

Climate Change and Humans

Grade 6

Come and learn about the impact on climate change on humans, gardens, and Santa Fe

Overview of Unit:

- Pre-assessment
- Climate or weather
- Pie Chart
- Interview adults about climate change
- Electromagnetic radiation introduction
- Temperature and carbon dioxide variability
- Trend lines and reading charts
- Field Trip
 - Pinon pine field study
 - Carbon dioxide and atmospheric heating
 - Beautiful and Xeric Plants
 - Reflection of trip
- Atmosphere game
- Earth's surface heating
- Post-assessment
- Glossary

Students will know:

- Related vocabulary
- The importance of EM radiation
- What current climate change data is indicating
- The impact of climate change on Santa Fe
- How CO₂ impacts the climate
- Why piñon pines are dying at greater rates
- How to apply knowledge of relationships between organisms

Students will be able to:

- Create a mini glossary
- Read nonfiction text and respond
- Support ideas with evidence
- Learn directly from nature through making careful observations
- Apply knowledge to a new task
- Use drawing to record data or information
- Understand a chart
- Conduct a field study

Links to Standards

- Common Core
 - ELA
 - CCSS.ELA-Literacy.RI.6.2
 - CCSS.ELA-Literacy.RI.6.3
 - CCSS.ELA-Literacy.RI.6.7
 - CCSS.ELA-Literacy.RI.6.8
 - CCSS.ELA-Literacy.RI.6.10
 - CCSS.ELA-Literacy.W.6.1
 - CCSS.ELA-Literacy.W.6.2
 - CCSS.ELA-Literacy.W.6.4
 - CCSS.ELA-Literacy.W.6.8
 - CCSS.ELA-Literacy.W.6.9
 - CCSS.ELA-Literacy.SL.6.1
 - CCSS.ELA-Literacy.SL.6.2
 - CCSS.ELA-Literacy.SL.6.4
 - CCSS.ELA-Literacy.L.6.4
 - CCSS.ELA-Literacy.L.6.6
 - Math
 - CCSS.Math.Content.6.NS.C.5
 - CCSS.Math.Content.6.NS.C.8
 - CCSS.Math.Content.6.EE.C.9
 - CCSS.Math.Content.6.SP.A.2
 - CCSS.Math.Content.6.SP.B.4
 - CCSS.Math.Content.6.SP.B.5
- Next Generations Science Standards
 - Coming Soon...
- NM Science Standards
 - Strand 1, Standard 1, Grade 6, Benchmark 1, #1, #2, #3
 - Strand 1, Standard 1, Grade 6, Benchmark 2, #1, #2
 - Strand 1, Standard 1, Grade 6, Benchmark 3, #1, #2
 - Strand 2, Standard 1, Grade 6, Benchmark 2, #3, #4
 - Strand 2, Standard 2, Grade 6, Benchmark 2, #2
 - Strand 2, Standard 3, Grade 6, Benchmark 2, #4, #5

Lesson Plans:

- Pre-assessment
 - *Purpose:*
 - Assess what students already know about the topic
 - Ask students to support their thinking with evidence
 - *Time:*
 - 15 minutes

- Climate or Weather
 - *Purpose:*

- Create a model for understanding a larger phenomenon
 - Create an understanding of the difference between weather and climate
 - Use data and create a graphic representation of the information
- *Time:*
 - 45 minutes
- *Materials:*
 - Bags of m&ms or beads with the same colors
 - Markers
 - Calculators
- *Intended Structure:*
 - Anticipatory Set
 - Ask students what the difference is between climate and weather
 - Give some examples, and ask them which it is
 - You bring an umbrella to class because the weather forecaster says it is going to rain (weather)
 - You do not plant a palm tree in Santa Fe (climate)
 - You want to retire in southern California because it is warm there (climate)
 - Let students know your expectations when it comes to having food in the classroom
 - Activity
 - Pass out materials
 - Explain that they will draw one m&m out of the bag at a time, correlate the color with the weather it represents, and record the weather for that year
 - E.g. the first m&m is light brown, record Sleet, 40° F as the weather for March 1st, 1981
 - Have them draw 30 m&ms, one for each year between 1981 and 2010
 - Have students sort the m&ms by color, and determine the most common type of weather and how they would categorize the climate in March
 - Have students average the temperature, by adding together all the temperatures and dividing this number by 30
 - Use the data to create a pie chart
 - Closing
 - Have students discuss the different results of their weather/climate study
 - Ask them what they think might live in the climate they studied. Imagine that the brown shades and red represented 70° weather with no precipitation. How could this change the climate?
 - Ask students what impact climate change would have on them and the environment in Santa Fe

