

Name \_\_\_\_\_

### ***Mining in Texas***

**Background Information:** A mineral is called an **ORE** if it contains enough of a useful substance that it can be sold for a profit. Many of the metals that humans use come from ores.

For minerals to be useful, they have to be located and **EXTRACTED** from the earth. This is called **MINING**. Mining is defined by the National Energy Foundation as 'the science, technology, and business of mineral discovery, extraction and marketing.' Once mining engineers have discovered, extracted and prepared the minerals, they can be used to make **products** and **energy**.

The extraction industry is a major force in the economy of Texas.

Mining can disrupt land, air and water systems. Because of this, there are many laws governing mining.

Mining or extraction always has some impact on the environment. Sometimes the impact is temporary; sometimes it is permanent. Any estimation of the cost of mining must include the costs of exploration, excavation, environmental protection during mining, and environmental reclamation afterward. These costs must be weighed against the benefits of minerals.

Many of the resources mined in Texas are **NONRENEWABLE**; that is they are natural resources with economic value that are slow to form and are destroyed by use.

#### ***A few facts about mining in Texas:***

- Texas is the 4th largest producer of clay and aggregates in the U.S.,
- Texas is the 5th largest coal-producing state,
- Domestic lignite (coal) provides 25 percent of the electricity generated annually in Texas,
- Mining provides more than \$28 billion annually to the state,
- The mining industry provides more than 14,000 direct and 225,000 indirect jobs for Texans,
- Mining is Texas' best paid industrial profession — the average miner earns more than \$40,000 annually in salary, bonuses and benefits, and
- Texas mining accounts for more than 50 percent of the local tax base for many rural communities providing schools, roads, hospitals and other services.

***(Source: Texas Mining and Reclamation Association:  
<http://www.tmra.com/index.html>)***

**Problem:** To simulate the extraction of nonrenewable minerals.

**Materials:**

Chocolate chip cookies	Paper towel	Graph paper
Flat toothpicks	Round toothpicks	Paper clips
Costs chart		

Costs			
Generic cookie mine -	\$3.00	Flat toothpick -	\$2.00
Average cookie mine -	\$5.00	Round toothpick -	\$4.00
Premium cookie mine -	\$7.00	Paperclip -	\$6.00
Cost of mining per minute -	\$1.00	Cost of reclamation per square	\$1.00

**Procedure:**

1. Work with a partner.
2. Examine the three mine options available to you (the 3 types of cookies). Select the one you would like to mine. How much did you spend on this mine? \_\_\_\_\_
3. Select the tool(s) you would like to use. If a tool breaks, it cannot be used again; a new one must be purchased. How much did you spend on the tool(s)? \_\_\_\_\_
4. Place the chocolate chip cookie on the graph paper. Outline the cookie on the paper. How much space did the cookie cover? \_\_\_\_\_
5. Predict the number of chocolate chips that you will be able remove from the cookie. \_\_\_\_\_
6. Put the cookie on a paper towel. Using the tool(s), remove as many chocolate chips from your cookie as you can. You may only use the tool(s) – no hands or fingers! Count the number of chocolate chips that you removed. \_\_\_\_\_  
Was your prediction correct? \_\_\_\_\_
7. Examine the cookie that is left. Describe it. Take the pieces of cookie that are left and try to put the cookie, minus the chocolate chips, back together again. What does it look like?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Move the cookie back to the circle on the graph paper. Do not pile the cookie pieces any higher than the original cookie. How much space does the cookie take up now? \_\_\_\_\_

**Data:**

Use the spreadsheet provided to enter your data and calculate your profit / loss. Print the spreadsheet and staple it to this paper.

**Questions & Conclusions:**

1. This was a mining simulation activity. What did the chocolate chips represent? What did the cookie represent?

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2. Describe the different processes you used to remove the chocolate chips from the cookie.

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3. Changing the way we extract a mineral resource from the environment could mean that we could not mine as much of the resource. What would the reduced amount of resources mean to consumers, the mining company and society overall?

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4. Do you think it is worth getting a reduced yield in order to protect the environment? Explain your answer.

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5. Based on your cookie-mining experience, explain why, in actual mining situations, some deposits of minerals are more expensive to mine?

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