

# How Caves Form: A Caves and Karst Webquest

**Lesson Objective:** This webquest was developed to compliment the “Views of the National Parks” Knowledge Center for Caves and Karst, and was designed as an introduction to several processes that form caves and karst.

This activity can be used independently or in conjunction with the *Interactive Reading Guide #2*.

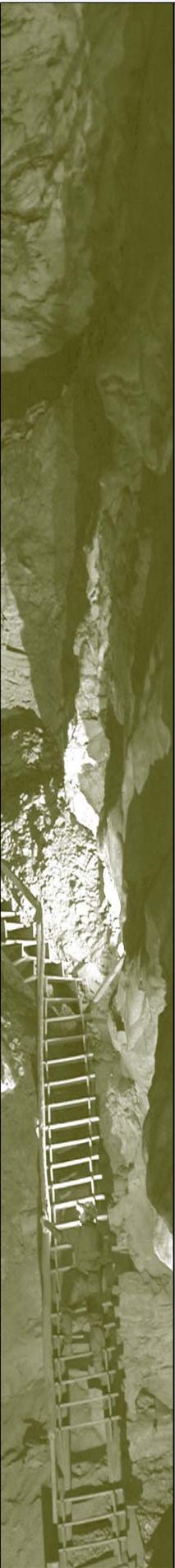
**Key Concepts:** caves formed by collapse, solution, lava, talus, sea, ice, sandstone, tectonic forces and acid producing bacteria.

**Duration:** 1 55-minute class period

**Audience:** Middle school and high school students

How Caves Form

# Teacher Copy and Answer Key



NPS Photo by Rick Wood



# HOW CAVES FORM- TEACHER COPY

## A CAVES AND KARST WEBQUEST

(To compliment the NPS Views: *Caves and Karst Knowledge Center*)

There are several processes that are at work forming caves and changing karstic landscapes. This activity will serve as an introduction to some common ways that caves and karst are forming all around us.

Enter the Views website by going to the following website:

<http://www2.nature.nps.gov/views/#>

Click on the “**Multimedia Version**” link.

Select the Knowledge Centers link, and then click on “**Explore Caves and Karst**”.

In the Introduction section, select the sidebar for “**Cave and Karst Formation**”.

Use the “**next ->**” link to see different ways that caves and karst form.

Use the information within each formation topic to answer the following questions.

### A. COLLAPSE

1. *Complete the following sentence:*

Collapse is part of cave FORMATION and EVOLUTION.

2. When do the ceilings of cave rooms and passages collapse?

**WHEN THEY BECOME TOO WIDE TO SUPPORT THE BEDROCK OVERLYING THEM.**

3. The ceilings of water-filled caves may be supported by the buoyant force of the water inside. If this water drains out, why is there a greater potential for the cave to collapse?

**BECAUSE THE BUOYANT FORCE IS NO LONGER PRESENT TO HELP SUPPORT A CAVE'S CEILING.**

## B. SOLUTION CAVES

1. *Finish the following paragraph:*

Earth movements cause cracks to form in the **BEDROCK**, which is the solid rock below the surface. These cracks, which are natural **PIPELINES** for water to seep into the ground, are called **FRACTURES** and **JOINTS**. When the water mixes with the natural acids in the ground, rocks such as **LIMESTONE** are dissolved.

2. What remains after the dissolved particles are carried away with the water?

**HOLLOW SPACES**

Follow the directions to get to the NOVA video <sup>1</sup>:

**WITHOUT CLOSING THE VIEWS WEBSITE,**

click on “File” and then “New Tab” or “New Window” to open a new window for the internet.

Go to the following website:

<http://www.pbs.org/wgbh/nova/caves/form.html>

Click on “**How Caves Form**”

(It is preferable to use the Flash version, but there is a Non-Flash text only version too.)

Watch the **RAINWATER** video and answer the following questions:

3. What type of cave is the most numerous? **LIMESTONE**
4. What has created, or fashioned, most of these caves? **RAINWATER**
5. Water and carbon dioxide form **CARBONIC** acid.
6. What is a water table? **THE LEVEL AT WHICH THE ROCK, SOIL, OR OTHER MATERIAL BECOMES SATURATED WITH WATER.**
7. What does the carbonic acid do to the limestone at the level directly below the water table? **IT DISSOLVES THE LIMSTONE, EVENTUALLY FORMING CHANNELS.**
8. When does the enlarging of the cave stop? **WHEN THE WATER TABLE LOWERS**

Return to the **Views Caves and Karst Knowledge Center**, leaving the **NOVA site open**.

