

Dear Educator,

During these uncertain times, Nutrients for Life Foundation wants to help you reach your students with engaging and relevant resources. These resources meet standards for 3-5th grade levels. Search state standards here: <https://nutrientsforlife.org/for-teachers/educator-resources/>



Digital 3-5th Grade Resources Available:

[Fun with the Plant Nutrient Team Booklet](#) (2nd / 3rd)

[Nourishing the Planet in the 21 Century](#)

Free Downloadable Curriculum (3rd/4th)

[NPK Soccer Poster](#)—PDF (shown left)

VIDEOS:

Check out our video library that corresponds with our *Nourishing the Planet in the 21st Century* elementary curriculum. These five videos are great to go along with the lessons, or can be used as a quick virtual lesson and completed with the suggested extension activities. Find the elementary video library here: <https://nutrientsforlife.org/for-teachers/video-library/>.

Lesson 1 Video— Plants All Around You— This video is all about seeds, their similarities and differences. They are all around us! What can you find that contains seeds?

Instructions: Go into your kitchen and look around. What can you find that has seeds? Do you have anything that was shown in the video? Write down a list of the fruits and vegetables you find that contain seeds.

Lesson 2 Video— Properties of Soil— Separate your soil at home, following the video and instructions in the Soil Separation attachment.

Instructions: In the lesson two video, you saw Dee talk about separating soil in jars to show you sand, silt and clay layers, as well as the organic matter floating at the top. In this activity, you are going to separate your own soil! Find a clear jar or empty water bottle and some soil. It can be soil from your yard, garden, or potting soil. Fill your jar or bottle about two-thirds full of soil. Add water to near the top of the bottle. Place caps on the bottle or jar tightly and shake the contents well. Place in a location it will not be disturbed. Check back in a day. Extension, if you have multiple types of soil, prepare multiple bottles and compare the results. Write down your observations.

Lesson 3 Video–Plant Soil Interactions –After watching, complete the attached celery investigation to investigate how roots take up nutrients from the soil.

Lesson 4 Video– Plant Growth Affects the Soil– In this video you learned different plants need different amounts of nutrients and have different needs to grow and stay healthy.

Instructions: Find some seed packets, if you don't have seed packets, search for seed packets online and compare different requirements. Write about what you notice.

Lesson 5 Video– How Does Your Garden Grow?– After watching the Lesson 4 video and looking at seed packets, what did you find that you want to grow in your garden?

Instructions: Think about the seed packets you looked at. What are some plants that will grow well where you live? Write down what you would like to grow in your garden and what they will need to grow and stay healthy.

Phosphorus Video--What is Phosphorus and where does it come from? Watch this video to learn more about phosphate.

https://www.youtube.com/watch?time_continue=9&v=KjmfpgBloAM&feature=emb_logo

Instructions: Complete the attached series of multiple-choice questions, writing prompt, and make a paper manipulative about what you observed.

READERS:

The Nutrients for Life 4R reader can be found and digitally downloaded at:

<https://nutrientsforlife.org/product/4r-reader/>

Share the digital copy of the reader with your students. Have them explore the 4R reader and learn about sustainable practices farmers use to feed the world. Have them write a reflection on what they read and what the 4Rs, right time, right rate, right place, and right source looks like in their life.

Get The Dirt on SOIL can be found and digitally downloaded at:

<https://nutrientsforlife.org/product/get-the-dirt-on-soil-reader/>

www.nutrientsforlife.org

Nutrients for Life Foundation is a tax-exempt organization as described in Section 501(c)(3) of the Internal Revenue Code and is incorporated in the State of Delaware. The Foundation was formed to disseminate educational information to the general public, including policy makers, about fertilizers, modern agriculture and the role plant nutrients serve in improving people's lives.

Lesson 3 Plant Soil Interactions Celery Investigation

- 1.) Have an adult help you use a sharp knife to cut celery stalks into pieces approximately two inches long. Make sure that the cut surfaces are flat and will allow the celery to rest upright when placed into the paper cup. Pour food coloring into the cup.
- 2.) What do you think will happen to the celery and the food coloring when you put the celery in the cup?

Write your prediction.

- 3.) Put the piece of celery into the cup so that one end of the celery is sitting in the food coloring. Start timing when you put the celery in the cup.

Write the time that you put the celery in the food coloring.

GETTING WATER AND NUTRIENTS TO THE PLANT

- 4.) Leave the celery in the cup for 5 to 10 minutes. Do not move the cup or the celery during this time. Write your observations below.

Write your observations after the celery has been in the food coloring for 5 minutes.

Write your observations after the celery has been in the food coloring for 10 minutes. Draw a picture of what you see.



Name: _____ Class: _____

Phosphate Mining 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.



Phosphate Mining Video

Reinforcement Activity: Paper Manipulative

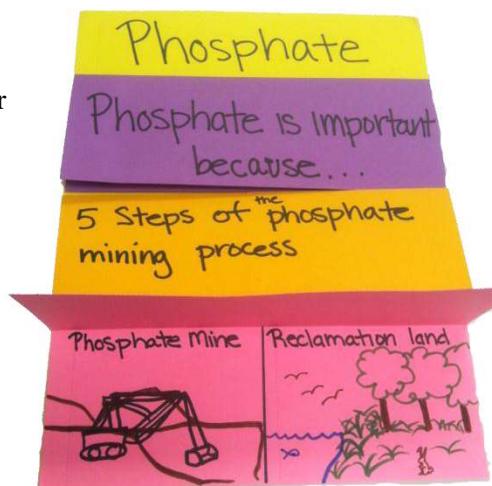
- This paper manipulative is a useful introduction activity for the Nutrients for Life phosphate mining video. The paper manipulative enforces concepts learned in the phosphate mining video; such as why phosphate is important, steps of the phosphate mining process, and visual identifiers of reclamation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