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Learn Through Experience

EARTH SCIENCE CONTRACTS

Earth science projects of varying difficulty for individuals and groups

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PURPOSE

This student activity package can be used as individual or cooperative learning team projects during class time or as an independent contract approach for homework to accompany a study of earth science. This program may be used with students from fourth grade through junior high (and for slower learners in high school).

While participating in EARTH SCIENCE CONTRACTS, your students will gain the following:

Knowledge

1. introductory information on rocks and minerals
2. introductory information on dinosaurs and fossils
3. introductory information on earth structures and movements
4. introductory information on earth resources
5. the value of differing learning styles

Students feel good about themselves when they work in learning styles in which they excel. Of course, they need to expand their horizons by working in several learning styles.

It's also good for them when they understand how class members can share one another's talents.

Feelings

1. increased appreciation of one's own best learning style
2. valuing the best learning styles for others
3. appreciating what is given and received while working in a group moving toward a common goal

Skills

1. working in non-preferred learning styles
2. making a contract and setting goals, individual and group
3. following directions in order to complete tasks within projected time plan
4. creating individual or group projects
5. improving problem-solving skills
6. using higher level thinking skills

OVERVIEW

This student contract package is written with teacher flexibility in mind. The package contains sufficient activities for seven one or two week "units," each of which has a wide selection of tasks at various ability levels.

While writing EARTH SCIENCE CONTRACTS, the author incorporated various learning styles and theories, including Howard Gardner's Theory of Multiple Intelligences and Bloom's Taxonomy of the Cognitive Domain. (See pages 3-7 immediately following this Overview.) Consequently, when students work on their contracts dealing with the fascinating world of geology, they use different learning styles while completing varying assignments requiring higher levels of thinking.

This unit is divided into four sections based on fields of study within the science of geology. As students do their unit contracts, they must create at least one product per week. Each week each student focuses his/her energy to create one of the following kinds of products.

w = written
o = oral
v = visual
k = kinesthetic (moving/making)
m = musical
a = art

(Of course, creating certain products involves more than one learning or presentation style, but the student knows that the focus is mainly on a **visual** or **written** product during a certain week.)

The unit proceeds as follows:

- The amount of time set aside for the unit is explained.
- The necessity of working to create each differing kind of product is emphasized.
- The student fills out a contract to complete certain contracts within the time allowed.
- A parent also signs the above contract.
- The students work alone or within activity groups.
- The contracts are completed with teacher help and displayed or presented.
- The contracts' products are evaluated.
- If possible, some kind of culminating activity such as an open house is held.

Parent/child planning can really help the student. And of course, this circumstance increases the home-school communication.

The projects students have created make excellent open house material.

Theory of Multiple Intelligences

In *Frames of Mind* Howard Gardner explains his Theory of Multiple Intelligences. The essence of Gardner's theory is found in this quote:

> "In my view, it should be possible to identify an individual's intellectual profile (or proclivities) at an early age and then draw upon this knowledge to enhance that person's educational opportunities and options."

In his book Gardner describes the seven forms of intelligence:

- linguistic (language)
- logical-mathematical
- musical
- spatial
- bodily kinesthetic
- interpersonal
- intrapersonal

The Seven Kinds of Smarts: In his book Gardner explains the seven ways students in your class demonstrate their varying intelligence.

- **Linguistic student:** Learned to read early, often by himself or herself ... Loves to talk, talk, talk ... Likes reading poems and telling stories ... Picks up foreign languages easily and inhales poems and phrases easily ... Give these individuals plenty of books, word games, and times when they can explain what *they* believe.

- **Logical-Mathematical:** Finds category and pattern fascinating ... Good at board games such as checkers and chess ... Loves abstractions and easily learns equivalencies ... Give such individuals opportunities to categorize, identify, and solve math and logic problems.

- **Musical:** From the beginning found musical sounds fascinating ... Enjoys making and listening to music ... Remembers familiar songs and picks up new ones easily ... Provide chances to grow academically through musical expression.

You will find using Gardner's 7 learning styles most effective when:
a) you allow students to use their preferred styles for much of their studies, particularly when they are working on their difficult subjects or concepts ....
b) you encourage students to "stretch into" other styles with which they are not so comfortable...

When your students are working in their preferred styles, you should expect higher quality products (better work). However, your standards might logically change for work they do in their less preferred styles.

- **Spatial:** Skilled with visuals ... Sees relationships between objects and space ... Aesthetically minded ... Likes using different media for self-expression ... Give such students opportunities to use art, models, diagrams, and maps.

- **Bodily-Kinesthetic:** Recognized while young to be graceful, handling own body and environmental objects skillfully ... Excels at physical activities because of well developed motor skills ... Possibly will become athlete, dancer, engineer, surgeon or ... Needs chance to use hands, to be directly involved with objects and life ... Give such students challenges requiring classroom movement and model-building.

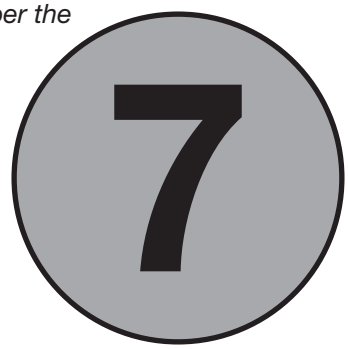
- **Interpersonal:** Has his/her antenna out ... Aware of own and other persons' feelings ... Compassionate ... Thrives when allowed to express leadership and caring skills ... Role-playing and drama are attractive to such individuals.

- **Intrapersonal:** Always organized ... Good at setting goals and self-evaluation ... Meet deadlines.

The activities in EARTH SCIENCE CONTRACTS have been shaped so that within limits students can choose varying learning styles to accommodate their individual preferences. An adaptation of the above seven intelligences was made so that students choose from the following learning styles:

- written
- oral
- visual
- kinesthetic
- musical
- art

Remember the

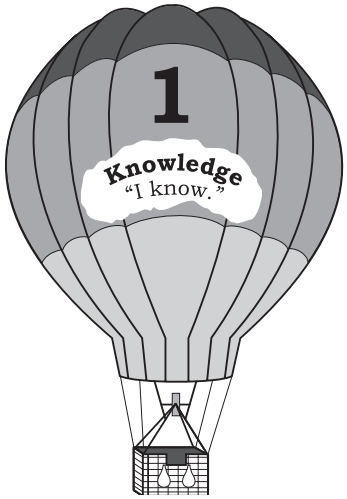


Taxonomy of the Cognitive Domain

Benjamin Bloom's educational theory is a classification system which he developed in 1948. It demonstrates that thinking is a process that begins at low levels requiring little thought and then develops into much higher levels requiring analysis, synthesis, and evaluation skills. This taxonomy provides the means to teach all students from the learning disabled to the gifted in a heterogeneous classroom setting. It adapts itself to all curriculum and requires no expensive materials—just a knowledge of Bloom's Taxonomy. It allows you to teach all students simultaneously in your classroom.

