Name:

What Happens to Convective Storms in a Warmer Climate?

Student Activity Sheet

Observe Warmed and Cooled Air

1. Draw the lab setup and what happens to the balloon during the demonstration. Label your drawing and describe what you see happening, as well as what you think is happening to the air inside the balloon.

Setup (before heating)	Heated balloon	Cooling balloon

The rising of hotter, less dense materials and sinking of cooler, more dense materials is called CONVECTION.

2. Describe what is happening to the air molecules inside the balloon that causes the balloon to rise and then sink.

3. Describe or draw a picture to show how the Mylar balloon demonstration serves as a model to explain how convective storms form.

Make a Thunderstorm

Use the Make a Thunderstorm simulation (https://scied.ucar.edu/interactive/make-thunderstorm) to determine the conditions needed to make a thunderstorm. In the simulation you can experiment with ground-level temperature, high-altitude temperature, and humidity (the amount of moisture in the air).

As a storm becomes more intense, it is likely to produce severe weather, such as strong winds, heavy rains, large hail, and possibly even tornadoes!

4. Open up the Make a Thunderstorm simulation. Before you begin, make a prediction. Which combination of conditions do you think will result in an intense thunderstorm? (check the box for each)

High-altitude temperature: ❑ very cold ❑ cold ❑ cool
Humidity: ❑ high ❑ moderate ❑ low
Ground-level temperature: ❑ cold ❑ cool ❑ warm

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5. Try out four different thunderstorm experiments by changing temperature and humidity combinations within the simulation. Record and explain your observations in the table below.

Conditions	**Outcome**	**Why did this happen?** *What helped the storm to form or not to form?*
High-altitude temp: Humidity: Ground-level temp:	❑ No storm ❑ Storm ❑ Intense storm	
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High-altitude temp: Humidity: Ground-level temp:	❑ No storm ❑ Storm ❑ Intense storm	

6. What atmospheric conditions are needed to make a storm happen? When no storm forms, what is missing?

7. Which conditions resulted in the most intense storm?

How Is the Warming Climate Changing Storms?

- The climate is warming due to the burning of fossil fuels that add greenhouse gases (such as CO_2 and CH_4) to the atmosphere.
- Earth's global average temperature has increased by about 1.1°C (2°F) since the early 1900s. This might not sound like a lot, but as a result, we are already experiencing sea level rise, melting polar ice sheets, more extreme weather events, ecosystem changes, and human health impacts.

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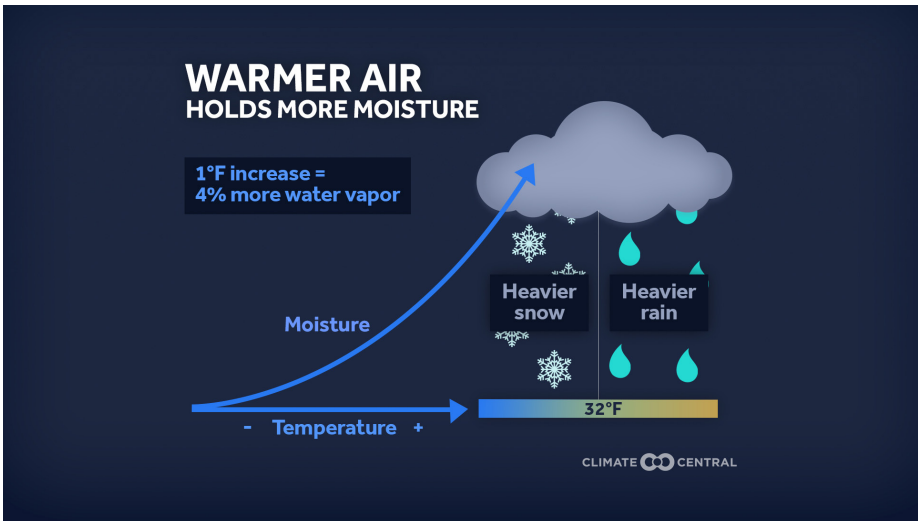
8. The graphic below says that for every 1°F of warming, the air can hold 4% more water vapor. Do you think this is significant enough to cause a change to storms? Why or why not?



