

# Mining and Reclamation to Protect the Environment

Name \_\_\_\_\_

Phenomenon: Observe the pictures. Write down three questions about what you see and what you are wondering.

- 1.
- 2.
- 3.

## Mining Activity

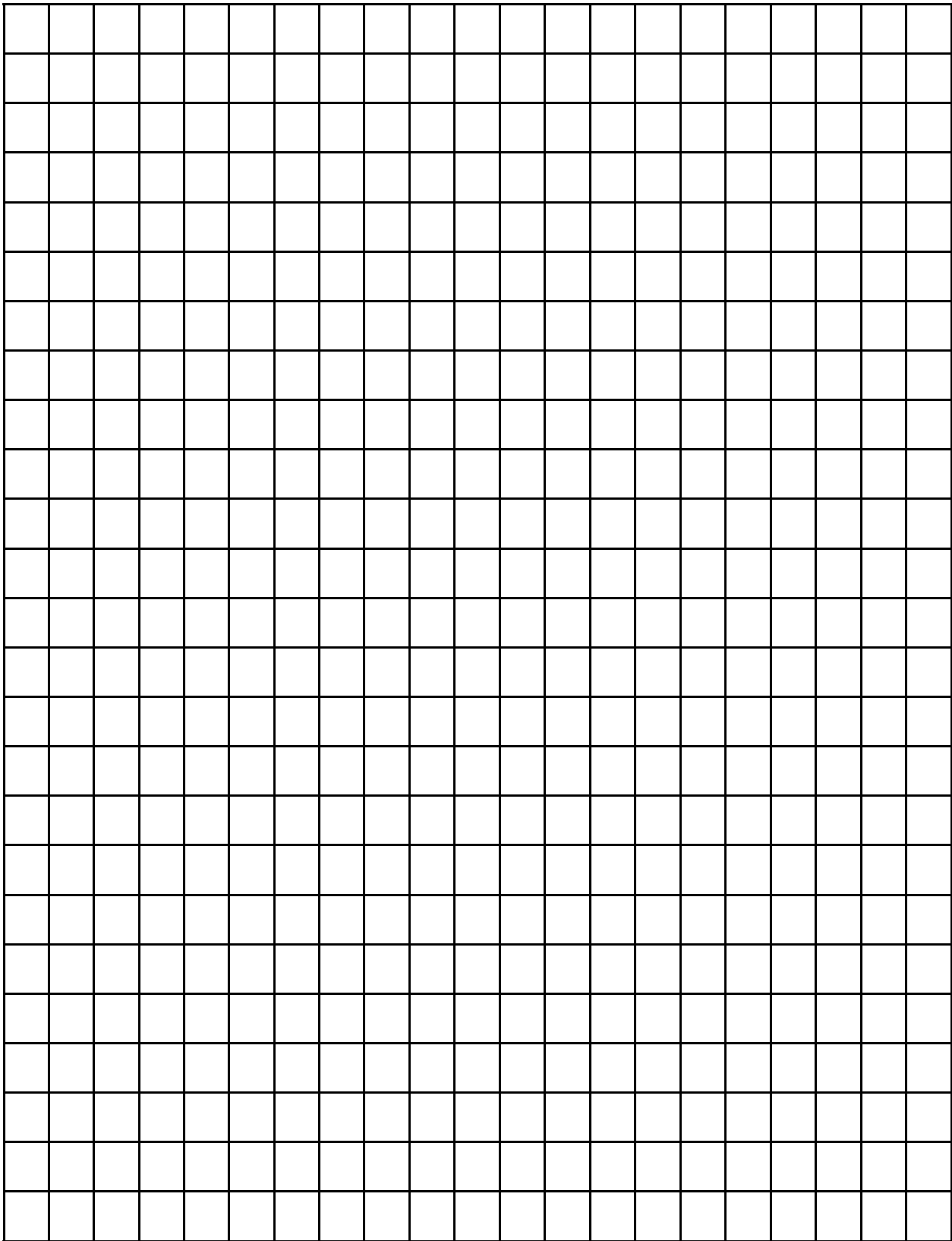
After you conduct your first mining activity, calculate the cost and profit of your mine using the table below.

