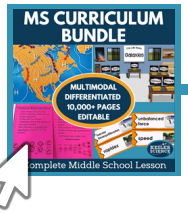
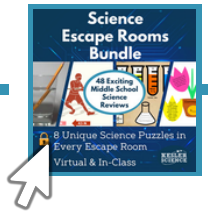
What Can Kesler Science Do for You?

4th - 8th grade science teachers love our Life, Earth, and Physical Science materials! With these easy and engaging materials, teachers can save planning time and put their focus back on the teaching that really matters.



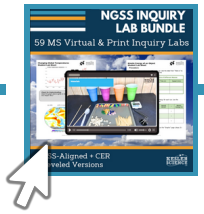
5E LESSONS

Two-week lessons with over 100 topics



ESCAPE ROOMS

Engaging activities for review

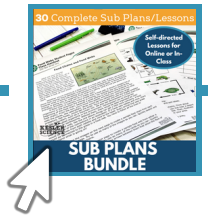


INQUIRY LABS

Three different levels to fit every student

AMAZING ANCHORS

Anchoring phenomenon to book-end your lessons



SUB PLANS

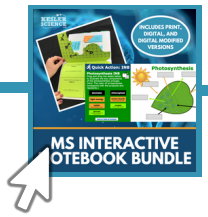
Never worry about planning for a sub again.

WARM-UPS

Bellringers for the entire year

STATION LABS

Student-led exploration

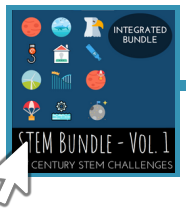


INTERACTIVE NOTEBOOKS

Bring science journals to life.

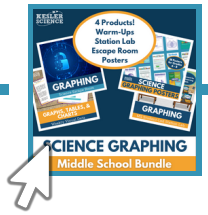
WIKI TICKETS

Quick formative assessments



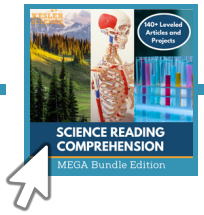
STEM CHALLENGES

Real-world STEM problem-solving



GRAPHING

Table and charts and graphs ... OH MY!

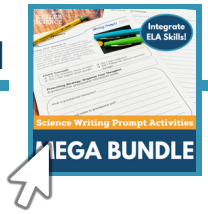


SCIENCE READING COMPREHENSION

Leveled reading passages with mini-activities

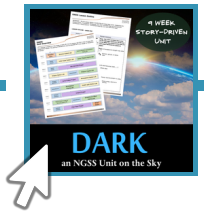
SPANGLER COLLABORATION

Exclusive Steve Spangler lessons and videos



WRITING PROMPTS

Writing activities covering 100+ topics



EXPLORIES

Story-driven units with integrated activities

The Kesler Science Professional Learning Network (PLN) group on Facebook has a huge community of engaged and supportive science teachers - come join us!

KESLER SCIENCE

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Weekly Phenomenon
Graphing Activity

Name: _____

Date: _____

Underground Mystery

It sounds like a scene from a science fiction movie: a team of workers are exploring a mine deep underground. They discover something so staggering that they have to call in the experts. Even the professional scientists have a hard time explaining what's down there!

This is exactly what happened in the year 2000 at an iron and lead mine in Naica, Mexico. The Naica Mountains formed when a pocket of magma cooled down, trapping water that was rich in minerals. This created the perfect conditions that led to the formation of some very bizarre objects.

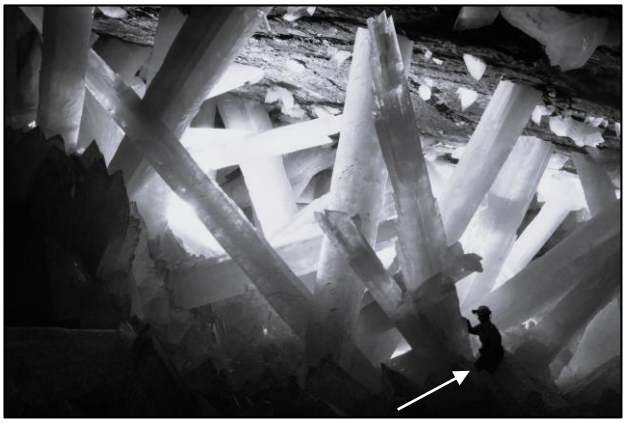
So, what is it that baffled the science community? When a mining operation drained the water from the cave, they found giant, beautiful crystals of selenite, a form of gypsum, with some that were nearly 40 meters long. Check out this photo (top right) and be sure to see the person in the bottom corner!