While using Bloom's taxonomy with EARTH SCIENCE CONTRACTS, you will accomplish the following:

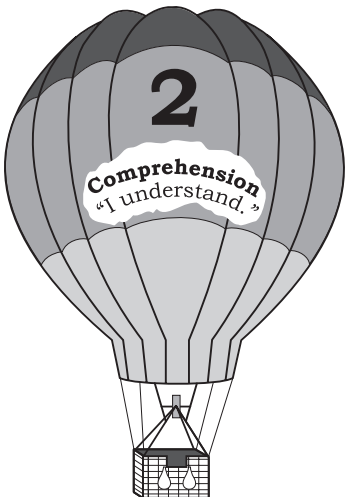
- develop several levels of creative thinking
- teach students how to use data by applying it
- help students organize ideas and thoughts according to a conceptual scheme
- motivate students because it generates answers requiring higher level thinking than questions requiring simple memorization and recall
- facilitate listening skills because complex questions require it
- make you aware of the level at which students think
- make you conscious of the levels of questioning you and students are using in the classroom
- give students confidence to take control of their learning
- create an environment where students feel free to risk sharing ideas they are uncertain about



Level 1: Knowledge

During this lowest level of learning, students work with simple recall. They move from general knowledge to specific knowledge. Therefore, the activities in EARTH SCIENCE CONTRACTS should emphasize the following learning processes:

- Defining
- Describing
- Identifying
- Listing
- Locating
- Matching
- Reciting
- Telling
- Writing

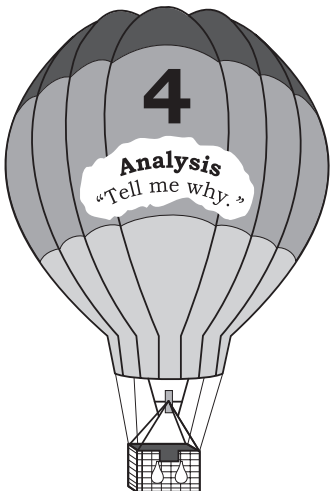


Level 2: Comprehension
During this second level of learning, students work with the ability to understand the meaning of material. Therefore, the activities in EARTH SCIENCE CONTRACTS should emphasize the following learning processes:

- Demonstrating
- Explaining
- Extending
- Inferring
- Summarizing

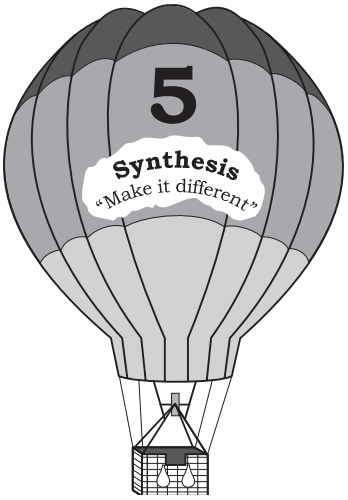
Level 3: Application
During this third level of learning, students use material in new situations. This may include concepts and rules (as in grammar or spelling). Therefore, the activities in EARTH SCIENCE CONTRACTS should emphasize the following learning processes:

- Changing
- Computing
- Constructing
- Producing
- Relating
- Solving
- Using



Level 4: Analysis
During this fourth level of learning, students work with the ability to sort out material into its basic structure or organize the material to show a basic understanding. Therefore, the activities in EARTH SCIENCE CONTRACTS should emphasize the following learning processes:

- Breaking down
- Diagraming
- Discriminating
- Selecting
- Separating
- Making inferences
- Simplifying
- Supporting ideas

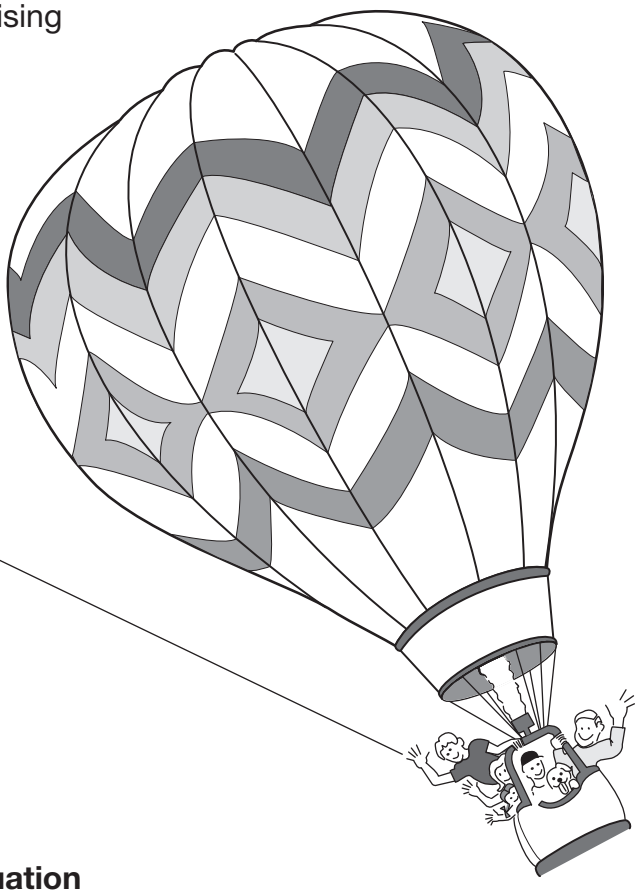


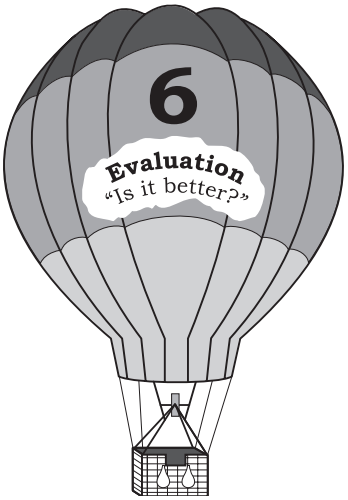
EARTH SCIENCE CONTRACTS is helping us think on higher and higher levels ...

Level 5: Synthesis

During this fifth level of learning, students work with formation of new patterns, taking the parts and forming a different whole. Therefore, the activities in EARTH SCIENCE CONTRACTS should emphasize the following learning processes:

- Creating
- Designing
- Composing
- Predicting
- Reorganizing
- Revising





Level 6: Evaluation

During this highest learning level, students work with judgmental decisions regarding values. This highest level contains elements of all other categories plus value judgments based on clearly defined criteria. Therefore, the activities in EARTH SCIENCE CONTRACTS should emphasize the following learning processes:

- Comparing
- Contrasting
- Criticizing
- Interpreting
- Relating
- Justifying

CLASSROOM ORGANIZATION

1. At least two weeks before beginning, gather a classroom collection of books, magazines, pictures, filmstrips, science texts, and encyclopedias that specifically pertain to geology and earth sciences.
2. About one week before beginning, heighten student interest by creating an attractive bulletin board and interest center. You may want to arrange a table or area nearby where individuals or groups can work on their contracts.

Coming ... EARTH SCIENCE CONTRACTS

ORGANIZING MATERIALS

1. Obtain a manila folder for each student and place each student's name on his/her folder.
2. Duplicate a class set of each of the following:
   - EARTH SCIENCE UNIT CONTRACT
   - ROCK AND MINERALS (Weeks 1 & 2)
   - FOSSILS AND DINOSAURS (Week 3)
   - EARTH STRUCTURES AND MOVEMENTS (Weeks 4 & 5)
   - EARTH RESOURCES (Weeks 6 & 7)
   - EARTH SCIENCE AWARD CERTIFICATE
3. Put the EARTH SCIENCE AWARD CERTIFICATES in a separate folder. Place a set of the remaining pages in each student's folder.
4. In each student's folder place a Student Guide, the seven weeks' contracts, and a time schedule calendar (if you have created one in advance). This folder will also become the place where the student accumulates work in progress.

