Analyze this picture. What are your thoughts about it?

Explore more!

Explore more about minerals and mining here

Play a game about mineral properties here

Explore a database of minerals here

One is worth thousands and one is worthless. How can you tell the difference?

Mineral 1

Mineral 2

Minerals

What are the characteristics of a mineral?

Characterics of a Mineral (Page 61)

1. Naturally occurring
2. Solid
3. Forms by inorganic processes
4. Crystal structures
5. Definite chemical composition

So that is what makes a mineral a mineral, but how can you tell the difference between minerals?

Properties of Minerals (Page 62 - 63)

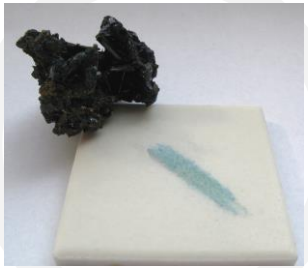
1. Color
2. Streak
3. Luster
4. Hardness
5. Density
6. Crystal structure
7. Cleavage or fracture
8. Special Properties

Using these properties we can figure out mystery minerals!

Properties of Minerals

Color

Minerals are all different colors and some are minerals are multiple colors.

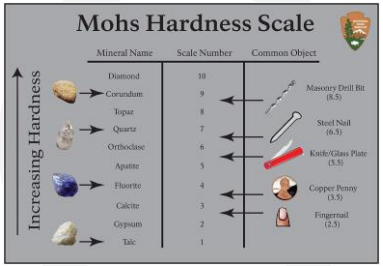


Streak

The color that is left behind in its powder form.

Luster

How shiny the mineral is when light shines on it.



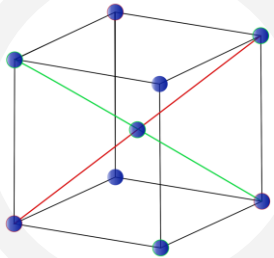
Hardness

How hard or soft the mineral is. Based on the Mohs Hardness Scale.

Properties of Minerals

Density

Density is mass in a certain volume and each mineral has a unique density.



Crystal Structure

The shape of the crystals inside the mineral with number of faces and angles.

Cleavage / Fracture

How the mineral breaks - either evenly for cleavage or unevenly for fracture.

Special Properties

Is there something special that the mineral has or does like magnetism?

Learn more here


IDENTIFYING
MINERALS

Let’s ID minerals based on their properties!

COMMON MINERAL IDENTIFICATION TABLE

Mineral Name	Color	Luster	Streak	Mohs	Fracture/ Cleavage	Crystal Structure	Special Features
Quartz	any	glassy	white	7	Fracture	hexagonal	most common
Muscovite Mica	clear to brown	glassy/ pearly	white	2-2.5	Cleavage	sheet or book	none
Biotite Mica	black or brown	glassy	white	2.5-3	Cleavage	sheet or book	none
Sulfur	yellow	earthy	white or yellow	1.5-2.5	Fracture	massive	smell like rotten eggs
Fluorite	clear, purple	glassy	white	4	Cleavage	cubic	looks like quartz
Feldspar	white, pink, gray	glassy	white	6	Cleavage	prism	none
Olivine	green	glassy	white-yellow	6.5-7	Fracture	prism	none
Galena	lead gray	metal	lead gray	2.5	Cleavage	cubic	none
Calcite	clear to white	glassy	white	3	Cleavage	hexagonal	reacts with acid
Gypsum	clear to white	glassy/ pearly	white	2	Cleavage	massive	None

Now It's Your Turn!

Use mineral properties to identify three different mystery minerals.

