Career Connection

The ultimate high-tech adventure…

In the next 20 years, the world will need twice as much oil and natural gas as it uses today. Nearly half of this future production has yet to be found. Meeting this demand will require creativity and new technologies. As an **exploratory geoscientist**, you will apply the principles of physics and earth science to study Earth's interior in the quest for new oil and gas to power the world.

Facts *True or False?*

Our economy runs on fossil fuels: natural gas, crude oil and coal supply 85% of our energy.

☑ TRUE.

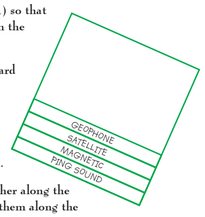
Graphic Organizers

Exploring for Oil: Layered Book

A layered book can be made to document the different ways technology is used for oil exploration: geophone, satellite, magnetic, ping sound. Under each heading students record research notes and draw pictures or diagrams.

Directions

1. Stack two sheets of paper (8 1/2 x 11) so that the back sheet is one inch higher than the front sheet.
2. Bring the bottom of both sheets upward and align the edges so that all of the layers or tabs are the same distance apart.
3. When all tabs are an equal distance apart, fold the papers and crease well.
4. Open the papers and glue them together along the valley or inner center fold, or, staple them along the mountain.



National Standards

Science and Technology

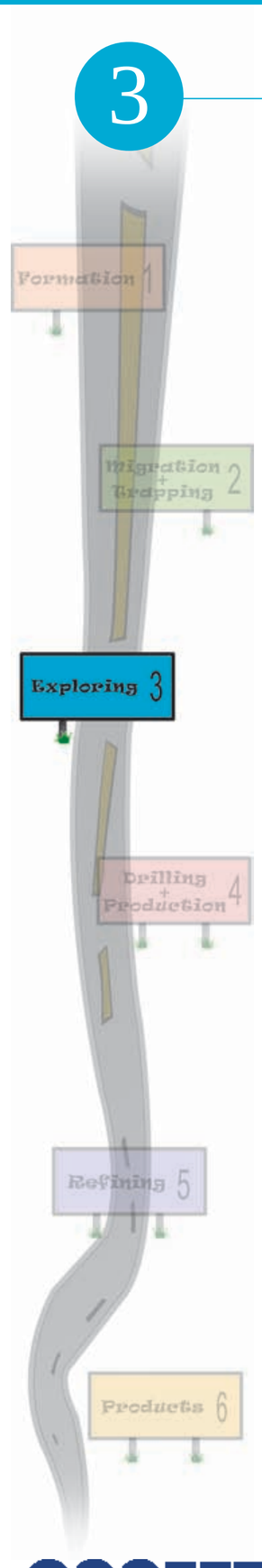
- Understand the roles of models and simulations

Inquiry Science

- Formulate scientific explanations and models using logic and evidence
- Conduct investigations and record data

Earth and Space Science

- Understand geological formations



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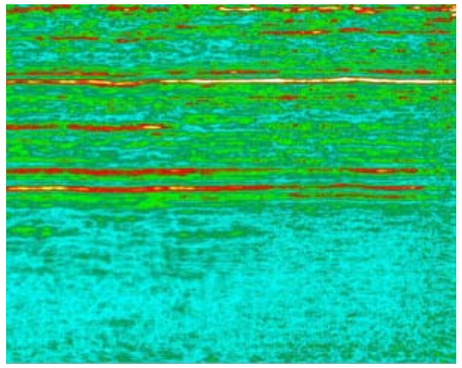
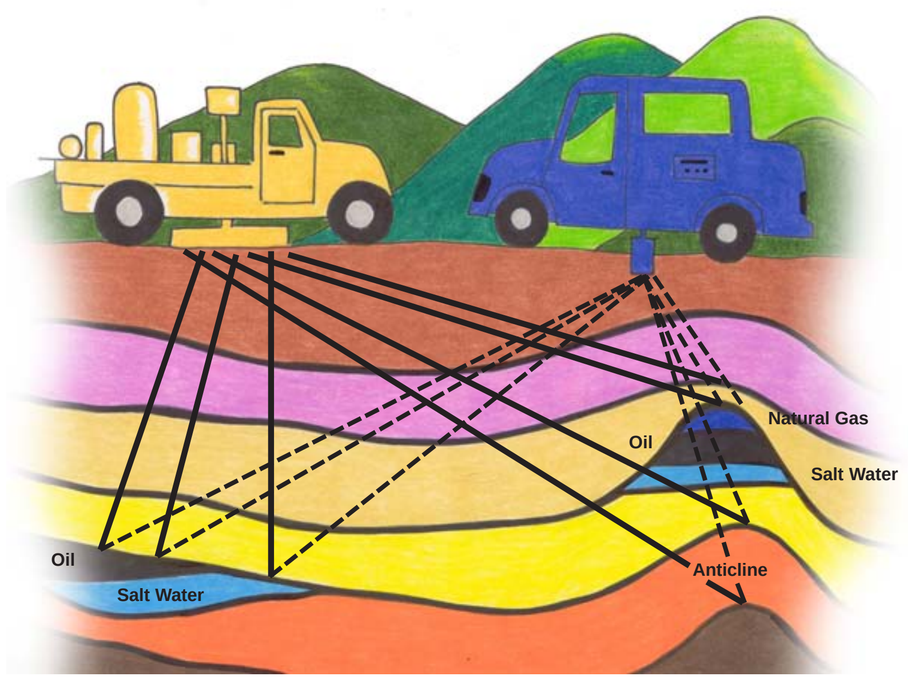
Exploring for Natural Gas and Oil