If you have an EARTH SCIENCE open house, you will be giving your students opportunities to develop social skills and self-esteem. My students wrote letters to parents and others and practiced how to introduce projects and how to carry on conversations—prior to the actual open house.

Students take pride in getting their projects and their classroom ready for the big night!

TEACHING OPTIONS

1. **All together option** Have all students do the activity clusters in order. For example, all students would work on Week 1 and that would be due on Day 7. This helps prevent instances where one student's original idea may be copied by other students.
2. **Choice option** You may choose to allow students to do the activity clusters in any order. This will be particularly helpful if you have relatively few reference materials for students to use since different sections require different types of materials.

OPEN HOUSE OPTION

1. Assign students to complete various jobs in preparing exhibits, writing invitations, providing refreshments, making signs, hosting, etc. Allow two weeks for preparation.
2. Send invitations approximately one week ahead of Open House to all parents, special friends, building staff, and principal. You may want to invite the class that is one year younger than yours.
3. Set up displays of work by section (i.e., ROCKS AND MINERALS Weeks 1 and 2 in one area of the room, etc.). Be sure to have at least one display item for each student. If you have enough room, display several items for each child.
4. Evaluate students' work on a separate form or on the back in order to insure privacy. Obviously you will have made every effort to have chosen a student's best work to display; however, it is important to maintain trust that grades not be open for all to see.
5. Prepare category signs, as well as having students' names on each item. You may copy or enlarge the activity sheets, cut apart the descriptions of items on display, affix such explanation to a card, and then attach the card to the item. Such preparation will help guests understand the assignment.
6. If you have made audio or videotapes of oral presentations in class, set up areas in which such tapes can be seen or heard.
7. Have the students help plan and prepare appropriate light refreshments. You may want to continue the theme: lava punch, rocky road cookies, etc. *Be creative!*

Setup Days

Be careful at the beginning: the amount of paper in the students' folders may intimidate them at first. (You may wish to set up a central file box for all your students' folders.) Stress over and over again how important it is for them to keep all their work and handouts in their folders.

#4 at the right gives you time to be certain your students have the "whole picture" before they take home their folders for their parents to examine after Day 2.

When you begin Day 2, be sure your students have the necessary pages out as you lead them through their content.

The tentative plan for all four weeks is important so that their points and the learning style codes will work out.

After students return with their folders, they and their parents may have some questions you will have to answer.

Day 1

1. Give everyone his/her personally labeled folder.
2. Have students examine the Student Guide and *briefly* discuss its various parts, explaining how they will use it during the unit. Stress that as the unit progresses, the Student Guide will help them succeed.
3. Go over the EARTH SCIENCE CONTRACT rather carefully.
4. Stress their need to store their folder in a place where they can *readily* find it each day. *Make clear that the folder does not go home tonight.*

Day 2

1. Go through the pages of Week 1 to Week 7 activities. Stress that a student should not make a decision yet but should listen to choices and expectations.
2. Students in your school may or may not need help in having some supplies provided for them. If you will supply some of those materials, announce in advance how this need will be taken care of. If you expect students to provide their own materials, make this option clear.
3. As homework, have your students review Week 1's activity clusters with his/her parents.
4. Explain that a choice(s) should be made for Week 1 and tentative selections for the following weeks.
5. Explain that both student and parent are to sign the contract and return it tomorrow. (This is a very significant step in home/school communication.) *Make clear that you are holding each student accountable.*

Day 3

1. Conduct a question/answer session to further explain and to ease any anxiety students might have.
2. Do one of the following: a) allow in-class time for all work individually or in teams; b) allow in-class time for the students to begin their projects; or c) proceed with class lessons on geology, while students use the program as homework.

Typical Contract Week

Day 1

1. Review the week's contract focus with your students. Answer any questions that show their concerns.
2. During the first week make clear to your students what quality work you are expecting them to do. During the second, third, fourth, fifth, sixth, and seventh weeks share your observations of the quality work you have been receiving. Offer suggestions on how to improve, if you feel it is necessary to do so.
3. Stress that you will be available to help them at all times.
4. Explain when you will be coming around to check up on their progress. *Help your students learn to manage time. Developing this ability is, of course, an essential part of growing up.*

Watch for signals that individuals are having trouble and need help!

5. Starting today, students have a seven day week to do the projects.

Day 2

1. Work continues.
2. By this day's end, all groups or individuals should have set goals and preliminary plans, including delegation of responsibilities if students are working together in a group.

Day 3

1. Work continues.
2. Give help where needed.

Day 4

This Day 4 checkup is optional. Make a judgment whether or not your students need to be individually contacted on their progress.

1. Work continues
2. Hold a mid-week checkup.

Days 5-6

1. Work continues.
2. Give help where needed.
3. On Day 6 remind everyone that all the week's work is due tomorrow. *Make clear the exact time of day when you will be accepting their work.*

Day 7

You may wish to establish in advance your penalties for late work.

1. Pick up all projects along with the written contract.
2. Praise your students for their completed work.
3. At the end of EARTH SCIENCE CONTRACTS, give deserving students their AWARD CERTIFICATES.

QUESTIONS/ANSWERS - 1

Q & A

Q. *How long does this packet take?*
A. It is designed for seven weeks; however, a teacher could certainly modify it for more or less time.

Q. *Is this homework or class work?*
A. Make this decision based upon your needs. Activities are marked **CL** for Cooperative Learning team options. These activities would obviously require class time. The in-class work furthers the goals of students learning through interaction.

Q. *Can students work quickly and finish all requirements in a very short time, for example, one week?*
A. If the contract work is given as homework, it is possible to complete everything quite rapidly; however, discourage such hurrying because it rushes students, who then turn in projects of inferior quality. Additionally, by extending the projects over time, student often immerse themselves in and *personalize* the subject. Consequently, longer retention should result. Individual contracts with a section due each week are quite successful in helping students learn to budget time.

Q. *Must I immediately evaluate each student's work each week?*
A. Yes. Grade each week's project right away—and as a separate item. If any project you evaluate is incomplete, incorrect, or below the contract grade the student is working for, you should return it to the student for expansion, correction, or improvement. After the project is returned, you might consider regrading and averaging the two grades for a final grade on that project.

Q. *Is it enough that the student turns in a product in order to meet the requirements? Or must the projects meet a quality requirement?*
A. By providing immediate feedback for each week's projects, you will likely prevent students doing inferior work in their next week's work. If a student completes nine activities but they are of inferior quality, speak to that student and ultimately assign an overall grade based on quality. *Volume should not be enough to merit an A or B.*

Q & A

Q. *How do I address the needs of students with a wide range of abilities?*

A. Actually EARTH SCIENCE CONTRACTS is purposely designed to meet a wide range of individual differences in intelligence and learning styles. Of course, you will have to rely on your own judgment of varying students' abilities while helping them choose activities.

Q. *Should I attempt to influence or direct a student's choices on the initial contract?*

A. Certainly. It is appropriate for you to look over each student's choices of activities to question, to anticipate possible problems, and to praise. Each student, regardless of academic ability, should be able to find challenging choices. The selection should not be too easy for the student; nor should it be too difficult. Often your judicious comments will help the student make intelligent choices.

Q. *Once the contract has been filled out and signed by everyone, can it be changed?*

A. Ask any student wishing to change the contract to negotiate any such changes with you and a parent, requiring that they explain why they wish the change(s). Then, having gained adult approval, allow them to proceed with the change(s).

