15C Natural Resources

How fast are we using nonrenewable resources?

As the world population and demand for energy increases, having a variety of energy sources becomes more and more important. We consume energy quickly, so we need sources of energy that are long-lasting, efficient, and as clean as possible.

In this investigation, you will model the depletion of resources over time at a constant rate of use. Then you will model the depletion of resources when the rate of use increases. Next, you will make a physical model of an oil seep. This will help you understand how we find oil in the ocean.

Materials

- 1 open container per two students
- 2 types of dried beans or nuts—100 beans per pair (90% one color/type, 10% another color/type)
- Blindfold
- Large clear cup or glass
- Small mixing bowl
- 2 mL cooking oil
- 10 mL sand
- 30 mL soil
- 1 stick of modeling clay
- Water

1 Stop and think

WARNING — This lab contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

a. What is the difference between renewable and nonrenewable resources?

b. What are some examples of each of these resources?

c. What type of resource do you expect will be depleted first?

2 Activity A

In this activity, you will learn how nonrenewable resources get depleted over time, especially as rate of use increases.

1. Fill your container with 100 beans (90 of one color type, 10 of another color/type). The 90 beans represent the fact that the United States currently uses nonrenewable fossil fuels for 90% of our energy needs. The other 10% of our energy needs are met with renewable resources.
2. One student in each pair will put on the blindfold. This student will choose beans from the container.
3. For the first trial, the situation is as follows: The population is NOT growing and the demand for resources stays exactly the same from one year to the next. The blindfolded student will randomly pick 10 beans out of the jar. Any "renewable beans" can be put back in the jar. After replacing these beans, count how many beans remain in the jar. Record this information in the "Year 1" column of Table 1. How many years do you think it will take to deplete the nonrenewable beans?
4. Repeat the process for year two. Continue until only renewable beans are left. Record all your data in Table 1. You may or may not use all of the columns available. You might even have to add more columns. Calculate the percentage left after each drawing. How many years did it take to run out of nonrenewable resources?

Consumption level	Year														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Remove 10 beans each year (constant use)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
# of beans remaining in container															
% renewable															
% nonrenewable															

5. Now, remove the blindfold. Put it on the other student. Place all the beans back in the container. This time, you will be modeling a situation where the population is increasing and so is the demand for energy.
6. Predict again how many years it will take to deplete the resources.

7. Proceed in the same way, except follow the table to see how many beans to pull out each year.

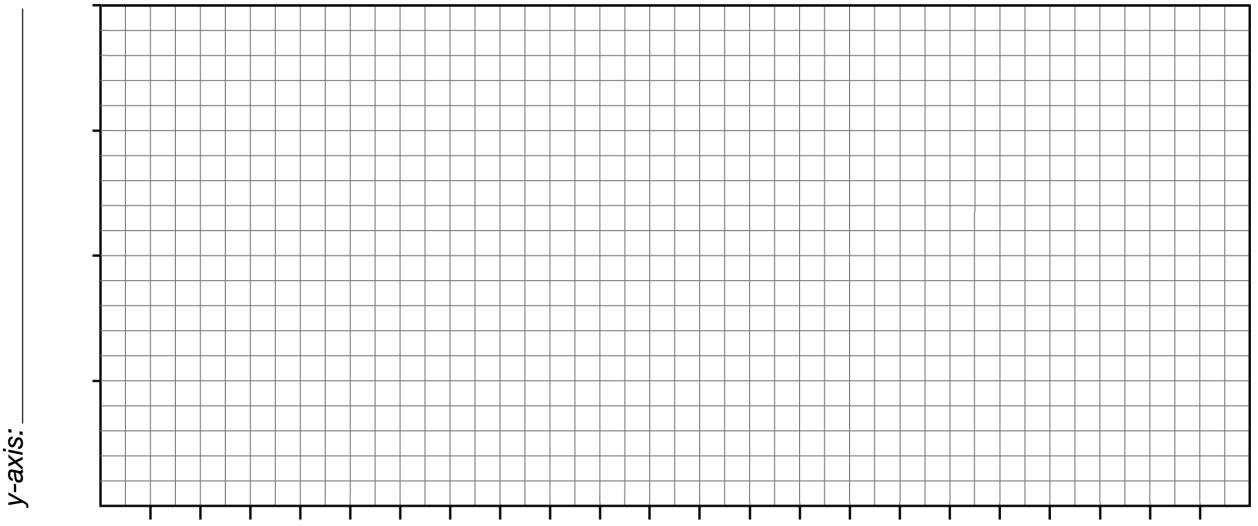
Consumption level	Year														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Remove 5 more beans each year (increasing demand)	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
# of beans remaining in container															
% renewable															
% nonrenewable															

