# Elementary Science Lesson Plan

<table>
<thead>
<tr>
<th>Objective</th>
<th>The students will use cereal to model rock layers and the formation of fossil fuels.</th>
</tr>
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<tbody>
<tr>
<td><strong>TEKS</strong></td>
<td>§112.16. Science, Grade 5, Beginning with School Year 2019-2020.</td>
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<tr>
<td>(3) Scientific investigation and reasoning. The student uses critical</td>
<td>(A) analyze, evaluate, and critique scientific explanations by using evidence,</td>
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<td>thinking and scientific problem solving to make informed decisions. The</td>
<td>logical reasoning, and experimental and observational testing;</td>
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<td>student is expected to:</td>
<td>(B) draw or develop a model that represents how something that cannot be seen such</td>
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<td>as the Sun, Earth, and Moon system and formation of sedimentary rock works or</td>
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<td>looks; and</td>
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<td>(B) draw or develop a model that represents how something that cannot be</td>
<td>(C) connect grade-level appropriate science concepts with the history of science,</td>
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<td>be seen such as the Sun, Earth, and Moon system and formation of</td>
<td>science careers, and contributions of scientists.</td>
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<td>sedimentary rock works or looks; and</td>
<td>(7) Earth and space. The student knows Earth's surface is constantly changing and</td>
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<td>(C) connect grade-level appropriate science concepts with the history of</td>
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<td>science, science careers, and contributions of scientists.</td>
<td>(A) explore the processes that led to the formation of sedimentary rocks and fossil</td>
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<th><strong>STAAR</strong></th>
<th>Previous STAAR Questions</th>
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<td><strong>Answer:</strong></td>
<td>B</td>
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</table>

**Diagram:**

The diagram shows parts of a process that occurred over time.

**Question:** Which process does this diagram most likely represent?

- **A** The erosion of a coastline
- **B** The deposition of sediments
- **C** The weathering of a mountain
- **D** The formation of a sea
### 18. Which of these environments could form coal if the area is buried for a long time?

- **F** - Mountain top
- **H** - Wetland
- **J** - Valley
- **G** - Snow-covered landscape

**Answer:** H

### 9. Some buildings and homes are heated by energy produced from an alternative to fossil fuels. Which of these is an example of a building or home heated using an alternative energy source?

- **A** - A home heated by energy generated by a hydroelectric dam
- **B** - A building that has emergency electric generators that run on gasoline
- **C** - A home heated by energy produced from a coal power plant in a city
- **D** - A building that has furnaces powered by natural gas

**Answer:** A

### 14. Which list contains only processes that must occur in order for fossil fuels to form?

- **F** - Formation of faults, burial, glacier formation
- **G** - Organism growth, burial, volcanic eruptions
- **H** - Organism growth, burial, compaction
- **J** - Erosion, burial, earthquakes

**Answer:** H
23 A scientist finds the plant fossil shown.

Which question can the scientist most likely answer by examining this fossil?

A  What was the average monthly rainfall in the area?
B  How much water was absorbed by the roots of the plant?
C  How much oxygen was in the atmosphere surrounding the plant?
D  What was the environment like in the area when the plant was alive?

Which statement best describes the processes of weathering and erosion?

F  Weathering and erosion are directly responsible for the breakdown of any type of rock into smaller particles and the carrying away of the loose sediments.
G  Weathering and erosion are directly responsible for depositing loose sediments on the bottom of the ocean, forming layers of sediment.
H  Weathering and erosion are directly responsible for the amount of water in a river that transports sediments to the sea.
J  Weathering and erosion are directly responsible for the transportation, deposition, and compaction of loose sediments on the seafloor.
28 Which diagram models the process of compaction leading to the formation of sedimentary rock?

The diagram shows layers deposited under a body of water. This layering continued for millions of years.

What most likely happened to the dead plants and animals?

F  They were eaten by scavengers.
G  They became fossil fuels.
H  They were washed away by water.
J  They became an underground aquifer.
## Elementary Science Lesson Plan

| Struggling Learners | • The struggling learners will work in small groups.  
• The struggling learners will have a partner for the worksheet. |
|---------------------|---------------------------------------------------------------|
| Advanced Learners   | • The advanced learners will describe the properties of each type of rock.  
• The advanced learners will follow written instructions without direct guidance. |

### Helpful Links
- [Oil and Gas Formation of Fossil Fuels](#)
- [See the link listed under Explore Activity](#)

### Engage
As students enter the room, tell them they will each be conducting a scientific demonstration. Assign students in each group with the task of mixing the cereal, pouring the cereal, and crushing the cereal.

