PURDUE UNIVERSITY

PURDUE EXTENSION

4-H-429-W

Advanced Geology

EXPERT REVIEWED

Purdue Extension
Knowledge to Go
1-888-EXT-INFO

Advanced Geology

Note to Parents and Leaders

The Advanced Geology manual encourages a continued expansion of individual interests and experiences in geology. Each 4-H member will select the area in which they plan to specialize. They may collect, study, and identify rocks, minerals, or fossils and prepare an educational exhibit.

The 4-H geology project helps youth learn about rocks, fossils, and minerals. Youth are encouraged to take responsibility for deciding what to study, making decisions, and establishing their own goals. Those enrolled in 4-H project work and/or activities are encouraged to consult outside resources at the school, library, and the Indiana Geological Survey resource materials (http://igs.indiana.edu/).

Purpose

Advanced Geology encourages youth to

• use their experiences and resources gained in Geology I through III as a foundation for further study (if you are beginning the geology project with this manual you may want to borrow the manuals for Divisions I - III for review);
• develop the habit of asking questions and searching for answers;
• develop an understanding of earth science;
• make decisions based upon experiences, new knowledge, facts, and observations.

Advanced Geology was written for youth interested in broadening their knowledge about geology. This project offers the opportunity to

• continue collecting and studying rocks, fossils, and/or minerals;
• go on field trips and continue to collect and study specimens (build and expand upon your experiences by specializing and expanding your rock, fossil, or mineral collection);
• teach others about rocks, minerals, or fossils by doing an Action Demonstration.

Amateur Geologists

In Advanced Geology you will find opportunites to have fun while learning about the world around you. You are becoming an **amateur geologist** and should be adding to your specimen collection. In this division, more opportunities to be creative exist, since there are fewer guidelines on preparing your exhibit than in lower levels.

Revised by Natalie Carroll, Extension Specialist (2003)

Advanced Geology

Advanced Geology offers you the opportunity to select your own project. This allows you to investigate many different geologic subjects. Go at your own speed, determine how many areas you wish to work on, and select what you wish to do, even if it is not listed in this manual.

You can be as creative in your geology project and exhibit as you wish. Think about what you want to do and learn as you explore geology at an advanced level. Then, decide on a project and write a sentence that describes

- the problem,
- the project and exhibit,
- people you'll contact,
- process of investigation,
- practices you'll use,
- your goals for investigation.

Discover

1. Continue adding to your collection of rocks, fossils, and minerals. No specific number is required, but you should add a minimum of 15 to 20 specimens a year.
2. Give geology demonstrations at a club meeting, a county meeting, adult leaders meeting, in school, or to service clubs. These can be classified as part of the selected experiences you will record.
3. Complete the Selected Experiences and the Specimen Record Inventory sheets.
4. Perform a minimum of three (3) selected learning experiences (see list that follows) and record them.
5. Prepare an educational display and/or exhibit for public viewing.

Learning Experiences

Choose three or more of the following.

- Participate in local clubs and assist members in lower divisions by providing information, teaching the geology tests for identification, assisting with collection tours.
- Become acquainted with people associated with various areas of geology and learn to ask them for assistance. Respect their time and what they do. (People to contact include: science teachers, museum workers, rock and mineral hobbyists.)
- Exhibits of your specimens may be displayed in libraries, store windows, community houses, project meetings, and fairs. Models, collections, photographs of specimens, photographs of collecting sites, samples of materials, etc., are all excellent aids for exhibits.
- Visit local and community rock shows and exhibits. Consult rock and mineral clubs for materials and slides to view and literature available. Many clubs are open to young people.
- Write for literature and materials and begin building a geology library of pamphlets, leaflets, and books.

• Read and consult resource material, and try the experiments. Learn to investigate to add to your knowledge.
• Begin now to vary your experiences with resource materials. Read and consult the various references listed in 4-H Geology I and II.
• Give demonstrations and experiments to show and tell others about some phase of your interest in geology.
• Collections are vital to anyone interested in geology. Continue locating specimens. Arrange and catalogue your collection and show it to others.
• Tell people about your interest through such things as demonstrations and illustrated talks on your activities in geology (field trips, collecting, information about specimens). Television and radio are excellent resource aids.
• Consult city and school science libraries for books, magazines, pamphlets, etc., available for your use.
• Visit science fairs to observe various projects dealing with the science of geology.

