

Teacher's Guide

AG IN THE CLASSROOM—HELPING THE NEXT GENERATION UNDERSTAND THEIR CONNECTION TO AGRICULTURE

Additional Resources:

State of Colorado, Department of Natural Resources, Division of Reclamation, Mining and Safety.

This division is responsible for mineral and energy development, policy, regulation and planning. Their website provides information on the division, as well as many of the division's projects and other related topics.
1313 Sherman St., Rm. 215
Denver, CO 80203
(303) 866-3567 or fax (303) 832-8106
<http://mining.state.co.us/>
and their page for children is:
<http://mining.state.co.us/kids/dmgkids.htm>

American Geological Institute is a nonprofit federation of 32 geoscientific and professional associations that represent geologists, geophysicists, and other earth scientists.

4220 King Street
Alexandria, Virginia 22302-1507
(703)379-2480
<http://www.k5geosource.org/index.html> is an online Earth science professional development tool for K-5 teachers

American Association of Petroleum Geologists

P.O. Box 979
Tulsa, Oklahoma 74101
(918) 584-2555
<http://www.aapg.org/k12resources/> is their website intended to assist teachers of K-12 students in finding classroom resources focusing on the earth sciences.

Geological Society of America

3300 Penrose Place, P.O. Box 9140
Boulder, CO 80301
(303) 447-2020
They have teacher's resources at
http://www.geosociety.org/educate/esw_bkfst.htm

Comments, questions, suggestions and feedback about the *Colorado Reader* are welcome.
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Livermore, CO 80536
Phone (970) 881-2902

Earth Science Benefits Everyone

Our lives and civilization depend upon how we understand and manage our planet – Earth processes affect us all. Weather patterns influence the availability of water resources and the potential for forest fires; earthquakes, volcanic eruptions, hurricanes and floods can kill large numbers of people and cause millions or even billions of dollars in property damage.

Just as Earth systems directly affect each of us, we – as individuals, communities and nations – affect our planet. Expanding technologies and growing populations increase demand of natural resources. As we

extract and use these resources, we impact Earth today, which will in turn impact those who come after us. To enhance our stewardship of the environment, we must proceed into the future with a sound understanding of Earth systems.

More on Careers in Earth Science

Where can we find enough water, mineral and energy resources to support growing populations? What are the long-term effects of human interaction with natural environments? How can we predict accurately earthquakes and volcanic eruptions? Earth scientists decipher clues concealed in rocks, minerals,
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Page 1: Answers



Did you know you can discover the meaning of many words by knowing the meaning of their parts. Some words have prefixes, roots and suffixes. The root of a word is the main part, a prefix comes before the root and a suffix is added to the end, after the root.

An example is "geologist."
The root "geo" means earth and the suffix "logist" means someone who studies.

So, geo + logist = someone who studies the earth.

Now try your hand at discovering the meaning of the following words:

the root archeo means ancient or primitive
archeo + logist = someone who studies ancient people and their culture

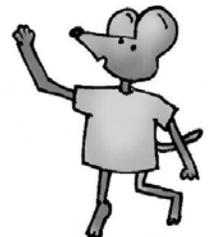
the root bio means life
bio + logist = someone who studies living things

the root hydro means water
hydro + logist = someone who studies water

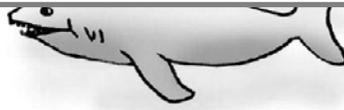
the root paleo means being ancient or old things
paleo + logist means someone who studies old things
(usually fossils)

What is a gemologist? someone who studies gems

What is a mineralogist? someone who studies minerals



Lisa is a Marine Biologist studying the population of sharks in a coral reef. She counted 83 tiger sharks, 24 hammerheads and 16 great whites. How many total sharks did she count? Write a number sentence and then figure out the answer.



$$83 \text{ tiger sharks} + 24 \text{ hammerheads} + 16 \text{ great whites} = 123 \text{ total sharks}$$



A glaciologist, Richard came upon a flock of penguins when studying ice sheets in Antarctica. He counted 14 rockhopper males, 32 females and 24 hatchlings. How many total penguins did he count? Write a number sentence and then figure out the answer.

$$14 \text{ males} + 32 \text{ females} + 24 \text{ hatchlings} = 70 \text{ rockhopper penguins}$$

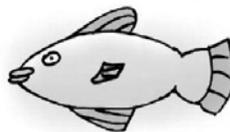
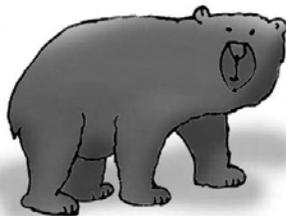
dispose of industrial wastes? How can we fill society's growing demands for energy and conserve natural resources for future generations?

Geoscientists enjoy the Earth. It is an outdoor laboratory filled with opportunities to observe earth processes in action. By applying knowledge of forces that shape the Earth, geoscientists seek to reconstruct the past and anticipate the future.

What do geoscientists do? They

Write a food chain for these creatures:

bear → fish → insect



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fossils, mountains, volcanoes, glaciers, water and landforms to answer vital questions about the earth.

Earth scientists, or geoscientists provide basic information to society for solving problems and establishing policy for resource management, environmental protection, public health, safety and welfare.

They are curious about the Earth. How was it formed? How is it changing? What effects will shrinking glaciers have on the oceans and climate? How do islands form? What makes a continent move? Why did the dinosaurs become extinct?

Geoscientists are concerned about the Earth. Is there a global warming trend? How and where should we

gather and interpret data about the Earth for the purpose of increasing our understanding and improving the quality of human life. Earth scientists investigate the materials, processes, products and history of the Earth.