### Explore
As an introduction, explore the different types of rocks and how sedimentary rocks form.

### Explain
Explain the causes and effects of erosion and sedimentation.

### Elaborate
Begin the demonstration using the cereal and cups.

### Evaluate
If the students follow instructions to the best of their ability, they should have the same depictions of the rock layers and similar answers on their worksheet.
EXPLORE ACTIVITY -- 5.7A: Formation of Fossil Fuels (Grade Level 5)

This activity is courtesy of The Growth Machine (TGM) channel on YouTube
Formation of Fossil Fuels: Modeling Rock Layers
https://www.youtube.com/watch?v=LtvShu7glo&list=PLCJ2JM63760xkmcKpPlqXp0iW4bvZjfaT&index=2&t=1s

In this activity, students use cereals to explore the processes that led to the formation of sedimentary rocks and fossil fuels. Adjustments can be made to suit other grade levels by the amount of preparation, number of groups, and teacher demonstration.

Materials

Marker   Clear plastic cups   Coffee grounds   Mixing bowls   Water
Small plastic bags   4 types of cereal (Ex. Cocoa Krispies, Froot Loops, Bran Flakes, Cheerios)
Large plastic bags   Measuring cups   Spoons   Student science worksheet

Preparation for Modeling Rock Layers

Prepare the following items in advance (for each group in your class):

A) 4 small plastic baggies, a large plastic bag (to protect against spills or tears), 2 clear plastic cups, a measuring cup, a mixing bowl with spoon, and water.

B) ½ cup each of various cereals – Many kinds of cereal can be used for this demonstration. The example uses Froot Loops that when crushed represent sandstone, Bran Flakes when crushed represent shale, and Cheerios that when crushed represent eroded sand. As long as the cereals differ visually and in texture, others can be substituted for the same effect.

C) 3 cups of chocolate cereal – The example uses Cocoa Krispies to represent coal but Coco Puffs or another chocolate cereal would also work as long as it loses volume when crushed.

D) 3/4 of a cup of coffee grounds – the coffee grounds are meant to represent the mixture of organic sediment that, when placed under heat and pressure, combine to form coal. For reasons of time, preparation, or budget, the coffee could be excluded and the demonstration would still be effective with only the chocolate cereal.
Steps

1) First, setup your materials for each rock layer. To model the formation of “coal,” mix three cups of Cocoa Krispies and three-fourths of a cup of ground coffee in a bowl. Add three-fourths of a cup of water and toss lightly to mix. Measure one-half cup of this mixture and place into a plastic baggie. Seal and label accordingly. This recipe would make enough “coal” for approximately 4 groups.

2) For the remaining layers, place one-half cup of Froot Loops, Bran Flakes, and Cheerios into separate sandwich bags. Label them to type: Sandstone, Shale, and Sand, respectively.

3) Now, we can model the foundations of rock. For the bottom layer of sediment, pour the bag of Cocoa Krispies and coffee into one of the plastic cups. Draw what this material looks like in the student worksheet. The coffee and krispies mixture represents the organic sediment that combines to form coal and oil.

4) Next, create a layer of sandstone by crushing Fruit Loops. Pour on top of the bottom mixture. Add this layer to the drawing.

5) Add shale sediments by crushing Bran Flakes and pour over the sandstone layer. As before, draw the rock layer.

6) For the final formation, crush Cheerios cereal to model the sand that has eroded over time by wind and water and settled on top. Pour this last layer over the shale and add it to the drawing. That completes the rock layer model. This final step models the end of deposition of sediments.

7) Students can now use the second cup to model the pressure it takes to form fossil fuels and sedimentary layers. Place a fist inside the empty cup, and push down hard on top of the rock layer model. This process demonstrates the role of heat and pressure during compaction.

8) Observe what happens to the bottom layer of the model, which contains the organic sediments. As a final exercise, illustrate what the layers look like after heat and pressure have been applied, and answer the remaining questions in the student worksheet.
Fossil Fuel Formation
Part 1 – Layers of the Model – ‘Deposition’

As you add layers to your cup, add another drawing of the layer. When you finish here should be four layers.

1. What organic compound does the mixture of Cocoa Krispies and coffee represent?
   ____________________________________________________________

2. What sediment material does the crushed Froot Loops represent?
   ____________________________________________________________

3. What sediment material does the crushed Bran Flakes represent?
   ____________________________________________________________

4. What sediment material does the crushed Cheerios represent?
   ____________________________________________________________

Part 2 – Heat and Pressure – ‘Compaction’

Draw what you see AFTER pressure is applied to the layers

List some changes that you see after applying pressure to the layers

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