**Introduction**

The purpose of the activity is to provide an introduction to the economics of mining. This is accomplished through purchasing land areas and mining equipment, as well as paying for mining operations and reclamation. In return the “miners” receive money for the ore mined. One of the goals is to make as much money as possible.

The general definition of ore is a naturally occurring material from which minerals of economic value can be extracted at a profit. The chocolate chip cookie represents land area to be mined. The chocolate chip is the ore. The worthless rock that is associated with the ore and must be separated from the ore is the gangue (pronounced “gang.”) The rest of the cookie is the gangue.

**Materials:** Graph paper, chocolate chip cookies, pencils, electronic balances, toothpicks, paper clips

**Procedure:** Each mining company is responsible for keeping track of all mining costs, which includes cost of cookies, mining equipment rental, mining and reclamation time, and reclamation costs.

1. **Cookie mines for sale:** Mines and values may vary. Each mining company is expected to purchase and excavate at least TWO cookies. ***Record cookie brand name in Data Table 1 and purchase costs in Data Table 2.***

Chips Ahoy Reg $5.00

Chips Ahoy Chunky $7.00

1. Following the purchase of a cookie (land area), miners place the cookie on the graph paper and trace the outline of the cookie. Miners then count each square that falls inside the circle. Each partial square counts as a full square.  ***Record the total land area of each mine in Data Table 1.***

Round toothpick $5.00

Paper clip $6.00

1. **Mining equipment for rental:** ***Record type of rental equipment in Data Table 1 and costs of rental in Data Table 2.***

**Please note:**

**\*\*\*** If any of the above is returned broken, an extra fee of double the rental price will be charged. Record any damage fees assessed in Table 2.

**\*\*\*** No miner may use their fingers to hold the cookie. Any miner who violates this procedure loses the contract entirely. The only items which can touch the cookie are the mining tools and the paper on which the cookie is sitting.

1. **Start Mining the ore (chocolate chips**) from your cookie mine.

**\*\*\*** **Someone in the group must record the duration of mining time.**

1. **When mining is complete:**
	1. ***Record the mining time (in minutes) in Data Table 1.***
	2. Separate your normal ore (clean chocolate chips) from your impure ore (chips with cookie still attached).
	3. Mass your two types of ore and ***record the masses (in grams) in Data Table 1.***
	4. Calculate your total profit from the masses of your ore. ***Record this total under “Sale of Ore” in Data Table 2.***

Normal ore (chips) $15 per gram

Impurities $5 per gram

1. After the cookie has been mined, **the remaining rock (gangue) must be placed back into the circled area on the graph paper.** This can **only** be done using the mining tools. Count up the number of squares covered by the gangue. If the gangue covers more squares than the original cookie, a reclamation cost of $1.00 per extra square will be assessed.

**\*\*\*** **Someone in the group must record the duration of the reclamation time.**

1. ***Record the reclamation time in Data Table 1. Total the total amount of Mining & Reclamation Costs and record this in Data Table 2.***
2. Return all rented equipment. ***Record the fee for any “breakage/damage fees” you are responsible for (1/2 cost of equipment) in Data Table 2.***
3. Calculate the total cost to mine your ore***. Record this in Table 2 under Total Mining Fees.***
4. Subtract the Total Mining Fee from the amount your collect from the Sale of Ore. ***Record this amount in the Profits or Loss section of Data Table 2.***
5. ***Answer questions 1-10.***

**Data Table 1**

|  |  |  |
| --- | --- | --- |
|  | **COOKIE #1** | **COOKIE #2** |
| **GENERAL INFO.** | **Cookie brand name** |  |  |
| **Cookie area (#squares)**  |  |  |
| **EQUIPMENT** | **Type of Mining Equipment Used** |  |  |
| **TIME** | **Mining Time (min.)** |  |  |
| **Reclamation Time (min.)** |  |  |
| **MASS** | **Mass, normal ore (g)**  |  |  |
| **Mass of impurities (g)** |  |  |

**Data Table 2**

|  |  |  |
| --- | --- | --- |
|  | **Cookie 1** | **Cookie 2** |
| **Cookie Mine Purchase Cost ($)** |  |  |
| **Total Equipment rental fees ($)**  |  |  |
| **Breakage/damage fees ($)**  |  |  |
| **Total Mining & Reclamation Cost ($)** **($2.00/min)**  |  |  |
| **TOTAL MINING FEES**  |  |  |
| **Sale of “ore” ($)**  |  |  |
| **Profits or Loss** |  |  |

**QUESTIONS**

1) If valuable ore was discovered in a city or town, should a mining company be allowed to harvest the ore? Defend your opinion.

2) How can a mine be beneficial a town or community? How can a mine be detrimental to a town or community?

3) How would a mining company try to restore the land back to its original state after extraction of the ore was completed?

4) Based upon your calculations, can the landscape be restored to its original topography? Explain why this is or is not possible.

5) Would it be better to mine in a wilderness area than a developed area? State the pros and cons for mining in each area.

6) Were the minerals evenly distributed throughout the cookie mines? Do you think this a good model for a real mine? Why or why not?

7) Did you leave any chips behind in the cookie? Why or why not?

8) Do you think the mining process is faster when you know in advance that the land must be restored? Explain.

9) What changes in your mining technique would have resulted in more profit?

10) If the cost of restoration was built in to the resource (full cost pricing), how would that affect the demand for non-renewable vs. renewable resources?

**WHAT TO TURN IN (per each person in the group): Data Table Sheet & Answers to questions #1-10.**