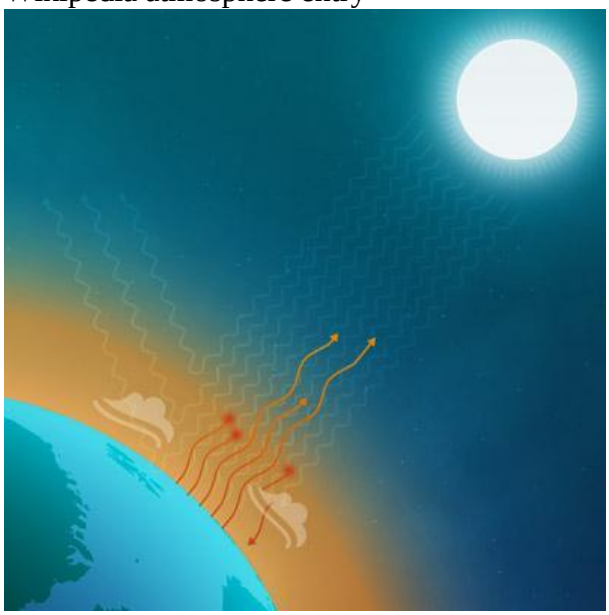
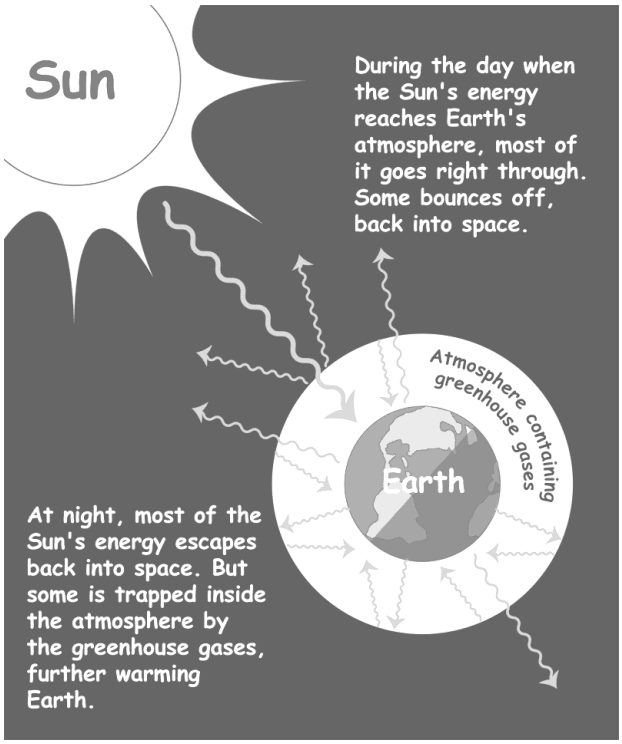
Date	August 24, 2022 Hurley Recreation Center
Topic	Climate Science/ Greenhouse Gases / Weather v Climate
Grade Level	Outdoor Activity for children aged 6-12
Essential Questions	What's the Greenhouse Gas effect? What is a gas? What gases are Greenhouse gasses and why? Water: What are different states of matter? How is water vapor formed? What's the difference between weather and climate? How do warmer temperatures affect water? Does the amount of water on the Earth change? [NO – it is finite – and only x% is available for drinking – see water curriculum]
Prerequisite:	General knowledge of daily weather events and water
Objectives	SWBAT: • Name at least one GHG and model its chemical composition • write a descriptive statement about that GHG • describe the difference between climate and weather; • demonstrate basic understanding of the Greenhouse effect
Materials **Vocabulary**	Word Search; Basic info about atmosphere Colored Card with Atom symbols with Clothespins or clips to attach same 4-color Starburst style candy and toothpicks sufficient for creating 56 GHG models Pencils for everyone / Writing paper (20 sheets) Worksheets / Folders See Vocabulary hand-outs which include Matter Mass-Atom-Atmosphere-climate-weather
Opening	DO NOW: Greenhouse Effect Word Search – seating randomly with pencils
Activities	Whole Class – Introduction – Name/Hurley CSTF/ Questions to start? Ask your students what they have heard about the greenhouse effect. Ask them to explain whether they think it is a **good** or **bad** thing. Lead a short class

	discussion around this topic. Without any greenhouse effect, Earth would be an inhospitable, frozen ball of ice. However, too much greenhouse effect, caused today as we burn fossil fuels, is warming our climate rapidly and causing numerous other problems. Intro *The Earth's surface is made up of land and water and is surrounded by an atmosphere. Today where going to take a closer look at that atmosphere and what's in it. We're especially interested in those greenhouse gases* **Divide class initially by Assigned Group Letter**– Hydrogen (24) 8-10 yrs Oxygen (16) Carbon (8) 11-12 yrs Nitrogen (8) 6-8 yrs Discuss atoms/ elements/ compounds/ as needed **Mix ages to form 4-groups of 14 consisting of 6-H // 2-N // 2-C // 4-O** Distribute Modeling instructions of 4-gasses atomic structure to each group. Students stand and form the 4 main gases using their arms to 'bond' to the next atom at the shoulder. **Regroup students according to the GHG** Water Vapor = 12 students Methane = 20 students (make 2 groups) Methane & Ozone Nitrous oxide = 12 students Carbon dioxide = 12 students **5 groups each study 1-GHG together** Potential for 6th group studying CFC's *BTW – Everyone will get to make their own GHG model with Starbursts. And one group will get tattoos* Distribute folder for each group (assign manager?) discuss group work briefly

