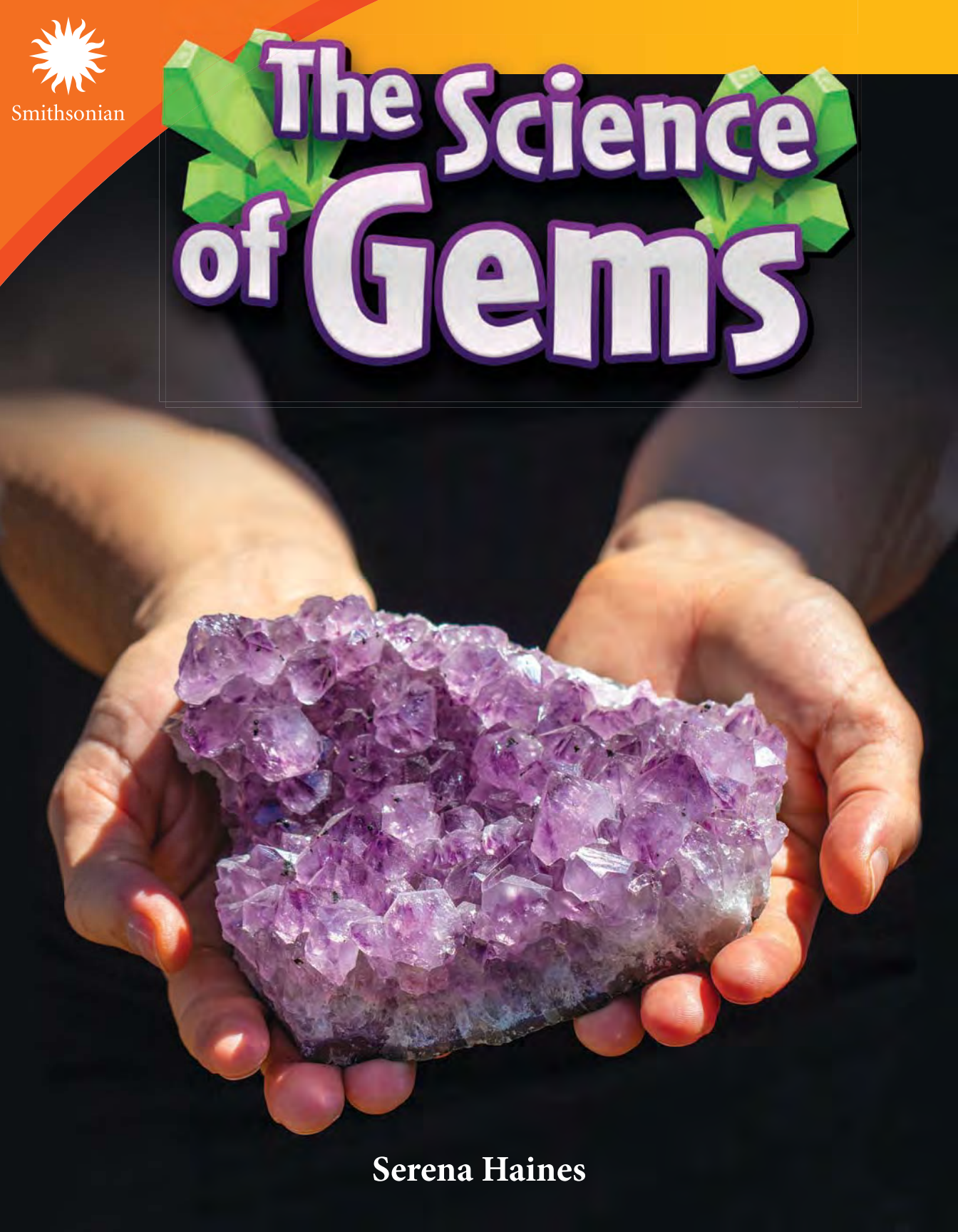
