Distance Learning at the Cleveland Museum of Art

Weather, Weather Everywhere

Grades 4-7

This Packet Includes:

HOW TO PREPARE YOUR CLASS FOR THE DISTANCE LEARNING PRESENTATION .................................................. 2

TEACHER INFORMATION GUIDE: ......................................................................................................................................... 3

  PROGRAM OBJECTIVES: ........................................................................................................................................... 3
  COMMON CORE STATE STANDARDS APPLICABLE: ........................................................................................................ 3
  NATIONAL EDUCATION STANDARDS: ................................................................................................................................. 4
  PRIOR TO THE PROGRAM: ........................................................................................................................................... 5
  WEATHER VOCABULARY: ............................................................................................................................................. 5

DURING THE VIDEOCONFERENCE – ACTIVITIES: .............................................................................................................. 7

  SHAKE TO CONDENSATE: ............................................................................................................................................... 7
  CLOUD IN A BOTTLE: ....................................................................................................................................................... 7

BEYOND THE VIDEOCONFERENCE – TEACHING EXTENSIONS: .......................................................................................... 8

  MAKE YOUR OWN BAROMETER: ....................................................................................................................................... 8
  HOW DOES THIS DAY MAKE YOU FEEL? ............................................................................................................................. 9
  CLASSROOM WEATHER STATION INSTRUMENTS: .............................................................................................................. 9

SUGGESTED READING: ....................................................................................................................................................... 10

WEBSITES OF INTEREST: ................................................................................................................................................... 10

TEACHER RUBRIC: ............................................................................................................................................................. 11

THE CLEVELAND MUSEUM OF ART DISTANCE LEARNING EVALUATION FORM .................................................... 12

SELECTED IMAGES: .......................................................................................................................................................... 14

WATER CYCLE WORKSHEET ............................................................................................................................................... 17

WATER CYCLE ANSWER KEY ............................................................................................................................................ 18

CLOUD IDENTIFICATION CHART ....................................................................................................................................... 19

CLOUD IDENTIFICATION ANSWER KEY ............................................................................................................................. 20

Teacher Note:

- For the videoconference, please make copies of the blank Water Cycle Worksheet and Cloud Identification Chart included in the packet for each student.
- Also, please bring the materials for the Cloud in a Bottle activity described in this packet, if you would like to have the class make clouds during the program.
How to Prepare Your Class for the Distance Learning Presentation

Teacher Information will be sent or made available to you prior to the program.

Please familiarize yourself with the materials and discuss them with your class.

Have the Teacher Information Packet (T.I.P.) materials on hand in the classroom, ready for the program. These materials may be used during the videoconference.

Be prepared to facilitate by calling on students yourself during the lesson. Students are sometimes initially shy about responding to questions during a distance learning lesson.

Explain to students that this is an interactive medium and encourage them to ask questions.

Reinforce topics discussed in the program by asking students to complete some of the suggested pre- and post-conference activities in the Teacher Information Packet.

We ask teachers, after the program, to please fill out the Evaluation Form and return it to:

Dale Hilton/Distance Learning
The Cleveland Museum of Art
11150 East Boulevard
Cleveland, OH 44106

Thank You!
Teacher Information Guide:

Program Objectives:

*Students will understand...*

- The water cycle.
- How density of air affects weather.
- Weather changes due to pressure and temperature.
- Clouds consist of water vapor or ice crystals, depending on their altitude and other physical conditions.
- Different types of clouds are associated with different weather conditions, so visible changes in clouds alert one to oncoming weather systems.
- Cloud types, and their weather systems, have followed consistent patterns for centuries, as documented by both photography and by artwork that predates photography.

Common Core State Standards Applicable:

*English Language Art & Literacy in History/Social Studies, Science, and Technical Subjects* -

4th Grade

CCSS.ELA-Literacy.W.4.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.SL.4.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on *grade 4 topics and texts*, building on others’ ideas and expressing their own clearly.

5th Grade:

CCSS.ELA-Literacy.W.5.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.SL.5.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on *grade 5 topics and texts*, building on others’ ideas and expressing their own clearly.

6th Grade

CCSS.ELA-Literacy.SL.6.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on *grade 6 topics, texts, and issues*, building on others’ ideas and expressing their own clearly.

CCSS.ELA-Literacy.W.6.4
CCSS.ELA-Literacy.WHST.6.4
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.RST.6.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

7th Grade
CCSS.ELA-Literacy.SL.7.1
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.W.7.4
CCSS.ELA-Literacy.WHST.7.4
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.RST.7.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

National Education Standards:
(This is a selection of the National Education Standards that align with this program – others may apply, as well.)