These huge crystals have grown far beyond the size of most minerals we encounter. The first graph on the next page shows a sampling of the largest crystals found of some well-known minerals.

How did these amazing crystals form? First off, the mineral-rich water that was trapped in the underground cavern played a huge role. The water was super-saturated with a salt called calcium sulfate ($CaSO_4$). Fun fact: that's the same material used to make the drywall, or "gypsum board", in your house. 🏠

Secondly, the temperature of the cave was perfect for slowly forming large, stable crystals. As the magma around the cave cooled, the temperature dropped slowly. When the saturated water reached a temperature range between 54 - 58 degrees C, the calcium sulfate started to fall out of solution and collect as crystals.

The cavern was able to maintain that ideal temperature for crystal growth for a ***really long*** time. Scientists replicated the cave conditions in their lab to estimate how long the crystals have been growing. You can imagine their surprise when they calculated that the



Cave of Crystals, Naica, Mine, Chihuahua, Mexico

beams of selenite would add just the thinnest sliver of a millimeter - **less than a sheet of paper** - over **two centuries**.

Nearby caverns filled with the same kind of mineral water cooled off much faster. They have crystals too, but they look more like little swords than towering monuments.

The cave was still *really* warm when the researchers were called in: the water and environment inside of the cavern was 50 degrees Celsius, or about 120 degrees Fahrenheit! The cave was at 90% humidity, too, so imagine Death Valley temperatures paired with Everglades swampy-ness. The researchers could barely spend 15 minutes at a time in the cave!

Now, here's an out-of-this-world connection: gypsum doesn't only accumulate on planet Earth. Rovers on Mars have taken magnified photos of the same crystals on a much smaller scale, and orbital scans have detected gypsum, too. This has some pretty big implications.

Selenite "swords"

Cave of Crystals - Alexander Van Driessche, CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons. Selenium "swords" - Wikipedia Loves Art participant "Assignment_Houston_One", CC BY-SA 2.5 <https://creativecommons.org/licenses/by-sa/2.5>, via Wikimedia Commons