- Have students write the definition of weather and climate in their glossaries

- Interview two adults about Climate Change
 - *Purpose*
 - Have students begin a dialogue about climate change with the adults in their lives
 - Connect the learning in the classroom with the real world
 - *Time*
 - 20 minutes, homework
 - *Intended structure*
 - Anticipatory Set
 - Discuss climate change
 - Explain that we will be looking at the science, we are not making a political statement
 - We will be studying temperature changes and atmospheric changes that have been collected over time.
 - We want to encourage conversation and understanding of the science that relates to our changing climate
 - Activity
 - Have students choose two adults in their lives and interview them about what they think about climate change
 - Closing
 - Have students reflect back on the interviews in the classroom
 - Go back to this not being a political statement, rather it is looking at the science behind the beliefs of climatologists

- Electromagnetic Radiation Reading
 - *Purpose*
 - Understand how Earth gets energy from the sun
 - Understand there are different types of radiation given off by the sun
 - Introduction to energy being carried through wavelengths
 - *Time*
 - 30 minutes
 - *Intended Structure*
 - Anticipatory Set
 - Ask students what the sun does for the Earth
 - Have them discuss what the Earth would be like without the sun
 - Give students 30 seconds to look over the reading
 - Ask them what they think the reading is about
 - Activity
 - Have students read page 6 alone or in small groups

- Have them circle words they think are important and to underline the sentence that they think is the most important in each paragraph
 - Closing
 - Review the paragraph, looking at text structure
 - Have students try the rope experiment at the bottom of the page and reflect on what this tells you

- Temperature Variability and CO₂ Data
 - *Purpose*
 - Practice graphing data and comparing data from two graphs
 - Use actual data and look for correlations between sets of data
 - Identify trends
 - *Time*
 - 1-1.5 hours (depending of student familiarity with graphing)
 - *Materials:*
 - Data and graph paper
 - or
 - Data and computers with Excel
 - *Intended Structure*
 - Anticipatory Set
 - Have students look at both data sets and make observations
 - Discuss how to define graph limits, where to start and stop numbering
 - Activity
 - Haves students graph the data, can be a good homework assignment
 - Closing
 - Draw trend lines
 - Compare trend lines in both graphs
 - Discuss the tension between causation and correlation
 - Finish page 11

- Field Trip
 - Structure of Field Trip
 - 15 minutes – Begin as a group
 - 1 hour 45 minutes – Rotate through 3 Activities
 - 25 minutes – Writing reflection and closing activity as a group
 - Time for teacher and class to explore
 - Rotations
 - Piñon Pine Die-Off exploration
 - CO₂ Experiment
 - Botanical Studies