Q. *I don't know all of the words on the advanced vocabulary list. Why will students need to know such difficult words?*

A. You will possibly have a "science whiz" in your class. This list is intended to stretch or challenge your brightest.

Q. *Can a student do more than nine projects?*

A. Of course. Don't say no to the enthusiastic learner. However, avoid encouraging students to complete so many projects that the quality of their work suffers.

Q. *What if a student wishes to create his/her own project?*

A. That is up to you! If you wish to allow this, have your student write out the proposed idea *in detail* before meeting with you to determine the learning style code, the difficulty points, and the week in which the project should be completed.

EARTH SCIENCE UNIT CONTRACT

I understand that each week I must complete at least one activity on or before the due date. I also must use all six different learning styles during this unit. See the code system: **w** ... **o** ... **v** ... **k** ... **m** ... **a** ...

Weeks 1-2: Rocks and Minerals

	Code	Value Pts.	Due Date	Completed on	Parent's Initials
* Activity # _____	_____	_____	_____	_____	_____
* Activity # _____	_____	_____	_____	_____	_____
Activity # _____	_____	_____	_____	_____	_____

* = required activity **Total:**

Week 3: Fossils and Dinosaurs

	Code	Value Pts.	Due Date	Completed on	Parent's Initials
* Activity # _____	_____	_____	_____	_____	_____
* Activity # _____	_____	_____	_____	_____	_____
Activity # _____	_____	_____	_____	_____	_____

* = required activity **Total:**

Weeks 4-5: Earth Structures and Movements

	Code	Value Pts.	Due Date	Completed on	Parent's Initials
* Activity # _____	_____	_____	_____	_____	_____
* Activity # _____	_____	_____	_____	_____	_____
Activity # _____	_____	_____	_____	_____	_____

* = required activity **Total:**

Weeks 6-7: Earth Resources

	Code	Value Pts.	Due Date	Completed on	Parent's Initials
* Activity # _____	_____	_____	_____	_____	_____
* Activity # _____	_____	_____	_____	_____	_____
Activity # _____	_____	_____	_____	_____	_____

* = required activity **Total:**

Total Points for 7 weeks:

I understand this grading scale:

C = 18 points
B = 22 points
A = 26 points

Signed by _____ (student)

I have reviewed the above requirements with my son or daughter.

Signed by _____ (parent)

C = 7 activities (min. of 1 per wk.) ... each completed at satisfactory level + all adding up to 18+ value or difficulty level pts.

B = 8 activities (min. of 1 per wk. + 1 additional) ... each completed at satisfactory level + all adding up to 22+ value or difficulty level pts.

A = 9 activities (min. of 1 per wk. + 2 additional) ... each completed at satisfactory level + all adding up to 26+ value or difficulty level pts.

Rocks and Minerals

Activity Cluster—Weeks 1–2

- To help you succeed in EARTH SCIENCE CONTRACTS, *study all the suggestions found in the early pages of your Student Guide.*
- While examining each activity below, note how each is coded for **learning style** (one of these letters: w ... 0 .... v ... k ... m ... a ...) and a **difficulty factor** (a number from 1 to 4). If the two letters **CL** appear, they indicate that you are to work with one or more persons in a **C**ooperative **L**earning activity.
- Remember that during the unit's seven weeks *you must use all of the six learning styles at least once.*

Select two:

1. Read to find out about **birthstones**. Is there more than one for each month? Why? What is yours? Select five friends or family members and find out what their birthstones are. Tell the class what you learned. (O-1)

2. Write a **letter** to each of five national parks or monuments asking for information relating to the geology at that location. Make a bulletin board display using maps, booklets, etc. (K/W-2) **CL**

3. Interview a **geologist** and write a paper about his/her **career**. Make a list of 12–15 important questions (i.e., What kind of education is needed? What businesses employ geologists? What types of work do they do?). Turn in your report and notes. (W-3) **CL**

4. Write a one- or two-paragraph description of two environments in which **sedimentary rock** may be formed. (W-1) **CL**

5. Prepare a report on the development and use of **Mohs' Scale of Mineral Hardness**. Find at least five actual examples. (W-2)

Hardness Scale

The hardness scale in the left column was devised by Austrian Friedrich Mohs in 1822. (The softest mineral is **1**; the hardest is **10**.) Everyday objects are in the column on the right.

1	Talc		
2	Gypsum		
3	Calcite	Fingernail	2
4	Fluorite	Silver	2
5	Apatite	Teeth	5
6	Orthoclase	Penknife	5
7	Quartz	Glass	6
8	Topaz		
9	Corundum		
10	Diamond		

6. Research and **report** on the **commercial uses** of any four of the following: coal, halite, muscovite, mica, quartz, calcite, biotite, diamonds, graphite, talc. (O-3) **CL**

7. Discover what a lump of **coal**, a **pencil lead**, and a beautiful **diamond** have in common. Explain to the class. (O-2)

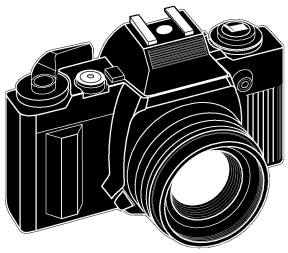
8. **Paint** a **Pet Rock Music Group or a Pet Rock Family** with six or more members. Each of the characters should have an appropriate name and a certain character (face and personality) of its own. Use actual rocks. (A-2) **CL**

9. Select **10 rocks or minerals**. Compare and contrast their characteristics. Make a **chart** to display in the room. (V-3) **CL**

10. Make a **chart** of the three **rock types** and list five or more varieties under each category. (V-2) **CL**

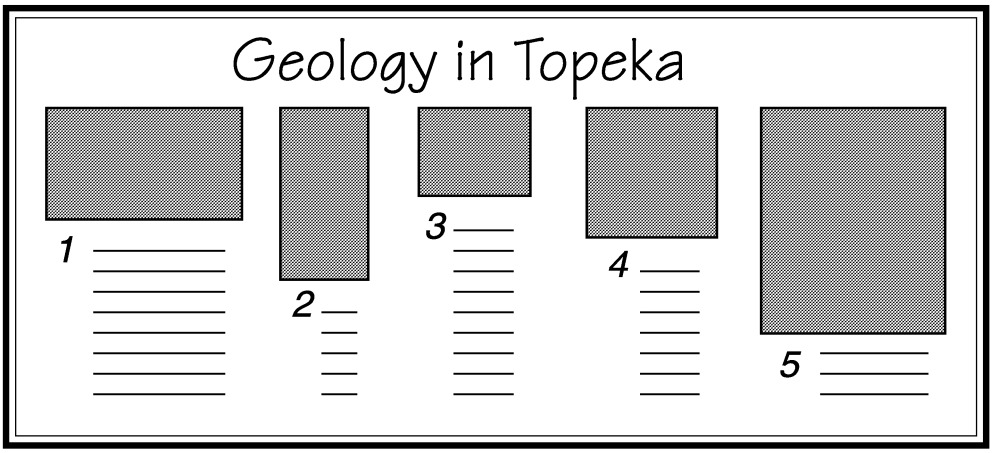
11. Draw or paint a **mural** showing two different environments in which **sedimentary rock** may be formed. (A-2) **CL**

12. Make a **sedimentary rock** with plaster of Paris. Consider how sedimentary rocks are formed. Plan the materials that you will need. (A-2) **CL**