For Science (grades K-4):
Earth and Space Science
- Properties of earth materials
- Objects in the sky
- Changes in earth and sky

For Science (grades 5-8):
Earth and Space Science
- Structure of the earth system
  - Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.
  - The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.
  - Clouds, formed by the condensation of water vapor, affect weather and climate.
Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle.

For Fine Arts - Visual Arts (grades K-4, 5-8):
- Making connections between visual arts and other disciplines.
- Choosing and evaluating a range of subject matter, symbols, and ideas

For Language Arts - English (grades K-12):
- Applying Knowledge
- Communication Skills
- Applying Knowledge
- Developing Research Skills
- Applying Language Skills

For Technology - (grades K-12):
- Basic Operations and Concepts
- Technology Productivity Tools
- Technology Communications Tools
- Technology Research Tools
- Technology Problem-solving and Decision-making Tools

For Social Sciences – Geography (grades K-12):
- Environment and Society

Prior to the Program:
- For the videoconference, please make copies of the blank Water Cycle Worksheet and Cloud Identification Chart included in the packet for each student.
- Also, please bring the materials for the Cloud in a Bottle activity described in this packet, if you would like to have the class make clouds during the program.

Weather Vocabulary:

Altitude – height as measured in the atmosphere.

Altocumulus – cumulus clouds at middle altitudes between 6,000 and 20,000 feet.

Altostratus – stratus clouds at middle altitudes between 6,000 and 20,000 feet.
**Barometer** – an instrument for measuring air pressure.

**Collection (accumulation)** – the process in which water pools in large bodies (like oceans, seas and lakes.)

**Condensation** – the process in which water vapor (a gas) in the air turns into liquid water. Condensing water forms clouds in the sky.

**Cirrocumulus** – cumulus clouds about 18,000 feet; may also be called “mackerel sky” because of their almost shiny silvery appearance, resembling the scales of a mackerel.

**Cirrus** – wispy clouds of ice crystals above 18,000 feet.

**Cumulonimbus** – cumulus clouds that can extend from near the ground to above 50,000 feet; thunderheads that often develop from towering cumulus, and bring thunderstorms.

**Cumulus** – white puffy clouds with distinct edges that sometimes look like cotton balls dotting a blue sky; sometimes have flat bottoms.

**Density** – mass divided by volume.

**Dew Point** – is the temperature at which water vapor can condense into liquid form.

**Evaporation** – the process in which liquid water becomes water vapor (a gas). Water vaporizes from the surfaces of oceans and lakes, from the surface of the land, and from melted snow in fields.

**Fog** – clouds so low they rest on the ground. Fog that forms in valleys and lowlands is known as radiation or ground fog and may leave the valleys fogged in all day, while the tops of the hills are clear.

**Hydrologic** – the study of water.

**Humidity** – refers to how much water vapor is in the air.

**Precipitation** – the process in which water (in the form of rain, snow, sleet, or hail) falls from clouds in the sky.

**Relative humidity** – the amount of water vapor in the air compared to the amount of water vapor the air can hold at a given temperature.

**Saturation** – air reaches the point where it cannot hold any more water.

**Stratocumulus** – layered cumulus clouds below 6,000 feet.
**Stratus clouds** – long clouds without distinct edges below 6,000 feet; create overcast days.

**Tornado** – rapidly rotating winds blowing around a small area of extreme low pressure that develops within a severe thunderstorm. Often visible as a funnel-shaped cloud, tornadoes can develop with little or no warning.

**Transpiration** – the process in which some water within plants evaporates into the atmosphere. Water is first absorbed by the plant's roots, then later exits by evaporating through pores in the plant.

**During the Videoconference – Activities:**

*These activities may be done during the videoconference. The Cloud in a Bottle activity does require you to bring supplies for the class, which are listed below.*

**Shake to condensate:**

Have students stand at least an arm’s length from each other. While standing they can wiggle and move their arms up and down. When you say Evaporate, they can move about the room, but as soon as they touch someone they have to lock arms, they can still wiggle their free arms until they touch another person. Every 10 seconds the teacher can call out “you are higher in the atmosphere cool off and slow down, and take one step towards the center of the room”. Continue until eventually all arms are locked together. At this point you can call them a cloud (s), and then say precipitate and everyone has to sit down. At this point you can illustrate how easy it was to move around when they were alone and “low in the atmosphere” with lots of energy, but as they got higher in the atmosphere they had to cool down, lose energy, move closer together and stick just like water molecules forming condensate.

