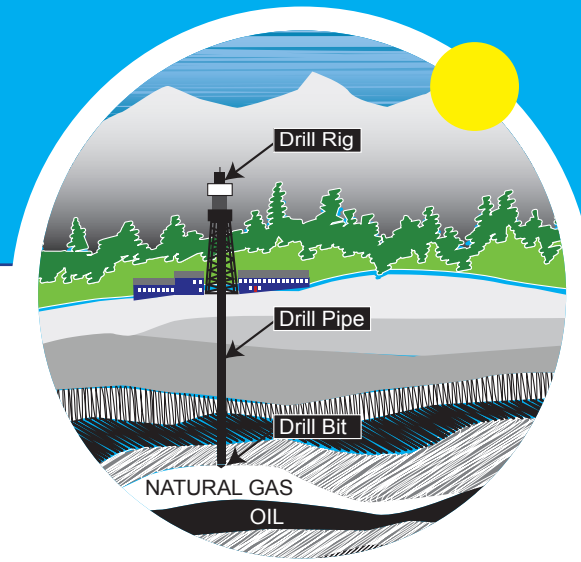


Grade: 3-5 | Time: 2 hours

FOSSIL FUEL HUNT

Essential Question: What are fossil fuels?



Overview

Students use written and internet resources to find answers to ten questions about fossil fuels followed by class discussion. Students will then build a model of an oil well and demonstrate how to get oil out of the ground.

Assessment

Can students

- Describe three kinds of fossil fuels?
- Explain how fossil fuels were formed?

Vocabulary

- Fossil fuel
- Petroleum
- Non-renewable
- Porous
- Core Sample

Teacher Information and Procedure

Prior knowledge for students: Students should have some experience using written resources to find information.

Source: Adapted from previous AMEREF materials. Oil Well extension activity Adapted from Mining, Minerals, & Me, a copyrighted program of the Mineral Information Institute for the Alaska Resources Kit: Minerals and Energy, Primary Adaptation, 6/97. (Graphics on page 2 and 4 from www.NEED.org, others from Depositphotos.com and by volunteers)

Materials needed

Books, Handouts, Posters, and Internet Sites with information about fossil fuels.

Per group:

- Handout: What are Fossil Fuels?
- Oil Well activity instructions
- 1 cup measurer
- Large clear plastic cup/tub
- 3 sticks of modeling clay
- 2 cups of Gravel or marbles

Alaska Standards Addressed

Science GLEs

The student demonstrates an understanding of:

- the attitudes and approaches to scientific inquiry by [3]SA2.1 answering "how do you know?" questions with reasonable answers [4]SA2.1 supporting the students own ideas with observations and peer review [5] SA2.1 supporting the student's own statements with facts from a variety of resources and by identifying their sources
- the processes of science by [3,4,5]SA1.1 asking questions, predicting, observing, describing, measuring, classifying, inferring, and communicating [3]SA1.2 observing and describing the student's own world to answer simple questions, [4] SA1.2 observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate [5]SA1.2 using qualitative and quantitative observations to create inferences and predictions

Geography GLEs

A 1) use maps and globes to locate places and regions;

Library/Information Literacy GLEs

B1) state a problem, question, or information need;

2) consider the variety of available resources and determine which are most likely to be useful; 3) access information; 4) evaluate the validity, relevancy, currency, and accuracy of information

Writing GLEs

The student writes about a topic by[3] 1.1.1 Writing complete sentences with a subject and a predicate [3] 1.1.2 Writing a paragraph on a single topic with two or more supporting details [4] 2.1.1 Writing a paragraph that maintains a focused idea and includes details that support the main idea [4] 2.1.2 Organizing ideas logically (L) [5] 2.1.1 Writing more than one paragraph stating and maintaining a focused idea and including details that support the main idea of each paragraph [5] 2.1.3 Organizing ideas logically to establish clear relationships within and between paragraphs (e.g., using transition words or phrases that reveal order or chronology) (L) [5] 2.1.4 Writing a concluding statement

Alaska English/Language Arts and Mathematics Standards (2012)

- RI.K-5.4, RI.K-5.7
- WS.K-5.1, WS.K-5.8
- SL.K-5.1

- 2 cups of Sand
- ½ cup of cooking oil
- 2 bending straws
- Small funnel (to fit on straw)
- Pitcher of water
- Cup to collect oil

What to do in advance

- Collect books and resources, and bookmark useful internet sites for students.
- Make copies of “Information Scavenger Hunt” Worksheet.
- Make copies of the “Oil” Direction sheet.