Geoscientists may be found sampling the deep ocean floor or collecting rock specimens on the moon. But the work of most geoscientists is more "down to earth." They work as explorers for new mineral or hydrocarbon resources, consultants on engineering or environmental problems, researchers, teachers, writers, editors, museum curators and in many other challenging

positions. They often divide their time among work in the field, the laboratory and the office.

Field work usually consists of preparing geologic maps, collecting samples and making measurements that will be analyzed in the laboratory. For example, rock samples may be x-rayed, studied under a polarizing or electron microscope and analyzed for chemical content. Geoscientists may also conduct experiments or design computer models to test theories about geologic phenomena.

In the office, they integrate field and laboratory data to write reports that include maps and diagrams that illustrate the results of their studies. Such maps may pinpoint areas favorable to the occurrence of ores,

coal, oil, natural gas or underground water or indicate subsurface conditions of construction sites.

Generally speaking, geoscientific work includes a mix of indoor and outdoor duties.

Academic Training

The most important prerequisites for a career in the earth sciences are interest and thorough academic training. Someone who is interested will need a good science background in high school and a bachelor's degree from college at the minimum. Geology draws on biology, chemistry, mathematics, physics and

engineering. High-school courses related to these subjects plus a geology or earth science course, or a strong integrated science curriculum, will help prepare a candidate for college. A solid foundation in English is also essential.

The introductory college courses are physical and historical geology. Physical geology focuses on the Earth's structure and composition and on the physical and chemical processes that affect it. Historical geology focuses on the evolution of the Earth and its life forms from its origins to the present.

Geology majors take four academic years of lecture

and laboratory courses, usually supplemented by a special summer course in geological field work. Basic geology courses such as mineralogy, petrology, stratigraphy, paleontology and structural geology will make up the

(continued on page 4)

Page 5: Answers

Word Search:

E	P	A	Y	L	O	A	D	S	T	O	L	I	P	M
L	S	N	J	Q	T	U	A	N	O	R	T	S	A	I
T	R	Z	O	B	N	F	E	R	A	O	N	Y	E	S
T	A	X	K	O	E	B	A	X	Y	M	A	P	B	S
U	M	B	G	T	M	I	R	Z	C	D	M	N	A	I
H	S	I	Y	E	K	L	N	K	L	O	Z	O	A	O
S	P	A	C	E	C	R	A	F	T	V	V	B	C	N

Page 7 Answer for "Which things are not made with minerals?" This question was a little tricky. Everything in the picture was made from minerals, so the answer is none.

STAY OUT--STAY ALIVE! is a national public awareness campaign aimed at warning children and adults about the dangers of exploring and playing on active and abandoned mine sites. Every year, dozens of people are injured or killed in recreational accidents on mine property. Each April, around Earth Day, "Stay Out-Stay Alive" partners visit schools, communities and youth organizations throughout the country to educate children about the importance of steering clear of active and abandoned mines. To become involved in "Stay Out-Stay Alive," and to

Fun Fact Aquamarine is the state gemstone. They are found and mined on the mountain peaks of Mount Antero at over 14,000 feet high. These aquamarines range in color from light blue to pale and deep green and are primarily used in jewelry.

download posters and stickers please visit: <http://www.msha.gov/places/placeshp.htm>.

Hands-on Activity/Discussion: Discuss the various ways you can get hurt on an active or abandoned mining site. Have the children create their own brochures, stickers or posters that address the various hazards with the STAY OUT - STAY ALIVE message.

Fun Fact Rhodochrosite (pronounced row-dough-crow-site) is the official Colorado state mineral. It is deep red or pink and is found in gold and silver veins. They are collected and used as mineral specimens, for sculpting and in jewelry

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bulk of a student's training. Requirements will include additional courses in mathematics, computer science, chemistry, physics, biology, economics and technical writing. A geoscientist must have good writing skills to prepare accurate, understandable technical reports.

A master's degree is required for entry-level research positions. As in any profession, the best jobs go to the best qualified applicants. Students contemplating a professional career in the geosciences should consider getting an advanced degree. A PhD is needed for advancement in college teaching and in most high-level research positions.

More than 800 colleges and universities in the United States offer degrees in the Earth sciences. Nearly half of these colleges offers a Masters Diploma, the professional degree for pursuing a career as an Earth scientist. However, training in the Earth sciences builds a foundation for work in other fields, and nearly half of those graduating with Earth science degrees establish careers in fields as varied as engineering, law, system analysis, and financial management.

Earth science provides a strong background for many career paths and instills an understanding of how the Earth system influences the many and varied aspects of human activity. However, many students graduate from high school unaware of the contributions that Earth scientists make to society and

the unique problem solving skills that Earth science instills.

Career Outlook

The employment outlook in the geosciences – as in any profession – varies with the economic climate of the country. The long-range outlook is good, especially for women or underrepresented ethnic minorities. Dwindling energy, mineral and water resources; increasing environmental concerns; global issues such as rising sea levels; and hazard assessment present new challenges to geoscientists.

Most geoscientists are employed by industries related to oil and gas, mining and minerals and water resources. Many work in consulting firms or are self-employed as consultants.

Geoscientists also work for the federal or state government. Most work for the United States Geological Survey (USGS), but others work for the Department of Energy, Forest Service, National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers or a state geological survey.

Adapted from *Careers in the Geosciences* written by the American Geological Institute, The American Association of Petroleum Geologists and the Geological Society of America and *Why Earth Science?* by AGI Member Societies.

Page 8: Answers

Read the information above and fill in each of the three boxes with the main ideas from each paragraph. Then using a separate piece of paper, write a summary using the details you included in this chart.

Summaries will vary.