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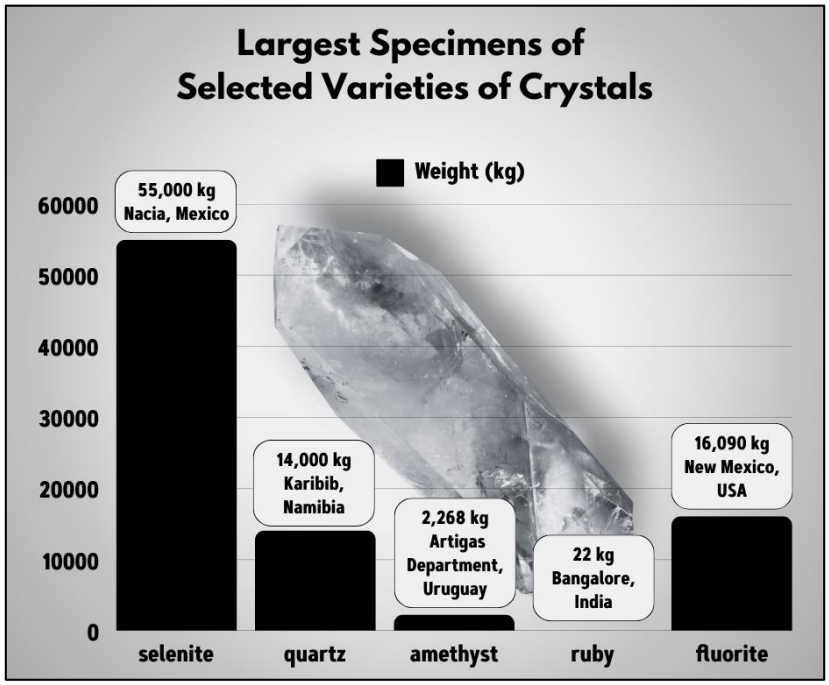
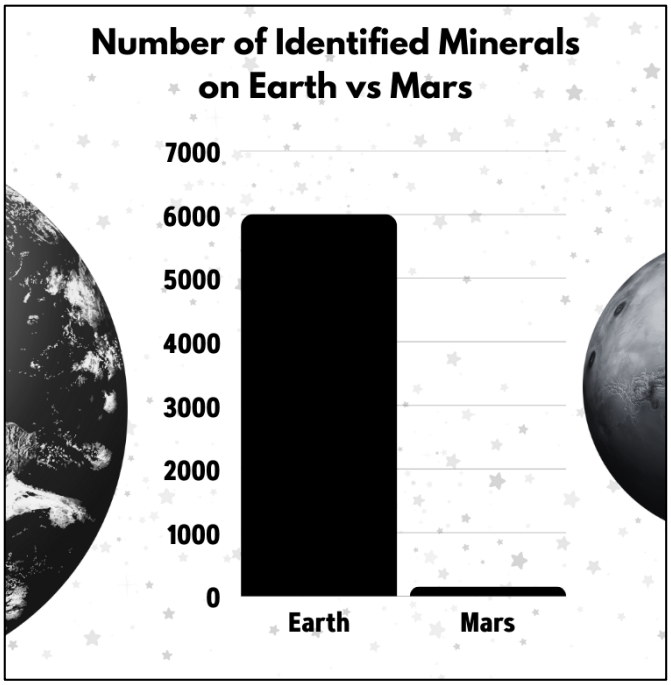
Underground Mystery

First, it hints that the red planet once had bodies of water where the $CaSO_4$ was dissolved. Second, the gypsum crystals would have formed as those water bodies slowly evaporated. That suggests a lot of interesting ideas about what Mars might have looked like in the past.

Gypsum is just one of the minerals observed on the surface of Mars, but here's an interesting fact for you: scientists think Mars has only a fraction of the minerals found on Earth.

Why? Mars doesn't have plate tectonics or continental drift, so the crust hasn't experienced as much pressure and recycling as Earth's crust has.





1. In the Naica Mountains, caverns that are closer to the surface tend to have much smaller crystals than those that are deeper down. Why might this be?

_____

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2. Scientists are looking at the surface of Mars for fragments of crystals similar to those found in Mexico. What could crystals tell scientists about ancient conditions on Mars?

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3. Why would the lack of plate tectonics on Mars affect the number of minerals there?

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Blog Link: https://blog.keslerscience.com/phenomenon-and-graphing/underground-mystery

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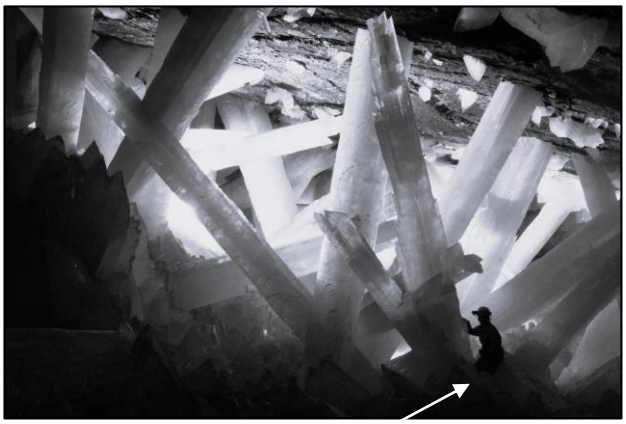

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Cave of Crystals - Alexander Van Driessche, CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons. Selenium "swords" - Wikipedia Loves Art participant "Assignment_Houston_One", CC BY-SA 2.5 <https://creativecommons.org/licenses/by-sa/2.5>, via Wikimedia Commons