**Cloud in a Bottle:**

**Materials**

- Inexpensive thin walled plastic water bottle
- Rubbing alcohol (isopropyl)
- funnel

**Method**

1. Empty the water bottle and remove the label.
2. Place approximately a ½ inch of isopropyl in the bottle and replace the cap.
3. Swirl the bottle around so the rubbing alcohol touches all parts of the inside of the bottle.
4. Quickly twist the bottle in half, around and around as if you were going to twist it apart.
5. When the bottle is pressurized and feels like it is going to pop, quickly remove the cap and a cloud will form.
6. If it doesn’t work here is a video http://www.youtube.com/watch?v=VNwZjkq9dZ

**Explanation of why we used isopropyl and not water for the demonstration**

Isopropyl alcohol has a lower boiling point than water and alcohol molecules have weaker bonds than water molecules that have very strong hydrogen bonds, so they break more easily. Consequently, isopropyl evaporates more quickly than water. By twisting the bottle, we increase the energy of the alcohol, as well as the pressure inside the bottle, causing the alcohol to vaporize. Since there are more evaporated alcohol molecules in the bottle, there are also more molecules able to condense. When we release the cap on the bottle, there is a rapid decrease in both temperature and pressure causing the alcohol to condense and form a cloud.

**Beyond the Videoconference – Teaching Extensions:**

**Make Your Own Barometer:**

**Materials:** Coffee or soup Can, balloon, rubber band, pin, drinking straw tape/glue, paper.

With the lid off the can, stretch the balloon over the top and put the rubberband around it to help hold it in place. Tape or glue (not hot glue) the straw to the middle of the balloon, and the pin to the end of the straw. On the paper make an even scale, maybe copy the gradients on a ruler. Mark the spot where the pin is pointing, and check the weather report for the air pressure that day. As days go by check your barometer to see if the air pressure increases or decreases. You can check your results for accuracy by checking the weather report as well.
How does this day make you feel?

(Grades 4, 5, 6)
Using the art from the lesson, looking at a picture we can ask the students to write a response to questions such as: What does that day feel like? What are you doing on this day? Would you want to be here right now, why or why not? How would the weather in this piece affect your mood or activities? What phase of the water cycle is represented here? What is the next phase? (Feel free to add in your own questions.)

Classroom Weather Station Instruments:
For a follow-up assignment, students can design simple meteorological instruments using common household materials, and construct a classroom weather station.

With a bit of patience, just a few dollars, and common household items (paper or plastic drinking cups, human hair, food coloring, drinking straws, modeling clay, masking or duct tape, scissors, etc.), students can build a fully equipped backyard or schoolyard weather station that—depending on how carefully and regularly measurements are made—can be surprisingly accurate. In addition to helping students become more aware of and observant of weather conditions on a daily basis, they may discover that conditions in their neighborhood’s local microclimate actually differ significantly from those of the nearest official weather station—commonly an airport—just a few miles away.

There are several good websites with directions for building backyard weather stations. Check out more than one site, because they feature somewhat different instruments (you may want to mix and match), as well as different approaches to their construction.

Sites with directions and drawings suitable for upper elementary and middle school grades:

- The Center for Innovation in Engineering Science and Education (CIESE) site at http://www.k12science.org/curriculum/weatherproj2/en/activity1.shtml gives simple instructions for building a weather vane, a rain gauge, and a barometer. It also includes instructions for a do-it-yourself thermometer using rubbing alcohol and food coloring, and for an anemometer from paper drinking cups for measuring wind speed.
**Suggested Reading:**

*For students....*


**Websites of Interest:**

*For students....*
- Test your cloud identification skills with these interactive weather games - [http://eo.ucar.edu/webweather/](http://eo.ucar.edu/webweather/)

- Check out more clouds in art here – [https://www.windows2universe.org/art_and_music/cloud_art/clouds_in_art.html](https://www.windows2universe.org/art_and_music/cloud_art/clouds_in_art.html)

*For teachers....*
- Teacher guide to clouds in art site - [http://www.windows2universe.org/teacher_resources/teach_cloudart.html](http://www.windows2universe.org/teacher_resources/teach_cloudart.html)