Exploring for oil and natural gas was once a matter of good luck and guesswork. Today, the guesswork has been replaced by science and technology. Geologists and geophysicists use many high-tech tools to search for oil and gas filled rock layers called reservoirs. One exploration method involves sending sound waves into the earth and then interpreting the signals that bounce off the rock layers back to the surface. This "seismic" data helps geoscientists find oil and gas traps.





OOGEEP
Ohio Oil & Gas Energy Education Program

www.oogeep.org

Experiment

Skewer Contour Mapping
Contour Map Example

How can you map what you cannot see?

Materials:

- Calibrated skewer with depth marks 1" – 3"
- Styrofoam sandwich box with stationery form inside with grid map on box top
- Grid map for each student or group of students
- Pencil

1 X	2 X	3 X	4 X	5 X	6 X	7 X
8 X	9 X	10 X	11 X	12 X	13 X	14 X
15 X	16 X	17 X	18 X	19 X	20 X	21 X
22 X	23 X	24 X	25 X	26 X	27 X	28 X
29 X	30 X	31 X	32 X	33 X	34 X	35 X
36 X	37 X	38 X	39 X	40 X	41 X	42 X
43 X	44 X	45 X	46 X	47 X	48 X	49 X
50 X	51 X	52 X	53 X	54 X	55 X	56 X

Procedure:

1. Select a calibrated skewer and a blank grid paper to record depth measurements.
2. Take depth measurements at all points. Record all measurements on the blank grid. Most measurements won't be exactly on a number, so record to the nearest 0.5.
3. Once you have recorded all of the depths, you are ready to contour the data with a pencil. Look for the deepest point (the largest number). There may be several points with the same depth or number. On this map a contour line represents places of equal depth; the contour interval is one "unit". There will be a contour line for every "one unit" of increased depth. Your map will have contour lines for 6, 5, 4, etc.

Contouring Rules

- Each contour line must pass through all points of equal depth.
- Each contour line must pass on the low side of higher or shallower points.
- Each contour line must pass on the high side of lower or deeper points.
- Contour lines never cross.
- Follow the 4" contour line on the example. It passes through all 4" points, passes on the low side of all 3.5" points, and passes on the high side of all 4.5" points.

Questions and Explanations:

1. Why is contour mapping important to the oil and gas industry?
2. What are the geologists looking for?

Reflection:

1. How can you map what you cannot see?
2. What technology has increased the accuracy of contour mapping?
3. What technology does the oil and gas industry use before it drills on land or offshore?

How to Make a Skewer Contour Model

Materials:

- Foam "take out" box
- Grid map for box top
- Glue
- Lollipop Stick
- Bamboo skewers
- Permanent marker
- Scissors
- Sweet potato, cut flat on the bottom or Plaster of Paris, heavy-duty aluminum foil, small tub of sand

Procedure:

1. Trim the grid map to fit the "take out" container. Glue it onto the box top. Use a nail to puncture through the "x" in each grid block.
2. Glue the flat-bottom sweet potato in the box. *Note: Since sweet potatoes will spoil in time, you can make a more permanent version out of Plaster of Paris. Cover the potato with layers of foil and gently mold it to the shape of the potato. Then put the foil model into a small tub of sand and tilt the model with plaster. Let dry and glue the plaster potato into the box.*
3. Calibrate the skewers as follows: Make a mark one inch from the flat end of the skewer. Label it "1". Continue upward in one inch increments. The highest mark is "7".
4. To make an answer key: Close the box lid and take readings at every grid point, record on grid paper and draw the contour lines.