| Title: How Fossil Fuels Are Formed | |
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| **Author:** Kathy Rusert Acorn High School Mena, AR | |
| **Course:** Science, Language Arts, Library Media **Grade Level:** 8 | **Duration:** One 45 minute class period |

**Objective:**
The Theory of Superposition tells us that in an undisturbed section of crustal material, the oldest layer is at the bottom and the youngest layer is at the top. In this activity, students will discover how "fossil" fuels are formed and why they are not renewable.

**Summary of Lesson:**
Students will learn how fossil fuels are formed when they analyze narratives for "then" and "now" and create visual timelines for Paleozoic, Mesozoic and Cenozoic Eras. Using the narratives, students will trade information and label features for the other group. After designing a graphic organizer to compare and contrast the information, students will write a 5-paragraph essay demonstrating understanding.

**Standards: CCSS, Arkansas State Frameworks, Next Generation Science Standards, Other**

| Subject: | Code: | Standard: |
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| Science | MS-PS1-4 | Develop a model that predicts and describes changes in particle motion, temperature and state of a pure substance when thermal energy is added or removed. |
| | MS-ESS2-2 | Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. |
| | MS-ESS3-1 | Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geosciences processes. |
| | ESS.8.8.4 | Synthesize and model the result of both constructive and destructive forces on land forms. |
| Language Arts | RI.8.1 | Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. |
| | RI.8.2 | Examine a grade-appropriate informational text. ● Provide an objective summary of the text. |

| | | ● Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas. |
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| | RI.8.3 | Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories). |
| | RI.8.4 | Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts when applicable. |
| | W.8.1 | Write arguments to support claims with clear reasons and relevant evidence. |
| | W.8.8 | Gather relevant information from multiple print and digital sources, using search terms effectively. ● Assess the credibility and accuracy of each source. ● Quote or paraphrase the data and conclusions of others while avoiding plagiarism. ● Follow a standard format for citation. |
| | W.8.9 | Draw evidence from literary and/or informational texts to support analysis, reflection, and research. |
| Library Media | IL.1.8.7 | Select and interpret various types of information on a topic using a variety of print/non-print/digital resources. |
| | IL.2.8.1 | Apply and refine organizational strategies to record information using available resources (e.g., graphic organizers, digital tools, notecards, note taking, summarizing, paraphrasing). |

**Teacher Enhancement Support Systems:**
Communicating with Students, Using Discussion Techniques, Engaging Students in Learning, Using Assessment in Instruction

**Instructional Strategies and Practices:**
Identifying Similarities and Differences, Note Taking, Reinforcing Effort and Providing Recognition, Cooperative Learning, Setting Objectives and Providing Feedback, Advance Organizers, Brainstorming and Discussion, Drawing and Artwork, Graphic Organizers, Models, Movement, Storytelling, Visualization and Guided Imagery, Visuals, Writing

**Bloom's Level:** *(Highest Level Only)*
Creating

| **Materials and Resources:** |
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| Materials for each group<br> •   6 sheets of plain white paper for each group of three students<br> •   Post-It Notes<br> •   Colored Paper<br> •   Colored Pencils<br> •   Copies of Student Worksheets (See Student Worksheet) |
| **Formative Assessment:** |
| Graphic Organizer<br>Exit Slip |
| **Teaching Notes:** |
| For additional activities and labs relating to how fossil fuels are formed, go to:<br>https://www.sciencedaily.com/terms/fossil_fuel.htm; https://socratic.org/questions/how-do-fossil-fuels-form;  or  https://www.conserve-energy-future.com/fossil-fuels-formation.php<br>or search the internet using key phrase "how are fossil fuels formed." |
| **Student Activity:** |
| 1. Begin by dividing the class into two sections—Then and Now.<br>2. For each group of three students in "Then" Group, students will need the following:<br> •   Copy of narratives for Paleozoic Then, Mesozoic Then and Cenozoic Then eras<br> •   6 sheets of plain white paper<br> •   Colored pencils<br>3. Students read, highlight and discuss the narrative for the each era, then draw the plants and animals that were present in that era on separate sheets of paper.  They may need to research organisms to determine physical properties.<br>4. For each group of three students in the "Now" Group, students need the following materials:<br> •   Copies of narratives for Paleozoic Now, Mesozoic Now and Cenozoic Now<br> •   6 sheets of plain white paper<br> •   Colored pencils<br>5. Students read, highlight and discuss the narrative for the each era, then draw the plants and animals that were present in that era on separate sheets of paper.  They may need to research organisms to determine physical properties.<br>6. After both groups have completed their illustrations, they will trade "Then" and "Now" narratives and use small post-it notes to label highlighted parts on the other group's illustrations.<br><br>Performance Assessment:  Students will create a graphic organizer comparing and contrasting the two diagrams and write a five-paragraph essay that will explain their findings.<br><br>Exit Slip Critical Thinking Question:  Why are oil and gas called "fossil fuels?" |
| **See Student Handout:  For a printable copy go to**<br>http://www.arkansasenergyrocks.com/educators/lesson-plans-k-8/ |