Distance Learning at the Cleveland Museum of Art

Weather, Weather Everywhere

Grades 4-7

**Teacher Rubric:**

Multimedia Project: Weather

Teacher Name: _________________________________

Student Name: _________________________________

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td></td>
<td></td>
<td></td>
<td>Content is minimal OR there are several factual errors.</td>
</tr>
<tr>
<td>Covers topic in-depth with details and examples. Subject knowledge is excellent.</td>
<td>4</td>
<td>Includes essential knowledge about the topic. Subject knowledge appears to be good.</td>
<td>Includes essential information about the topic but there are 1-2 factual errors.</td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td></td>
<td></td>
<td></td>
<td>More than 4 errors in spelling or grammar.</td>
</tr>
<tr>
<td>No misspellings or grammatical errors.</td>
<td>4</td>
<td>Three or fewer misspellings and/or mechanical errors.</td>
<td>Four misspellings and/or grammatical errors.</td>
<td></td>
</tr>
<tr>
<td>Oral Presentation</td>
<td></td>
<td></td>
<td></td>
<td>Delivery not smooth and audience attention lost.</td>
</tr>
<tr>
<td>Interesting, well-rehearsed with smooth delivery that holds audience attention.</td>
<td>4</td>
<td>Relatively interesting, rehearsed with a fairly smooth delivery that usually holds audience attention.</td>
<td>Delivery not smooth, but able to hold audience attention most of the time.</td>
<td></td>
</tr>
</tbody>
</table>
The Cleveland Museum of Art Distance Learning Evaluation Form

Your Name______________________________________________________________
Your School___________________________________________________________
School Address (with zip code) _____________________________________________
E-mail Address __________________________________________________________
Grade/Class of students (e.g. 10th grade French) ______________________________
Program Title ____________________________________________________________
Program Date ____________________________________________________________

Thank you so much for your participation in our distance learning program. We would appreciate your response to these questions by circling the appropriate answer and returning the survey. Please Mail or Fax to Dale Hilton at 216-707-6679

5= Strongly Agree  4= Agree  3= Neither Agree nor Disagree
2= Disagree  1= Strongly Disagree

1. The teacher information packet was helpful for preparing my class and me for the distance learning lesson.
   5  4  3  2  1

2. The teaching style of the on-camera instructor was interesting, engaging and fostered interaction.
   5  4  3  2  1

3. The Teacher Information Packet was helpful in providing interdisciplinary extension activities that I did use or plan to use.
   5  4  3  2  1

4. The distance learning lesson successfully taught its objectives.
   5  4  3  2  1

5. The distance learning lesson was not interrupted by technical difficulties.
   5  4  3  2  1

6. The pre-requisites the distance learning lesson and extensions are aligned with The National Education standards.
   5  4  3  2  1

7. I plan to register for another distance learning lesson.
   (circle one)  
   Yes  No

   If no, why? ____________________________________________________________
8. I would like more information about The Cleveland Museum of Art’s Teacher Resource Center.  
(circle one)  
Yes  
No

9. Why did you choose The Cleveland Museum of Art Distance Learning?  
(circle one)  

a.) Price Point  
b.) Quality of lessons  
c.) Selection of lessons  
d.) Ease of working with CMA  
e.) Other

10. How did you hear about The Cleveland Museum of Art Distance Learning program?  
(circle all that apply)  

a.) CMA inservice  
b.) CILC  
c.) TWICE  
d.) Conference  
e.) Brochure  
f.) The Cleveland Museum of Art website  
g.) The Teacher Resource Center  
h.) Other

11. Do you have any additional comments about the distance learning lesson?  

__________________________________________________________________________  

__________________________________________________________________________  

__________________________________________________________________________  

__________________________________________________________________________  

__________________________________________________________________________  

__________________________________________________________________________

Please return the completed teacher evaluation form to:  

Dale Hilton/Distance Learning  
The Cleveland Museum of Art  
11150 East Boulevard  
Cleveland, OH 44106

Or fax to Dale Hilton at 216-707-6679
Selected images:

Distance Learning at the Cleveland Museum of Art

*Weather, Weather Everywhere*

*Grades 4-7*

---

*Gray and Gold, 1942*

John Rogers Cox (American, 1915-1990)

Oil on canvas

1943.60

---

*The Secret Life, 1928*

Rene Magritte (Belgian, 1898-1967)

Oil on canvas

1992.298
Distance Learning at the Cleveland Museum of Art

Weather, Weather Everywhere

Grades 4-7

Mojave Desert Clouds, 1936
Brett Weston (American, 1911-1993)
Gelatin silver print
1992.52

Twilight in the Wilderness, 1860
Frederic Edwin Church (American, 1826-1900)
Oil on canvas
1965.233
Distance Learning at the Cleveland Museum of Art

Weather, Weather Everywhere

Grades 4-7

Untitled #102, 2001 (printed 2004)
Simen Johan (Norwegian, 1973-)
Chromogenic process color print
2005.38

Rain and Umbrella, c. 1875
Félix Hilaire Buhot (French, 1847-1898)
Etching
1920.705
The Water Cycle

Name: ____________________________

[Diagram with labeled spaces for parts of the water cycle]
The Water Cycle

- Condensation
- Transpiration
- Evaporation
- Accumulation (Collection)
- Precipitation
Cloud Identification Chart

Write the name and the average altitude (height) for each cloud.
Cloud Identification Chart – ANSWER KEY

Write the name and the average altitude (height) for each cloud.