



# Integrated STEM Lesson Plan:

# Introduction to the Water

# Cycle

*Grade 3*

*Science, English Language Arts, and Art*  
*Aimee Ferguson, New York*

## BIG IDEAS

Water can change states among liquid, gas, and solid at various stages of the water cycle.

## EDUCATION STANDARDS

### NGSS Performance Expectation(s)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts:
<p><i>Obtaining, Evaluating, and Communicating Information</i> Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.</p> <p><i>Obtain and combine information from books and other reliable media to explain phenomena.</i> (3-ESS2-2)</p>	<p><i>E SS2.D: Weather and Climate (NYSED) Earth’s processes continuously cycle water, contributing to weather and climate.</i> (3-ESS2-3)</p>	<p><i>Patterns</i> <i>Patterns of change can be used to make predictions.</i> (3-ESS2-1),(3-ESS2-2)</p>
<p style="text-align: center;"><b>Common Core State Standards:</b></p> <p><b>SCIENCE:</b> <i>3-ESS2-3. Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems. [Clarification Statement: Emphasis should be on the processes that connect the water cycle and weather patterns.]</i></p> <p><b>ELA:</b> <i>3W6 Conduct research to answer questions, including self-generated</i></p>		

*questions, and to build knowledge about a topic. (3-ESS2-3),(3-ESS3-1)*

#### OTHER STANDARDS

*ART: Visual Arts-VA:Cr2.3.3a. Individually or collaboratively construct representations, diagrams, or maps of places that are part of everyday life.*

### MEASURABLE STUDENT LEARNING OBJECTIVES

*Students will come up with at least 1 question to assist them in getting answers to support or debunk their prediction.*

*I can describe the processes involved in the water cycle and the importance of the water cycle, by identifying its four major components: collection, condensation, evaporation and precipitation.*

*Students will conduct research by carrying out an investigation and updating their diagrams daily of any changes related to the water cycle.*

### STEM INTEGRATION .

This lesson addresses Science, Math and Art

### NATURE OF STEM

*This lesson will cover concepts such as condensation, precipitation, collection and evaporation, while paying attention to the state of matter. The goal of this lesson is to help prepare students for future lessons on water conservation and sustainability. Students will eventually use satellites and weather stations to have a deeper understanding of how everything works together. Through reading, writing and art students will experience the water cycle in a multi-faceted way.*

### MATERIALS NEEDED

## SESSION 1:

- [Water Evaporation Time Lapse](#)
- [Discovery Education](#)
- Materials (each group)
  - o Bowl
  - o Cup
  - o Water
  - o Plastic Wrap
  - o Poster Paper (1 sheet)
  - o Sponge

## SESSION 2:

- [CER Framework](#)
- [NASA SVS | Water. Water Everywhere!](#)

### OPTIONAL:

- o [A Drop Around the World](#)

## SESSION 3:

- Quiz (see below)

STUDENTS SHOULD HAVE THEIR NOTEBOOKS AND CHROMEBOOKS.

## ENGAGING CONTEXT/PHENOMENON

*What are your engaging phenomena or your “hook” for the lesson? Be sure whatever you choose is appropriate for the subject area and grade level you are addressing. Several example phenomena are shared in course. Consider how observations of the natural world serve as phenomena to engage students in the content. You must utilize a NASA resource in your lesson (please discuss with your instructors if you need assistance).*

- *Ask students what they know about the water cycle and engage in a brief conversation about where rain comes from.*
- *Watch video, [Water Evaporation Time Lapse](#)*
- *Ask students the following questions:*
  - *What are three important things you learned from the video?*
  - *What are two things you found interesting about the video?*
  - *What is one wondering you still have?*

## **DATA INTEGRATION**

*Based on students' feedback and questions that come up, the NASA website can be introduced in a natural way. This will excite students as they will soon discover the many ways to track information, specific to their interests.*

## **TEACHER BACKGROUND KNOWLEDGE**

*Credit: BrainPop*

*Every living thing needs water, and thanks to the water cycle, we never run out. Our bodies are just a brief pit stop along the journey for water molecules. They evaporate into the sky as vapor, condense to form clouds, and precipitate back down to the ground as rain or snow. As water moves across Earth's surface, it transforms landscapes through weathering and erosion. But only a tiny fraction of Earth's water is freshwater, the kind that people can drink and use for farming. Most of it is saltwater, stored in our planet's enormous oceans.*

