STEMscopes NEW YORK 3D
K-12 SCIENCE

LESSON SAMPLE
Third Grade

WEATHER AND THE WATER CYCLE

LESSON SAMPLE

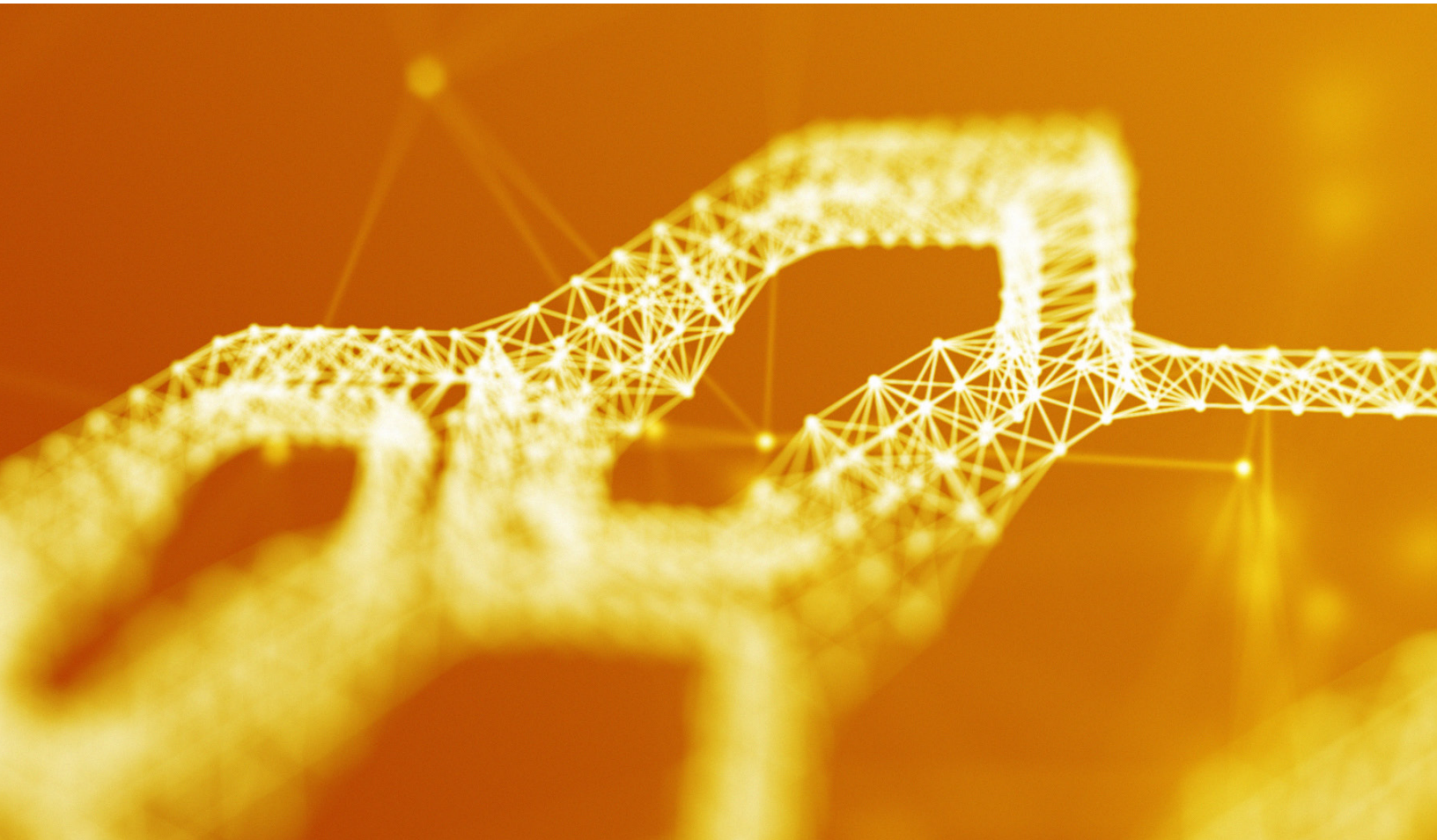
www.acceleratelearning.com/science/ny

Welcome to STEMscopes Science!