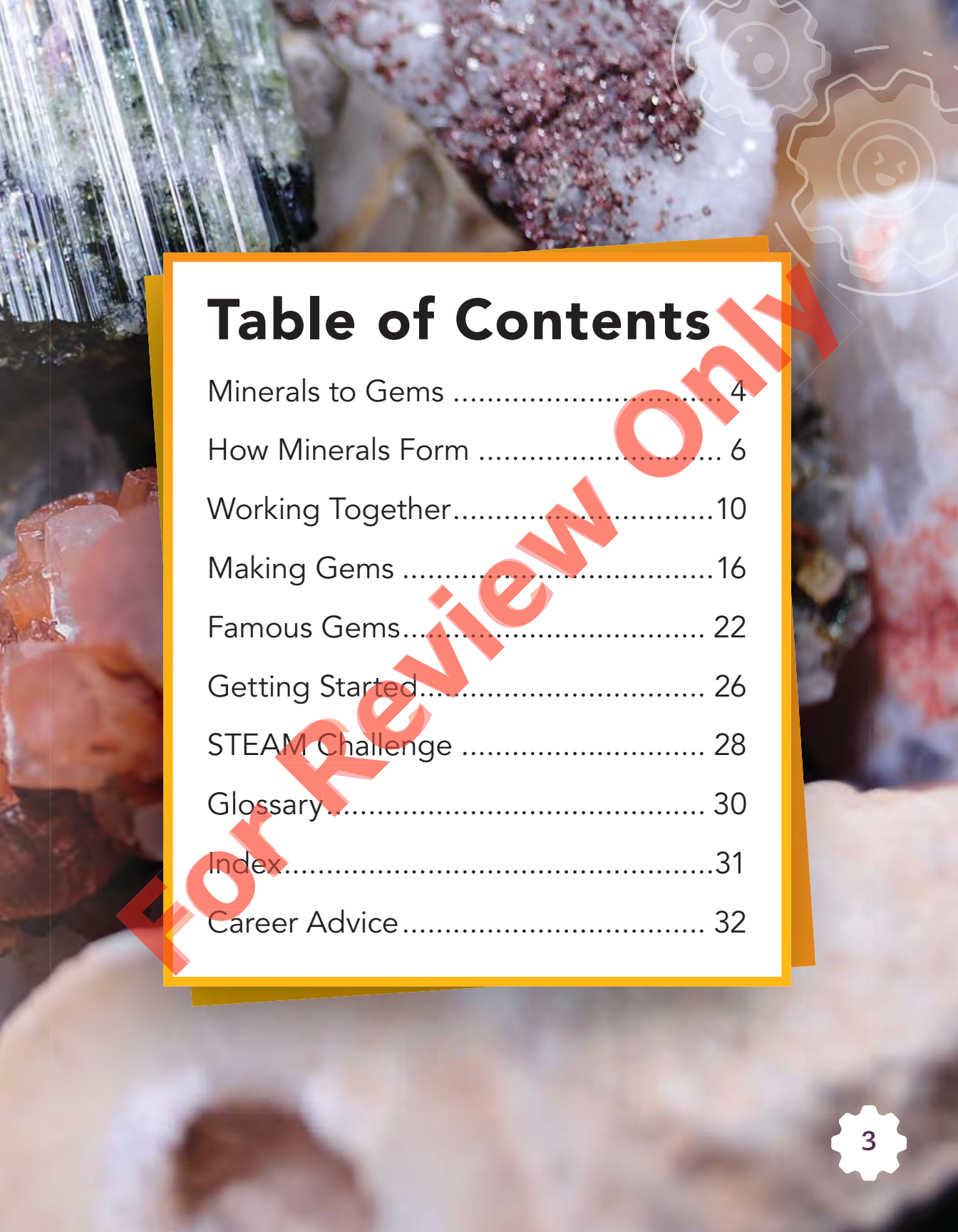
Smithsonian