9. Why is most cave formation and enlargement greatest at the water table?  
**THE CIRCULATION IS GREATEST HERE BECAUSE FRACTURES ARE CONNECTED AND MOST OPEN.**

TEACHER COPY AND ANSWER KEY

C. LAVA CAVES

Return to the NOVA website  
Click on "How Caves Form"  
Watch the LAVA video and answer the following questions:

1. What is lava?

**MOLTEN ROCK THAT HAS REACHED THE EARTH'S SURFACE**

2. At the deep center of a flowing channel, lava is moving: (Circle one) **FAST** or SLOW

3. Along the sides of a flowing channel, lava is moving: (Circle one) FAST or **SLOW**

Return to the Views Caves and Karst Knowledge Center

4. What is another name for a lava cave? **LAVA TUBE**

5. *Finish the following paragraph:*

When molten, fluid **LAVA** flows out of a volcano, it works its way downhill. In contact with **AIR**, the surface of this lava stream cools and hardens into a **CRUST**. The lava inside remains **MOLTEN** however, and continues to **FLOW** downhill. When the molten lava eventually **DRAINS** out of the interior of the hard-crusted passage, a lava **TUBE** or **CAVE** remains.

Without closing the Views or NOVA websites, go to the National Park Service website:  
<http://www2.nature.nps.gov/geology/tour/caves.cfm>

6. Name 2 national parks that possess primary cave features: **EXAMPLES: Carlsbad Cavern NP, Great Basin NP, Mammoth Cave NP, Sequoia NP, Wind Cave NP.**

7. Name a national park that you could visit to see a lava tube: **EXAMPLES: Hawaii Volcanoes NP, Craters of the Moon NM, El Mapais NM.**

8. What national park in California has sea caves? **Point Reyes National Seashore**

## D. TALUS CAVES

1. Rockslides and rockfalls produce piles of irregular shaped rocks and boulders. The spaces between these rocks are sometimes big enough to produce a cave-like configuration.

What is the name for these piles of rocks? **TALUS**

2. Because these types of caves can be formed when rocks break off and fall or slide into narrow canyons, talus caves are also referred to as:

**BREAKDOWN CAVES**

## E. SEA CAVES

1. What are sea caves? **SEA CAVES ARE CLEFTS IN THE BASES OF CLIFFS AT THE EDGES OF LARGE BODIES OF WATER.**
2. *Finish the following sentence about the formation of sea caves:*

The action of     **WAVES**     pounding against rocks that line the shores of     **OCEANS**     and large     **LAKES**     form sea caves.

Return to the NOVA website

Click on "How Caves Form"

Watch the **WAVES** video and answer the following questions:

3. Where is the abrasive action of the waves concentrated? **AT THE BASE OF CLIFFS**
4. Sea caves are typically found in what type of rock:  
**SANDSTONE (AND OTHER SEDIMENTARY ROCKS, LIKE LIMESTONE)**
5. Where are sea caves less likely to be formed?  
**IN HARDER ROCK, LIKE GRANITE**

---

## F. ICE CAVES

1. Ice caves that form in ice are also called:

**GLACIER CAVES**

2. Ice caves that are formed in rock that contain ice all year round are called:

**FROZEN CAVES**

---

## G. SANDSTONE CAVES

1. Early people used sandstone caves for     **SHELTER**    .  
Why?

**THEY ARE USUALLY SHALLOW AND EASILY ACCESSED.**

2. Define *contact*.

**GEOLOGICALLY SPEAKING, CONTACT IS THE SURFACE  
BETWEEN 2 TYPES OR AGES OF ROCKS.**

3. Fluids, like groundwater, move through sandstone, easily. However, when the water reaches a layer of shale, it cannot pass through because the pore spaces are too small.

When this happens, what is groundwater forced to do?

**THE GROUNDWATER IS FORCED TO MOVE LATERALLY ALONG THE CONTACT  
BETWEEN THE 2 ROCKS UNITS UNTIL IT SEEPS OUT ON THE FACE OF THE CANYON  
WALL OR AT THE BACK OF AN ALCOVE, CREATING A SRPING OR SEEP.**

---

## H. TECTONIC CAVES

1. *Finish the following sentence about the formation of tectonic caves:*

The actions of     **EARTHQUAKES**     form natural     **CRACKS**      
in rock that can be considered     **CAVES**    .

## TEACHER COPY AND ANSWER KEY

Return to the NOVA website

Click on “How Caves Form”

Watch the BACTERIA video and answer the following questions:

### I. CAVES FORMED BY BACTERIAL PROCESSES

1. Bacteria dissolve rock to form caves by producing a highly corrosive ACID .

2. Why are these bacteria also referred to as *extremophiles*?

**BECAUSE THEY THRIVE IN EXTREME CONDITIONS**

3. What is the source of food that feeds these bacteria?

**UNDERGROUND OIL DEPOSITS**

4. As the bacteria feed, what type of gas do they produce?

**HYDROGEN SULFIDE GAS**

5. Some bacteria, such as those living in Lechuguilla Cave of Carlsbad Canyons National Park, live within the caves themselves.

What are 2 things these cave dwelling bacteria feed on in the caves?

1.) **HYDROGEN SULFIDE GAS**

2.) **MINERALS WITHIN THE ROCKS**

---

<sup>1</sup> The NOVA video on **How Caves Form**, by Rick Groleau, was found on the NOVA website: <http://www.pbs.org/wgbh/nova/>. This Web site was produced for PBS Online by WGBH; Web site © 1996-2006 WGBH Educational Foundation. NOVA is a trademark of WGBH.