8. Remove the blindfold. How many years did it actually take to run out of nonrenewable resources?

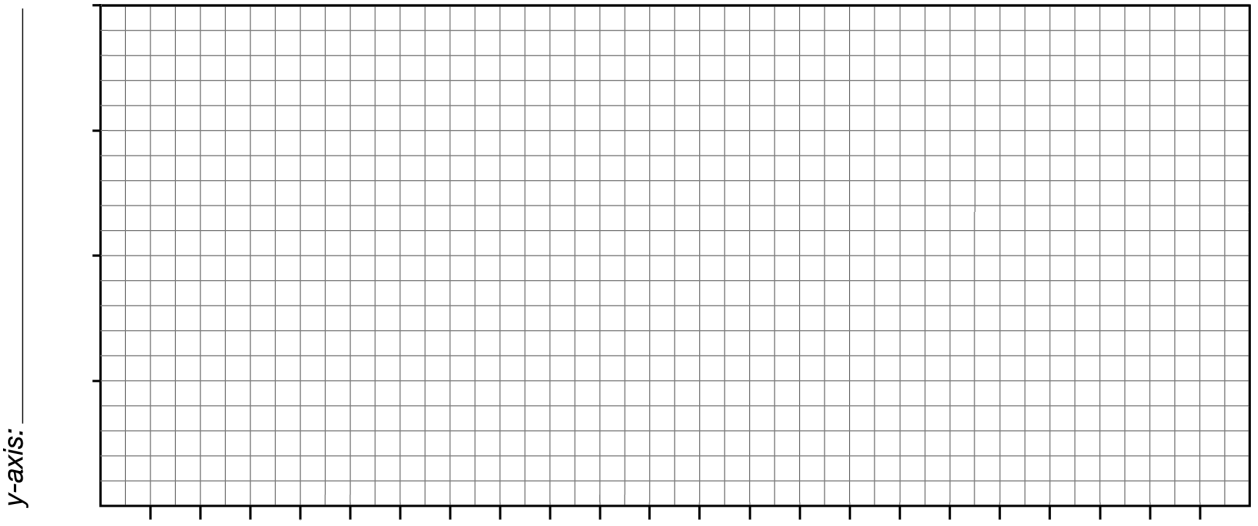
_____

9. Make two graphs—one for each table. On the *x*-axis put the year. On the *y*-axis, put the percent renewable and nonrenewable remaining.

Title: _____



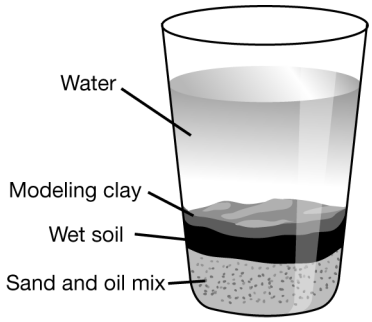
Title: _____



10. Answer the questions **a** through **d** in Part 4.

3 Activity B

In this activity, you will make a model of an oil seep, like those in the Santa Barbara Channel off the coast of California. There, cracks in rock layers of the ocean floor allow oil and gas to ooze or seep through the water to the surface. The gas dissipates in the air, but the oil floats on the ocean surface. Oil and gas are both fossil fuels.



1. Pour the sand into the bottom of the glass or cup.
2. Pour the oil into the sand. Add 1 mL of water.
3. Now, get some soil and mix it with water so that it is very wet. Pack it tightly into the glass on top of the sand/oil mixture.
4. Take the clay and flatten it into a circle that can fit into the glass. Stick it into the glass, making a thin seal over the mud mixture.
5. Fill the rest of the glass with water.
6. Time how long it takes the oil to seep through the layers to the top of the water.
7. Now, answer questions **e** and **f** in Part 4.

4 Thinking about what you observed

a. Which graph in Activity A is more realistic? Why?

b. Which type of resource lasts for a longer time?

c. Compare your predictions for the number of years it would take to deplete the resources to the actual number of years that you measured. How close were you? How did you come to your prediction?

d. What did you learn about the rate of depletion of the two types of resources?

e. How long did it take for the oil to seep to the top of the water? Do you think it would take longer if there was more water on top of the clay? Why?

f. In the future, what should the United States try to do about its energy consumption? Why?

5 Exploring on your own

1. Try the oil seep experiment with a taller glass so that you can add more water. Also try it with salt water. Did it take more or less time for the oil to seep to the surface?

2. Research some ways that oil and natural gas are removed from the ocean floor.

3. How is coal created?