	FOLDER CONTENTS: 3-Guide to Climate Change for Kids 6-Gas /Matter Fact Sheets 2-Vocabulary hand-outs with Group Role suggestions on reverse 1-Climate Related Chart (2 copies) with GHG reading material on reverse Writing paper Tasks: Read Fact sheets in pairs Complete individual worksheets Group talk – compare answers; prepare some facts to share about groups GHG As a class – Present group info to entire class For additional classes, assemble GHG groups Review Climate Related Charts in folders; discuss and prepare description/ info about that as a group Present: Info re Climate Chart to entire class
Summary	Student group present info about their GHG and Climate Related Chart Talk about effect of too much GHG and ways to reduce GHG emissions.
Assignment	Take home the Wordsearch Visit website on reverse
Extension	Draw your own picture; Do your own research; do things to save energy
NYS Standards	7-Crosscutting Concepts give students an organizational structure to understand the world and help students make sense of and connect Core Ideas across disciplines and grade bands. 1. Patterns, 2. Cause and Effect, 3. Scale, Proportion, and Quantity, 4. Systems and System Models, 5. Energy and Matter in Systems, 6. Structure and Function, 7. Stability and Change of Systems *Interdependent Relationships in Ecosystems*; *Weather and Climate;* effect relationship between weather and a water process in Earth systems. *Energy; Structure and Properties of Matter*; *Matter and Energy in Organisms and Ecosystems; Earth's Systems;*

Main resources
https://www.nesdis.noaa.gov/about/k-12-education >
shttps://www.nesdis.noaa.gov/about/k-12-education/jpss-education/lesson-plan-greenhouse-gases-aerosols
https://climatekids.nasa.gov/menu/ > https://climatekids.nasa.gov/carbon/
https://www.thoughtco.com/most-abundant-gases-in-earths-atmosphere-607594
Wikipedia atmosphere entry





NYS State Science Standards

The seven Crosscutting Concepts that are meant to give students an organizational structure to understand the world and help students make sense of and connect Core Ideas across disciplines and grade bands. They are not intended as additional content. Listed below are the Crosscutting Concepts from the Framework:

1. Patterns
2. Cause and Effect
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter in Systems
6. Structure and Function
7. Stability and Change of Systems

Interdependent Relationships in Ecosystems;
3-LS4-4 Level 1- Identify the problem caused when the environment changes, from those provided, that matches the given solution to that problem.

Weather and Climate; 3-ESS3-1: Level 1- Identify the given evidence that supports a claim about the merit of a solution that reduces the impacts of a weather-related hazard.

3-ESS2-3 NYSED: Level 1- Using the results of an investigation, determine a cause and effect relationship between weather and a water process in Earth systems. [higher temp = more water vapor in the atmosphere = more precipitation]

Further investigation: Identify the given evidence [rising temp = more precipitation & more heat waves] that supports a claim about the merit of a solution [reduce GHG asap to lower the amount of temp rise such as not burning fossil fuels] to reduces the [severity and frequency] impacts of a weather-related hazard. {Netherlands' Room for the River program vs none in Germany last year's floods;

Energy; 4-ESS3-1: Level 1-Given information, identify an energy and/or fuel derived from natural resources that affects the environment. Level 2-Identify from the given information how the use of energy and/or fuels derived from natural resources affect the environment.

P. Physical Sciences

P-PS1-1. Ask questions and use observations to test the claim that different kinds of matter exist as either solid or liquid. [Clarification Statement: Emphasis should be on observing and describing similarities and differences between solids and liquids based on their

physical properties. Solids and liquids can be compared and categorized (sorted) based on those properties.]

Structure and Properties of Matter

5-PS1-1 Level 1-Identify one piece of evidence in a model, from those given, that shows matter is made of particles too small to be seen. 5-PS1-2 States of Matter Level 1- Using measured quantities or a graph, identify the evidence, from those given, that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total amount of matter is conserved.

Matter and Energy in Organisms and Ecosystems

5-LS1-1 Level 1- Using evidence, identify the argument from those provided, that plants get the materials they need chiefly from air and water.

5-PS3-1 Level 1- Identify the evidence in a model that shows that energy in animals' food was once energy from the Sun

5-LS2-1 Level 1- Identify the evidence in a model of a food web that shows one pathway for the transfer of matter among plants (producers), animals (consumers), decomposers, and/or the environment.

Earth's Systems;

U5-ESS2-1: Level 1 using a model, identify two Earth systems (spheres- geosphere, biosphere, hydrosphere, and atmosphere) that are interacting. Level 2: Describe above

Life Sciences
Earth and Space Sciences
Matter and Its Interactions
Interdependent Relationships in Ecosystems
Weather and Climate