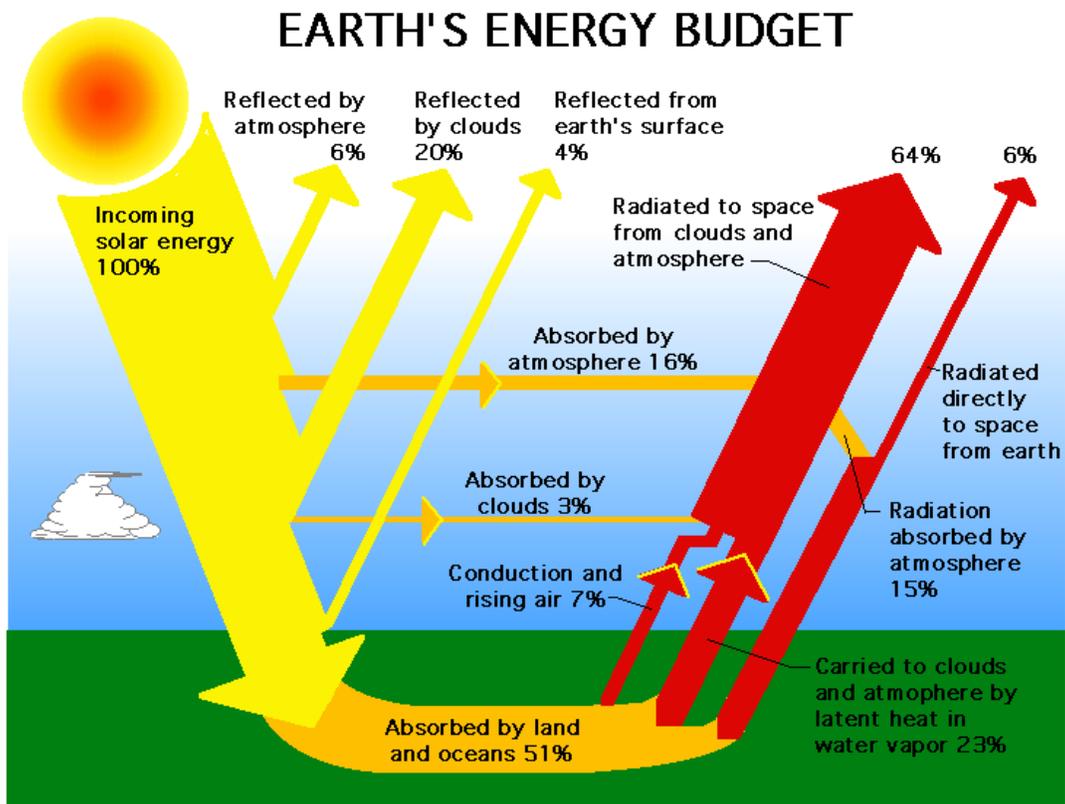
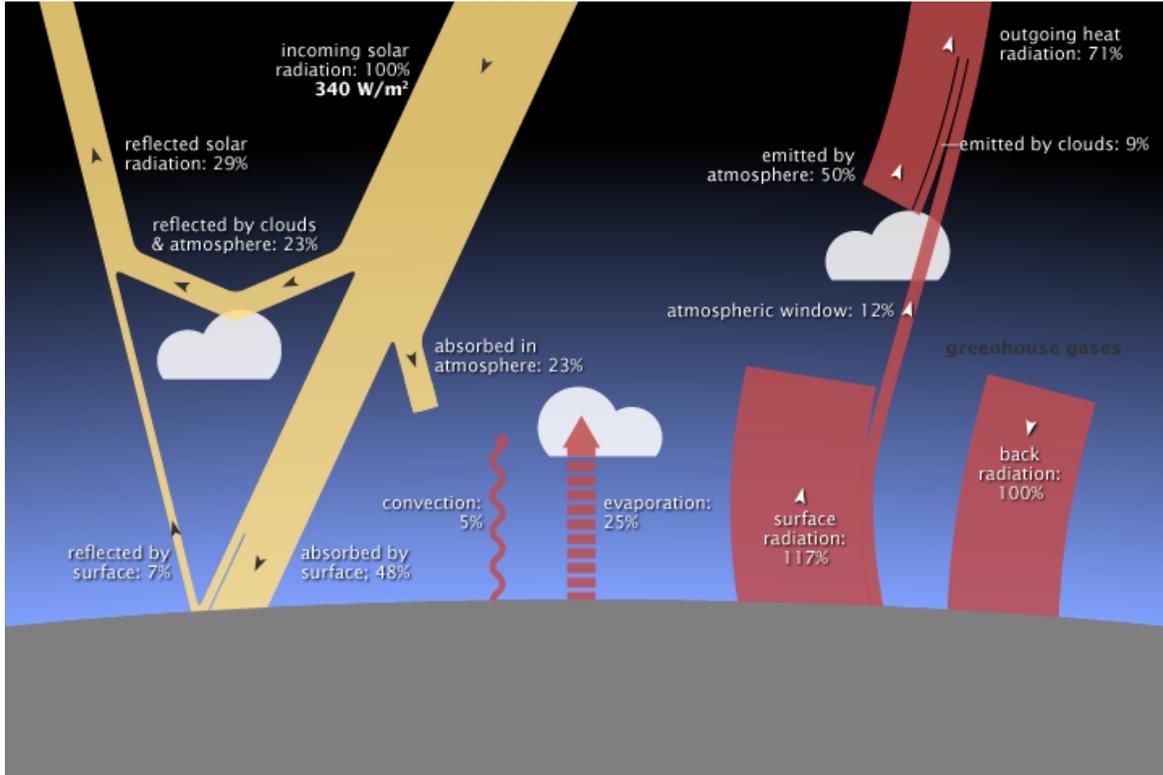
- Atmosphere Game
 - *Purpose*
 - Create a model of what happens when atmospheres are added to a planet
 - Use a model to explore a complex concept
 - *Time*
 - 1 hour
 - *Materials*
 - Energy budget chart, see attached
 - Coins for each to flip
 - Atmosphere game sheets, see attached
 - Energy markers
 - Links:
 - <https://spark.ucar.edu/climate-bathtub-model-animations>
 - *Intended structure*
 - Anticipatory Set
 - Discuss the graph of CO₂ and the CO₂ experiment
 - Look at the energy budget charts. Spend time examining:
 - % of the energy that enters the atmosphere
 - % of the energy that leaves the atmosphere
 - The ways that the energy can change (E.g. from being light to temperature, and so on)
 - Review rules of the game, playing the first two rounds with the students
 - Activity
 - Play the game
 - Closing
 - Reflect on what the results tell us
 - Note: the two atmospheres should have significantly more than the one atmosphere, which should have more than the no atmosphere
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- Earth's Surface Heating
 - *Purpose*
 - Conduct a scientific investigation, following the scientific method
 - Allow students to design an experiment with one variable
 - *Time*
 - 1 hour, plus collecting materials to test
 - *Materials*
 - Thermometer
 - Student determined materials
 - *Intended Structure*
 - Anticipatory Set