Item	Cost	Running total Total starting amount \$25.00
Land Acquisition <ul style="list-style-type: none"> <li>● Cost of Cookie = \$7</li> </ul>	\$7	\$18.00
Size of Cookie <ul style="list-style-type: none"> <li>● 1 square = \$1</li> </ul>		
Equipment <ul style="list-style-type: none"> <li>● Flat Toothpick = \$ 2</li> <li>● Round Toothpick = \$4</li> <li>● Paper Clip = \$6</li> </ul>		
Time Spent Mining <ul style="list-style-type: none"> <li>● Each Minute = \$1</li> </ul>		
Reclamation Each <b>land</b> square = \$1		
Reclamation Each <b>water</b> square = \$2		
Total cost of mining		\$ _____

Number of Chocolate chips = \$2 each		
Total profit = Remaining Mining money + money from chocolate chips		\$ _____

### Mining and Reclamation Game Instructions

1. You will start with \$25 in your account. First, you must buy your own “mining property,” which is one cookie.
2. After the cookie is purchased, place the cookie on the grid paper, and using a pencil to trace the outline of the cookie. Count each square that falls inside the circle. Count partial squares as a full square. Add this number to your chart.
3. Buy your “mining equipment.” More than one piece of equipment may be purchased. Equipment may not be shared between students. If the mining tools break, they are no longer usable and a new tool must be purchased. Mining equipment for sale is:
  - a. Flat toothpick — \$2
  - b. Round toothpick — \$4
  - c. Paper clips — \$6
4. Mining costs are \$1 per minute with a maximum of 5 minutes.
5. After the cookie has been “mined,” count how many ‘squares’ are covered by any cookie crumbs. Reclamation costs are \$1 for each square covered outside the original outline.
6. Also, count the number of squares in the water body that have crumbs in it. Reclamation costs are \$2 for each water square with a crumb in it.
7. Total your mining experience.
8. The sale of one chocolate chip mined from a cookie results in a \$2 profit. (Broken chocolate chips can be combined to make one whole chip). Total your mining profits and write it on your chart.
9. Add your profits to the remaining money from your mine purchases.



Name: \_\_\_\_\_

### Design a Solution

Design a solution that will increase the profit of your mine and decrease the environmental impact.

The Problem:

Criteria:

Constraints:

Solution:

## Second Mining Activity

After you conduct your second mining activity, calculate the cost. Compare the original cost and environmental impact to your first mine.

Item	Cost	Running total Total starting amount \$25.00
Land Acquisition <ul style="list-style-type: none"> <li>● Cost of Cookie = \$7</li> </ul>	\$7	\$18.00
Size of Cookie <ul style="list-style-type: none"> <li>● 1 square = \$1</li> </ul>		
Equipment <ul style="list-style-type: none"> <li>● Flat Toothpick = \$ 2</li> <li>● Round Toothpick = \$4</li> <li>● Paper Clip = \$6</li> </ul>		
Time Spent Mining <ul style="list-style-type: none"> <li>● Each Minute = \$1</li> </ul>		
Reclamation (Count the number of squares with cookie crumbs and pieces outside of original size) <ul style="list-style-type: none"> <li>● Each land Square = \$1</li> </ul>		
Total cost of mining		_____

Number of Chocolate chips = \$2 each		
Total profit = Remaining Mining money + money from chocolate chips		_____

Write a Claim statement: The summary should have a clearly stated **claim** with one solution for minimizing environmental impact identified. **Evidence** statements should come from the data collected on the table and the process of your mining. The **reasoning** should be thoughtful and complete based on which evidence and why they think it is most compelling. Students should include the engineering process in their text.