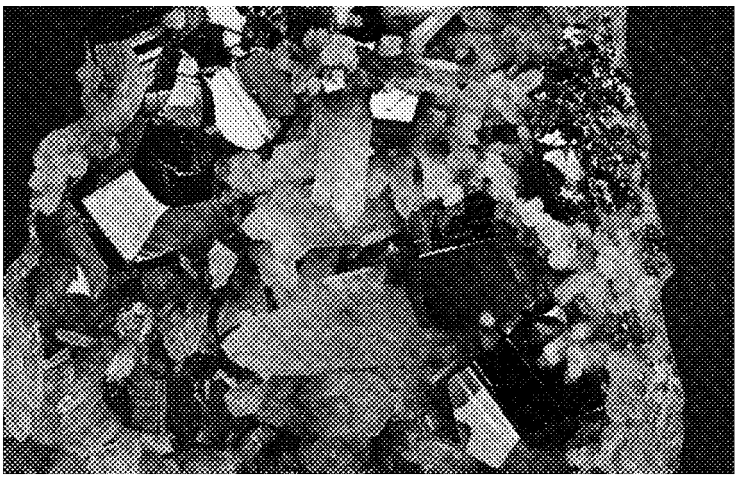
13. Design three pieces of **jewelry**. What **gemstones** will you use? Why? (A/K-2)

14. **Photograph** five examples of **geology in your area**. Label, explain and display the photos on a bulletin board. (A/K-3) **CL**



15. Teach the class a lesson on the differences between **rocks and minerals**. (O-2) **CL**

16. Use a microprojector to magnify and project an image of a pinch of salt. Draw and label a **diagram** of the image. Then, by the same means, study a grain of **sand**, a **diamond**, or any other **crystal**. How are they alike? How are they different? Present through a **display** for your class. (V-3) **CL**



17. Collect a variety of **quartz specimens** (common in many gravels). They will be of approximately the same hardness. However, they will differ in color and other observable characteristics. Develop ways to classify and **display** the specimens. (K-2) **CL**

18. Make a **rock and mineral collection**. Identify and label the samples. Tell the common usage and where each may be found. (K-2)

19. What are the **three classes of rocks**? Plan and conduct a survey of 30 people to determine how many people can name all three. Make a **graph** of the results. Did age make any difference? Turn in your notes. (V-3) **CL**

20. Plan and conduct a **science experiment** for the class in which you investigate **crystal formation**. Using hot and cold water can you draw conclusions about the affect of temperature on the growth of crystals? (K-2) **CL**

21. **Collect** 10 **minerals** that are not on Moh's Scale of Mineral Hardness. Classify according to hardness. (K-2) **CL**

22. Find five common objects that could be used to **test the hardness of minerals**. (K-1)

23. Use at least 25 of the Student Guide's vocabulary words to make a **crossword puzzle**. Your clues must indicate your knowledge of geology and must make the puzzle worker think. Study several crossword puzzles to become familiar with the format. Suggestion: graph paper will help you with the layout. Provide the answers on a separate sheet of paper. Your teacher may choose to copy and distribute to the class. (W-2)

24. Use at least 30 of the Student Guide's vocabulary words to make a **word search**. Turn in the key on a separate sheet of paper. Use graph paper to help you make a neat layout. Your teacher may choose to copy and distribute your word search to the class. If so, you will check the other students' completed word search puzzles. (W-1)

SCRAMBLED WORD LIST:
Earth Science Vocabulary

• ---------	• ---------	• ---------
• ---------	• ---------	• ---------
• ---------	• ---------	• ---------
• ---------	• ---------	• ---------
• ---------	• ---------	• ---------
• ---------	• ---------	• ---------
• ---------	• ---------	• ---------
• ---------	• ---------	• ---------

25. Use at least 25 of the Student Guide's vocabulary words to make a **scrambled word sheet**. Provide a knowledge-based clue for each scrambled word. Be very neat. Turn in the key on a separate sheet of paper. Your teacher may choose to copy and distribute your word sheet to the class. If so, you will be responsible for checking each student's finished work. (W-1)

26. Read about **rock collecting** as a **hobby**. Design a **brochure** to promote that hobby. Include a list of the benefits or aspects of enjoyment for the collector. Write at least seven hints for rock collecting. (W-2) **CL**

27. Select your favorite kind of rock and write **a "rock" music song**. The song must incorporate descriptions, geological facts, etc. You will need to use lined music paper. (M-2)

28. Identify a variety of minerals that must be extracted from ore before they can be used. Imagine you are visiting Earth from a far away planet. Write a **report** for the **captain of your space ship** to tell him/her of these riches you have found. (W-2)

29. Evaluate a **classification system of minerals** based on color instead of hardness. Turn in your report. (W-3) **CL**

30. Verify through research the worth of 10 rocks and minerals. Use dollars per ounce or pound. Write a conclusion about why people have assigned **dollar value** to **rocks and minerals**. (W-4) **CL**

- *Why are diamonds so expensive?*
- *Are other minerals even more expensive?*

Fossils and Dinosaurs

Activity Cluster—Week 3

- To help you succeed in EARTH SCIENCE CONTRACTS, *study all the suggestions found in the early pages of your Student Guide*.
- As you examine each activity below, note how each is coded for a **learning style** (one of these letters: w ... o .... v ... k ... m ... a ...) and a **difficulty factor** (a number from 1 to 4). If the two letters **CL** appear, they indicate that you are to work with one or more persons in a **C**ooperative **L**earning activity.
- Remember that during the unit's seven weeks *you must use all of the six learning styles at least once*.

Select one

1. Define "fossil." Name five facts about **fossils**. (W-1)

2. Label a **United States map** showing **major fossil beds**. (V-2) **CL**

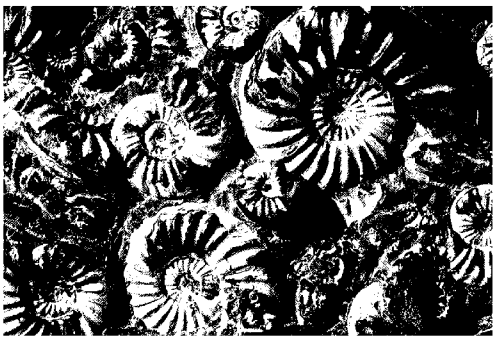
3. Read and learn about the **La Brea Tar Pits**. Then with two or three friends write and act out a play about the Tar Pits. This must have a script and last five minutes. (K-3) **CL**

4. Draw an illustrated **time line** of the scientific view of **the geologic past**. (V-3) **CL**

5. Make a **display** that will explain that fossils provide clues to **what organisms and plants look like**. (V-2) **CL**

6. Make a **display** that explains that fossils provide evidence about **the Earth's history**. (V-2) **CL**

7. Set up a **display** that shows the many **ways fossils may be formed**. (V-2) **CL**



5 kinds of ...

