Mining the World's Most Used Minerals

Students will analyze the quantities and origins of basic mineral resources.

GRADES
6 - 12, Higher Ed

SUBJECTS
Earth Science

CONTENTS
1 Link

OVERVIEW

Students will analyze the quantities and origins of basic mineral resources.

For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/mining-worlds-most-used-minerals/

DIRECTIONS

Have students follow the directions below using the premade ArcGIS map to explore the origins of mineral resources they use in their lives.

Engage students by asking: What earthly things do you surround yourself with?

1. List some things around you that were manufactured from materials mined from the earth.
2. Click this link to launch the map.
3. Click the link in the upper-right, Modify Map.
4. With the Details button underlined, click the button, Show Content of Map (Conent).
Instruct students to use the tools in the map to answer the following questions: 

6. How far is it across the opening? [Answer: It is approximately 4.3 kilometers (2.7 miles) across, 1.2 kilometers (0.75 miles) deep.]

7. How many major league football stadiums would fit in this hole? [Answer: Using the 80,000-person capacity of the Dallas Cowboys' stadium, approximately 115 stadiums would fit in the hole.]

Have students explore the question, What amount of raw minerals do we need in our lives? by following the next set of steps.

1. Each mine is the largest of its kind of the world.
2. Click the bookmarks for each mine, and then click each marker to view additional information.

Ask: What does each mine produce? [Answer: Among other things, the mines produce copper, salt, iron, and lithium.]

Based on the information you learned from the Bingham Canyon Mine, what is the total amount of mineral resources an average person uses? [Answer: An average person uses 1600 pounds of mineral resources.]

Explain the answer to the question Why do more minerals gather in certain places? by following these next steps.

1. Click the Home button to see the full extent of the map.
2. Turn on the two layers, Copper Mine Density and the Sources Of Minerals.
3. Click the large box containing the word Copper to see how copper ore is formed.

Ask: What are the top three areas that produce this metal for the world? [Answer: Chile, China, and Peru are the top three areas.] The instruct students to explore the other three metals (iron, aluminum, and gold) in the same way.
The following steps will allow students to elaborate on the question, at this rate, how long can we use resources?

1. Click the marker near Lake Huron.
2. Click the image in the popup, and explore the image and graph further.

Ask: Which resource will we run out of soonest if we keep consuming it at today’s rate? [indium] What product will we need to redesign after we run out of its associated mineral? [We will need to redesign flat-screen televisions.]

This activity has been adapted slightly to fit the National Geographic Education format. Please find the original here.

Informal Assessment

Will recycling help extend how long we have access to these minerals?

Ask: If the recycling rate of chromium is doubled, what is the fraction of new material needed to make products that use chromium? [Answer: It is 0.50, or 50 percent. The fraction of the percent of new material used currently, divided by how much new material there will be after recycling is increased, results in how much longer this resource will now be available.]

Have students calculate how much time the use of tin can be extended by doubling the amount of recycling from 75 percent new material to 50 percent new material. [Answer: 0.75/0.5 = 1.33, so tin will currently last 17 more years. By doubling the recycling, you will have 1.33 x 17 = 22.6 years.]

OBJECTIVES

Subjects & Disciplines

Earth Science

Learning Objectives

Students will:

- explore mineral resources used in their lives and learn the origins of these resources to better predict where they might be found.
Teaching Approach

Teaching Methods

Skills Summary

This activity targets the following skills:

National Standards, Principles, and Practices

NEXT GENERATION SCIENCE STANDARDS

• MS-ESS2-1:
  Develop a model to describe the cycling of Earth’s materials and the flow of energy that drives this process.

PREPARATION

What You’ll Need

REQUIRED TECHNOLOGY

• Internet Access: Required
• Tech Setup: 1 computer per learner, 1 computer per pair

PHYSICAL SPACE

• Classroom
• Computer lab

BACKGROUND & VOCABULARY

Background Information
Prior Knowledge

Recommended Prior Activities

- None

Vocabulary

<table>
<thead>
<tr>
<th>Term</th>
<th>Part of Speech</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>chromium</td>
<td>noun</td>
<td>metal element with the symbol Cr.</td>
</tr>
<tr>
<td>copper</td>
<td>noun</td>
<td>chemical element with the symbol Cu.</td>
</tr>
<tr>
<td>manufacture</td>
<td>verb</td>
<td>to make or produce a good, usually for sale.</td>
</tr>
<tr>
<td>mine</td>
<td>noun</td>
<td>place dug in the earth where ores are extracted.</td>
</tr>
<tr>
<td>mineral</td>
<td>noun</td>
<td>inorganic material that has a characteristic chemical composition and specific crystal structure.</td>
</tr>
<tr>
<td>ore</td>
<td>noun</td>
<td>deposit in the Earth of minerals containing valuable metal.</td>
</tr>
</tbody>
</table>

© 1996–2019 National Geographic Society. All rights reserved.