# The Science of Gems



Serena Haines



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# Minerals to Gems

Have you ever looked at a rock up close? You might see tiny flecks of color. Those are some of the **minerals** that make the rock. Some minerals can be cut and polished to make gems.

It takes a lot of work to make gems. Some people have to find minerals. Other people have to cut and polish minerals to make gems. But how do these people do their jobs? It all begins with finding minerals.



Some of these emerald minerals have been cut and polished to make gems.


The opal minerals that are part of this rock are easy to see.

# How Minerals Form

Minerals are formed in rocks in three ways. The first way involves **magma**. Magma is found underground. It is made up of rocks that are so hot they have turned to liquid. Those rocks are made of minerals.

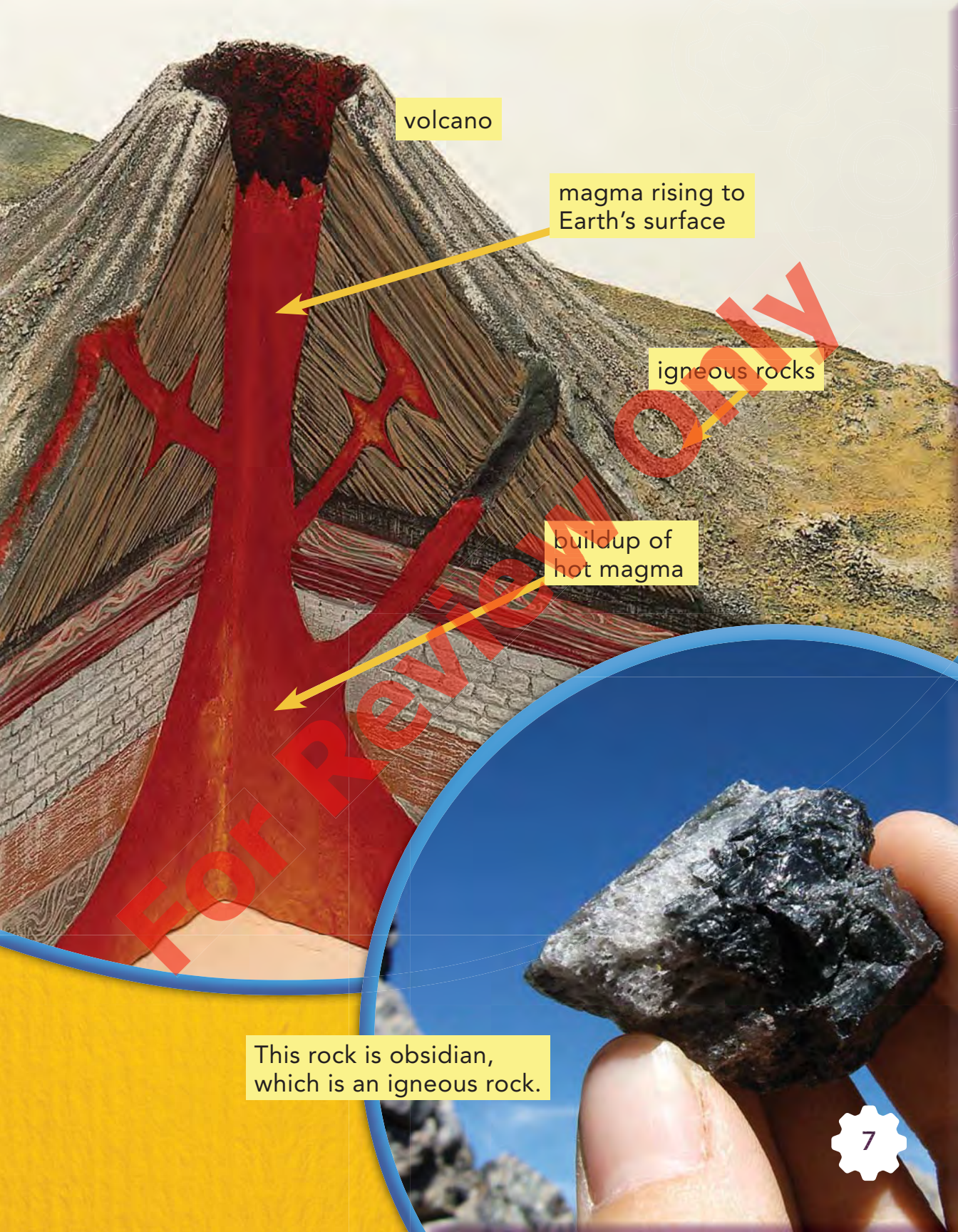
Over time, magma comes to Earth's surface. It cools as it rises. Once it cools enough, it turns solid. This forms **igneous** (IHG-nee-uhs) rocks. These rocks are made of the same minerals that the magma was.



Science

## Minerals and Crystals

Most minerals found in nature are **crystals**. Each crystal is made up of special shapes. Not all crystals are turned into gems. Salt is a mineral that is a crystal. But people do not make salt gems!