## DIFFERENTIATION OF INSTRUCTION

- *Video: 1-Pause when showing the videos to review misconceptions 2. Show it multiple times to reinforce information 2-pause at certain parts of the video to review important concepts.*
- *CER Framework: To help students answer questions about matter*
- *A Drop Around the World Have students read independently to deepen their understanding of the topic.*
- *Visual vocabulary and diagram of the water cycle.*
- *Offer Spanish cognates (Examples: evaporación, condensación, precipitación and ciclo)*

## REAL-WORLD CONNECTIONS FOR STUDENTS

- *Condensation: droplets outside of water bottle and foggy glass shower doors.*
- *Evaporation: clothes drying and ice melting.*
- *Precipitation: rain and snow.*

## INTEGRATION POSSIBLE MISCONCEPTIONS

- *When water evaporates it disappears.*
- *Water comes from a tap then you drink it.*
- *Water evaporates only for certain water forms, such as oceans.*
- *I do not have an impact on water conservation.*

## LESSON PROCEDURE

5E	Details of 5E Lesson Implementation
<p><b><u>Engage</u></b></p> <p><b><u>SESSION 1</u></b></p> <p><i>Introduce the lesson with an anchoring phenomenon. Facilitate student questions, discussion, etc. as appropriate. Learn about what students already know and want to know.</i></p>	<p><b>Procedure:</b> <i>(What happens during this phase? What is the teacher doing? What is the student doing?)</i></p> <ul style="list-style-type: none"> <li>● <i>Ask students what they know about the water cycle and engage in a brief conversation about where rain comes from.</i></li> <li>● <i>Watch video, <a href="#">Water Evaporation Time Lapse</a></i></li> <li>● <i>Ask students the following questions:</i> <ul style="list-style-type: none"> <li>○ <i>What are three important things you learned from the video?</i></li> <li>○ <i>What are two things you found interesting about the video?</i></li> <li>○ <i>What is one wondering you still have?</i></li> </ul> </li> </ul> <p><b>Modifications</b></p> <p><i>You can give additional examples of the water cycle to grab students attention like telling them that dinosaurs drank the water . Remind students of previous lessons on clouds and States of Matter.</i></p> <p><b>Standards Addressed</b></p> <p><i>3-ESS2-3. Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems</i></p> <p><i>3W6 Conduct research to answer questions, including self-generated questions, and to build knowledge about a topic. (3-ESS2-3),(3-ESS3-1)</i></p> <p><b>Formative/Summative Assessments</b></p>

	<p><i>Pay attention to students' responses to the questions.</i></p> <p><b>Resources</b></p> <p><a href="#"><u>Water Evaporation Time Lapse</u></a></p>
<p><b><u>Explore</u></b></p> <p><b><u>SESSION 1</u></b></p> <p><i>Plan for students to engage in hands-on activities that are designed to facilitate conceptual change.</i></p>	<p><b>Procedure:</b></p> <ul style="list-style-type: none"> <li>● <i>Tell students that the phenomenon they saw is an Earth Process that is continuous. It is called the water cycle. The water cycle has four main parts: condensation, precipitation, collection and evaporation.</i></li> <li>● <i>Show students the short video, <a href="#"><u>Discovery Education</u></a> to explain the water cycle.</i></li> <li>● <i>Display an image of the water cycle on the SMARTboard with labels of its four major parts: evaporation, collection, condensation and precipitation throughout the sessions (except for session 3).</i></li> <li>● <i>Credit: Discovery Education</i> <ul style="list-style-type: none"> <li>○ <i>Now we explore the water cycle in our own classroom, following the procedure below:</i> <ul style="list-style-type: none"> <li>▪ <i>Take a sponge and wet the sponge with water from the sink. Have the students feel and describe the sponge.</i></li> <li>▪ <i>Wipe the sponge on the chalkboard, so that students can see a wet streak.</i></li> <li>▪ <i>As the streak dries, ask students, “Where is the water going?” (Possible Response: Though the particles are small, they are evaporating into the air-As the cycle continues, the water particles in the air come back together and we can see clouds).</i></li> <li>▪ <i>Display a bowl and pour a cup of water in it.</i></li> </ul> </li> </ul> </li> </ul>