- Discuss with students what impact changing the surface of the Earth could have on heating of the Earth
- Ask students if they can think of any examples of surfaces that might heat differently (E.g. Ice, blacktop, etc)
- Have groups of students choose three surfaces to test
- Make sure students understand how to design an experiment that examines just one variable
- This experiment is testing the surface, make sure that they are thinking about:
 - Volume
 - Position in the sun
 - Containers in which the surfaces are tested
 - Other?
- Activity
 - If they are ready, have students write a complete procedure, defining each step
 - If not, write the procedure with the class, focusing on how to reduce the variables to just one
 - Have students develop a materials list
 - Conduct the experiment
- Closing
 - Reflect on what the experiment tells the students
 - Reflect on what else this makes the students want to learn

Post-assessment

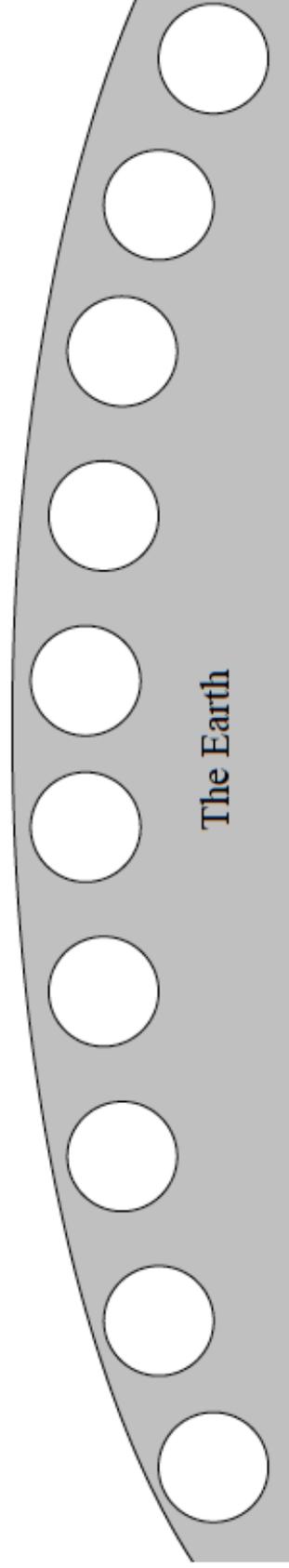
- *Purpose*
 - Assess what students learned over the course of the unit
- *Time*
 - 20 minutes
- *Intended structure*
 - Ask students to independently take the final assessment