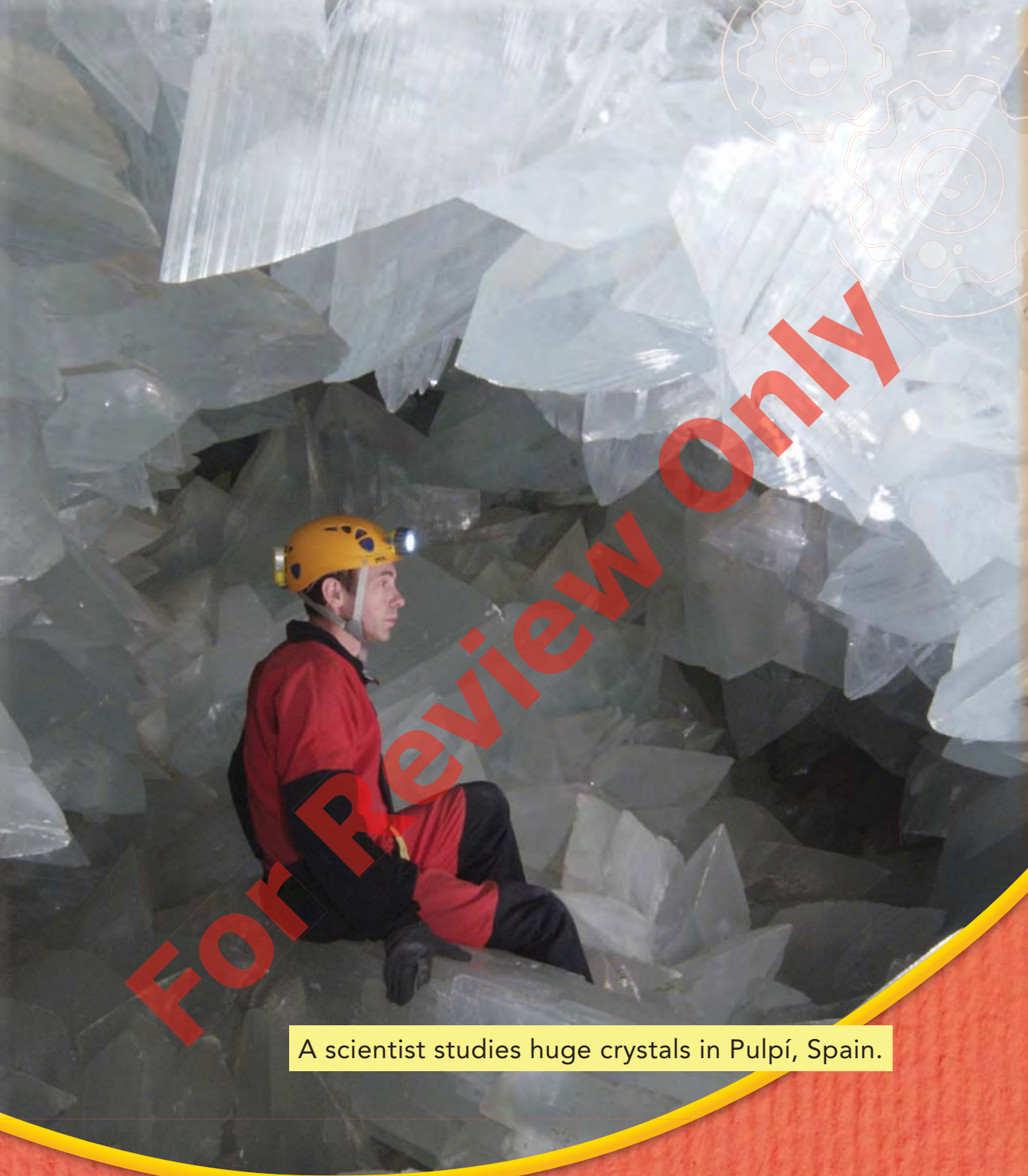



This rock is obsidian, which is an igneous rock.

The second way minerals form involves underground water. Deep within the earth, heat and pressure cause minerals to **dissolve** in water. The hot water fills cracks in rocks. Over time, the water cools. The pressure drops. Then, the minerals form into crystals in the water. The new crystals fill the cracks in the earth. Those cracks are called veins.

The third way minerals form also involves water. Some water has dissolved minerals in it. When this mineral water gets hot, it **evaporates**. That leaves just minerals behind.

A scientist in Kenya studies a vein of minerals in the earth.



A scientist studies huge crystals in Pulpí, Spain.

# STEAM CHALLENGE

## Define the Problem

Pretend you and a friend are going gem hunting. Build a tool that will help you get rocks out of the ground to inspect their minerals.

**Constraints:** You may use craft sticks, tin foil, cardboard, rubber bands, plastic utensils, paper clips, and plastic cups.

**Criteria:** Your tool must help a gem hunter dig a rock out of a ball of mud. It must also help a gem hunter pick up the rock. Your tool must work without the user touching the mud.

## 1 Research and Brainstorm

How do scientists know where to find gems? How are gems made? What tools do geologists use to open rocks?

## 2 Design and Build

Sketch a plan for your tool. What purpose will each part serve? What materials will work best? Build the model.

## 3 Test and Improve

Use your tool to dig a rock out of a ball of mud. Then, use your tool to pick up the rock. Did it work? How can you improve it? Improve your design and try again.

## 4 Reflect and Share

What was the hardest part about building your tool? Is there another way you can test your design? How would your design change if you had to break open the rock?