8. Find or draw **pictures** of five or more fossils. Glue them onto heavy paper and make **jigsaw puzzles** (K-1) **CL**

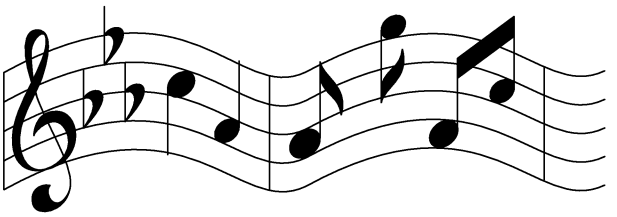
9. Make a **papier mache model of a dinosaur**. Research to make your model a realistic replica. (K-3) **CL**

10. Create a **mobile** that illustrates five different dinosaurs. (K-2) **CL**

11. Make up 10 **story problems** about a **geologist** (paleontologist) discovering a mound of buried fossils. You must include addition, subtraction, multiplication, division, and fractions. On a separate page, work the problems to make an answer key to turn in. (W-3)

12. Make a **bulletin board** to compare the ways fossils are formed. Read the directions about making bulletin boards. (V-2) **CL**

13. Compose a **song** about how fossils form and where they usually form. Practice and perform for the class (live or on tape). (M-2)

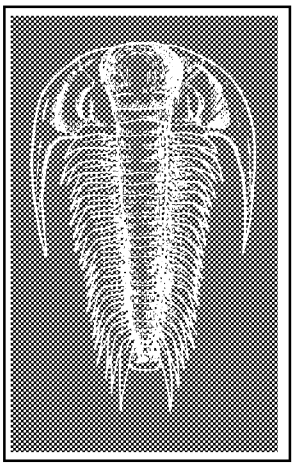


*Your **F O S S I L S O N G** just might be a big hit in class!*

14. Create a **shadow box** to show the environment in which dinosaurs may have lived. (K-3) **CL**

15. Read several kinds of **poetry**. Discuss poetry with your teacher before beginning. Choose any two forms (i.e., cinquain, haiku, limerick, couplet, triplet, or other form as your teacher may suggest). Write at least four poems about fossils or dinosaurs. Options: a) carefully letter and mount the poetry for a bulletin board display, b) carefully letter or type, then copy and distribute to the class, c) read your poems to the class (audio-tape for Open House). (O/W-3)

"And for the Oregon state fossil I nominate ...."



16. Select one fossil and **conduct a campaign** to have the legislature name it a "**state fossil**." The campaign will need to reflect your research and knowledge about the fossil. (W-2) **CL**

17. Based on a **drawing of a dinosaur skeleton**, draw over it what you believe one might have looked like. Suggestion: draw the body on a plastic sheet in order that you can lay it over the original picture of the skeleton. (V-2)

18. Discuss the **advantages and disadvantages of** geologists **digging up fossils**. Evaluate the results of their efforts over the years. What costs are involved? Is it worth the cost? Write up your opinion and conclusions. (W-2)

Activity Cluster—Weeks 4-5

Earth Structures and Movement

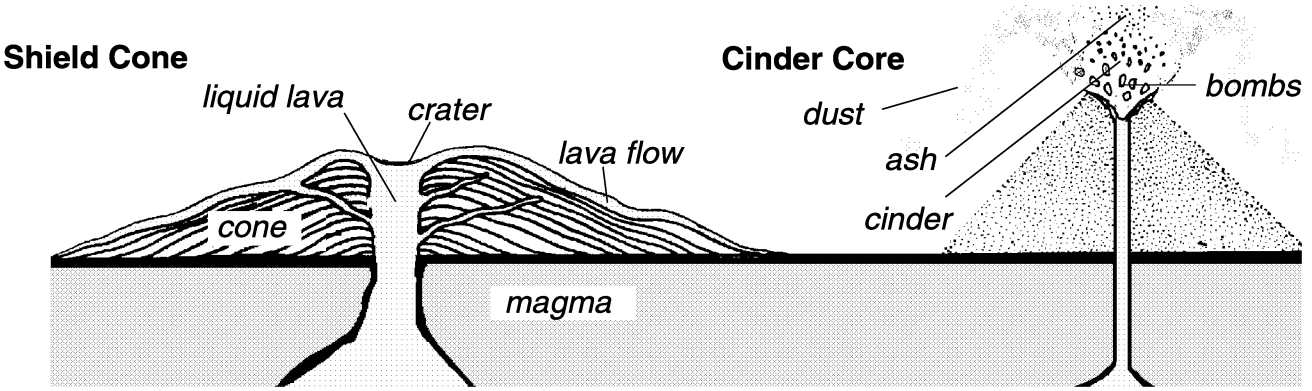
- To help you succeed in EARTH SCIENCE CONTRACTS, *study all the suggestions found in the early pages of your Student Guide*.
- As you examine each activity below, note how each is coded for a **learning style** (one of these letters: w ... o .... v ... k ... m ... a ...) and a **difficulty factor** (a number from 1 to 4). If the two letters **CL** appear, they indicate that you are to work with one or more persons in a **C**ooperative **L**earning activity.
- Remember that during the unit's seven weeks *you must use all of the six learning styles at least once*.

Select one

1. Label a United States **map** with **national parks** and **monuments** that are of geologic interest. (V-1)

2. Locate and label the following **places** on a **world map**: (V-2) **CL**

   Vesuvius
   Kilauea
   Mount Hood
   Mount Pelee/Saint Pelee
   Mount Katmai
   Mount Agung
   Paricutin
   Krakatoa
   Mount Lassen
   Mount Baker
   Aconcagua
   Hibokhibok
   Mount Etna
   Stromboli
   Mount Shasta
   Mount Rainier
   Mount Saint Helens
   Mauna Loa
   Cotopaxi
   Mount Tambora
   Surtsey



3. Make a **bulletin board** that will explain the different kinds of **volcanoes and volcanic material**. (V-2) **CL**

4. **Research**, then write a two-page report to tell how **the plate tectonics theory** is used to explain the locations of most volcanoes. (W-2)

5. How many ways can **changes** occur in **the earth's crust**? Research this question, then explain in a two-page report. Include illustrations. (W-2)

6. Read about **quicksand**. Construct a **bulletin board** of the important points. (V-1) **CL**

7. Conduct **research** on **caves and caverns** in the United States. Write a three-page report on how they are formed, what they look like, and how they are explored. (W-2) **CL** *Option:* Add a shadow box showing the inside of a cave (W-4) **CL**

8. Prepare a **presentation** for the class in which you explain **how geologists look at land forms and rocks** and can know that ancient seas were once there. Be sure you have read and researched the problem. (O-1) **CL**

9. Read about **Vesuvius** and **Pompeii**. Retell the story to the class. Tape record for use at Open House. (O-1)

10. Read and research to discover **the ways that scientists have developed to study earthquakes**. Present your information to the class. (O-1)

11. What is the **Ring of Fire**? Read and research to learn about it. Present a lesson to the class. Be sure to use **visuals**. (O-1) **CL**

tsunami?

12. What is a **tsunami**? Read and research about them. Write **a newspaper story** about one. Include a map and other illustrations. (W-2) **CL**

13. Teach the class about **the Richter Scale**. Include such information as: who developed it? How and when is it used? (O-1)

14. Read several **myths** that explain **geologic events** such as earthquakes, volcanoes, etc. Retell two of your favorites to the class. (O-1)

15. Make a **model** (papier mache, salt dough, etc.) of **Mount St. Helens** before and after the major eruption of May 18, 1980. (V-3) **CL**

16. Make a **map or model** of the world. Show the **plates of the Earth's crust**. Show the Ring of Fire. Accuracy and neatness are important. (V-2) **CL**

17. Make a **shadow box or flip book** (cartoon) of a **volcano erupting**. Be sure to work for neatness and artistic effect. (V-2)

18. Make a **bulletin board** showing an interior side view of a **volcano**. Label all parts. (V-2) **CL**

19. Make a **model** of the **Earth** that will show the parts (i.e., **the three layers**). (V-2) **CL**

20. Devise a **demonstration** for the class that will show how **"new" land forms at the mouth of a river**. (K-2) **CL**

myths

earthquakes

21. Read several Greek, Roman, Norse, or Native American myths. Determine the characteristics of myths. **Create** your own **myth** about **earthquakes**. (W-2) **CL**

22. Devise an **experiment or** a **model** of a **glacier** that will demonstrate how glaciers contribute to erosion. (K-2) **CL**

23. Write a one-page **report** to summarize why **volcanoes** occur in certain areas of the world. How are scientists able to predict when some volcanoes are going to erupt? (W-2)

24. How does **soil erosion** take place most often **in your area**? How do farmers and construction workers deal with erosion? (Interview and take notes.) Analyze the methods. Which are costly? Which are practical? Present in a written report. Turn in your notes. (W-3) **CL**

25. **Interview** several people about their memories of **Mount Saint Helens**' eruption on May 18, 1980. Write a newspaper story. What conclusions can you form about the importance of that event to the people of your area? Turn in your interview notes. (W-3) **CL**

26. Conduct a **survey** of 30 or more people. See how many can name three **geologic hazards**. Make a graph of the information. Turn in your interview notes. (V-2) **CL**

Speech?
Body Language?