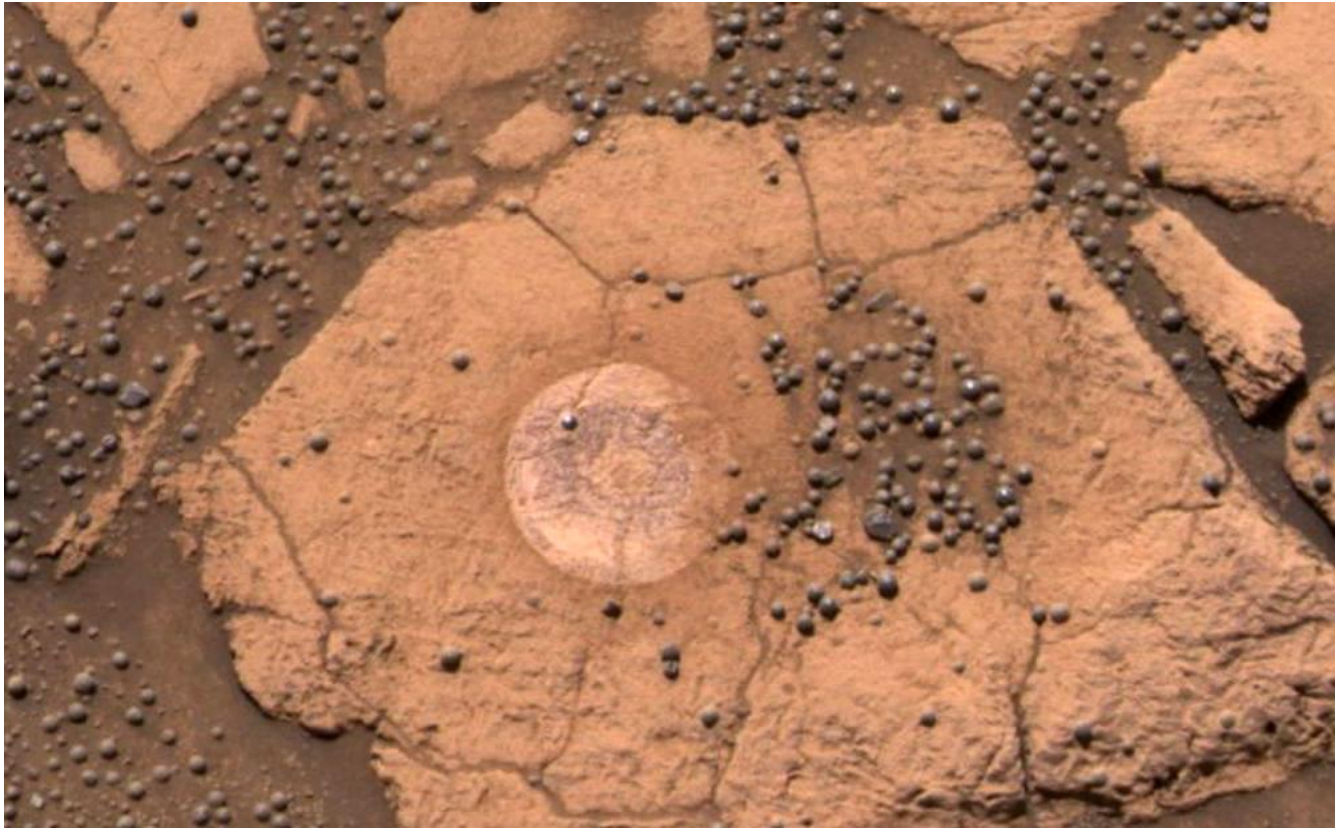
Why might it be useful to identify minerals in everyday life?

Want a DYI project about crystalline structures? Check out this link!

Done early

Done Early?

