CFAES

OHIO STATE UNIVERSITY EXTENSION

Geology: CAN YOU DIG It?

NAME

AGE (AS OF JANUARY 1 OF THE CURRENT YEAR)

COUNTY

CLUB NAME

ADVISOR

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

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NOTE TO THE PROJECT HELPER

Congratulations! A 4-H member has asked you to serve as a project helper. You may be a parent, relative, project leader, friend, club advisor, or another person important in the 4-H member's life. Your duties begin with helping the youth create and carry out a project plan, as outlined in the Member Project Guide.

As a project helper, it is up to you to encourage, guide, and assist the 4-H member. How you choose to be involved helps shape the 4-H member's life skills and knowledge of the importance of geology.

YOUR ROLE AS PROJECT HELPER

Your contributions are critical to delivery of the 4-H program, which is committed to providing experiences that strengthen a young person's sense of belonging, generosity, independence, and mastery. Your interactions should support positive youth development within the framework of the **Eight Essential Elements** (also known as the Eight Key Elements):

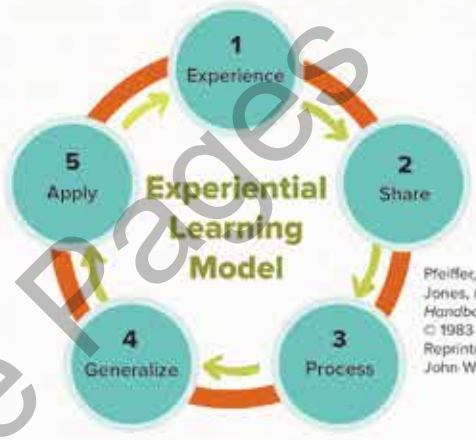
1. A positive relationship with a caring adult
2. An inclusive environment
3. A safe emotional and physical environment
4. Opportunity for mastery
5. Engagement in learning
6. Opportunity to see oneself as an active participant in the future
7. Opportunity for self-determination
8. Opportunity to value and practice service to others

For more information on the Eight Essential Elements, please refer to the *Ohio 4-H Volunteer Handbook* available online at **ohio4h.org**. On a practical level, your role as a project helper means you will strive to do the following:

- Guide the youth and provide support in setting goals and completing this project.
- Encourage the youth to apply knowledge from this project book.
- Serve as a resource person.
- Encourage the youth to go beyond the scope of this 4-H project book to learn more about geology.

WHAT YOU SHOULD KNOW ABOUT EXPERIENTIAL LEARNING

The information and activities in this book are arranged in a unique, experiential fashion (see model). In this way, a youth is introduced to a particular practice, idea, or piece of information through an opening (1) **experience**. The results of the activity are recorded on the accompanying pages. The member then (2) **shares** what he or she did with the project helper and (3) **processes** the experience through a series of questions that allow him or her to (4) **generalize** and (5) **apply** the new knowledge and skill.



Pfeiffer, J.W., and J.E. Jones, *Reference Guide to Handbooks and Annuals*. © 1983 John Wiley & Sons, Inc. Reprinted with permission of John Wiley & Sons, Inc.

WHAT YOU CAN DO

- Review the Learning Outcomes (project skill, life skill, educational standard, and success indicator) for each activity to understand the learning taking place. See the inside back cover for the Summary of Learning Outcomes.
- Become familiar with each activity and the related background information. Stay ahead of the learner by trying out activities beforehand.
- Begin the project by helping the learner establish a plan. This is accomplished by reviewing the Member Project Guide.
- After each project area is completed, conduct a debriefing session that allows the learner to answer the review questions and share results. This important step improves understanding from an experiential learning perspective.
- Help the learner celebrate what was done well and see what could be done differently. Allow the learner to become better at assessing his or her own work.
- In the Member Project Guide, date and initial the activities that have been completed.

MEMBER PROJECT GUIDE

Welcome to *Geology: Can You Dig It?* This beginning-level project is designed for youth of any age with an interest in geology. This project focuses on rocks, minerals, and fossils, including where to find them, how to identify them, and how they were formed. The last activity guides members through organizing their interesting findings in a display.