Teaching the Lesson

Gear-up

Introduce the idea that we use some resources today that are as old as dinosaurs. Ask the students if they know what a fossil fuel is and where they are found. Explain that fossil fuels get trapped deep below the Earth’s surface.

Look at the pictures in the “What are Fossil Fuels” handout.

Explore

Fossil Fuel Hunt

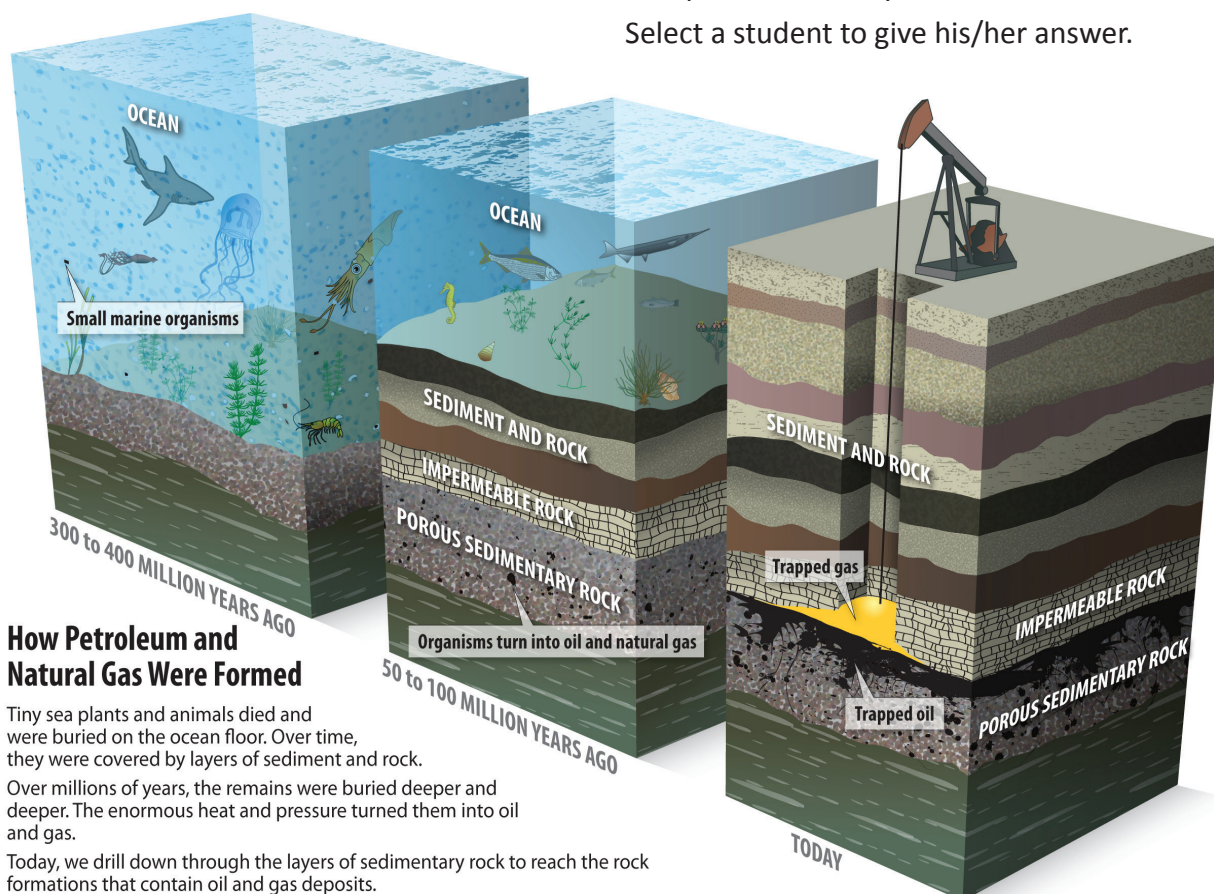
Provide resources and send students on an “Information Scavenger Hunt” to look for the answers to these questions:

1. Why are natural or “crude” oil, natural gas, and coal called “fossil fuels”?
2. How is coal formed?
3. How are oil and natural gas formed?
4. What products are made from crude oil?
5. What do we use coal for?
6. What does coal look like?
7. Where does the word petroleum come from?
8. Why are fossil fuels non-renewable?
9. Where is crude oil and gas found in Alaska?
10. Where is coal found in Alaska?

