

Curiosity Gets Ready to Drill a Strange Martian Rock

NASA's rover is studying crystal-shaped textures that may hold clues about Mars's past environment.



An illustrated Mars rover prepares to examine a bumpy reddish rock under a pale Martian sky.

NASA's Curiosity rover is getting ready to drill a Martian rock site named "Nazca," according to NASA's Curiosity mission blog. Curiosity is a rover, a **robotic vehicle** that can drive across another world and use science tools there. The team chose Nazca after nearby rock showed many small disc- and needle-shaped lumps. Another nearby target, called "Chiu Chiu," had the same kind of texture, but it was not a good place to drill.

This matters because rocks can keep records. On Earth, **geologists** study rocks to learn about **ancient** lakes, volcanoes, deserts, and oceans. On Mars, scientists use Curiosity's cameras, drill, and **chemistry** tools to ask a similar question: what was this place like long ago? The strange shapes at Nazca may be clues about **minerals**, salts, fluids, and temperature in Mars's past.

One idea is that the discs and needles began as crystals. A **crystal** is a solid whose tiny **particles** are arranged in an orderly pattern, which can make it grow into certain shapes. Table salt can form cube-shaped crystals, for example. NASA says the large crystal-like forms at Nazca and

Chiu Chiu may help scientists understand the conditions when they grew, including how warm the area was and whether salty fluids were present.

But the story may not be simple. The rock's shape today may not match the material that first formed it. Sometimes one mineral can take the place of another while keeping the old shape. Scientists call that a pseudomorph, which means a "false form": it looks like the original crystal shape, but its composition and inner **structure** have changed. That is why Curiosity needs more than a photo. The rover has to test what the rock is made of.

Before drilling, the team planned several careful checks. Curiosity's close-up camera, called MAHLI, will take overlapping images from slightly different angles. Scientists can combine those images to build a three-dimensional model, meaning a model with height, width, and depth. That can show the raised and lowered parts of the crystal shapes in detail.

Curiosity will also use ChemCam, an **instrument** that studies chemistry with a laser. A laser is a narrow, powerful beam of light. For one nearby target called "Toucan," ChemCam will fire all 150 laser shots at the same spot. Each shot vaporizes, or turns into gas, a tiny bit of rock and makes a plasma, which is a very hot glowing gas. By focusing the shots in one place instead of spreading them out, scientists expect to study rock about five times deeper than usual for that kind of measurement.

That depth matters because the surface of a Martian rock has been exposed to today's Martian environment. The inside may tell a different story. If the deeper material is different from the surface, scientists may learn whether the rock changed after it formed or whether the crystal-like shapes grew under special conditions.

Curiosity is also watching Mars's sky. NASA says twilight cloud season is beginning, and the rover will take nighttime images of Phobos, the larger and brighter of Mars's two moons. When Phobos is full, sunlight reflected from it can scatter in the Martian atmosphere. That scattered light can help scientists estimate the sizes of particles in high-altitude carbon dioxide clouds. Carbon dioxide is the gas people breathe out, and on Mars it can also freeze or form clouds.

A drill site on Mars is not just a hole in a rock. It is a chance to connect chemistry, geology, weather, and engineering. Curiosity cannot bring a whole classroom to Mars, but it can bring back measurements that help people read the planet's history, one careful test at a time.

Written from reporting by NASA.

THINK IT THROUGH

1. When scientists study a rock on Mars, why might shape alone be misleading evidence?

A strong answer: A strong answer should discuss the difference between appearance and composition, including how a pseudomorph can keep an old shape while changing material.

2. Curiosity's team spends time taking images and chemistry readings before drilling. Is that caution worth the delay?

A strong answer: A strong answer should weigh careful planning and better data against the limited time and energy of a rover on another planet.

3. How is Curiosity's work like what geologists do on Earth, and how is it different?

A strong answer: A strong answer should compare shared methods such as observing rocks and testing composition with the limits of using a remote robot on Mars.