27. Pretend you are a **prehistoric person** and you have just seen your first volcano. Perform a **skit** in which you have to tell others about it. See the procedures for skits in the Student Guide. (K-3) **CL**

28. Compose a **song** about the **volcanoes** of Oregon, California, Hawaii, and Washington. Use original music and words. If you play an instrument, accompany yourself. Present in person or on tape for an audience. The song should represent knowledge of the states and the volcanoes. Don't simply hurry through this project. Work to create a quality song you are proud to present. (M-3)

29. Read several kinds of **poetry**. Discuss poetry with your teacher before beginning. Choose any two forms (i.e., cinquain, haiku, limerick, couplet, triplet, or other forms as your teacher may suggest). Write at least four poems about **volcanoes**. (O/W-3)

30. Research how **geologists** predict the **eruption of a volcano**. Then write your prediction of Mount Saint Helens' next eruption. (W-2) **CL**

Kilauea
Vesuvius
Krakatoa
Mt. St. Helens

31. Compare the following four **volcanoes**: Kilauea, Vesuvius, Krakatoa, and Mount Saint Helens. Evaluate the after effects to human kind in terms of dollar costs, human life, and other ways. Write a report and consider including **diagrams** or **graphs**. (W-3) **CL**

32. Evaluate the results of a **volcanic eruption**. Describe in a report. Give at least four positive and four negative results. (W-2) **CL**

Earth Resources

Activity Cluster—Weeks 6-7

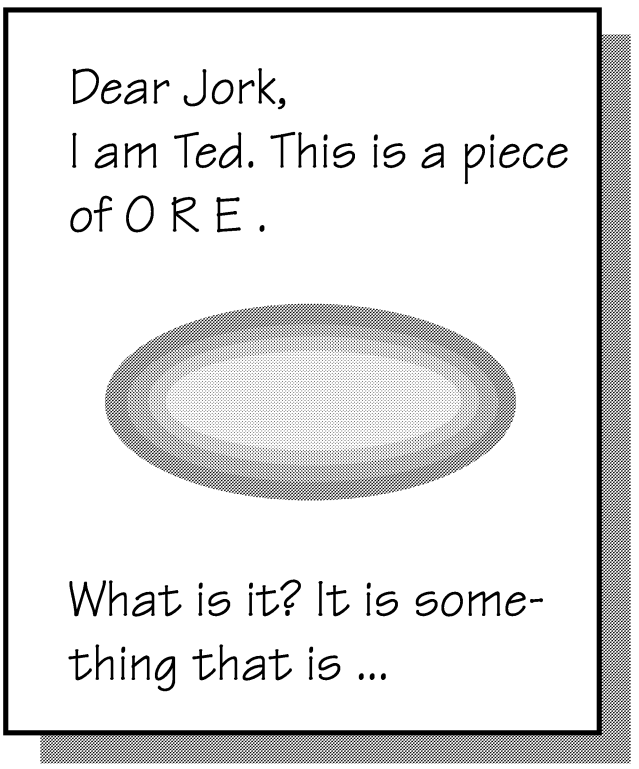
- To help you succeed in EARTH SCIENCE CONTRACTS, *study all the suggestions found in the early pages of your Student Guide*.
- As you examine each activity below, notice how each is coded for a **learning style** (one of these letters: w ... o ... v ... k ... m ... a ...) and a **difficulty factor** (a number from 1 to 4). If the two letters **CL** appear, they indicate that you are to work with one or more persons in a **C**ooperative **L**earning activity.
- Remember that during the unit's seven weeks *you must use all of the six learning styles at least once*.

Select two

1. Observe your classroom closely. What do you see in your classroom that came from **the Earth's crust**? Prepare a list and share with the class through an oral report. (O-1) **CL**

2. Use a **world map** and label **major oil fields**. (W-1)

3. Read to find out about natural resources. Make a **mobile** about **10 natural resources**. (K/V-2) **CL**

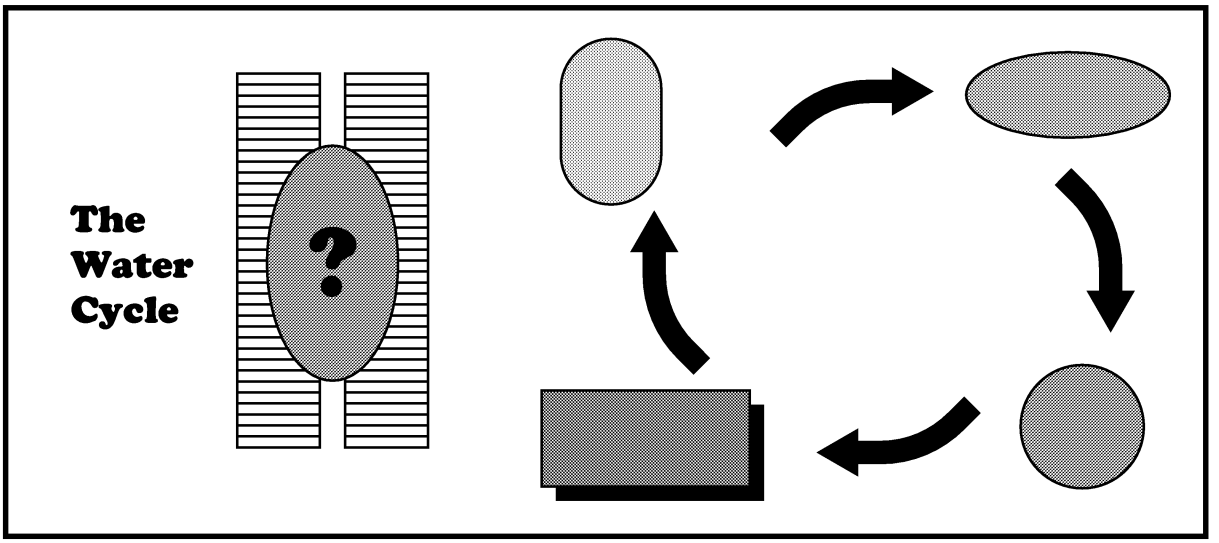


4. Write a **letter** that will travel back in time **to a prehistoric person**. Explain mining today. Include the following: a) define the meaning of the term "ore," b) describe one way ore may be formed, c) tell how the process of smelting aids in the recovery of certain mineral resources, d) how does mineral exploration affect human resources. (W-2) **CL**

