

# ScienceNews

## EDUCATOR GUIDE



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### **April 23, 2022**

### **Climbers Help Scientists Vibe With Utah's Rocks**



### About this Guide

In this Guide, based on the online *Science News* article "[How climbers help scientists vibe with Utah's famous red rock formations](#)," students will learn about a citizen science project that is helping scientists better understand the physical properties of rock formations. Students will then explore other citizen science projects that they could participate in based on their hobbies and interests.

### This Guide includes:

**Article-based Comprehension Q&A** — Students will answer questions about the online *Science News* article "[How climbers help scientists vibe with Utah's famous red rock formations](#)," which describes how researchers teamed up with rock climbers to collect data that can help assess the seismic stability of red rock formations in Utah. A version of the article, "Climbers help scientists vibe with Utah's rocks," appears in the April 23, 2022 issue of *Science News*. Related standards include NGSS-DCI: HS-ESS2.

**Student Comprehension Worksheet** — These questions are formatted so it's easy to print them out as a worksheet.

**Cross-curricular Discussion Q&A** — Students will explore the concept of citizen science and use their hobbies and interests to find a citizen science project they could participate in. Related standards include NGSS-DCI: HS-ETS1.

**Student Discussion Worksheet** — These questions are formatted so it's easy to print them out as a worksheet.

**Article-based Comprehension, Q&A**

**Directions for teachers:** Ask students to read the online *Science News* article "[How climbers help scientists vibe with Utah's famous red rock formations](#)" and answer the following questions. A version of the article, "Climbers help scientists vibe with Utah's rocks," appears in the April 23, 2022 issue of *Science News*.

**1. Who is Kathryn Vollinger? Who is she collaborating with?**

Kathryn Vollinger is an experienced rock climber who climbs in Utah's Moab Desert region. She is not a scientist but is collaborating with geophysicist Riley Finnegan of the University of Utah and her colleagues.

**2. What scientific equipment does Vollinger carry when she climbs? What data does she collect and when?**

Vollinger carries a seismometer. Once she reaches the top of a rock formation, she collects data on how much the rock formations vibrate.

**3. Why is that data important to scientists? What role does Vollinger play in the research and why do scientists need her help?**

Data on how much the rock formations vibrate is useful for understanding their stability and could offer clues to past seismic activity. Vollinger plays an important role in the data collection process. Scientists need skilled climbers who can get the seismometers to the top of the formations to take the measurements.

**4. Who else is the data important to? Why?**

Insights into the rock formations are important to Native American groups, because many of the rock formations hold cultural or religious significance for those groups.

**5. What is a fundamental frequency? What are the units of measurement?**

Fundamental frequency is the lowest natural frequency, or the background frequency. It is a measure of how many times the rock formations sway back and forth per second. Frequency is measured in hertz, or times per second.

**6. What did the data Vollinger collected reveal about the fundamental frequencies of the rock formations?**

The data showed that the fundamental frequencies range from 0.8 to 15 hertz.

**7. How are scientists using computer models to study the rock formations?**

Scientists are using computer models, or computer simulations, to try to understand the physics of the rock formations and their behavior. Inputting height, density, cross-sectional area and other material properties can reveal the fundamental frequencies.

**8. Aside from help from rock climbers, how might data on the vibrations of rock formations be collected in the future?**

Scientists imagine using robots to put seismometers in place and using drones to collect the data.

**Student Comprehension Worksheet**

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- 1. Who is Kathryn Vollinger? Who is she collaborating with?**
- 2. What scientific equipment does Vollinger carry when she climbs? What data does she collect and when?**
- 3. Why is that data important to scientists? What role does Vollinger play in the research and why do scientists need her help?**
- 4. Who else is the data important to? Why?**
- 5. What is a fundamental frequency? What are the units of measurement?**
- 6. What did the data Vollinger collected reveal about the fundamental frequencies of the rock formations?**
- 7. How are scientists using computer models to study the rock formations?**
- 8. Aside from help from rock climbers, how might data on the vibrations of rock formations be collected in the future?**

### Cross-curricular Discussion, Q&A

#### Directions for teachers:

Ask students to read the online *Science News* article "[How climbers help scientists vibe with Utah's famous red rock formations](#)" and the *Science News for Students* article "[Let's learn about citizen science](#)," then answer the following questions with a partner. Discuss the final question as a class. A version of the *Science News* article, "Climbers help scientists vibe with Utah's rocks," appears in the April 23, 2022 issue.

