Name Period Date

LESSON 5

How does air move and change when a storm is forming?

Your teacher will demonstrate how air changes as it is heated or cooled. This will help you figure out what happens to air that warms near the surface, and air that cools at higher altitudes.

STEP 1: Observe warmed and cooled air.

Draw the lab set-up and what happens to the balloon during the demonstration. Add your observations to your drawing as you make them. Remember to label what is happening.

LAB SET-UP	MYLAR BALLOON BEING HEATED	MYLAR BALLOON AS IT COOLS

1. Why does the heated balloon go up? Think about what is happening inside the balloon.

2. What is happening inside the balloon when the balloon starts to sink?

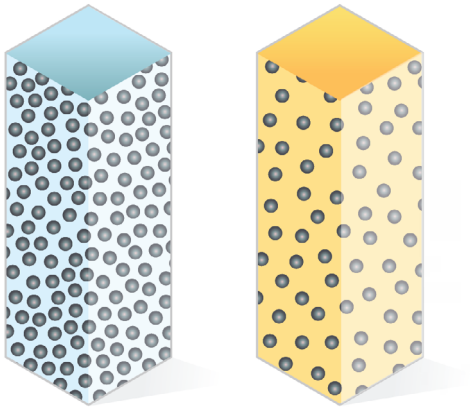
LESSON 5

How does air move and change when a storm is forming?

STEP 2: Air on the Move

There is something different between warm and cool air that causes warm air to go up and cool air to go down. When the air inside the balloon was warmed, the balloon expanded and went up. When the air inside the balloon cooled, the balloon started to shrink and go down. Let's think a little more about this air and what is happening when it is warmed and cooled. To understand this, we are going to need to zoom in and think about what's happening to the air molecules.

Imagine you can see a pocket of air molecules heated up. When air is heated, the heat energy is absorbed by the individual molecules, causing them to move around more quickly. The molecules move faster and farther apart. When molecules release their energy, they start to slow down and cluster closer together. This happens when the molecules no longer have a heat source and are "cooling."



COLD AIR WARM AIR

Draw a diagram that shows what 20 warmed air molecules look like inside the mylar balloon compared to 20 cooler air molecules.

BALLOON WITH WARM AIR	BALLOON WITH COOL AIR

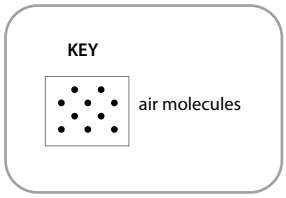
So, that's how warm air and cool air are different. But why do they move in different directions? To understand that, we're going to need to zoom out and think about the whole planet and gravity.

How does air move and change when a storm is forming?

STEP 2 CONTINUED: Air on the Move

Gravity is the force that draws all objects towards the center of the planet. Even tiny things like air molecules are affected by gravity and pulled downward. The weight of the air molecules higher in the atmosphere pushes air molecules lower in the atmosphere closer together. High in the atmosphere, they are spaced farther apart. Air molecules pushed close together are at high pressure. Air molecules spread apart are at low pressure.

Draw air molecules between the planet and the top of the atmosphere. Remember that they will be spaced differently depending on whether they are close to the ground or higher in the atmosphere.



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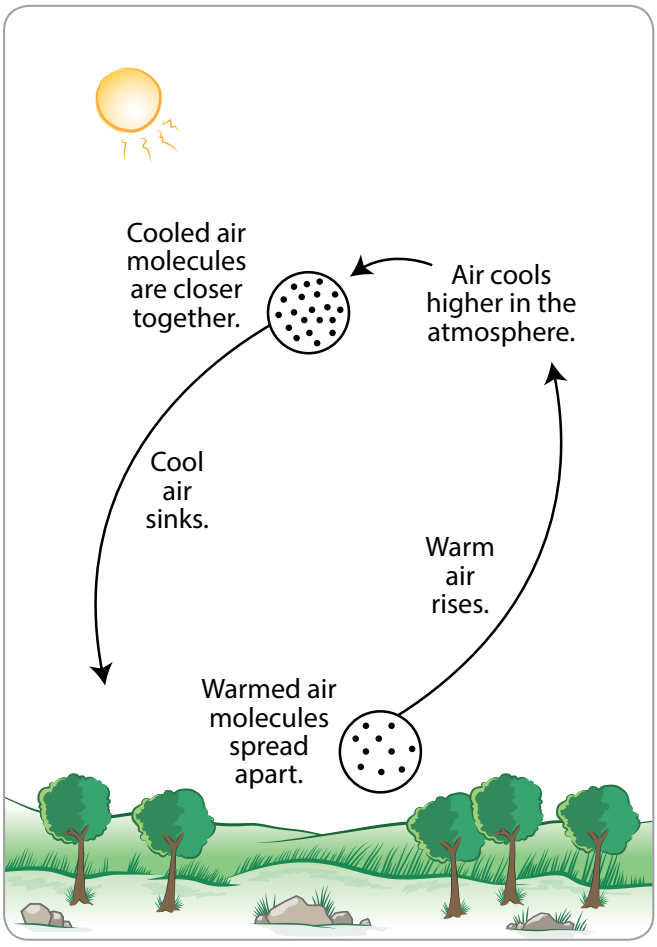
STEP 2 CONTINUED: Air on the Move

When sunlight warms the land, and then warms the air near it, the molecules spread out a bit, taking up more space, just like the air at high altitude. The warmed air has lower pressure than the air around it, so it rises in the atmosphere, like the warmed balloon in the previous activity.

As the warmed air rises in the atmosphere, it cools down, because air at higher altitudes is cooler. Remember that cool air doesn't hold as much water vapor as warm air, so as warm air cools, some of the water vapor condenses into the tiny water droplets that make up clouds.

As air gets cooler, the molecules come closer together. The air has higher pressure than the air around it, so it sinks in the atmosphere, like the cooled balloon in the previous activity. Then, it can be warmed and rise again.

This cycle of rising and falling air is called **convection.**



EXPLAIN: Why does warm air go up and cool air go down?

How does air move and change when a storm is forming?

STEP 3: Create a model to describe how precipitation happens in an isolated storm.

To get started, **draw and write** in the illustration to explain how precipitation happens in an isolated storm.

Make sure your model explains:

- What happens to energy from the Sun that leads to an isolated storm?
- What happens to water at the surface and clouds that lead to the isolated storm?
- How does air temperature and humidity change as air moves from the ground to the cloud?
- How does air move between the ground and where the storm forms?

Write an explanation that goes with your model and answer the question below:

EXPLAIN: What has to happen for an isolated storm to form?