

Title Clouds, Clouds Everywhere**Estimated Time for Completion of Lesson**

2 days

Concept/Main Idea of Lesson In this lesson, students will learn about the various types of clouds, the making of a cloud, and weather modification.

Intended Grade Levels

Grades 6-12

Infusion/Subject Areas

STEAM

Social Studies

Visual Arts

Science

Curriculum Standards**Next Generation Sunshine State Standards**

- Visual Arts:

Visual Arts

VA.68.S.2.1: Organize the structural elements of art to achieve artistic goals when producing personal works of art.

VA.68.O.1.3: Combine creative and technical knowledge to produce visually strong works of art.

VA.68.O.1.4: Create artworks that demonstrate skilled use of media to convey personal vision.

VA.912.S.2.6: Incorporate skills, concepts, and media to create images from ideation to resolution.

VA.68.H.3: Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields.

- Social Studies:

SS.912.G.5.In.c: Identify how human use of technology affects the environment of places.

SS.912.G.5.Pa.c: Recognize an effect of technology on the environment.

- Science:

SC.912.E.7.In.7: Recognize that global climate change is related to conditions in the atmosphere and oceans.

SC.912.E.7.Pa.1: Recognize that clouds release rain (part of the water cycle).

Or

SC.6.E.7.Pa.2: Recognize that rain comes from clouds.

SC.6.E.7.Su.2: Recognize parts of the water cycle such as clouds (condensation), rain (precipitation), and evaporation.

National Standards for Arts Education

Standard 1: Understanding and applying media, techniques, and processes.

Standard 3: Choosing and evaluating a range of subject matter, symbols, and ideas.

National Council for the Social Studies

Time, Continuity, and Change

People, Places, and Environments

Individuals, Groups, and Institutions

Power, Authority, and Governance

Science, Technology, and Society

Global Connections

Common Core

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-LITERACY.SL.9-10.1.C

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

Instructional Objective

The student will:

- identify various types of clouds by creating a cloud teller foldable;
- create a cloud via a cloud making activity;
- discuss weather modification via a think-write-pair-share;
- create cloud-inspired artwork and display work via a gallery walk.

Learning Activities Sequence

Pre-active: Make sufficient copies of Cloud Teller handout and activate PPT presentation, *Day 1. Karolina Sobecka (The Visible Turn) Clouds, Clouds Everywhere.*

Day 1: Learning Activities: Various Types of Clouds and the Making of a Cloud

Attention-Getter:

Slide 1: Start the class by showing the following “Clouds Background” video: <https://www.youtube.com/watch?v=o6wMCkY7kjA> (0:57). As the video plays in the background, ask students to engage in a stand and share based on the following questions: “What comes to mind when you think about clouds?” (For a stand and share, have students first think about a response to the question posed. Students are to stand when they have a response to share [as a modification, students can raise their hand]. When all students are standing, have one volunteer share his/her response aloud and then sit. If others share the same response then they should also sit down. Repeat until all students are sitting indicating that their response has been shared.

Slide 2: Tell students that today they will be learning about clouds and one contemporary artist who explores the creation and uses of clouds by using them in her artwork.

Mini-Lecture via Video

Slide 3: Various Types of Clouds Activity: Have students watch the following video, “How did clouds get their names?,” that outlines the history of and various types of clouds. Video can be found at: <https://www.youtube.com/watch?v=UuW1jhxGqx0> (5:06).

Creating a Cloud Teller

Slide 4: After the video, tell students that they will create a Cloud Teller that will help them learn more about the various types of clouds (directions and worksheet are provided). Distribute the foldable template and allow students to create their “cloud tellers” independently.

The Making of a Cloud Activity

Slide 5: Have students watch one of the following videos that explains how clouds are made (3:10): <https://www.khanacademy.org/partner-content/nova/clouds/v/makingofacloud>. Follow this video with another video by NASA (3:15):

https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Learning_About_Clouds.html. Then, organize students in groups of four, and tell them they will make their own clouds (two different methods). Directions for this activity can be found at: <https://www.giftofcuriosity.com/weather-science-how-to-make-a-cloud-in-a-jar/>.

Day 2: Learning Activities: Weather Modification

Attention-Getter:

Engage students in a whole-class discussion by posing the following question, “If we humans developed the ability to make it rain or make it stop raining, should we do so? What might be some of the unintended side effects?”

Mini-Lecture via Video

The History of Weather Modification Activity: Slide 6: Have students watch the following video that explains the history of weather modification (3:45):

<https://www.youtube.com/watch?v=f8HwK2tDL4Y>. Then have students watch the following video that explains solar radiation management (2:42):

https://www.youtube.com/watch?v=w8zM8nmm2_s.

Slide 7: Explain that in an art exhibition titled, *A Memory, an Ideal, a Proposition*, a New York-based artist and designer is working at the intersection of art, science, and technology (see notes for information on the artist, Karolina Sobecka).

Artist Biography

Advance to slide 8. Review details of Sobecka's background with students.

Slides 9-10: Explain that Sobecka's work, *A memory, an ideal, a proposition*, documents an attempt to reassemble three clouds that changed the world.