Using the proven 5E learning model, STEMscopes New York 3D allows teachers to seamlessly align their instruction with New York's new required investigations through hands-on activities that meet the New York State P-12 Science Learning Standards.

The Sample Lesson includes activities from the Weather and the Water Cycle scope (or unit) of our 3rd Grade science curriculum. These hands-on activities are found within the Engage and Explore sections of the scope. You'll notice a teacher set-up video, materials list, and facilitation points, as well as the student handouts that coincide with each activity.

To learn more about the STEMscopes New York 3D curriculum, reach out to your STEMscopes Account Manager or request a free 30-day preview at stempreview.com.



Weather and the Water Cycle

Investigative Phenomena

STEMcoach in Action

Facilitating Questioning and Discourse
Site

Description

The Investigative Phenomena is designed to help students work toward the goal of figuring out why or how something happens. Students should build their knowledge about the phenomena as they move through the scope.

Materials

None

Preparation

- Write the Student Wondering of Phenomena question on the board, or post it somewhere in the room so that all students can see it. You will refer to this question as the students move through the scope.

Teacher note: These are sample phenomena events, and possible student wondering questions. You may choose to adapt or change these to meet the needs of your students, and allow students to generate their own questions.

Facilitation

Part I: At the Beginning of the Scope

1. Introduce students to the sample Student Wondering of Phenomena question below.
   Why does it rain?
2. Allow students time to generate possible answers to the question. You can record the student responses in the Investigative Phenomena table so that they can be referred to throughout the scope.
3. Allow students time to generate their own questions about the phenomena.
4. Tell students that as they move through the scope, they will be doing many activities to learn the information needed to describe the events happening in the Investigative Phenomena.

Part II: During the Scope

1. Each time the students complete one of the elements in the scope, they should revisit the Investigative Phenomena, and revise their thinking. Each time they learn something new, discuss how the information relates to the Student Wondering of Phenomena question, and record their ideas.
2. When the scope is complete, have students look back at the Investigative Phenomena. As you lead them in answering the question, have them use the information they learned throughout the scope. Have students record their responses and ideas prior to completing the summative Claim-Evidence-Reasoning assessment.
3. Encourage students to ask any additional questions about this or other related phenomena.

Weather and the Water Cycle

Hook

Everyday Phenomena

How do clouds form?

Setup Video

The hands-on or demonstrative format of this activity does not allow it to feature a digitized version that would allow students to submit responses online.

Description

Students observe a cloud forming.

Materials

Printed Material

None

Reusable

1 Large glass jar with a lid (per class)

Consumable

Hot tap water, enough to fill the glass jar approximately 5 cm (per class)
1 Match (per class)
5 Ice cubes, approximate (per class)

Preparation

Gather all materials. If hot tap water is not available, heat the water just before beginning the activity.

Procedure and Facilitation Points

1. Show the hot water to the students.
2. Discuss:
    - What do you notice about the water? It is steaming. It must be hot.
    - What do you see when you look up in the sky? The sun, clouds
    - What do you think clouds are made of? Water, fluffy stuff
    - How are clouds formed? The sun makes the clouds, water makes clouds, the wind makes the clouds. *Accept all answers in order to gauge what students already know.
3. Fill the glass jar with 5 cm hot tap water.
4. Turn the jar lid upside down and fill it with ice.
5. Light the match, hold it inside the jar, and blow it out. Quickly place the lid upside down on the jar so the ice is on top.
6. Students should be able to observe faint swirls of a cloud forming. After a minute or two, the jar should fill up with enough condensation to form a cloud.
7. Discuss:
    - What do you see inside the jar? The steam built up and formed a cloud inside the jar.
    - Where did the steam come from? The hot water
    - The steam rose up and cooled when it got close to the ice. The tiny bits of smoke from the match gave the steam something to stick to. This made a cloud form and is part of Earth's water cycle.
8. Take the lid off the jar and allow the cloud to "escape."
9. Add new learning to the Graphic Organizer.