Students should be prepared to defend their answers when asked “How do you know”. They should be able to give sources.

When students have had time to research, go through the questions one by one:

Select a student to give his/her answer.



How Petroleum and Natural Gas Were Formed

Tiny sea plants and animals died and were buried on the ocean floor. Over time, they were covered by layers of sediment and rock.

Over millions of years, the remains were buried deeper and deeper. The enormous heat and pressure turned them into oil and gas.

Today, we drill down through the layers of sedimentary rock to reach the rock formations that contain oil and gas deposits.

Note: not to scale

Ask “how do you know” and hear the explanation.

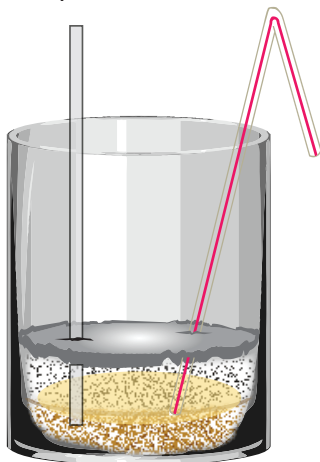
Ask for “challengers” who might have different answers or who might not be convinced.

Discuss the evidence, the answer to the question, and the sources of information that students used.

For the last two questions, have students take turns putting colored pins on the map of Alaska to show where oil, gas, and coal resources are found.

Invite students to ask more questions about fossil fuels.

Remind the students that in addition to all the big animals in the oceans and lakes, there are billions of tiny one-celled animals and plants. After dying, these bodies sink down to the bottom of the ocean. In each tiny body there are also tiny bits of fats and oils. Over hundreds of thousands of years, they pile up as layers of mud and ooze. After being buried by thick layers of sand and mud, these layers get squeezed and the drops of oil are squished out. The oil moves upward through porous layers to high points, where there is a cap rock that won't let the oil go through it.



Oil Well

Build the model by following the instructions.

*Make sure the oil is between the bottom of the container and the clay.

*Make sure the straw goes through the clay, into the gravel and that it is sealed tight around the straws. (It will not work if you don't

have a good enough seal between the clay and the edges of the can and the straws).

*The bending tip of the straw should lead the oil into the empty cup.

See diagram.

Show the students the homemade oil well. Ask them how you could get the oil out of the container? Show the students a glass of oil and water. Ask if the oil and water can be mixed. Ask which one is on top. Ask if it is always on top. Tell students “If the oil is in the well and water is poured in something will come out of the straw. Do you think it will be the water or the oil?”

Why do you think so?”

After students explore with the well ask them to share their observations. Did it work? Why or why not?

Ask students to explain how the oil comes out and why it comes out instead of the water. (Refer back to a jar with oil and water where the oil floats on top of the water.)

Generalize

Discuss with students the idea that fossil fuels formed under special conditions, and that the amounts available are limited, which makes them a non-renewable resource. Talk about how we use fossil fuels and how we might sometimes waste them. Brainstorm conservation ideas for fossil fuels.

Assess

Have students write in their journals or on paper to describe what they know and what they have learned about fossil fuels.

Extensions, adaptations, and more resources

Do the “Finding Oil in a Cupcake” activity to further explore how we find oil.

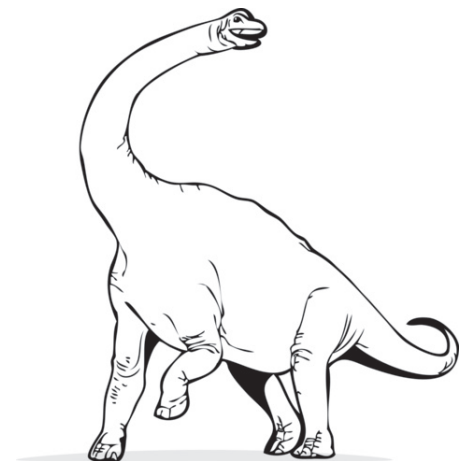
Do additional research to answer students' new questions.