Slide 11: Explain that one of the clouds she creates, titled "*A Proposition*" is scheduled to be produced in 2019 eight miles above the ground in Tucson, Arizona as part of a first ever field test in Solar Radiation Management.

Slide 12: Ask students to engage in a think-write-pair-share based on the following question, "Should humans be engaging in weather modification?"

Closure:

After allowing for students to share their thoughts in dyads and whole-group formats, explain that artist Karolina Sobecka includes "Cloud Tasting" as part of her exhibition on clouds. Explore the following website with your students:

<http://www.amateurhuman.org/cloud-tasting>. Explain that the purpose is to bring to light the effects of pollution on cloud precipitates for us to experience. Sobecka states, "Our bodies, tongues, mouths and noses are perfectly suited to register the forensic evidence of climate change realities." Ask students to discuss their thoughts about using human consumption as a method to communicate this message.

Evaluation

- Class participation
- Completion of the Cloud Teller
- Completion of the Making of a Cloud Activity
- Completion of the Cloud-Inspired Art Project and Gallery Walk

Optional Extension Activities

Cloud-Inspired Art Project & Gallery Walk: Select any artistic medium of your choice and using what you learned in this lesson about (a) types of clouds, (b) what clouds are made up of, and the (c) cloud modification. Have students share their artwork with the class via a Gallery Walk.

Minority Women in STEM Careers: Dr. Yolanda Shea, Atmospheric Science Researcher for NASA: Have your students watch the NASA Bend the Science video that describes how Dr. Yolanda Shea, from a very early age, was interested in storms, clouds, and meteorology and was able to turn her passion into a career (9:59):

<https://www.globe.gov/web/marile.colonrobes/home/blog/-/blogs/37039035>

Gifting Lasting Clouds: Artist Karolina Sobeca created a “Lasting Clouds” project where people can dedicate real clouds to people and record their dedication on Tumblr. For information on how to participate, go to <http://www.karolinasobecka.com/news/gifting-last-clouds>

A Nerding Out About Clouds: In this NRP podcast, Gavin Pretor-Pinner, Founder of the Cloud Appreciation Society; Dr. David Romps, Assistant Professor of Earth and Planetary Science at Berkeley; and Karolina Sobeca, an interdisciplinary artist and designer, share their insights on the importance of clouds and in what ways clouds are Earth’s defining characteristic. Podcast can be found at: <http://www.wnpr.org/post/nerding-out-about-clouds#stream/0>

GLOBE Observer Cloud Science Project: In this activity, students pair up with NASA scientists and help them better understand clouds by collecting data using a system called GLOBE.” Have students watch the following introductory video: https://www.youtube.com/watch?time_continue=10&v=TNc5qjj8ZZE. The following website outlines exactly how to participate in this program, including (a) choosing how you wish to participate, (b) requesting satellite overpass times, (c) observing and reporting, (d) satellite comparison, and (e) exploring data (<https://www.globe.gov/web/s-cool/home/participate>). More information and resources to assist with the planning and execution of this project can be found at <https://scool.larc.nasa.gov/> Please note: this project requires the teacher to register his/her class, etc.

Materials and Resources

- Cloud foldable handout (included)
- Materials for Making of a Cloud Activity (directions found at: <https://www.giftofcuriosity.com/weather-science-how-to-make-a-cloud-in-a-jar/>)
 - Jars with lids (1 jar per student group)
 - Hot water (1/3 cup per student group)
 - Ice
 - Hairspray (enough for half of the groups)
 - Match (enough for half of the groups)
 - Balloons with the bottom cut off (enough for half of the groups)
 - Flashlights (enough for half of the groups)
- Computers with internet connection and speakers
- PPT presentation, projector, and screen

Internet Links

- Opening video: <https://www.youtube.com/watch?v=o6wMCkY7kIA>
- TED TALK-How did clouds get their name: <https://www.youtube.com/watch?v=UuW1jhxGqx0>
- Cloud Teller: https://www.globe.gov/documents/16792331/19458623/GLOBE_Cloud_Teller_update_20180215.pdf/e731b34f-ff9a-431a-bf40-68eab48eae9d

- Khan Academy-How clouds are made: <https://www.khanacademy.org/partner-content/nova/clouds/v/makingofacloud>
- NASA-Learning about clouds and how they are formed: https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Learning_About_Clouds.html
- Cloud making activity: <https://www.giftofcuriosity.com/weather-science-how-to-make-a-cloud-in-a-jar/>
- History of weather modification: <https://www.youtube.com/watch?v=f8HwK2tDL4Y>
- Solar radiation management: https://www.youtube.com/watch?v=w8zM8nmm2_s
- Cloud tasting: <http://www.amateurhuman.org/cloud-tasting>
- Minority Women in STEM Careers: <https://www.globe.gov/web/marile.colonrobes/home/blog/-/blogs/37039035>
- Gift of lasting clouds: <http://www.karolinasobecka.com/news/gifting-last-clouds>
- Nerding out about clouds: <http://www.wnpr.org/post/nerding-out-about-clouds#stream/0>
- Globe introductory video: https://www.youtube.com/watch?time_continue=10&v=TNc5qjj8ZZE.
- Globe information on how to participate <https://www.globe.gov/web/s-cool/home/participate>
- Globe project overview: <https://scool.larc.nasa.gov/>