Energy, Plants, and Humans  
Grade 5  

Come and learn about the how the sun fuels most life on Earth.

Overview of Unit:  
• Pre-assessment  
• Thought experiment, No sun  
• Solar energy on Earth  
• Plant cells  
• Photosynthesis  
• The Sun and Humans  
• Field Trip  
  o Food Web  
  o Santa Fe Cholla  
  o Leaf Dissection  
• Plant cell model  
• Photosynthesis, making and breaking glucose  
• Post-assessment  
• Glossary

Students will know:  
• Related vocabulary  
• Plants, leaves, and plant cells have specialized anatomy  
• Plants are producers and animals depend on them for survival  
• Humans rely on plants in many ways  
• The process of photosynthesis

Students will be able to:  
• Create a mini glossary  
• Read nonfiction text and apply this knowledge  
• 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 and make a chart and model  
• Conduct a field study  
• Use scientific tools

Links to Standards  
• Common Core  
  o RI.5.5  
  o RI.5.10
Lesson Plans:

• **Pre-assessment**
  o **Purpose:**
    ▪ Assess what students already know about the topic
    ▪ Ask students to support their thinking with evidence
  o **Time:**
    ▪ 15 minutes
  o **Intended structure**
    ▪ Ask students to answer the questions on page 2
    ▪ Reassure them that it is ok if they do not know the answers, this is to see what they still need to learn

• **Thought Experiment**
  o **Purpose**
    ▪ Explore the impact of the sun on Earth
    ▪ Have students make a hypothesis and support their claims with specific examples
  o **Time**
    ▪ 30 minutes
  o **Intended structure**
    ▪ Introduce the writing prompt
    ▪ Give example of what evidence is and how to incorporate it into their writing
    ▪ If necessary, have students brainstorm together
    ▪ Independent writing, or homework assignment
• **Solar Energy on Earth**
  o **Purpose**
    ▪ Practice non-fiction reading
    ▪ Review nonfiction text structure
  o **Time**
    ▪ 30 minutes
  o **Intended structure**
    ▪ Anticipatory set:
      • Revisit the paragraphs they wrote as the Thought Experiment
      • Discuss what the sun helps them do every day
    ▪ Activity:
      • Have students read each paragraph independently
      • Have them underline the main idea
      • Have them circle words they think are important, recording these in the glossary
      • Come together at the end of both paragraphs to discuss the text features
    ▪ Closing:
      • Have students record five ways they used solar energy
      • They could each draw one on a sticky note and bring these up to the board
      • The sticky notes could be sorted in different ways: “fossil fuels, foods, and other” or in another way

• **Plant Cells, Photosynthesis, and The Sun and Me**
  o **Purpose**
    ▪ Practice non-fiction reading
    ▪ Review nonfiction text structure
    ▪ Use other formats to learn and share ideas (comics and diagrams)
  o **Time**
    ▪ 45 minutes
  o **Intended structure**
    ▪ Anticipatory set:
      • Ask students to discuss the “Imagine…” in small groups
      • Report back what this would be like
    ▪ Activity:
      • Have students read each paragraph in Plant Cells independently
      • Have them underline the main idea
      • Have them circle words they think are important, recording these in the glossary
      • Come together at the end of both paragraphs to discuss the text features
      • Have students read the comic in small groups
• Have them compare and contrast the paragraph with the comic
• Have them discuss:
  o Which they think taught them more
  o Which was more fun
  o Why do they say that
• Share their ideas in the whole group
• Ask them what make a “good” educational comic

  ▪ Closing:
    • Have students create their own comic on page 7
    • Challenge them to include at least 3 ways humans use energy
    • This could be homework assignment
    • Let students share these with the class

  o The Sun on My Skin
  o  Purpose
    ▪ Practice non-fiction reading
    ▪ Make connections between text and personal experiences
    ▪ Read and understand maps as a source of data
  o  Time
    ▪ 30 Minutes in Class, 30 Minutes of Homework
  o  Intended Structure
    ▪ Anticipatory Set
      • Have students close their eyes and imagine the feeling of warm sunlight on their skin
      • Ask how many have had a sun burn or had their skin get darker in the sun
      • Today we are going to learn about the impact of sun on the skin
    ▪ Activity
      • Use your favorite reading structure to read the article
      • Ask students what information they learned
      • Ask students where the information came from
        o Explain the role of the CDC and the NIH in our country
      • Focus on the map and have a group discussion:
        o What does this map show?
        o How do you know?
        o What can you learn from this map?
        o Which states have the greatest number of people who are diagnosed with skin cancer?
        o What are the states with the lowest diagnosed rates of skin cancer?
        o Where is New Mexico in this range?
        o What do you think might be the reason that there are different rates in different states?
• Closing and Homework
  • Closing question: What will you do to protect yourself against the sun?
  • Homework: Have students imagine that they worked at the CDC or NIH. Their job is to share information about the dangers that the sun can have. Their assignment: create some sort of information that could teach the public about the potential harmful impact of the sun. This can take any form from a piece of art, film, pamphlet, poster, etc.