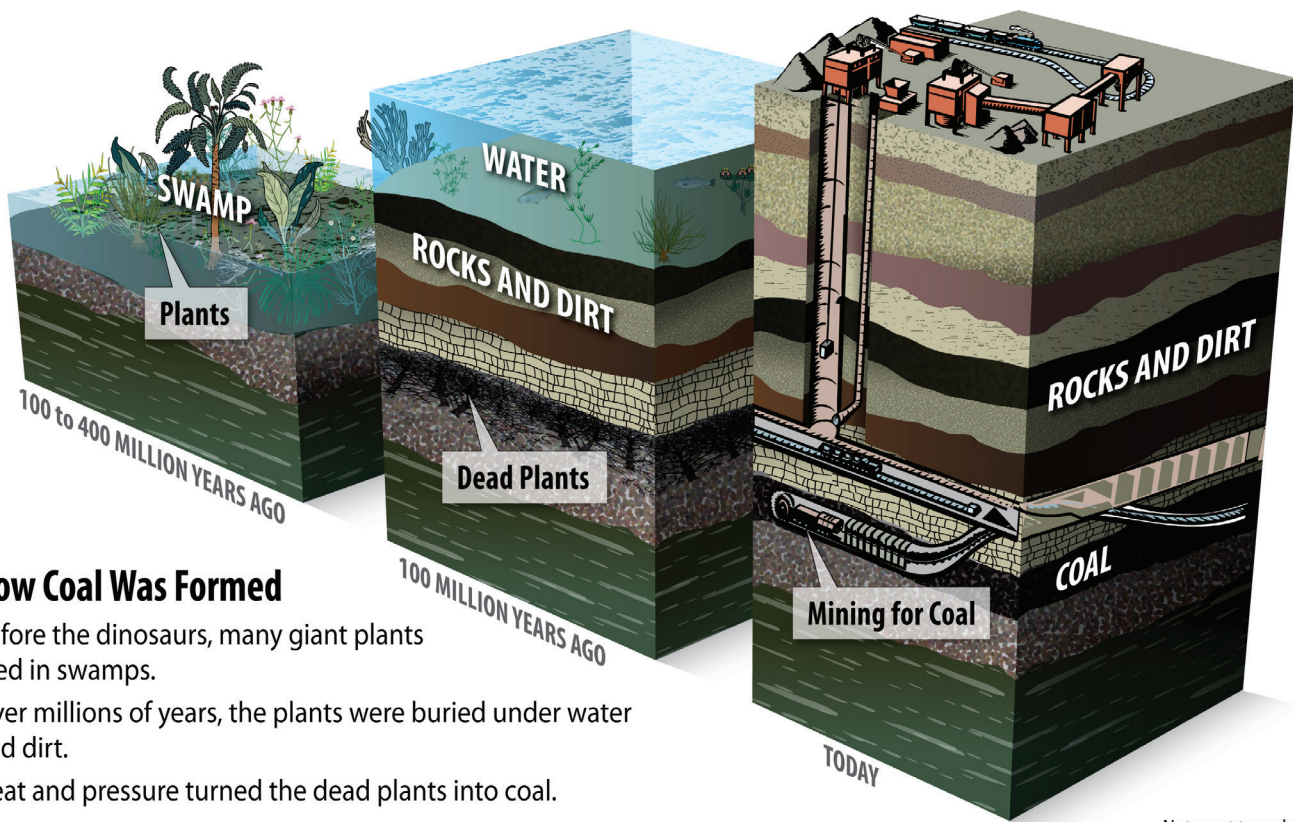
More background information: Energy Sources and Natural Fuels Volume 2 NSTA/API Monograph by Aldridge et al.

Children's Books about Fossil Fuels:

Energy Essentials: Fossil Fuel Saunders, Nigel and Steven Chapman, Raintree, Chicago, Illinois, 2004. ISBN 1-41090-501-2

Future Energy: Fossil Fuels Richards, Julie, Smart Apple Media, North Mankato, Minnesota, 2004. ISBN 1-58340-334-5





Note: not to scale

How Coal Was Formed

Before the dinosaurs, many giant plants died in swamps.

Over millions of years, the plants were buried under water and dirt.

Heat and pressure turned the dead plants into coal.

What Are Fossil Fuels?

Coal, oil, and natural gas are considered fossil fuels because they were formed from things that were alive many millions of years ago. Oil and gas come from both plants and animals, and coal comes from plants. Much of the world's coal and oil was formed about 250 million years ago during the carboniferous period or the Coal Age. Swamps were very extensive during the carboniferous period and when plants died; their remains accumulated in the swamps and eventually were covered by sand and mud. Through time, they became buried more deeply. Pressure and heat slowly changed the plant material into coal.