- *Tell students that they will create a Water Cycle model to ‘trap’ the water particles from the bowl that would normally evaporate into the air just like the water from the chalkboard did.*
- *Have students place the cup inside the bottom of the bowl, pour water in the bowl around the cup, and cover the bowl with plastic wrap.*
- *Distribute materials to each group (up to 4 students) and have them create the model. Review safety procedures before you begin.*
- *Give each group a poster paper to record their diagram of their experiment setup. On the same paper, they can record their predictions about what will happen to the water in the bowl.*
- *Have students observe and record their observations daily.*

### **Modifications**

*Have students explain their posters and share what each part shows.*

### **Standards Addressed**

*3-ESS2-3. Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems*

*Arts 3<sup>rd</sup>- VA:Cr2.3.3 a. Individually or collaboratively construct representations, diagrams, or maps of places that are part of everyday life.*

### **Formative/Summative Assessments**

*Pay attention to how students are following the procedure and if their focus is on parts based on the water cycle.*

	<p><b>Resources</b></p> <ul style="list-style-type: none"> <li>● <a href="#">Discovery Education</a></li> </ul>
<p><b><u>Explain</u></b></p> <p><b><u>SESSION 2</u></b></p> <p><i>Facilitate opportunities for students to explain their understanding of concepts and processes and make sense of new concepts.</i></p>	<p><b>Procedure:</b> <i>(What happens during this phase? What is the teacher doing? What is the student doing?)</i></p> <ul style="list-style-type: none"> <li>● <i>After several days, display student posters in the classroom to do a gallery walk and generate questions about the work</i></li> <li>● <i>Allow students time to write a reflection in their notebooks on if their predictions were accurate. If so, justify how the experiment supported your prediction OR If not, explain new discoveries/any misconceptions addressed.</i></li> <li>● <i>Ask students about their experiment by engaging them in a conversation:</i> <ul style="list-style-type: none"> <li>○ <i>Where did the water in the cup come from?</i></li> <li>○ <i>How does our model show how the water cycle works on earth?</i></li> <li>○ <i>How are clouds formed?</i></li> <li>○ <i>Where does rain come from?</i></li> <li>○ <i>BONUS: What happens when lakes and rivers become polluted?</i></li> </ul> </li> <li>● <b>OPTIONAL:</b> <a href="#">The Anatomy of a Raindrop   Precipitation Education (nasa.gov)</a></li> </ul> <p><b>Modifications</b></p> <p><i>Take students outside to identify where water is, have them observe the clouds.</i></p> <p><b>Standards Addressed</b></p> <p><i>3-ESS2-3. Plan and conduct an investigation to determine the</i></p>

	<p><i>connections between weather and water processes in Earth systems</i></p> <p><i>3W6 Conduct research to answer questions, including self-generated questions, and to build knowledge about a topic. (3-ESS2-3), (3-ESS3-1)</i></p> <p><b>Formative/Summative Assessments</b></p> <p><i>Pay attention to participation (students answering questions, students making connections, students using any available materials to deepen their understanding)</i></p> <p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.nasa.gov/education/earth/ess/3-ESS2-3-ESS3-1-1.html">The Anatomy of a Raindrop   Precipitation Education (nasa.gov)</a></li> </ul>
<p><b><u>Elaborate</u></b></p> <p><b><u>SESSION 2</u></b></p> <p><i>Provide applications of concepts and opportunities to challenge and deep ideas; build on or extend understanding and skills.</i></p>	<p><b>Procedure:</b></p> <ul style="list-style-type: none"> <li>• <i>Have students clearly see each part of the water cycle by setting up different stations that show them. Encourage students to make observations and record their findings on each category using the <a href="#">CER Framework</a></i> <ul style="list-style-type: none"> <li>o <i>Evaporation: Boil water and observe steam.</i></li> <li>o <i>Condensation: Show condensation on a cold surface like a mirror.</i></li> <li>o <i>Precipitation: Demonstrate rain using a model cloud and water droplets</i></li> </ul> </li> </ul> <p><i>Show <a href="#">NASA SVS   Water, Water Everywhere!</a></i></p> <p><b>Modifications</b></p> <p><i>This can be done while students are observing their lab work to support their explanation and recording of information on their posters.</i></p> <p><i>In addition when each station is modeled, take a picture of it and</i></p>