9. Use your knowledge of storm formation, your observations from the experiment you did in class, and the information in the graphic (above) as evidence to support the claim that a warming climate will bring more extreme precipitation during storms. Fill in your evidence and reasoning in the table below.

Source of evidence	**Evidence that supports the claim**	**Reasoning** *Explain why the evidence supports the claim.*
Science of storm formation		
Condensation experiment		
Graphic (above): Warmer air holds more moisture		

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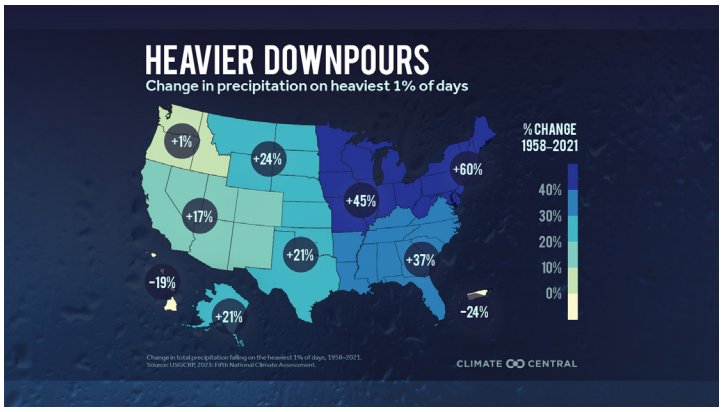
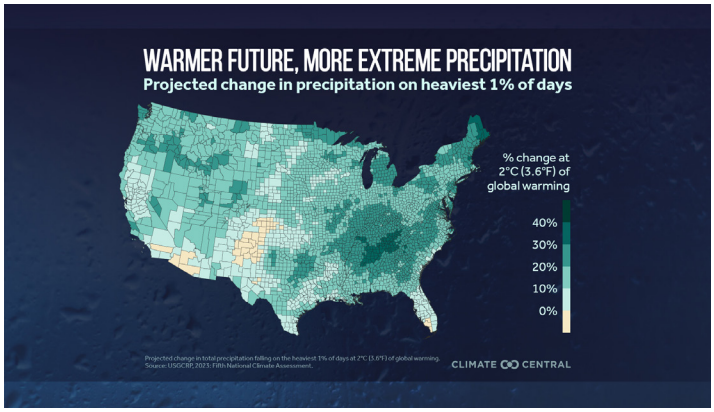
Use the graphics below to answer questions 10 and 11.





10. Write a caption that explains the main idea for each of the graphics above.

Heavier downpours:

Warmer Future:

11. Based on the information in the graphics above, what do you think is important for people who live in your community to know about how storms are changing, both under current climate conditions and for the future? How might these changes affect them?

Stay Safe During Severe Thunderstorms

A severe thunderstorm is defined as a storm with at least one of the following: winds of 58 mph or greater, hail 3/4 inch or larger, or tornadoes.

Thunderstorm Hazards:

- Lightning - All thunderstorms have lightning.
- Wind - High speed winds are responsible for most thunderstorm damage.
- Hail - Solid ice forming inside a thunderstorm can become large, damaging hailstones.
- Flooding - Heavy rainfall can trigger flash flooding.
- Tornadoes - A dangerous, rotating column of air can form.

12. Come up with a pitch for a creative way to inform others about how to stay safe from at least one thunderstorm hazard. Research thunderstorm hazards and safety to inform your pitch. Be prepared to present your pitch to the entire class.

Use any of the following websites or other credible sources to learn more about thunderstorm hazards and safety:

- NOAA: Severe Weather 101
- National Weather Service: Severe Thunderstorm Safety
- Red Cross: Thunderstorm Safety
- UCAR: Storms and Other Weather

Your pitch should include:

- **Format:** How will you share your information (TikTok video, Instagram post, newsletter, poster, radio jingle, etc.)?
- **Audience**: Who is your intended audience (teens, general public, your school, etc.)?
- **Justification**: Why is this information important to share with your audience? Use evidence from the other parts of this lesson to support your justification.
- **Goal**: How will your creation help people stay safe?
- **Content**: What do you want your audience to learn? Share bullet points of the main ideas.