**Want to make it a virtual lesson?** Post the online *Science News* and *Science News for Students* articles to your virtual classroom. Discuss the article and questions with your class on your virtual platform.

#### What is citizen science?

1. Define "citizen science" in your own words, based on your understanding of the *Science News for Students* article "[Let's learn about citizen science](#)."

*Citizen science is the practice of volunteers contributing to scientific research through data collection, analysis or through other collaboration.*

2. What is the purpose of citizen science? How does it contribute to scientific research?

*Because citizen science allows people — potentially from all over the world — to contribute to research, scientists can get and analyze data from many more diverse sources than had the scientists been working alone.*

3. Describe the citizen science highlighted in the *Science News* article "[How climbers help scientists vibe with Utah's famous red rock formations](#)." How did a person without a formal scientific background contribute to a research study?

*The article highlights expert rock climbers who carry a seismometer up rock formations in Utah to gather data for scientists who study the formations' physical properties. It was important to have people who are expert climbers install the seismometer because the rock formations are steep and difficult to reach by any other method.*

4. Visit the Society for Science webpage [Research from Home: Citizen Science](#) and search for citizen science projects you could do in your local area or online. What opportunities appeal to you?

*Student answers will vary but should include a list of possible citizen science projects they can engage in.*

5. What kind of help do scientists need for the citizen science project you explored? Are there any common themes among projects?

*Student answers will vary but may include ideas for collecting data from certain geographic areas, analyzing large sets of images, videos, audio tracks, etc., annotating or transcribing content to create digital resources, providing data to train computer algorithms, etc.*

### **Turning hobbies into science explorations**

1. Make a list of your hobbies and interests. When making your list, think about favorite class projects you've done and activities that you enjoy outside of school.

*Student answers will vary.*

2. Do any of the citizen science projects featured in [Research from Home: Citizen Science](#) incorporate a hobby or interest of yours? Are you interested in participating in one of the projects? Explain.

*Student answers will vary.*

3. Choose two of the hobbies or interests you listed and brainstorm something you wonder or observe while engaging in the hobby or interest.

*Student answers will vary but students should make connections between their hobby/interest and an observation or general question. For example, if a student chose painting, they could wonder why their classroom is painted a certain color. If the student chose theater, they could observe how the acoustics of the space might be perfect for a performance.*

4. Turn one of your answers to the question above into a measurable scientific question that could be explored in a controlled experiment. What data would you need to measure and how would you measure it?

*Student answers will vary. For instance, a student who is interested in art could ask if the paint color of a room influences a person's ability to learn. To answer this question, the student could develop a set of problems to solve, or a timed test, for participants to take while they sit in rooms painted particular colors.*

5. Could calling on citizen scientists enhance your data set or allow you to explore a broader question? How would volunteers go about collecting data for your experiment? Explain.

*Student answers will vary. For instance, a student investigating how classroom color affects learning may say that using data collected by citizen scientists through surveys would enrich the data set by adding data*

*from many different schools, grade levels, class subjects and students of various backgrounds. The types and amount of data collected could allow the student to make additional comparisons of variables such as geographic location, culture, age, etc. These data could provide deeper insights into which colors might help promote learning for people of certain ages or from certain geographic areas.*

6. What ethical concerns might you need to consider when conducting your experiment?

*Student answers will vary. For example, if citizen science volunteers are collecting data outdoors in a specific geographic region, the student could research the history of the land they are on and make sure that volunteers know to be respectful of any cultural or religious significance the land may have. Volunteers should not interfere with the environment or community around them by littering, picking flowers, disturbing animal nests, etc.*



### Student Discussion Worksheet

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