- Create your own mystery mineral to have others identify using the chart!
- Check out this explaining more about identifying minerals: https://artsandculture.google.com/story/QgXh9pyyxhIYKQ?hl=en
- Or check out this link to create your own crystalline structures: http://www.ellenjmchenry.com/homeschool-freedownloads/earthscience-games/documents/Crystalshap



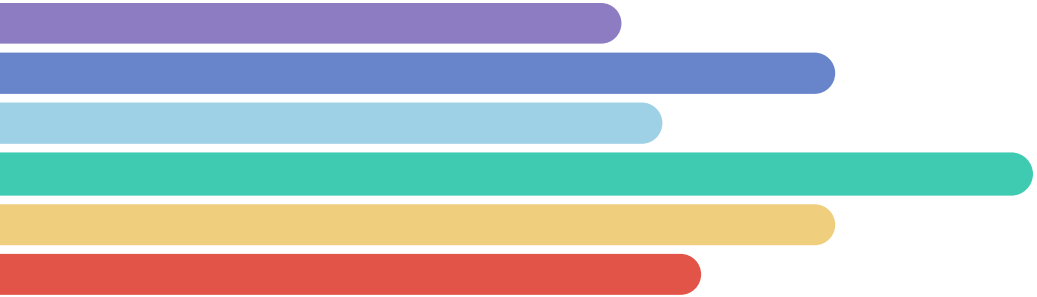
The small spheres in this picture were dubbed “berries” by geologists who first saw them. They sit on the surface of Mars and were photographed by the Mars rover Opportunity. A mass spectrometer on the rover was able to determine the chemical content of the berries and geologists recognized the chemical formula for hematite (Fe2O3).

Mineral Detectives!

Talc

Amphiboles

Magnetite



So why should we care about minerals?

Minerals in your life

Explore about all the different minerals in your life!

- Minerals in your food/body: https://www.uofmhealth.org/health-library/ta3912 and https://www.health.harvard.edu/staying-healthy/precious-metals-and-other-important-minerals-for-health
- Minerals in your electronics: https://pubs.usgs.gov/gip/0167/gip167.pdf
- Minerals in your house: http://www.mine-engineer.com/mining/min_house.htm
- Other minerals in your life: https://mnch.uoregon.edu/rocks-and-minerals-everyday-uses
- Play a game about creating your own crystals: https://www.brainpop.com/games/crystalcave/

Done Early? Read about the lives of geologist here: https://www.geosociety.org/documents/gsa/careers/Time_in_Field.pdf

