



Bird Seed Phosphate Mining Student Guide

Introduction:

Mining is a complex process in which relatively small amounts of sometimes valuable (fossil) or useful (phosphate) minerals or metals are extracted from very large masses of rock. Beneficiation is mineral processing where the phosphate, sand, clay, and other components of the matrix are separated. Reclamation is the process of making the land suitable for beneficial use or habitat after mining. This activity will help you understand some of the phosphate mining processes and the costs/rewards.

Standards:

SC.B.2.3.2 SC.D.1.3.2 SC.D.1.3.3 SC.D.1.3.4 SC.G.1.3.4 SC.H.1.4.7
SC.G.2.3.1 SC.G.2.3.2 SC.G.2.3.3 SC.G.2.3.4 MA.6.A.3.5 SS.7.E.3.3
SS.7.E.2.5

SC.912.E.6.2 SC.912.E.6.3 SC.912.E.7.3 SS.912.E.1.4
MA.912.A.3.5

Objectives:

Mining Regulations and Mine Reclamation

- What are some of the environmental consequences of mining?
- What legislation has been enacted in order to regulate mining and minimize its impact on the environment?
- Why is reclamation an important aspect of mining?
- What are the laws of supply and demand?

Vocabulary:

mining
beneficiation
reclamation
phosphate
DNA
ATP
matrix
supply
demand

Materials:

Shallow pan (“mine”)

\$50

DEP Fines

Toothpicks

Plastic spoons

Thumb forceps

Magnifying glass

Calculator

Plate (“beneficiation”)

Ziploc bag containing:

- Wild Bird Food
- Assorted color beads

Activity:

1. Work in a group of 2 to 3.
2. First you must purchase your mining tools:
 - wheelbarrows, picks and shovels = \$10 (2 toothpick)
 - mule-drawn scrapers = \$20 (Spoon)
 - dragline = \$50 (spoon and forceps)
3. Pour contents of your Ziploc back into your mine.
4. The following items can be found in your mine:
 - Brown beads = fossil
 - Gold beads = phosphate rock
 - Green beads = sand
 - Blue beads = clay
 - All other seeds and beads= waste
 - Red beads = reclamation cost
5. When instructed, using your tools search through the seed mixture and separate out or "mine" beads, sunflower seeds and other grain products, making piles of each. You can use your tools only. **NO FINGERS!**
6. Be careful! The DEP (Department of Environmental Protection) can give you Environmental Fines if you are caught using your fingers or if you make a mess. You never know who is watching!
7. When the instructor calls “time,” count up the number of sunflower seeds and brown, gold, blue, green and red beads in your piles. Write all information on the "Birdseed Mining Spreadsheet." Also note the amount of any environmental damage fines on the spreadsheet.
8. Total up the dollar value of your "mining" operation, subtracting the environmental damage fines and reclamation costs. Share your success with the other miners..

Don't worry; we'll do the math together.

THERE WILL BE A PRIZE FOR THE BEST MINERS!!!!

Data:

Birdseed Mining Phosphate Spreadsheet

Beginning Balance: \$50

Subtract equipment cost _____ = _____

- BROWN bead = Fossil:

$$\text{Number of beads } \underline{\hspace{2cm}} \times \$ \frac{\underline{30.00}}{\text{price}} = \underline{\hspace{2cm}} \text{ value}$$

- GOLD bead = Phosphate:

$$\text{Number of beads } \underline{\hspace{2cm}} \times \$ \frac{\underline{20.00}}{\text{price}} = \underline{\hspace{2cm}} \text{ value}$$

- GREEN bead = Sand:

$$\text{Number of beads } \underline{\hspace{2cm}} \times \$ \frac{\underline{4.00}}{\text{price}} = \underline{\hspace{2cm}} \text{ value}$$

- BLUE bead = Clay:

$$\text{Number of beads } \underline{\hspace{2cm}} \times \$ \frac{\underline{-1.00}}{\text{price}} = \underline{\hspace{2cm}} \text{ value}$$

TOTAL Value of all Products = _____

***Note- all other seeds and beads are WASTE and have zero value

SUBTRACT cost of Environmental Damage fines = _____

ADD DEP Rewards = _____

SUBTOTAL = _____

$$\text{Number of RED beads } \underline{\hspace{2cm}} \times \$ \frac{\underline{-20.00}}{\text{price}} = \underline{\hspace{2cm}} \text{ value}$$

SUBTRACT reclamation cost from SUBTOTAL = _____

GRAND TOTAL = _____

Analysis/Conclusion:

Middle School grades 6-8

1. What was more economical, the items that were worth more or less? Why?
2. Why is it important to practice clean mining?
3. Do mining operations abandon the land when they are done?
4. Why must mining operations turn a profit?

High School grades 9-12

1. What is an ore mineral?
2. What are the environmental implications for subsurface mining and for surface mining?
3. What are some of the environmental consequences of mining?
4. What legislation has been enacted in order to regulate mining and minimize its impact on the environment?
5. Why is reclamation an important aspect of mining?
6. What federal and state regulations are in place to permit mining and ensure reclamation?
7. What was more economical, the items that were worth more or less? Why?
8. How do regulations affect the economics of mining?
9. Why is mining so important to Florida?
10. How does the prospect of greater profits affect the quantity supplied?
11. How is price affected by shortages and surpluses?
12. What are Florida's sources of state revenue?
13. What roles do interest groups, political parties, the media and public opinion play in the legislative process?
14. What influence could conservation programs have on the economy of Florida?