	<p><i>have it on display so that it is readily linked .</i></p> <p><i>When demonstrating each stage, display the word.</i></p> <p><i>Allow students to work in partnerships.</i></p> <p><b>Standards Addressed</b></p> <p><i>3-ESS2-3. Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems</i></p> <p><i>3W6 Conduct research to answer questions, including self-generated questions, and to build knowledge about a topic. (3-ESS2-3),(3-ESS3-1)</i></p> <p><b>Formative/Summative Assessments</b></p> <p><i>Assess student posters and see if their labeling is accurate and when they present their work if their explanations match their poster.</i></p> <p><b>Resources</b></p> <p><a href="#"><u>CER Framework</u></a></p> <p><a href="#"><u>NASA SVS   Water, Water Everywhere!</u></a></p>
<p><b><u>Evaluate</u></b></p> <p><b><u>SESSION 3</u></b></p> <p><i>Assess students knowledge, skills and abilities.</i></p>	<p><b>Procedure:</b></p> <ul style="list-style-type: none"> <li><i>Assess students' understanding of the water cycle by having them complete the missing blanks of the water cycle and explaining each part's role.</i></li> </ul> <p><a href="#"><u>Quiz</u></a> (see below)</p> <p><b>Modifications</b></p> <p><i>Highlight the boxes students need to fill-in to identify the water cycle categories so it stands out more. Give sentence starters to support students generating words such as Condensations job is to... OR Water in the condensation stage is...</i></p>

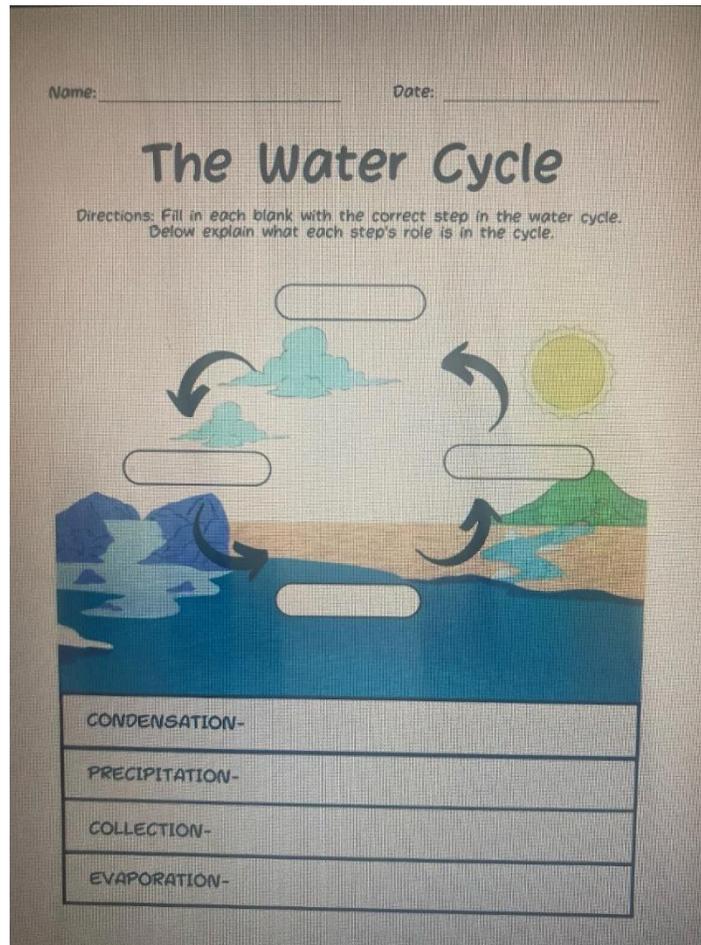
## Standards Addressed

*3-ESS2-3. Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems*

## Formative/Summative Assessments

*Giving students the quiz.*

## Resources



## REFERENCES

- [BrainPOP](#)
- [BrainPOP JR](#)

- [CER Framework](#)
- [Discovery Education](#)
- [3-5-science-learning-standards.pdf \(nysed.gov\)](#)
- NASA
- [NYSED Arts Standards](#)