https://www.youtube.com/watch?v=1BFPmxBMFOI

https://www.youtube.com/watch?v=mJCLlfL_i5E

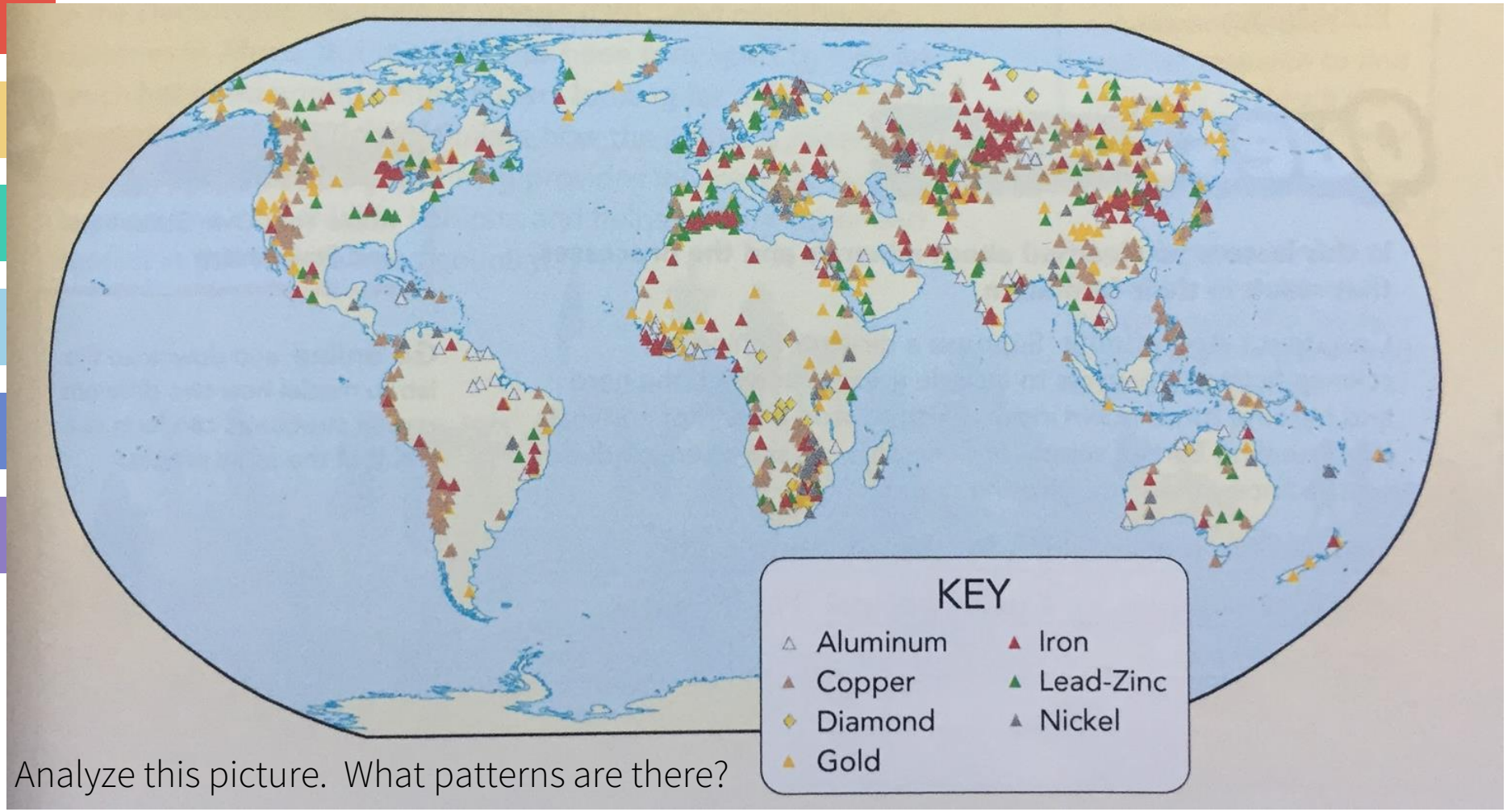
Where can you find minerals in your life?

New Mineral!

https://www.livescience.com/new-mantle-mineral-found-in-diamond

Even Stronger

https://bgr.com/science/scientists-discovered-a-mineral-thats-even-stronger-than-diamond/



Analyze this picture. What patterns are there?

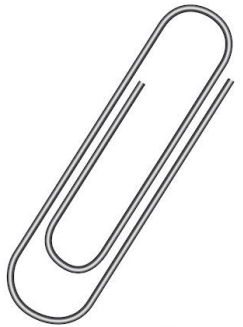
How do humans get the minerals from underground so they can be used?

Mining!

Cookie Mining

If you have a chocolate chip cookie and a paper clip you can do this activity with me!

If you don’t have these items, that’s okay! Just watch what is going on and you can do this activity later on.