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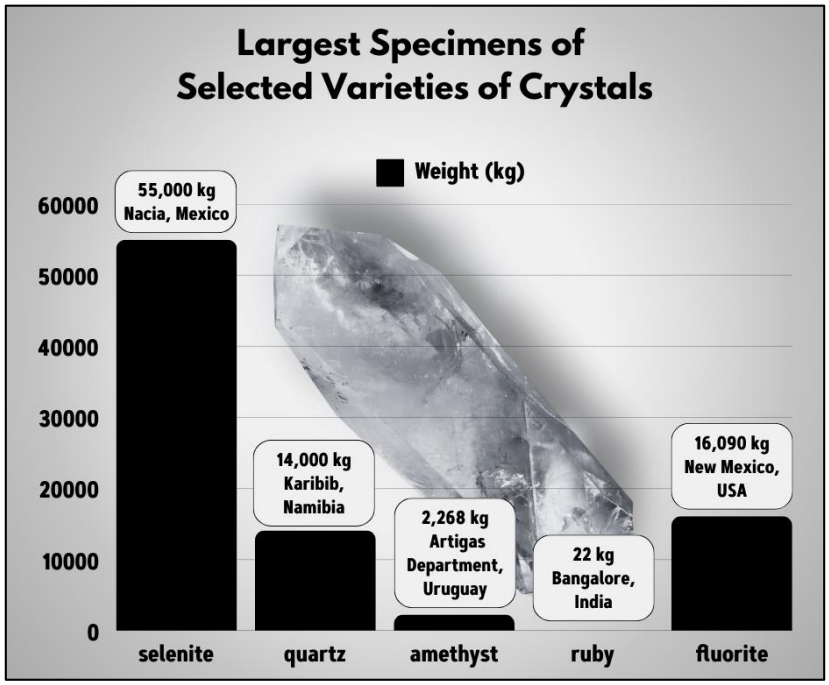

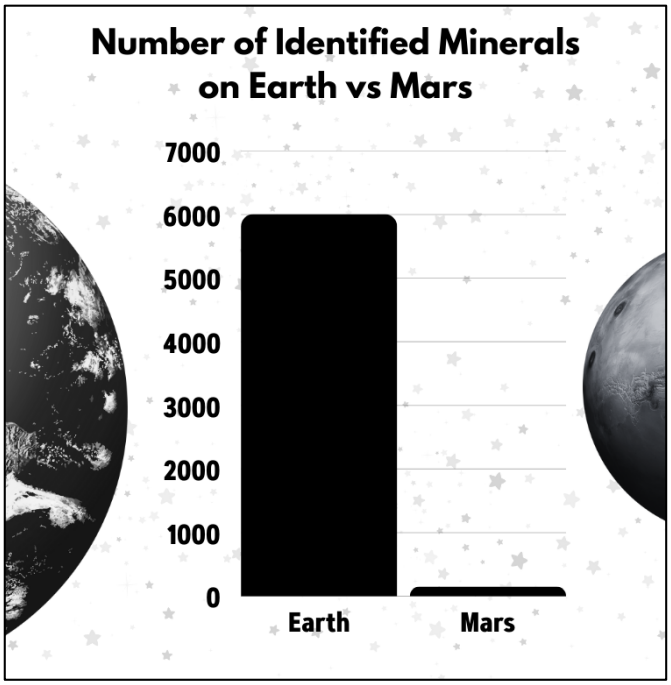

1. **In the Naica Mountains, caverns that are closer to the surface tend to have much smaller crystals than those that are deeper down. Why might this be?**

   Those really big gypsum crystals need a temperature range between 54 - 58 degrees C in order for the solute to come out of the solution. Caverns closer to the surface may have cooled off more quickly, while the deeper caverns could be closer to a hotter pocket of magma.

2. **Scientists are looking at the surface of Mars for fragments of crystals similar to those found in Mexico. What could crystals tell scientists about ancient conditions on Mars?**

   The composition of crystals could tell scientists about the presence of water on the planet, past temperatures, and chemical compounds that would have been dissolved in the water.

3. **Why would the lack of plate tectonics on Mars affect the number of minerals there?**

   On Earth, the constant shifting of the crust through the rock cycle puts heat and pressure on minerals, changing them. On Mars, the crust is very stable.

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