Earth's Energy Budget, Images from NASA



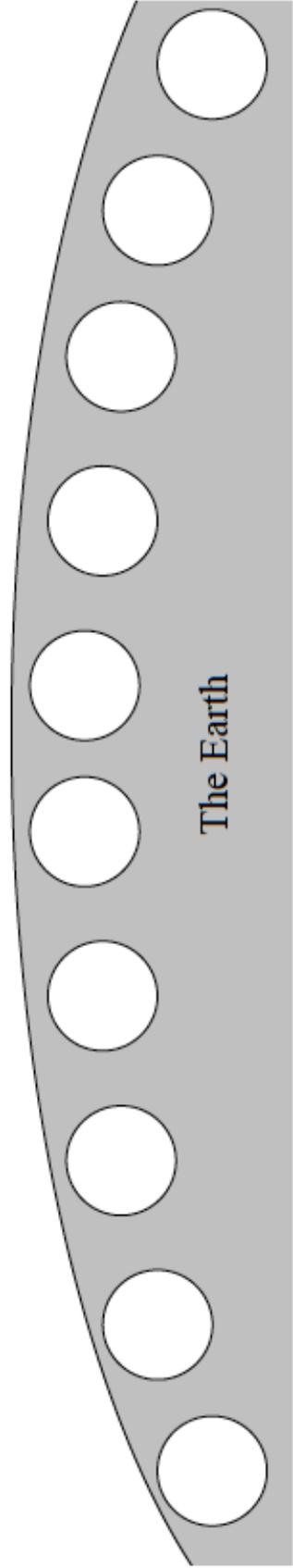
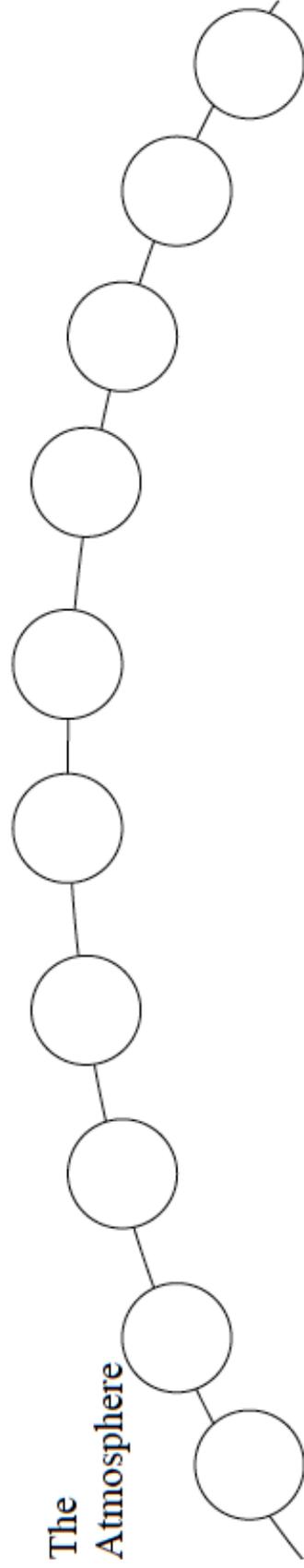
No Atmosphere

Above this line pieces are in space and can no longer be used



One Atmosphere

Above this line pieces are in space and can no longer be used



Two Atmospheres

Above this line pieces are in space and can no longer be used