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A H U E S A T C O Y W T S L I A L I
R F N E C A O A R I E M A R H S A T
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ANCIENT

CHEMISTRY

CRYSTAL

GEOLOGISTS

INSTRUMENT

MINERALS

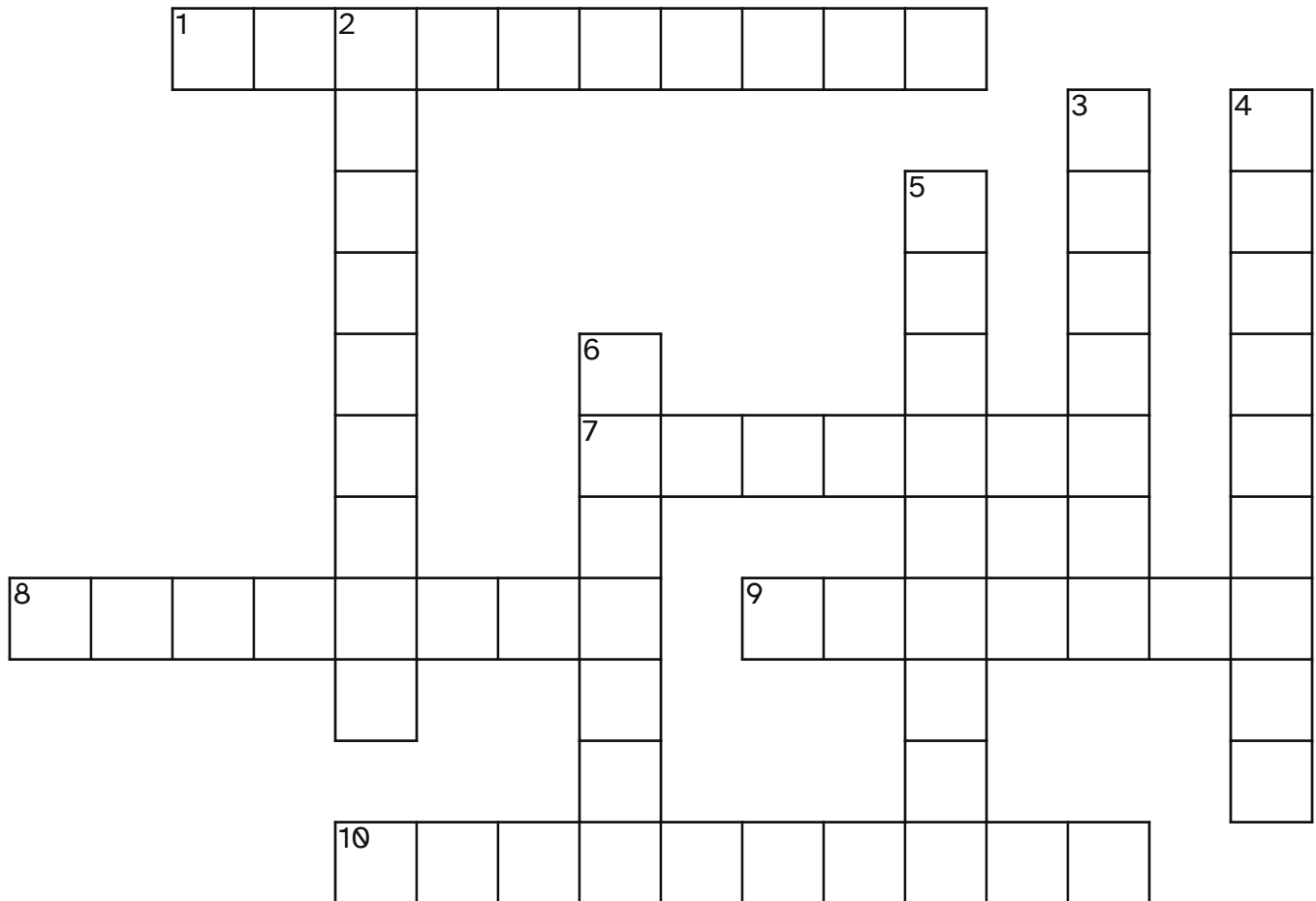
PARTICLES

ROBOTIC

STRUCTURE

VEHICLE

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ACROSS

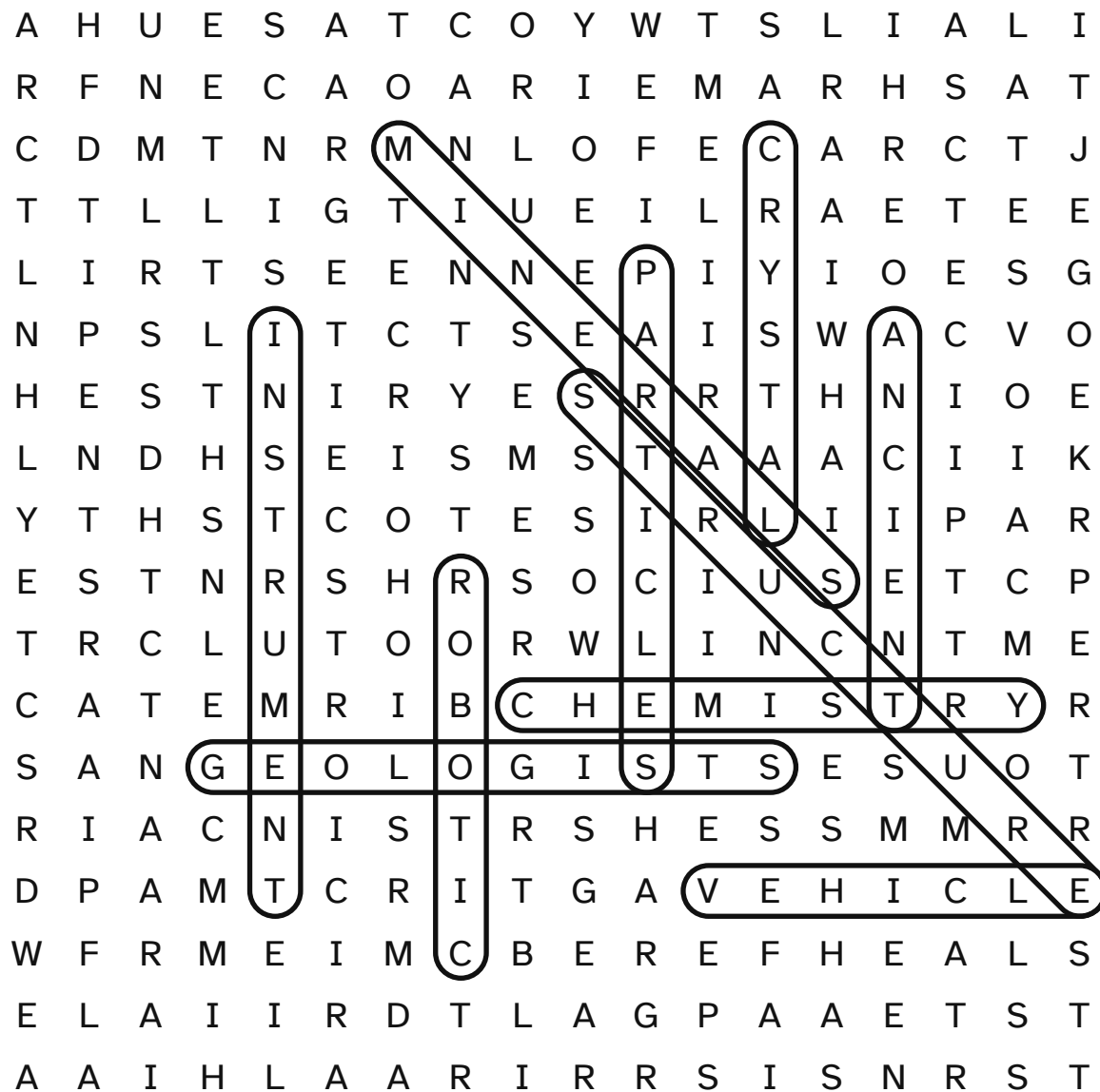
- 1 Tool for making observations or measurements
- 7 Able to work on its own or from far away
- 8 Natural solids that form many rocks
- 9 Very old or from long ago
- 10 Scientists who examine rocks, landforms, and a planet's past

DOWN

- 2 Way parts are arranged or put together
- 3 Machine for traveling between places
- 4 Study of materials, their traits, and how they change
- 5 Extremely small pieces of matter
- 6 Solid with tiny bits in a repeating pattern

