

## Phosphate Mining in the Southeastern U.S. Video

### Reinforcement Activity: Paper Manipulative

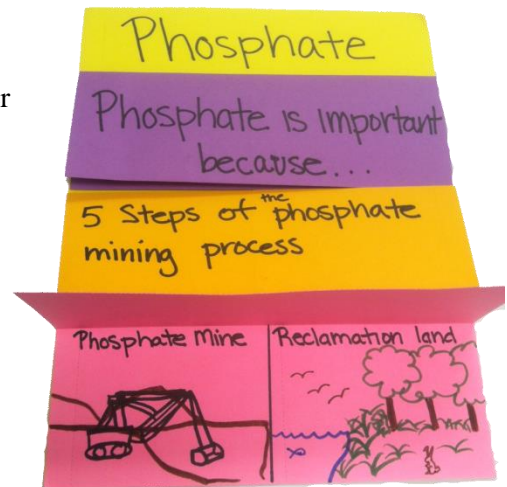
- This paper manipulative is a useful introduction activity for the Nutrients for Life phosphate mining video. The paper manipulative enforces concepts learned in the phosphate mining video; such as why phosphate is important, steps of the phosphate mining process, and visual identifiers of reclamation land. Students can easily review video concepts with the manipulative.

#### Materials Needed:

- Construction paper (4 colors)
- Scissors
- Markers
- Glue sticks or tape

#### Directions:

1. *Before students view the phosphate mining video:* Each student will need three 6-inch strips of construction paper and one 8 ½ x 11-inch piece of construction paper.
2. Students should fold the three strips of paper in half and glue them on to the 8 ½ x 11-inch paper as shown:
3. Students should label on top of the paper strips:
  - a. Phosphate is important because...
  - b. 5 Steps of the Phosphate Mining Process
  - c. Reclamation
4. *After students view the phosphate mining video:* Students should answer #3 a, b, and c inside the folded strips. Sample answers may include:
  - a. Phosphate is important because...
    - i. It feeds the world!
    - ii. It is a natural resource.
    - iii. It is one of 17 nutrients that help plants grow.

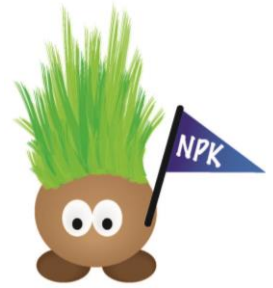


b. 5 Steps of the Phosphate Mining Process

- i. Enormous machines called draglines carve phosphate rock out of the mine.
- ii. The matrix, consisting of sand, clay and phosphate, is hydro-blasted and then pumped into the processing plant.
- iii. At the plant, the matrix is separated and transported.
- iv. Phosphate rock is ground into powder and mixed with water.
- v. Next, it is pumped to another area of the processing plant, where it reacts with sulfuric acid to form phosphoric acid. Finally, the fertilizer plant combines the phosphoric acid with anhydrous ammonia to produce fertilizer.

c. Reclamation

- i. Review the dragline section of phosphate video (minute 3:15 – 4:05) and then pause on a shot of a dragline. Instruct students to sketch a dragline and phosphate mine on one side of the inner strip of paper.
- ii. Review the reclamation land section of the phosphate video (minute 4:45-5:10) and then pause on a shot of reclamation land. Instruct students to sketch reclamation land.



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

### Phosphate Mining in the Southeastern U.S. Video: Multiple Choice and Writing Prompt

Directions: Write the correct answer on the line.