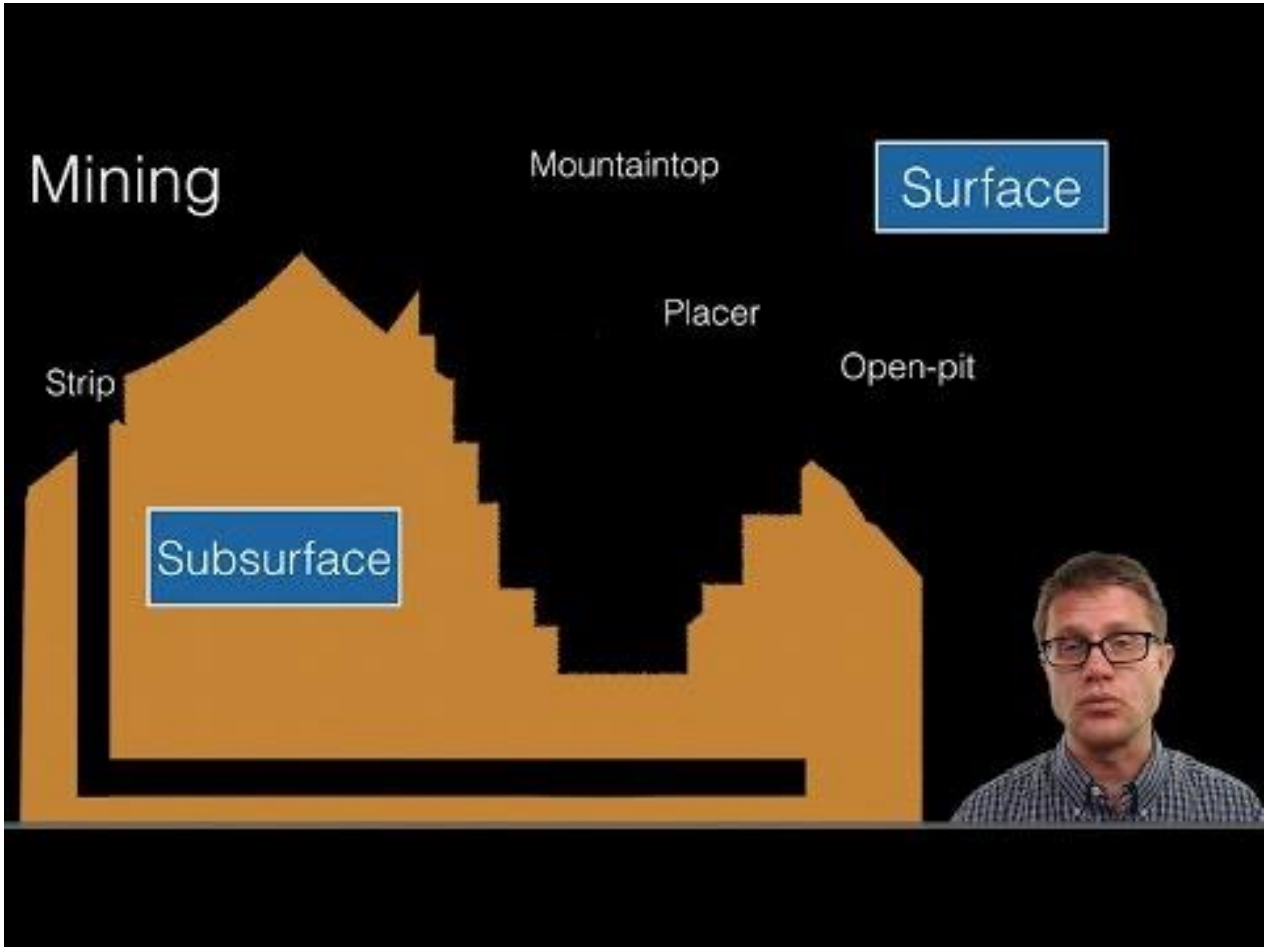


Analysis

1. What is left of the “land”?

1. How does this activity reflect the environmental impacts associated with real mining operations?

1. Based on what happened, how can you explain why in actual mining operations some minerals are more expensive to obtain than others?


Mining
Mountaintop
Surface
Placer
Open-pit
Strip
Subsurface

Mining is needed but it can have drawbacks.

(page 69 in your textbook)

Virtual Field Trip here

Explore More About Mining!

- NatGeo's explanation of mining here
- Minerals Education Coalition explanation of mining here
- Human cost of mining here
- Mining in Arizona laws and regulations here
- How mining will become even more important in the future here

Cost

- https://digintomining.com/virtualfieldtrips/archive
- https://www.nationalgeographic.org/encyclopedia/mining/
- https://mineralseducationcoalition.org/mining-minerals-information/all-about-mining/
- https://sciencing.com/what-are-the-effects-of-mining-emeralds-13662552.html
- https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/about/arizona
- https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action