  o Field Trip to the Botanical Garden
    o Structure of Field Trip
      ▪ 15 minutes – Begin as a group
      ▪ 1 hour 45 minutes – Rotate through 3 Activities
      ▪ 15 minutes – Closing activity as a group
      ▪ Time for teacher and class to explore
    ▪ They will participate in three activities around the garden
      • Make a Food Web with native Santa Fe animals
      • Learn about the endangered Santa Fe Cholla and plant a piece of a cholla to grow in the classroom
      • Explore the anatomy of two different leaves in the garden and look at how plants breathe

  o Making Models of Plant Cells
    ▪ Purpose
      • Create a model of something too small to see
    ▪ Time
      • Variable, depending on materials choice
    ▪ Materials
      • If you decide to make edible cells:
        o Small Tupperware containers, representing the cell wall
        o Clear or light colored Jello, representing the cytoplasm
        o Variety of at least 9 different fresh fruit and/or dried fruit, such as grapes, blueberries, cherries, strawberries, etc, representing all of the organelles
      • If you decide to make a non-edible model:
        o Small Tupperware containers, representing cell walls
        o Variety of craft materials, beads, plastic, fun foam, etc, representing the organelles
        o Clear drying glue, representing the cytoplasm
    ▪ Structure
      • Anticipatory set
        o Discuss what students learned about leaves at the Botanical Garden
Review what all of the organelles in a cell do and why they are important, pg 11 and 12

**Activity**
- Have students build cells
- Start by showing them all the components and filling out the Cell Wall line together
- Have students decide what each organelle should be represented by before starting to build
- Allow students to build the cells

**Closing**
- Look at the different models they build
- Complete page 13, even as a homework assignment
- Discuss why models are important

**Photosynthesis, Chemical Equation**

- **Purpose**
  - Have students create another form of a model that represents something too small to see
  - Understand that cells can pull molecules apart and put them back together in a different way
  - Everything is made of smaller parts
  - Understand that matter is not destroyed or created, just transformed from one form to another

- **Time**
  - 45 minutes – 1 hour

- **Materials**
  - Periodic table
  - Copies of what glucose looks like, see last page of teacher guide
  - Toothpicks
  - Gumdrops or three colors of clay

- **Structure**
  - **Anticipatory Set**
    - Together, read the article on cellular respiration and the elements
    - Reflect on what this means
    - Discuss how the elements can be joined together in different ways, giving some examples (H₂O have 2 Hydrogen and 1 Oxygen)
    - Review what happens during photosynthesis
  - **Activity**
    - Give each group a pile of materials
    - Discuss that just like a mathematical equation, there needs to be the same number of each type of element on both sides of the equation
o Have students start with hydrogen, how many are on the right side of the equation? Answer: 12
o How many need to be on the left of the equation? Answer: 12
o Where do you find hydrogen now? Answer: H₂O
o How many H₂O will it take to make there be 12 hydrogen on the left? Answer: 6
o Fill in 6 on the left
o Move on to carbon, there are 6 carbon atoms on the right, which means there need to be 6 CO₂ on the left
o Now, it gets complicated… if there are 6 CO₂ and 6 H₂O on the left, that means there are 18 oxygen atoms on the left
o How many oxygen are on the right side of the equation? Answer: 6
o That means we have 12 oxygen left over. Oxygen like being in pairs… so how many O₂ are there on the right? Answer: 6
o The final should read:
  • 6 CO₂ + 6 H₂O becomes 1 C₆H₁₂O₆ + 6 O₂

• Closing
  o Have students test this:
    o Start by choosing a color for each atom (E.g. blue = O)
    o Build 6 CO₂ and 6 H₂O
    o Deconstruct these
    o Build the C₆H₁₂O₆
    o See what is left over, there should be 12 O
    o Build 6 O₂
    o There should be nothing left over.
    o Remind them that cellular respiration is the reverse process
    o Have students make the original 6 CO₂ and 6 H₂O with these glucose and oxygen

• Post-assessment
  o Purpose
    ▪ Assess what was learned in the Garden and through the unit
  o Time
    ▪ 15-20 minutes
  o Intended structure
    ▪ Have students take the assessment individually