Advanced Collections

Your experiences in 4-H *Geology* Divisions I, II, and III required that you obtain scientific facts and information about your specimens. You could also keep photographs of their specimens, and some take pictures of the collecting sites to accompany your specimens.

Your geology museum can be outstanding if: (1) it describes the information about the mineral, rock or fossil specimens accurately and completely, and (2) it is organized, attractive and interesting to people.

As you work on your advanced collection, you should be more scientific and give more information about your specimen. Most collectors use a card file. A card should contain information such as:

No.: 105 Date: 7/13/81

Specimen Name: Crinoid Stem

Locality: Hoosier 4-H Leadership Center
on trail by girls' dorm

Collector: Rocky Marcus

You will need a method of storing your specimens because you probably will not mount them as permanent exhibits (as in divisions I, II, and III). Many collectors use cardboard boxes with small compartments. Others use plastic dishes or metal cabinets. Eventually you will want to construct your own permanent cabinet similar to the one pictured in Figure 1.

In the advanced division you should plan on adding 15 to 20 specimens to your collection each year.

Many club members choose to put their most prized specimens in an exhibit box with glass similar to those used in entomology. This makes an attractive exhibit to show and display.

Educational Box

These displays are designed to explain a geological era, exhibit a technique learned, display a skill used in identification, show how the earth was formed, or exhibit something learned in geology.

Several suggestions for education boxes are listed in the exhibit suggestions.

Exhibit Suggestions

Posters are displayed horizontally (22” x 28”), mounted on a firm backing, and covered in clear plastic or other transparent material. Be sure to include your exhibit label with your name, grade, and county. You may display your exhibit in a shadow box not larger than 22” x 28” or an insect box 18” x 24”. A title on the poster will add to the attractiveness of the exhibit. Secure your specimens to the poster board or base of the display box with very strong adhesive (hot glue, bathroom clear sealant, etc.). To improve the attractiveness of the exhibit, you may wish to mount specimens on small pieces of colored heavy posterboard stock first, then onto your poster or display box.

Selected Experiences

Keep track of the activities and/or experiences you have completed by checking each one you have done.

_____1. Visit scenic spots in your area, take pictures of rock formations, and describe the kinds of rocks in the area, how they were found, the nature of the soil, and the various types of plant and animal life in the area. Take photographs and collect material to prepare an educational exhibit.

_____2. Locate, identify, and make a collection of crystals and/or minerals found in geodes.

_____3. Prepare a large map of Indiana showing fossils, minerals, and rocks that might be found in various areas.

_____4. Show the differences between polished and unpolished rocks.

_____5. Create an exhibit showing what life may have been like in one of the geological eras.

_____6. Prepare an exhibit showing evolutionary changes due to environment, etc.

_____7. Create an exhibit showing how fossils were formed.

_____8. Make color photographs of some of your best specimens and exhibit them.

_____9. Prepare an exhibit on a geological industry such as Bedford Stone, glass manufacturing, the petroleum industry, gypsum production, etc.

_____10. Exhibit the steps required to polish a stone.

_____11. Prepare and display an exhibit on techniques used to cut and shape a stone for jewelry.

_____12. Create a plant or animal fossil exhibit.

_____13. Prepare a display listing examples of various rocks showing differences in characteristics. For example:

Luster – earthy, vitreous, resinous, pearly, greasy, or silky
Streaks – different colors of streaks on streak plates or plaster tile
Cleavage – prism, cubic, octahedral, rombic
Color
Fracture – conchoidal, even, uneven, hackly, or simple

_____14. Display rocks of varying classifications and types:

Igneous – granite, basalt, gabbro
Sedimentary – limestone, dolomite, shale, chert, gypsum
Metamorphic – quartzite, schist, basalt, granite

_____15. Display the crystal forms characteristic of most minerals: cubic, tetragonal, hexagonal, orthorhombic, monoclimic, triclinic.

_____16. Display the commercial use and value of specimens in your collections.

_____17. Create and display lapidary work you have done. Examples include: polished flats, nodule halves, spheres, and carvings.

_____18. Display jewelry or metalcraft items. Examples include: ash trays, vases, rings, earrings, cuff links, bracelets, tie clasps, buckles, and necklaces.

_____19. Exhibit tests used in identifying specimens. Examples include: streak, acid, hardness, chemical analysis, specific gravity.

