

Cookie Mining: Profits, Reserves, Gangue, and Reclamation

Cookie Mining: 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. In this exercise, 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. The rest of the cookie is the gangue.

Instructions:

1. 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.
2. Cookie mines for sale: Mines and values may vary. Each mining company is expected to excavate at least **2** cookies. They must all be the same kind of cookie.
 - a. Mother’s Chocolate Chips \$3.00
 - b. Chips Ahoy \$5.00
 - c. Mother’s Double Chips \$6.00
 - d. Keebler Chips Deluxe \$7.00
 - e. Chunky Chips Ahoy \$10.00
3. Following the purchase of a cookie (land area), the miner places the cookie on the graph paper and traces the outline of the cookie. The miner then counts each square that falls inside the circle. Each partial square counts as a full square. Miners will attempt to reclaim the land to the original shape after the ore has been removed.
4. Each cookie will be massed
5. Mining equipment for rental
 - a. Flat toothpick \$2.00
 - b. Round toothpick \$5.00
 - c. Paper clip \$6.00
 - d. If any of the above is returned broken, an extra fee of double the rental price will be charged

No miner may use their fingers to hold the cookie. The only items which can touch the cookie are the mining tools and the paper the cookie is sitting on.

6. Mining and Reclamation time costs: \$2.00/minute.

7. Sale of the chocolate chips brings \$10/gram. Chips with 25% to 50% impurities will be worth only \$5/gram. Chips with >50% impurities will be worth \$1/gram
8. When mining is completed, count and mass the chips.
9. 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. No fingers or hands may touch the cookie.
10. 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.

Mining Data Sheet

1. Name of Cookie (mine area) _____
2. Price of Cookie \$ _____ x _____ # of cookies = \$ _____
3. Size of Cookies _____ squares
4. Mass of Cookies _____ g
5. Mass of chips _____ g
6. Mining Equipment rental
 - a. Flat toothpick _____ x \$2.00 = _____
 - b. Round toothpick _____ x \$5.00 = _____
 - c. Paperclip _____ x \$6.00 = _____
 - d. Broken equipment charge _____
 - e. Total Equipment Costs _____ = \$ _____

7. Mining and Reclamation time costs _____ minutes x \$2.00/minute = _____

8. Total costs of mining = \$ _____

9. Income from chip sales mass of chips _____ x \$10.00/g = _____

10. Profit = value of chips – cost of mining \$ _____ - \$ _____ = \$ _____

11. Reclamation costs _____ extra squares x \$1.00/square = \$ _____

12. Profit after reclamation = \$ _____.

13. Calculate the % ore in your mine. Show all work

Questions

1. Where the minerals evenly distributed throughout the cookie mines? Is this a good model for a real mine?
2. Did you leave any chips behind in the cookie? Why or why not? Is this a good model for a real mine?
3. Were you able to restore the land? Why or why not?
4. Do you think the mining process is faster when you know in advance that the land must be restored? Explain
5. Do you think that legislation requiring the restoration of the land makes mining more expensive?
6. The average copper ore mined in 1900 was 5% copper by weight. Today the average copper ore is 0.5% copper by weight. What factors could account for this difference?
7. What changes in your mining technique would have resulted in more profit?