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— answer key



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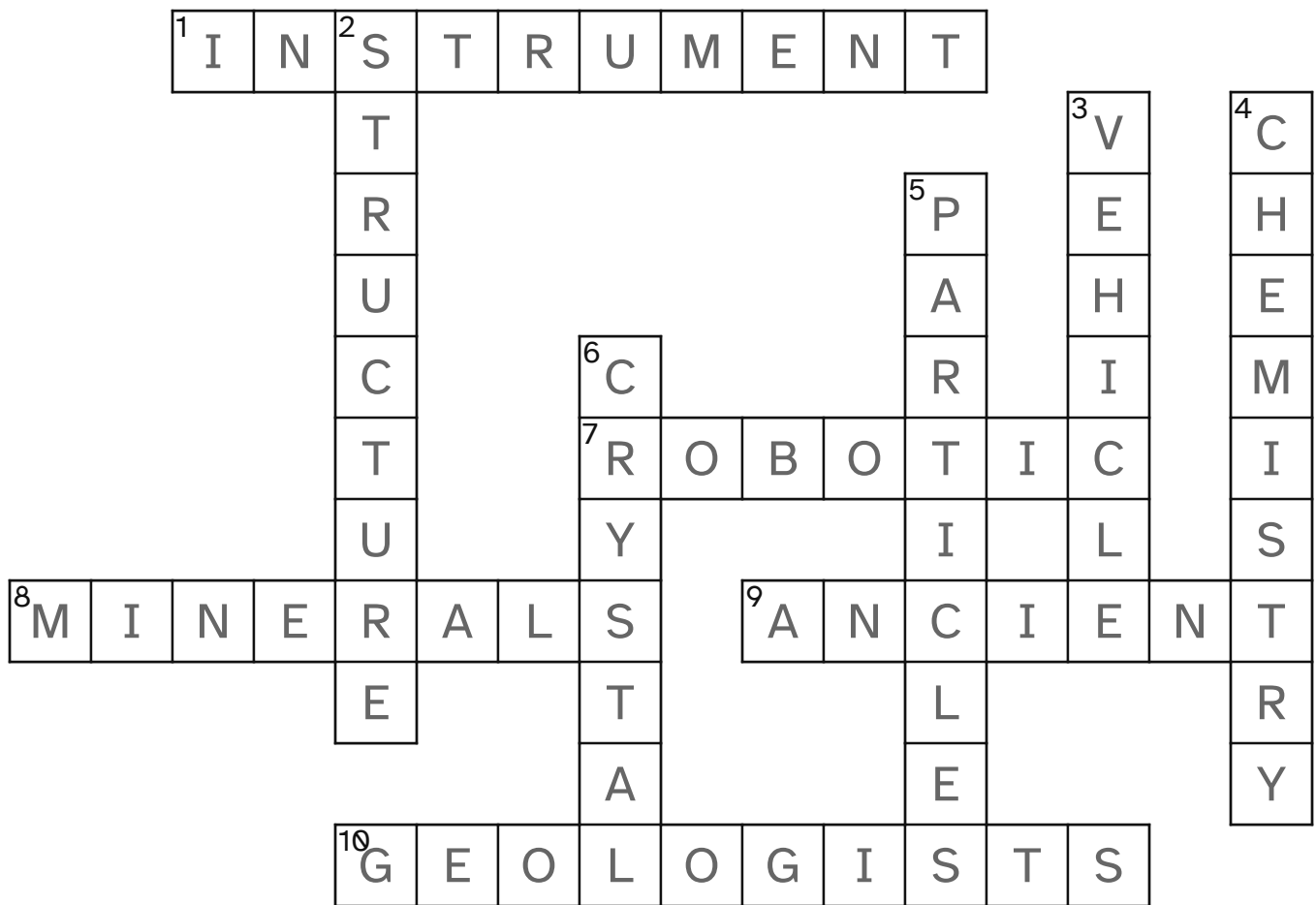
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Where this came from

This article was written for 3andB from the reporting below. It is not a reprint — the wording is ours and the facts are theirs.

NASA

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<https://science.nasa.gov/blog/curiosity-blog-sols-5043-5049-preparing-to-drill-at-nazca/>

WHAT IS IN THIS PACKET

The article with a note on each question, a word search, a crossword, and the answer key to both.

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