The purpose of this experiment is to visually understand the formation of general thunderstorms.

Supplies:

- Clear plastic container
- Red & blue food coloring/dye
- Ice cube tray (will be making ice cubes)
- Room temperature water (for tub)

Instructions (*further discussion is italicized*):

1. Fill the ice cube tray with water and 1 drop of blue food coloring/dye. Place in the freezer until frozen.

*(These represent a cold air mass.)*

**\*Continue experiment once blue ice cubes are frozen\***

2. Fill a clear plastic container with room temperature water. It is important that the water is room temperature to clearly see the red/blue food coloring.  
*(room temperature water represents a stable atmosphere.)*
3. On one side of the container pour in a few of the blue ice cubes. Immediately following this, add in 3-4 drops of the red food coloring to the opposite side of the container. Watch to see what happens.

*(red food coloring represents a warm air mass. Thunderstorms require an unstable atmosphere, moisture and a lifting mechanism. The warm air (red food coloring) is forced to rise over the colder air (blue food coloring). In this scenario, the lifting/forcing mechanism is the cold front (blue food coloring). Within thunderstorms, this visualization represents the formation of an updraft. Warm air rises, condenses, and releases latent heat. This heat helps to further fuel thunderstorms.)*



# How Do Clouds Form?

**Purpose:** The purpose of this experiment is to visualize the formation of clouds. This will involve the formation of water vapor and the process of condensation.

## Supplies:

- A jar with a lid
- ~1/3 cup of hot water
- Ice
- Hairspray
- \*match, flashlight & balloon with the 'neck' cut off (2<sup>nd</sup> method)

## Instructions (further discussion is italicized):

1. Fill the jar with the hot water. Swirl the water around to warm up the sides of the jar.  
*(The warm water represents warm air that turns into water vapor.)*
2. Place the lid upside down on top of the jar followed by a few ice cubes. Leave alone for ~20 seconds.  
*(Some of the water vapor rises to the top of the jar and comes into contact with the cold air (ice cubes).)*
3. Quickly remove the lid, spray a bit of hairspray in the jar and place the lid & ice back on top.  
*(Condensation occurs when water vapor cools down and a cloud forms when the water vapor has something to condense on. In this situation, the water condenses onto the hairspray.)*
4. Watch the cloud form.  
*(In reality, water vapor can condense onto particles of dust, pollen, air pollution, etc.)*
5. Once a decent amount of condensation has formed, remove the ice & lid and watch the cloud transition into the air.  
**\*alternative method: this is a second method of the same experiment with a different supply list\***
6. Pour warm water into the jar to cover the bottom ½" of the jar.  
*(Some of this water is turned into water vapor)*
7. Light a match and hold the lit end in the jar for a few seconds so smoke enters the jar. Then, remove the match or drop it into the jar (flame extinguishes once hitting the water at the bottom).  
*(As with the previous method, the smoke in this case is what the water vapor condenses on)*
8. Quickly and carefully cover the opening of the jar with the balloon.
9. With your finger, gently push the balloon into the jar to increase the air pressure inside the jar. Carefully, release your finger and watch as a cloud forms instantly within the jar. It may help to use a flashlight to see the cloud more clearly.  
*(pressing on the balloon increases air pressure within the jar which results in warmer air. Releasing the balloon decreases the air pressure within the jar resulting in colder air. Cooling air leads to the condensing of water vapor within the jar. Water vapor condenses onto the smoke particles from the match leading to cloud formation.)*
10. Step 9 can be repeated several times & additional clouds will form.

## How Does Air Pressure Work?

**Purpose:** The purpose of this experiment is to show how air pressure works and what happens when air pressure within an object changes.

### Supplies:

- Balloon
- Matches
- Paper
- Mason Jar
- Optional: marks to draw on the balloons prior to the experiment ☺

### Instructions:

1. Fill a balloon with water so it is just large enough to sit on top of the opening of the mason jar.
2. See how the balloon won't fit through the opening.  
*\*Ask kids if they think it is possible for the balloon to enter the jar.*
3. Light a piece of paper on fire & drop it into the jar. Place the balloon back on top.  
*(Hot air is created when the paper is heated and dropped into the jar and the air tries to escape around the balloon)*
4. Balloon will start to shake and be sucked partially into the jar. Should get stuck about halfway into the jar.  
*(The balloon is sucked into the jar due to air pressure. The hot air around the balloon is what causes it to shake initially. Since the balloon is made of a latex material, no new air is allowed to enter the jar.)*
5. Once the fire dies down and the jar cools down see if you can pull the balloon out of the jar.  
*Since no new air is allowed inside the jar this leads to a local low-pressure system within the jar that partially sucks the balloon inside the jar.)*
6. Were you successful?



# How Do Clouds Produce Rain?

**Purpose:** The purpose of this experiment is to show how rain is created from clouds.

## Supplies:

- Mason jar
- Shaving cream
- Food coloring (blue)
- Optional: use different colors (food coloring) to make rain within the cloud more colorful ☺

## Instructions:

1. Fill the jar with water.  
*(this represents air)*
2. Add a thin layer of shaving cream on top of the water.  
*(this represents clouds—previous water vapor)*
3. Place a few drops of the blue food coloring on top of the shaving cream. *(this represents the water droplets within the clouds)*
4. Wait for the ‘rain’ to fall through the ‘clouds.’  
*(As a background, clouds form when water vapor rises and condenses into tiny air particles (this could be dust, smoke, air pollution, etc.) When a large amount of these droplets come together, visible clouds form. As a cloud becomes saturated, the water within the clouds eventually gets heavy enough and falls through the cloud towards the surface (earth) due to the pull of gravity. For the purpose of this experiment the use of food coloring (rain) and shaving cream (cloud) are forms of ‘water’ that is visual)*