This project may be repeated as long as new learning takes place each time. If repeating this project, use a new project book so the activities can be completed with new responses.

Check your county's project guidelines (if any) for completion requirements in addition to the ones below, especially if you plan to prepare an exhibit for the fair.

The amount of time for each activity varies, but the project is easily completed within one year.

NOTE: Ohio 4-H offers plenty of projects about natural resources. If you want to do more projects like this one, check the *Family Guide* or visit Project Central at **projectcentral.ohio4h.org**.

Keep safety in mind. Always ask an adult to join you when you rock hunt. Ohio rockhounds can find great tips about responsible rock collecting at **geosurvey.ohiodnr.gov/rocks-and-minerals/collecting**. Highlights of these tips include the following:

Always ask for permission before collecting on private property.

Keep your cell phone charged and handy in case of emergencies.

Wear safety glasses at all times.

Never hammer rocks when people are within range of flying chips.

BE SURE TO CHECK THE RULES OF THE SITE YOU WOULD LIKE TO VISIT BEFORE YOU PLAN YOUR TRIP.

PROJECT GUIDELINES

Step 1: Complete **all eight** activities and all of the Talking It Over questions, and fill in your field journal.

Step 2: Take part in **at least two** learning experiences.

Step 3: Become involved in **at least two** leadership/citizenship activities.

Step 4: Complete a project review.

STEP 1: PROJECT ACTIVITIES

Complete **all eight** activities and all of the Talking It Over questions. The More Challenges activities are optional. As you finish activities, review your work with your project helper. Then, ask your project helper to initial and date your accomplishment.

ACTIVITY	DATE COMPLETED	PROJECT HELPER INITIALS
GEOLOGY ROCKS!		
1. Digging In		
Talking It Over		
ROCK ON!		
2. Parts of a Whole		
3. Rock and Roll		
Talking It Over		
WHAT'S A MINERAL?		
4. Minerals in Everyday Life		
5. Collect Them All		
Talking It Over		
FOSSIL-TASTIC!		
6. Step Into the Past		
7. Walk With the Ancients		
Talking It Over		
PUTTING IT ALL TOGETHER		
8. Some Assembly Required		
Talking It Over		

STEP 2: LEARNING EXPERIENCES

Learning experiences are meant to complement project activities, providing the opportunity for you to do more in subject areas that interest you. What are some learning experiences you could do to show the interesting things you are learning about?

HERE ARE SOME IDEAS:

- Attend a clinic, workshop, demonstration, or speech related to geology.
- Help organize a club meeting based on this project.
- Go on a field trip to a natural history museum.
- Prepare your own demonstration, illustrated talk, or project exhibit for your club.
- Participate in county judging.

Once you have a few ideas, record them here. Complete **at least two** learning experiences. Then, describe what you did in more detail. Ask your project helper to date and initial in the appropriate spaces below.

PLAN TO DO	WHAT I DID	DATE COMPLETED	PROJECT HELPER INITIALS
Demonstration	*I taught my 4-H club about our state fossil. I brought a sample in and told them about how it lived.*	*5/5/YR*	*M.H.*

HERE ARE SOME EXAMPLES OF LEADERSHIP/CITIZENSHIP ACTIVITIES:

- Teach a younger member about geology.
- Help another member prepare for his or her project judging.
- Host a workshop to share tips about rock hunting.
- Encourage someone to enroll in *Geology: Can You Dig It?*
- Arrange for a geologist to visit your club.
- Plan your own leadership/citizenship activity.

STEP 3: LEADERSHIP AND CITIZENSHIP ACTIVITIES

Choose **at least two** leadership/citizenship activities from the list to the left (or create your own) and write them in the table on the next page. Record your progress by asking your project helper to initial next to the date as each one is completed. You may add to or change these activities at any time.

LEADERSHIP/CITIZENSHIP ACTIVITY	DATE COMPLETED	PROJECT HELPER INITIALS
Organized a club field trip to the Cincinnati Natural History Museum.	*6/12/YR*	*M.H.*

STEP 4: PROJECT REVIEW

All finished? Congratulations! After you've completed the activities in this book, you are ready for a project review. This process will help assess your personal growth and evaluate what you have learned.