Oil was formed in the same way but comes from plankton and other plants and animals that lived in the sea. The dead plants and animals settled on the sea bottom, and were covered with mud and sand. Heat and pressure slowly changed them into oil. Oil is a liquid and can move underground. It is trapped in porous rocks deep underground.

We use energy from fossil fuels for heat, transportation, and electricity. Almost all of the energy we use comes from oil, gas, and coal. Many

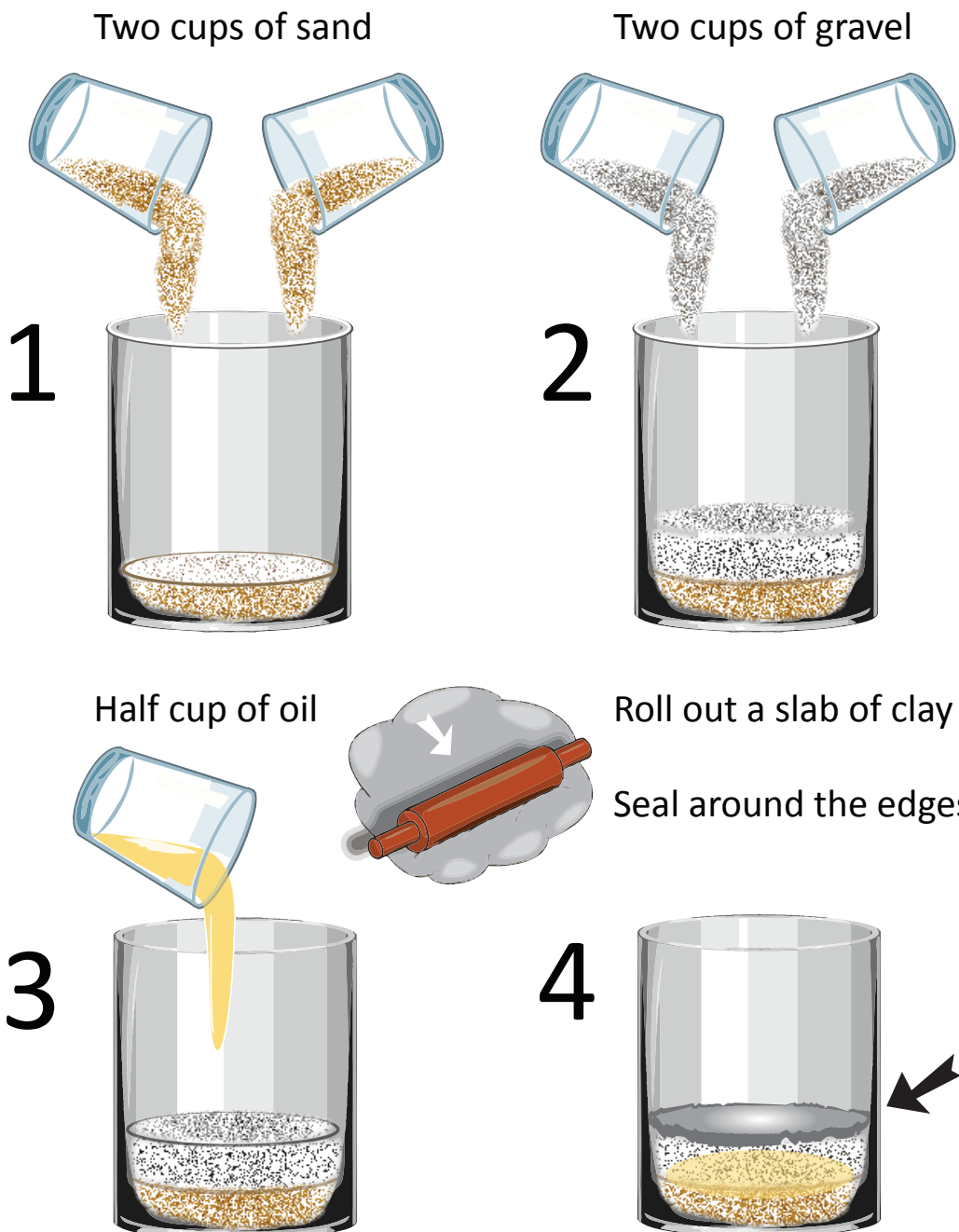
things that we use every day also are made from fossil fuels. For example, nylon, and manmade rubber are made from coal. Waxes, cosmetics, plastics, asphalt, fertilizers, and many other things are made from oil.