Weather and the Water Cycle

Explore 1: Activity - The Amazing Water Cycle

Everyday Phenomena

When does the water cycle occur?

Setup Video

Description

In this activity, students will explore the relative rate at which water cycles and relate it to weather conditions.

ESTIMATED

1 hr - 2 hrs

Materials

Printed Material

1 The Amazing Water Cycle (per student)

1 Student CER (per student)

Reusable

1 Hot plate (per class)

1 Large metal spoon (per group)
1 500 mL beaker (per class)
1 Foam cup (per group)
2 Aluminum pans (per group)
2 Thermometers (per group)
1 Graduated cylinder (per group)
3 Small rubber spatulas (per class)
1 Heat lamp (optional) (per class)
1 Pair of scissors (per group)

Consumable
2 Ice cubes (per group)
100 mL hot water (per group) *for Part I
100 mL room temperature water (per group) *for Part II
2 Sheets plastic wrap (enough to cover each aluminum pan) (per group)
2 Small plastic cup (per group)

Preparation

- Copy The Amazing Water Cycle for each student.
- Cut the plastic cups about an inch from the bottom. They should be large enough to hold about 50 mL of water but short enough to fit inside the pan without touching the plastic wrap.
- Plan ahead to take students outside to place their models in the sunshine as well as to observe the results later.
- Gather all materials.
- Place students in groups of three to four.

Procedure and Facilitation Points

As students work through the activity, look for teachable moments to introduce them to the following vocabulary terms. Try to point out examples of the terms as students are working so that they can connect the meaning of the word with their experiences. Encourage students to use the following words as they record and discuss their findings.

- **Climate**: Average weather conditions for a region year after year
- **Data**: Information that has been collected
- **Water cycle**: The constant movement of water through the land, air, oceans, and living things
- **Weather**: The current outdoor conditions
- **Pattern**: The regular or repeated way in which something happens or is done
- **Evaporation**: Water changing from liquid to gas
- **Condensation**: Water changing from gas to liquid
- **Precipitation**: Rain, snow, sleet, or hail that falls from clouds in the sky
- **Runoff**: The movement of water on a surface to areas of lower elevation

Part I

1. Use the 500 mL beaker and the hot plate to heat up enough water so each group will have about 100 mL.
    a. Safety note: Heat the water to the point at which it is steamy but not boiling. Do not give boiling water to students, as it could cause burns.
2. Pour about 100 mL of hot water into a foam cup for each group. Distribute a metal spoon with a few cubes of ice to each group.

3. Students should place the ice cubes on the spoon and hold the spoon above the hot water for 3 minutes and record their observations on The Amazing Water Cycle page.
4. Discuss:
    - What did you notice about the spoon? Small drops of water formed on the bottom of the spoon. As the drops got bigger, they fell back down.
    - Where did the water come from? The hot water was steaming. The water on the spoon came from the steam.
    - The water in the cup was like the water on Earth. The sun's heat warms up the water and causes it to change to a gas called water vapor. This process is called evaporation. The ice on the spoon cooled the air temperature at the top, because the temperature is cooler as you get higher up in the sky. When the water vapor moved higher in the sky, the cooler temperature made the water vapor change back into liquid water, but it needed something to hold on to. In our air, that can be tiny pieces of dust or other solids or liquids. In our example, that was the spoon. The water vapor clung to the spoon and changed back into tiny liquid waterdrops. This process is called condensation. It is the condensation of water vapor into liquid water that forms clouds and causes precipitation to fall.

