MINING COOKIES FOR COAL

In this activity, you will simulate the environmental costs of mining operations by mining a cookie for its precious coal (chocolate chips). You and your teammates will work together to maximize the profit of your mining company by reducing revenue and minimizing.

Procedure:

1. When you first place your cookie in the middle of the graph paper, trace a line around the cookie and count the number of squares covered by the cookie (a partially covered square counts as half). Each square costs \$100. This is the value of your land.

Number of squares: _____ x \$100 = \$ _____ (land cost)

2. When mining, you may only use the "mining" tools. You may **not** use your hands to touch any part of the cookie at *any* time. You must therefore purchase mining tools at the following cost:

Tool	Cost Per Item	Quantity	Total Cost
Toothpick	\$2,000	X	=
Paperclip	\$5,000	X	=
Jumbo Paperclip	\$8,000	X	=
		Total Equipment Cost	

3. Mining costs \$1,000 per minute. There is a 10 second grace period in every minute, after which point the full \$1,000 is charged. A chip is considered "mined" when it has been moved outside the boundary of the map (remember, no hands!).

Mining time: _____ minutes X \$1,000 = _____

4. Calculate Total Operational Costs:

Land Cost _____ + Equipment Cost _____ + Mining costs _____ =

5. When you have finished mining, count the number of chips. Whole chips are worth \$3,000 and partial chips can be combined together to be worth \$2,000.

Chip Type	Selling Price	Quantity	Total
Whole Chip	\$3,000	X	=
Reconstructed Chip	\$2,000	X	=
		Total Revenue	=

6. Calculate Profit:

Total Revenue	\$
- Total Operational Costs	\$
= Profit	\$

Did you make a profit? What changes could you make to maximize your profit if you were to do this again?

7. Now look at the debris you have scattered over the landscape. For every square that contains debris outside your original land purchase (not including squares containing water), you must pay reclamation costs of \$100. This fee must be paid if there is any cookie debris in the square, no matter the amount.

# of Polluted squares	X \$100 =	(total reclamation
costs)		

8. Now look at debris in squares containing water. The arrows in the rivers indicate the direction of the flow of the river. If 5 or more squares of water are polluted upstream from a city, you will incur \$10,000 in legal fees to defend against a lawsuit brought by that city's government.

City Name	# of Polluted Upstream Squares	Legal Fees
Frankfort		\$
Danville		+\$
Sioux City		+\$
Lafayette		+\$
	Total Legal Fees	=\$

9. Now calculate your adjusted profits:

Total Revenue	\$
- Total Operational Costs	\$
- Total Reclamation Costs	\$
- Legal Fees	\$
= Profit	\$

When you have finished the simulation, answer the following questions. Use a separate sheet of paper if necessary.

- How might your group have approached the activity differently if you knew about the reclamation costs and legal fees ahead of time? (time permitting: if you performed the simulation a second time, how were your results different?)
- Are the environmental costs of *mining* coal the only environmental costs? What other environmental costs might occur *after* the coal has been mined?
- Why are environmental regulations important? Use specific evidence from this activity to support your answer.

Tragedy of the commons

- Describes....
- How is coal mining an example of "tragedy of the commons" ?