

Water Cycle and Weather Fronts



Recommended Grades:

K-5



Time Needed:

15-20 minutes

Description

- Students will learn how weather fronts interact with the water cycle.
- Guiding Question/Concept: What role do weather fronts play in the water cycle and how do fronts affect severe weather

Learning Objectives: Student will:

- Learn and describe the difference between a warm front and a cold front
- Describe how the type of fronts affect or produce severe weather
- Learn and describe the basic water cycle

Materials

Water Cards
Blue Cold Front Cards
Red Warm Front Cards
Chain
Lanyards (optional)

Rules: (e.g., have students remove shoes before walking on map)

Directions

1. Introduce the water cycle- evaporation, condensation, precipitation- and the types of precipitation- rain, snow, sleet, hail.
2. Introduce what a front is and how fronts move (for this activity the fronts move west to east)
 - a. Ask students what they think causes the weather conditions outside- rainy, sunny, cool/cold, warm/hot
 - b. Say to students: A front is a boundary that separates two types of air masses and can cause the weather outside like if it is raining or if it is sunny. Air masses determine what the weather will be like outside. For example, a warm air mass produces warm weather whereas a cold air mass produces cold air outside. The type of front corresponds to the air that is following behind it. A cold front brings in cold air and a warm front brings in warm air. Fronts move from one side of an area to another- for the activity today, the fronts will move west to east (left to right).

3. Describe warm and cold fronts

- Ask the students what type of air a warm front brings and what type a cold front brings
- Say to students: A cold front is a line of cool air that goes from the ground to way up in the air. A cold front is colder than the air in front of it. A warm front is a line of warm air that goes from the ground to way up in the air. A warm front is warmer than the air in front of it.

4. Describe how fronts determine weather

- Ask the students how they think fronts would change the weather
- Say to students:
 - A cold front brings cold air making the weather outside colder. A cold front can also cause severe weather like strong storms and even hail and tornadoes. This is because the cold air coming in acts like a bulldozer and causes the warmer air to move out of the way. This pushing causes the warm air to rise ahead of the front, taking the evaporated water molecules with it. This starts the process of evaporation. Once the warmer air can rise no more, the water condenses and forms clouds, which grow bigger as the front moves closer. Once the front comes to the area, the clouds cannot hold the water molecules any longer and precipitation starts coming down in the form of rain. Sometimes the water molecules in the very top of the cloud will freeze and form hail, making the storm a severe storm. Hail most commonly forms in thunderstorms, which are very common with cold fronts. Once the front is out of the area, the storms leave and the temperature is cooler than what it was before the front moved through. It is also less cloudy because the colder air is commonly drier than the air it replaced.
 - A warm front, on the other hand, brings warm air, making the weather outside warmer. Warm fronts can produce storms but most times those storms are not as strong as the storms that come with cold fronts. As the warm air in the warm front approaches an area, the air is forced to rise above the cold air. The cold air acts like a ramp for the warm air to rise up. As it rises, the warm air takes the evaporated water molecules in the air with it and starts the process of condensation and forms clouds. Eventually the clouds can no longer hold the water molecules and start the process of precipitation, in the form of rain. After the front moves through, warm air replaces the cold air and the weather outside becomes warmer and the sky is cloudier.

Activity:

1. Have the students divide into 2 groups - One group will represent the fronts and the other group represents water molecules traveling through the water cycle. Provide one group with Cold Front Cards and the other group with the Water Cards. Optional: students could connect their front and water molecule cards to lanyards so their hands are free for the activity.

2. Start with the cold front group:

a. Have the kids stand in a line spanning the width of the giant map

c. Provide the chain to the students that are lined up to represent the cold front. Have the students hold the chain across the Kentucky Giant Map.

3. Water molecule group:

a. Have the kids disperse across the map and sit down.

- b. Divide the map into columns and give each column a designation (a name, a number, something the kids will understand)
 - c. Have the kids in the column closest to the front start standing up- explain the standing up represents condensation- the kids standing up are representing clouds. Have all of the other kids lying/sitting down and explain that this represents water molecules that are still in liquid form that have not been evaporated yet. Explain that as the front moves closer, you will designate when each column is to stand up gradually to show evaporation and that once the front is close enough, you will tell each column when to jump over the chain to demonstrate precipitation. After the kids jump, have them lay back down to show the molecules are back into their liquid state.
4. Once the groups are established and are in their starting places, have the front group slowly start moving across the map, keeping the chain as close to the ground as possible.
 5. Have the kids representing the water molecules jump over the chain front to demonstrate precipitation and then have them lay/sit back down and watch as the front progresses.
 6. As the front group starts progressing into a new column and the kids in that column start jumping over the chain front, have the kids in the next column over stand up.
 7. Collect Cold Front Cards and Water Cards. Provide the group who was the Cold Front with the Water Cards. Provide the group who represented the Water with the Warm Front Cards. Repeat steps 2-6 for the warm front.

Teacher Note: Pause the activity as needed if you want to ask the students questions to make sure they are understanding the water cycle and what stage of the water cycle each column of the water molecule group is in.

Teacher Tip: Use red and blue pool noodles to represent the warm and cold fronts instead of the chain and cards.

Key Vocabulary:

- Cold front: A front that brings cold air to a region
- Front: A boundary that separates two types of air masses
- Water cycle: How the water is in constant cycle through the atmosphere. The basic water cycle includes evaporation, condensation, and precipitation
- Condensation: Process where water vapor transforms into a liquid and forms clouds in the sky
- Evaporation: Process where liquid water turns into a gas
- Precipitation: Water released from clouds in the form of rain, sleet, snow, or hail, but most commonly as rain.
- Hail: Frozen water pellets, can sometimes be as big as baseballs or even bigger; is the term used for frozen water pellets in the summer
- Sleet: A form of winter precipitation does not get any bigger than a little pellet. Most commonly occurs when rain freezes and becomes ice before it hits the ground.

Connections to Kentucky Curriculum:

- K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time
- K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
- 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.