Use this space to write a summary of your project experience. Be sure to include a statement about the skills you have learned and how they may be valuable to you in the future.

Now, set up a project evaluation. You can do this with your project helper, club leader, or another knowledgeable adult. It can be part of a club evaluation or it can be part of your county's project judging.

ACTIVITY 1

DIGGING IN

Have you ever wondered what the earth is made of? Do you want to know why **rocks** have assorted colors, textures, and sizes? Sometimes the best way to understand something is to just "dig in."

Words in **bold** throughout this book are defined in the glossary.

LEARNING OUTCOMES

Project skill: Collecting rocks **Life skill:** Keeping records **Educational standard:** NGSS 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. ***Success indicator:** Find at least eight rock samples and log in field journal

**The activities in this book support the learning goals for the performance indicators cited, sometimes as described in the performance indicator itself but oftentimes by laying the groundwork for learning with reinforcement of the related science and engineering practices, disciplinary core ideas, and crosscutting concepts.*

WHAT TO DO

Explore the area around where you live and collect at least eight rocks. Find rocks that are different from each other. Always ask for permission to hunt for rocks on private property and public lands. If you repeat this project, collect eight new and different rocks each year.

Keep the following tools handy when you collect rocks. Use a backpack or tote bag to carry them. You might want to take photos of a rock sample's original setting or other sites to review later, so bring a camera or smartphone, too.

RECORD THE ROCKS YOU FIND HERE.

SAMPLE	NAME*	DATE	LOCATION	
1				
2				
3				
4				
5				
6				
7				
8				

*Use the internet or a reference book to identify your samples. The author's favorites are listed under Resources on page 10.

MORE CHALLENGES

If you go on vacation or even take a weekend drive, look for interesting rocks to add to your collection. Share any rock finds with your club.

Finally, use the information in the table below as your starting point in your own field journal. It can be whatever you like: a spiral notebook or a binder, a bound journal, or notecards on a ring. Just be sure to include all the important details.

	DESCRIPTION

BACKGROUND

Geology is the study of Earth's materials and history. Throughout time, people of all ages have been fascinated with uncovering Earth's secrets. **Geologists** travel all around the world to get their hands dirty and answer important research questions. They study many topics of interest, but they all share something in common: their interest in rocks, **minerals**, and **fossils**.

Rocks are made of one or more minerals. Rocks and minerals can form through many different processes. The way they form affects their texture, weight, size, and color. Minerals are **inorganic materials** that occur naturally. Each mineral has its own chemical structure. Fossils are remains or impressions of a prehistoric **organism**, such as an animal or a plant, usually within a rock. Overall, geology rocks!

DID YOU KNOW?

According to the National Snow and Ice Data Center, the polar caps hold the highest amount of fresh water on the planet. The next largest supply is the five Great Lakes, which hold about 20 percent. The Great Lakes were formed throughout thousands of years of glaciers coming and going across the area.

RESOURCES

A good rock and mineral guide or two is helpful as you start your geology adventure. You can borrow them from a library or you might want to purchase them. Here are some of the author's favorites:

Dictionary of Geological Terms by the American Geological Institute

Dig Into Rocks: Minerals & Crystals by Beverly Wilson and Shore Wilson Rundell

Handbook of Rocks, Minerals, and Gemstones by Walter Schumann

National Audubon Society Field Guide to Rocks and Minerals: North America

Ohio Rocks! A Guide to Geologic Sites in the Buckeye State by Albert B. Dickas

Peterson Field Guides: Rocks and Minerals by Frederick H. Pough and Roger Tory Peterson

Rock and Gem by Ronald Louis Bonewitz

Rocks and Fossils by Martin Bramwell

TALKING IT OVER

GEOLOGY ROCKS

SHARE

What is your favorite part about geology this year? If you are repeating this project, has your favorite part changed over time?

REFLECT

If you could travel anywhere in the world to study geology next month, where would you go?

GENERALIZE

Give at least one reason why keeping a field journal is important. If you repeat this project, give a new reason each year.

APPLY

If you become interested in a new subject, how do you learn more about it?