

# Cookie Mining

The purpose of this activity is to simulate a mining operation. In order to make the simulation economically valid, many of the costs associated with real mining operations will be considered. Several of the economic considerations in this simulation follow.

- ☛ A land area will be purchased from the bank.
- ☛ The land area will be surveyed and quantified.
- ☛ Mining equipment will be purchased from the bank.
- ☛ A mining operation will be undertaken, with the cost for each minute of the mining operation included in the total operating costs.
- ☛ At the conclusion of mining operations, the reclamation of the land area is required, with a fine assessed for any part of the land area that is not successfully reclaimed.
- ☛ The ore that was mined will be sold back to the bank to offset the start-up costs of the mining operation.

While the goal of this simulation is entirely economic, that is, to make as much money as possible. There are many goals other than economic goals that must be considered in a real mining operation. Although it is not possible to include all of the social and environmental implications of mining in this simple simulation, they must not be forgotten, and you should be prepared to discuss them in class.

## Materials

- 1 chocolate chip cookie
- Mining tools
- graph paper

## Procedure

1. Each miner must obtain a sheet of graph paper and purchase a land area (cookie), on credit, from the bank.
  - ☛ Cookie = \$1000
2. Each miner may purchase any combination of the following mining equipment, on credit, from the bank (at least two items must be purchased).

☛ Paper clip	\$800/ea
☛ Round toothpick	\$500/ea
☛ Flat toothpick	\$300/ea
3. Following the purchase of the cookie and mining equipment, place the cookie on the graph paper, trace the outline of the cookie, determine the area of the cookie by counting the number of squares that fall inside the line (count partial squares as full squares), and record the area of the cookie.
4. Place the cookie back inside the circle, and wait for the instruction to commence mining.
5. Once mining begins, the cookie is only to be touched by the mining tools. The cookie may not be touched with fingers or hands. You may not blow crumbs off the paper at any time. Any part of the cookie that falls off the graph paper is considered to be “lost,” and should not be retrieved until the simulation is complete.
6. Attempt to dig out as many chocolate chips as possible. The chocolate chips simulate ore, and will be sold back to the bank to offset the start-up costs of the mining operation. Whole, clean, intact chocolate chips will be purchased by the bank for \$500 each, “dirty” chocolate chips will be purchased for \$200 each, and partial chocolate chips will be purchased for \$100 each (partial chips must be combined to form the amount of ore in one chip).
7. The cost of an ongoing mining operation is \$200 per minute.
8. After the cookie has been mined, reclamation must be attempted. Try to place all that remains of the cookie back into the circled area on the graph paper using the mining tools (remember, no fingers or hands allowed). Draw additional circles around each crumb that is not placed back in the circle, and count the number of squares that fall inside all circles (again, partial squares count as whole squares).
9. The fine for unsuccessful reclamation is \$100 per square (in excess of the original number of squares).
10. When all mining and reclamation is complete and you are ready to sell your chocolate chips to the bank, arrange them in such a way that they may be easily counted, record the end time of the simulation, and raise your hand.

## Mining Information

### Land Area

Cost of Cookie = \$1000

Initial Size of Cookie (in squares) = \_\_\_\_\_

Final Size of Cookie (in squares) = \_\_\_\_\_

### Mining Equipment Costs

Paper Clip \_\_\_\_\_ x \$800 = \_\_\_\_\_

Round Toothpick \_\_\_\_\_ x \$500 = \_\_\_\_\_

Flat Toothpick \_\_\_\_\_ x \$300 = \_\_\_\_\_

Mining Equipment Costs = \_\_\_\_\_

### Time Cost

Minutes Spent Mining \_\_\_\_\_ x \$200 = \_\_\_\_\_

### Cost of Mining Operations

Cost of Cookie + Mining Equipment Costs + Time Cost = \_\_\_\_\_

### Reclamation Cost

Final Size of Cookie – Initial Size of Cookie x \$100 = \_\_\_\_\_

### Mining Revenue

Total \$ \_\_\_\_\_

\* To sell partial chips, the partial chips must be amassed so that their total size includes at least the amount of chocolate as an intact whole chip.

### Bottom Line (Profit/Loss)

Mining Revenue – Cost of Mining Operations – Reclamation Cost = \_\_\_\_\_

## Postlab Questions—Write out and respond to the following questions.

1. Were the minerals evenly distributed throughout the cookie mines?
2. Were you able to restore the land?
3. Explain how the time required for mining is affected by the advance knowledge that the land must be restored.
4. Explain why legislation that requires land to be restored after mining makes mining more expensive.
5. Outline the Surface Mining Control and Reclamation Act.
6. Identify when and discuss why the Surface Mining Control and Reclamation Act was written.
7. Speculate about the citizens and organizations most likely to support and oppose the Surface Mining Control and Reclamation Act.
8. Compose a list of minerals used in and around your home and how they are used.