

Lesson Plan Overview: Mine-a-Pie

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Background

The "Mine-a-Pie" lesson is based on the Alaska Resource Education lesson plans for both "Mine-a-Pie" and "Finding Oil in a Cupcake." The lessons have been simplified to be taught in a shorter time frame (45 to 60 minutes opposed to two to three hours).

Standards Earth Systems, Earth and Human Activity, Engineering Design

Objectives Teach the students the basics on the following objectives:

- Alaskan mining resources
- Mining procedures
- Environmental impact
- Budgeting
- Cost analysis
- Reflection

Target Grades 3rd to 6th grade

Time Requirements Instruction 45 to 60 minutes
Preparation 60 to 90 minutes (requires baking cakes)

Preparation Pies Prepare pies for each small group (about six)

- Bread loaf aluminum pans (9"x5"x2.5")
- Two yellow cake mixes
 - Requires 6 eggs and one cup of vegetable oil
- Cans of corn, black beans, and peas
- Oats
- Chocolate frosting
- Blue and green sprinkles
- Chocolate syrup (insert with a straw)

Mix the vegetables and oats with the cake mix
Bake the cakes
Use a straw to inject chocolate syrup into the cake
Add the frosting
Add green sprinkles to represent vegetation
Add green sprinkles to represent water

<u>Supplies</u>	Plastic forks, spoons, and knives Toothpicks Plastic translucent straws Paper towels and Clorox wipes Calculators (optional) Pencils
<u>Handouts</u>	STEM Experiment: Mine-a-Pie student directions Background (Mining) Laws and Permits that Affect Mining
<u>Groups</u>	Divide the students into small groups (2 to 6). It is recommended the groups are academically and behaviorally balanced. Each group will complete one "pie" and handout.

Format

The students work in small groups, 2 to 6.
The students will discuss multiple options to plan their strategy.
The students will collaboratively mine and count their resources.
The students will complete the Profit Analysis Sheet to document their resources. They need to use addition, subtraction, and multiplication. They may use calculators (teacher discretion).
The students will complete a reflection component.

Procedures

1. The teacher presents a brief overview of mining in Alaska.
2. The students spend a "budget" to buy tools to mine.
 - The students have multiple tool options.
 - The students have the option to purchase insurance.
3. The students work collaboratively to "mine" a pie (cake) for a finite amount of time (ten minutes).
4. The students count the resources mined and the number of environmental "spills."
5. The students calculate their gross profit and subtract their initial investment and environmental penalties to determine their net profit.
6. The students complete two reflection questions.
7. The teacher announces the net profits of each team to recognize their hard work.

8. The class discusses that they learned, what they would do differently, and how the activity has impacted their perspective of mining operations in Alaska.
9. The students will celebrate their success by eating their pies.

STEM Experiment: Mine-a-Pie (5th Grade Version)

Names _____

Synopsis

In this experiment your team will carefully "mine" a pie for valuable "minerals." You have a budget of \$1000. Since the mining season is limited by the weather, you will have a finite (limited) amount of time to mine (ten minutes). Your profit is based on how many valuable minerals you can extract (dig up) before the time expires. You will receive penalties (\$200 per incident) if you damage the environment (e.g. get frosting or crumbs anywhere). You may not touch anything except the tools that you purchase. Complete both sides of this form.

EXPENSE CHART

Record what you buy. Please spend your \$1000.

Resource	Description	Cost	Purchases
Land Lease	Pie	\$300	\$300
Insurance	Only pay \$100 per incident (1/2 normal)	\$250	
Excavator	Fork	\$150	
Loader	Spoon	\$100	
Scraper	Knife	\$50	
Crane	Toothpick	\$50	
Drill	Straw (cost per drilling)	\$50	
		TOTAL EXPENSES	



PROFIT ANALYSIS SHEET

Carefully identify and count the minerals that you extracted.

Resource	Description	Value	Amount Mined	Income
Gold	Corn	\$100		
Coal	Black Beans	\$20		
Jade	Peas	\$50		
Oil	Chocolate Syrup	\$150 per time "oil" was found with a "drill" (straw)		
Precious Stones (rubies & diamonds)	Red or White Hard candy	\$200		
			TOTAL INCOME	

How many times did your team have a "spill" (frosting or crumbs)?

Penalties	Expense	Incidents	Fines
Environment incidents	Pay \$200 per incident, or \$100, if you bought insurance		



Total Income _____

Fines _____

Total Expenses _____

Net Profit

REFLECTION

What did your team learn about mining?

What would you do differently if you had a second opportunity to mine?

**Excavator
(Fork)**



**Loader
(Spoon)**



**Scraper
(Knife)**



**Crane
(Toothpick)**



**Drill
(Straw)**