_____20. Produce a display of fluorescent minerals and rocks.

_____21. Display fossil models of rubber and/or wax you have made of your specimens.

_____22. Show the steps used in making model casts.

_____23. Show how to mount micromounts and miniatures for display.

_____24. Create a collection of micromounts or miniatures you have prepared.

_____25. Create a display or exhibit on how to grow general crystals.

_____26. Exhibit a collection of crystals you have grown.

Selected Experiences

List any field trips, museum visits, demonstrations, rock and mineral shows, or clubs that you have visited or completed. Complete the information requested.

Experience _____ Location _____ Date_____

Summary _____

_____

_____

Experience _____ Location _____ Date _____

Summary _____

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Experience _____ Location _____ Date _____

Summary _____

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Experience _____ Location _____ Date _____

Summary _____

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Specimen Record Inventory

Name	Rock, Mineral, or Fossil	Locality	Date Collected	Physical properites or other important data
Example: Annularia	Fossil	Approximately 8 miles south of Terre Haute, 1 mile east on side road 350.	3/14/04	Pennsylvania period – growing in the swamp.
Example: Galena	Mineral	Quarry at Rensselaer	9/20/04	Metallic, very heavy. One direction of perfect cleavage, hardness 2.5, lead grey color, sometimes crystallizes in cubes
Example: Limestone	Rock	In streambed at Hoosier 4-H Leadership Center, 12 miles west of Lafayette	7/24/04	Greyish brown color, sedimentary group, used in building industry

Specimen Record Inventory (continued)

Name	Rock, Mineral, or Fossil	Locality	Date Collected	Physical properties or other important data

Exhibits

Geology exhibits are judged on the following:

- Correct identification
- Specimen condition
- Required information (learning experiences and card information): completeness, and accuracy
- Neatness, arrangement
- Placement, background

Resources

Web sites

- Indiana Geology: http://igs.indiana.edu/geology/index.cfm
- Indiana Geological Survey: http:// igs.indiana.edu/
- Indiana maps (infrastructure, demographics, environment, biology, hydrology, geology, and coal across Indiana or in your county): http://igs.indiana.edu/GISatlas
- Publications from the Indiana Geological Survey: http://igs.indiana.edu/survey/publications/index.cfm

Publications

From Purdue University

- 4-H 419, *Lapidary* (explains polishing, cutting, and engraving of stones and gems) 5/pkg
- 4-H 420, *Fossil Models* (how to make molds, casts, and models of fossils) 5/pkg
- 4-H 417, *Micromounts & Miniatures* (how to mount very small rock specimens)
- 4-H CIR5, *Let's Look at Rocks*, Collecting and Identifying Rocks in Indiana

Order from:

Ag Communication
Media Distribution Center
231 S. University St
West Lafayette, IN 47907-2094
Telephone: (888) 398-4636
FAX: (765) 496-1540
Email: media.order@purdue.edu
www.ces.purdue.edu/new

From the Indiana Geological Survey

Examples:

- AM10, Glacial Geology of Indiana
- MI01A, Summary of Indiana Geology, Slides, CD
- MI02A, Minerals of Indiana, Slides, CD
- MI04, Educational Services rock set (samples of Indiana rocks)

- MM36, Map of Indiana showing topography of the bedrock surface scale SPG
- MM37, Map of Indiana showing thickness of unconsolidated deposits
- MM39, Map of Indiana showing topography of the bedrock surface
- MM40, Map of Indiana showing thickness of unconsolidated deposits
- MM48, Bedrock geologic map of Indiana
- MM50, Map of Indiana showing bedrock geology
- MM59, Quarternary geologic map of Indiana
- MM68, Map of Indiana showing locations of coal and industrial mineral operations
- MM69, Map of Indiana showing physiographic divisions.
- Poster 3, Features of Indiana Caves
- SPG Set (State Park Guides)

Order from:

Publication Sales Office Manager
Indiana Geological Survey
(812) 855-7636
http://igs.indiana.edu/survey/publications/index.cfm

Advanced Geology

Indiana 4-H Club Record

Name _____ Year _____

Your grade in school on January 1 of current year _____

Name of Club _____ Year in Geology project _____

I have reviewed this record and believe it to be correct.

Signature of Leader _____ Date _____

Fill in this record sheet by answering the following questions. Keep this record sheet in your 4-H record book.

Did you make an educational poster? ____ Yes ____ No

If yes, what was the theme of your poster? _____

Sketch how your poster looked:

List the activities you completed this year on the back.

Revised 1/05

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