When oil and coal are burned in engines or power plants, they can cause air pollution problems. Scientists are finding ways to reduce the amount of air pollution that comes from burning fossil fuels.

There is a lot of oil, gas, and coal in Alaska. Most of it is shipped to other places, and Alaska gets money in return. The biggest coal mine is in Healy. Some of the coal from the mine is used in Fairbanks for heat and electricity. Because it takes so long to make fossil fuels, they are considered a non-renewable resource.

Oil Well

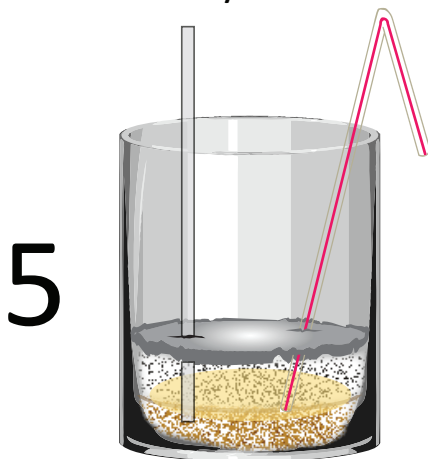
- Put two cups of sand in the bottom of the tub
- Put two cups of rocks on top of the sand
- Poor half a cup of cooking oil on the rocks
- Roll the clay into a fat sheet big enough to cover the rocks all the way to the edge of the tub
- Put the clay on top of the rocks and seal the edges around the inside of the tub
- Put two straws through the clay until they reach the sand. Seal the edges around the straws



Oil Well *(continued)*

- Tip one straw into a cup
- Put the small funnel on top of the other straw
- SLOWLY, pour water into the straw with the funnel.
Watch as the oil comes out of the straw and drips into the cup.

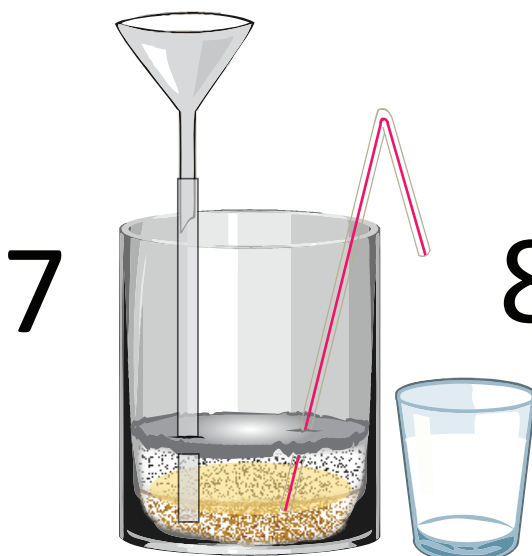
Put two straws into the clay until they reach the sand.
Seal the clay around the straw



Tip one straw into a cup

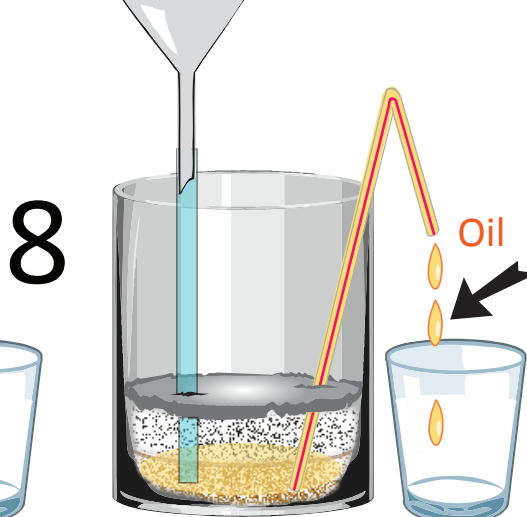


Put a small funnel into the other straw



Water

Pour water into the funnel



Name _____



Information Scavenger Hunt

- 1) Why are natural or “crude” oil, natural gas, and coal called “fossil fuels”?
- 2) How is coal formed?
- 3) How are oil and natural gas formed?
- 4) What products are made from crude oil?
- 5) What do we use coal for?
- 6) What does coal look like?
- 7) Where does the word petroleum come from?
- 8) Why are fossil fuels non-renewable?
- 9) Where is crude oil and gas found in Alaska?
- 10) Where is coal found in Alaska?