- \_\_\_\_\_ 1. Phosphorus \_\_\_\_\_.
- Helps plants form proteins, starches, and growth hormones
  - Important catalyst for chemical reactions within plant cells.
  - Essential for chlorophyll formation.
  - Moves energy around the plant and makes photosynthesis possible.
- \_\_\_\_\_ 2. Phosphate is \_\_\_\_\_.
- One of our nation's largest natural resources.
  - Mined in the Bone Valley region of central Florida.
  - Formed from the skeletons and decomposition for ancient sea creatures.
  - One of many nutrients that helps grow healthy plants.
  - All of the above.
  - None of the above.
- \_\_\_\_\_ 3. Fertilizer is responsible for \_\_\_\_\_ percent of world food production.
- 15
  - 25
  - 50
  - 80
- \_\_\_\_\_ 4. After initially arriving at a fertilizer-manufacturing complex, phosphate rock is ground and mixed with water. Then, phosphate is pumped to an area where it reacts with \_\_\_\_\_.
- Sulfuric acid.
  - Ammonium nitrogen.
  - Anhydrous ammonia.
  - Potash.
- \_\_\_\_\_ 5. \_\_\_\_\_ is previously mined land that was carefully restored and reclaimed back into high-quality ecosystems.
- Ecoplensh
  - Land reclamation
  - Land recovery
  - Beautification

### Writing Assignment

After viewing the video on mining phosphate and reviewing other resources as needed, **write an essay** that summarizes the production of phosphate and its importance in food production, then **draw and label** five main steps in the phosphate mining process.



### Answer Key

1. D
2. E
3. C
4. A
5. B

### **Writing Prompt**

#### **Coding: Essential Standards**

EEn = Earth/Environmental

#### **Standards for Literacy in History/Social Studies, Science, and Technical Subjects:**

RST: Reading Standards for Literacy in Science and Technical Subjects

WHST: Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

**Note:** Teachers may need to adjust the wording of writing assignment to meet the proficiency level of their English language learners and/or struggling readers. Teachers may also need to provide classroom modifications, such as pictures, word walls, sentence starters, and sentence frames, as appropriate.

#### **Sample Answer:**

Phosphorus, along with other essential nutrients, plays an important role in feeding the world. With phosphorus, plants are able to convert energy into usable energy, and therefore, photosynthesis is possible. Although nutrients are found naturally in the soil, they must be replenished once the land has been farmed and nutrients depleted. Phosphates in fertilizers help replenish the soil so the next crop of plants can grow healthy and strong.

Fertilizer companies create phosphate fertilizer through a mining process. Enormous machines called draglines carve phosphate rock out of the mine. Next, the phosphate is mixed with water into what is called a matrix consisting of sand, clay and phosphate. The matrix is hydro-blasted and then pumped into the processing plant. At the plant, the matrix is separated through a high-tech process and transported to a fertilizer-manufacturing complex. Machines grind the phosphate rock into a powder and mix with water. Next, it is pumped to another area of the processing plant, where it reacts with sulfuric acid to form phosphoric acid. Finally, the fertilizer plant combines the phosphoric acid with anhydrous ammonia to produce the final fertilizer product.

**Draw and Label:** 1. Enormous machines called draglines carve phosphate out of a mine. 2. Matrix (sand, clay and phosphate) is hydro-blasted and then pumped to the processing plant. 3. The matrix is separated and transported to a manufacturing processing plant. 4. Phosphate rock is ground in powder and mixed with water. 5. Next, it is mixed with sulfuric acid to form phosphoric acid. Then it is combined with anhydrous ammonia to produce fertilizer.

Sample Writing Rubric:

Category:	4	3	2	1
Accuracy of Facts	All facts about the mining process are reported accurately.	1 or 2 steps of the mining process are incorrect, but others are correct.	3 to 4 steps of the mining process are incorrect, but others are correct.	None of the facts are correct
World Connection (Food Production)	The phosphate mining connection to food production is successfully stated.	The food production connection is attempted but not fully stated.	The food production connection is not strongly described.	Food production to phosphate mining is mentioned, but it not explained.
Visual	All 5 visuals and 5 labels are correct and recognizable.	1 or 2 of the visuals and labels are incorrect and unrecognizable.	3 or 4 of the visuals and labels are incorrect and unrecognizable.	None of the visuals are correct or recognizable.
Grammar & Spelling	Writer makes no errors in grammar or spelling that distracts the reader from the content.	Writer makes 1 to 2 errors in grammar or spelling that distract the reader from content.	Writer makes 3 to 4 errors in grammar or spelling that distract the reader from content.	Writer makes more than 4 errors in grammar or spelling that distracts the reader from the content.