Part II

1. Tell students they will be creating two models of Earth to observe the water cycle in action.
2. Have students follow the steps in The Amazing Water Cycle:
    - Pour about 50 mL of water in the bottom of each cup.
    - Place one cup of water inside each aluminum pan and cover both with plastic wrap.
    - Rest a thermometer on top of the plastic wrap of each model. Leave one model inside; take one model outside and place it in a sunny location. (If taking the model outside in the warm sunshine is not an option, a heat lamp could be used indoors.)
3. Discuss:
    - Do your two models look the same? Yes, we used the same materials and the same amount of water.
    - What is the only thing that is different between the two models? One is in the heat and one is inside, where it's cooler. The temperature is the only thing we're changing.
    - What kind of information will this test give you? This test is going to help us see how temperature affects the speed of the water cycle.
4. Students should record the temperature of each location on The Amazing Water Cycle page.
5. The models will need time to work. Wait at least 2 hours before observing the models. If possible, leave them out the rest of the day and overnight, then observe them the next day.
6. Students should bring their outdoor model back inside.
7. Have students tap the plastic wrap a few times to make the last few drops of condensation fall into the pan.
8. Students should then remove the plastic wrap and measure the temperature of the water in each cup.
9. Students should then measure the amount of precipitation that fell in each environment.
10. To measure the precipitation, students should use the rubber spatula to push the water off the bottom and edges of the pan toward one corner, where they can then pour all the water from the pan into the graduated cylinder. Water that is still inside the cup should not be measured.
11. Students should record the water temperature and the amount of precipitation for both models on the Amazing Water Cycle page.
12. Discuss:
    - Which model received more precipitation? The one that was outside had more precipitation.
    - Why do you think it had more? It was warmer outside, which made the water warmer. Heat makes water evaporate, so the warmer temperature made more water evaporate, collect in the air, then fall as precipitation. It seemed to speed up the water cycle.
    - When we talk about humidity, we are referring to the amount of water vapor in the air. Which model do you think had more humidity? The model that was out in the sun probably had more humidity, or water vapor in the air, because the warmer water evaporated more into the air.

- What was happening inside the models you built? Evaporation, condensation, and precipitation were happening. The models showed the processes that happen in the water cycle.
- What starts the process of evaporation? The sun
- How are weather and the water cycle related? The water cycle has to take place for weather conditions such as precipitation and humidity to occur.
- What is a cycle? It is a pattern that repeats over and over again with no beginning or end.
- When does the water cycle occur? It happens constantly.

13. Encourage students to write down other questions they may have about weather and the water cycle on their copy of the The Amazing Water Cycle. These questions could be explored later in their inquiry investigation in Explore 3.
14. Students should complete the Student CER and add new learning to the Graphic Organizer.

Explore

Name: _____ Date: _____

The Amazing Water Cycle

Part I

Draw your group's model below. Label and explain each process happening in your model as you discuss it as a class.

Part II

Our Driving Question

How does water temperature affect weather and climate?

What We Need

2 Aluminum pans
2 Thermometers
1 Graduated cylinder
1 Small rubber spatulas (you may need to share with other groups)
1 Heat lamp (if your class cannot go outside)
100 mL Water
2 Sheets plastic wrap (enough to cover each aluminum pan)
2 Small plastic cup (per group)
Scissors

Explore

Procedure

1. Pour about 50 mL of water in the bottom of each cup.
2. Place one cup of water inside each aluminum pan and cover both with plastic wrap.
3. Rest a thermometer on top of the plastic wrap of each model. Leave one model inside; take one model outside and place it in a sunny location.
4. Measure and record the temperature of each location on the data table.
5. Allow the models to work for at least 2 hours.
6. Bring the outdoor model back inside.
7. Tap the plastic wrap a few times to make the last few drops of condensation fall into the pan.
8. Remove the plastic wrap and measure the temperature of the water in each cup. Record it on the data table.
9. Measure the amount of precipitation that fell in each environment.
10. To measure the precipitation, use the rubber spatula to scrape the water off the bottom and edges of the pan toward one corner, where they can then pour all the water from the pan into the graduated cylinder. Water that is still inside the original cup should not be measured.
11. Record the amount of precipitation for both models on your data table.

Explore

Record all data and observations below.

	Temperature of Environment	Time Model Was Left Alone	Temperature of Water after Testing	Amount of Precipitation
Indoor Model				
Outdoor Model				

1. Which model environment had the most precipitation? Explain why you think this happened.

_____
_____
_____

2. Describe the climate of each model.

_____
_____
_____

3. What is the relationship between the water cycle and weather and climate?

_____
_____
_____
_____
_____