5. Make two **collages**—one showing renewable resources and one showing nonrenewable **resources**. (V-2) **CL**

6. Make a **mural** that illustrates the steps—from mining to production—involved in **the manufacture of steel**. Check with your teacher about when and where to display it. (V-2) **CL**

7. Draw a **diagram** or paint a **mural** that explains **the water cycle**. Check with your teacher about when and where to display it. (V-2) **CL**

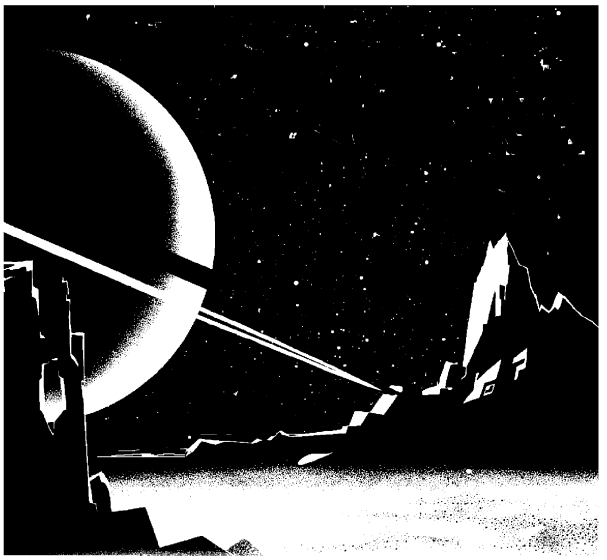


8. **Research** the production of **concrete** from initial through final stages. A visit to a cement company will help. Create a **display** of the step-by-step process. (V-2/V-3 if the trip is included) **CL**

9. **Research and graph** the rate of **oil consumption** in this country in the last 15 years. Then make predictions about our consumption in the future. (V-3) **CL**

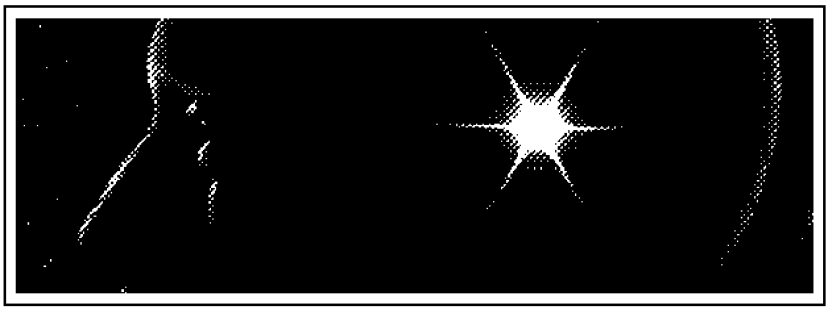
10. Describe the major types of fuels used to produce energy. Present the information through a **mobile** or **bulletin board**. (V-2) **CL**

11. Read and research to learn the history of human beings' use of **rocks for making tools**. Give an **oral report** to the class. (O-2) **CL**



Use your imagination and have a good time being creative with all the activities in EARTH SCIENCE CONTRACTS.

12. Write a **letter** to a **pen pal from another planet**. Explain the uses of natural gas and oil. Describe the functions of a refinery. Describe new methods of recovery and sources of oil currently being explored. Pretend that your pen pal's planet does not have oil or gas. (W-2) **CL**



Dear ✳ ✳ ✳ ✳ ✳,

I deeply appreciate how you sent me a computer picture of your head and another of your planet taken from one of your planet's moons. (We call your planet Saturn. I have always loved its beautiful rings.)

In this letter I wish to explain how we on Earth use natural gas and oil. Choosing the right words will be difficult, but ...

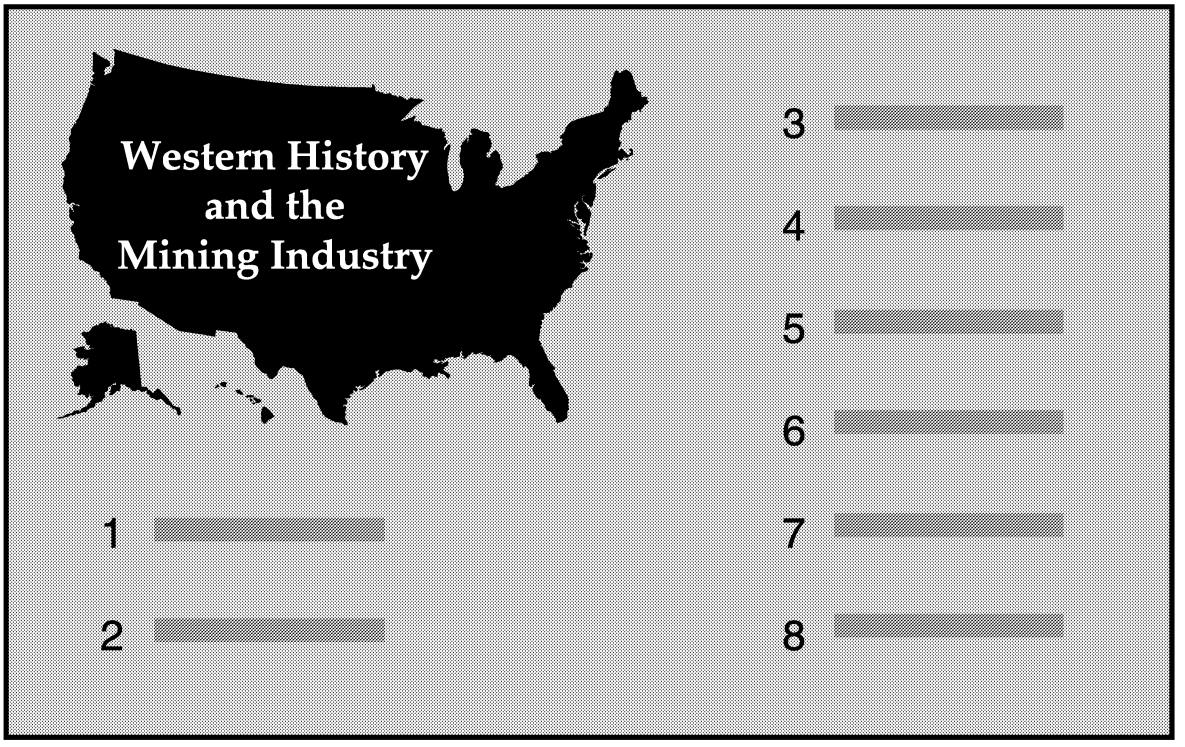
13. Write a **report** in which you describe the differences between **bituminous and anthracite coal** and the mining of each as well as the value of each as a source of energy. Be sure to describe how coal is formed. (W-3) **CL**

14. Write a **biography of an ore mineral** from the time it is formed until it is discovered, mined, processed into a product, and used by a consumer. (W-2) **CL**

15. Make up 10 **story problems based on mining**. Two of the problems must include money or time and two must include ounces, pounds, or tons, also use multiplication and division. Work the problems on another sheet of paper to turn in to your teacher. (W-3)

16. Develop a **chart** of 10 or more of **the Earth's resources** that are important to people. Tell how each one is used. (V-2) **CL**

17. Investigate how the **western United States' history** relates to the development of **the mining industry**. Present an oral report to the class. Be sure to use visuals. (W-2) **CL**



18. Set up a **display** of 10 common **by-products of petroleum**. Label with name and use. (K-1) **CL**

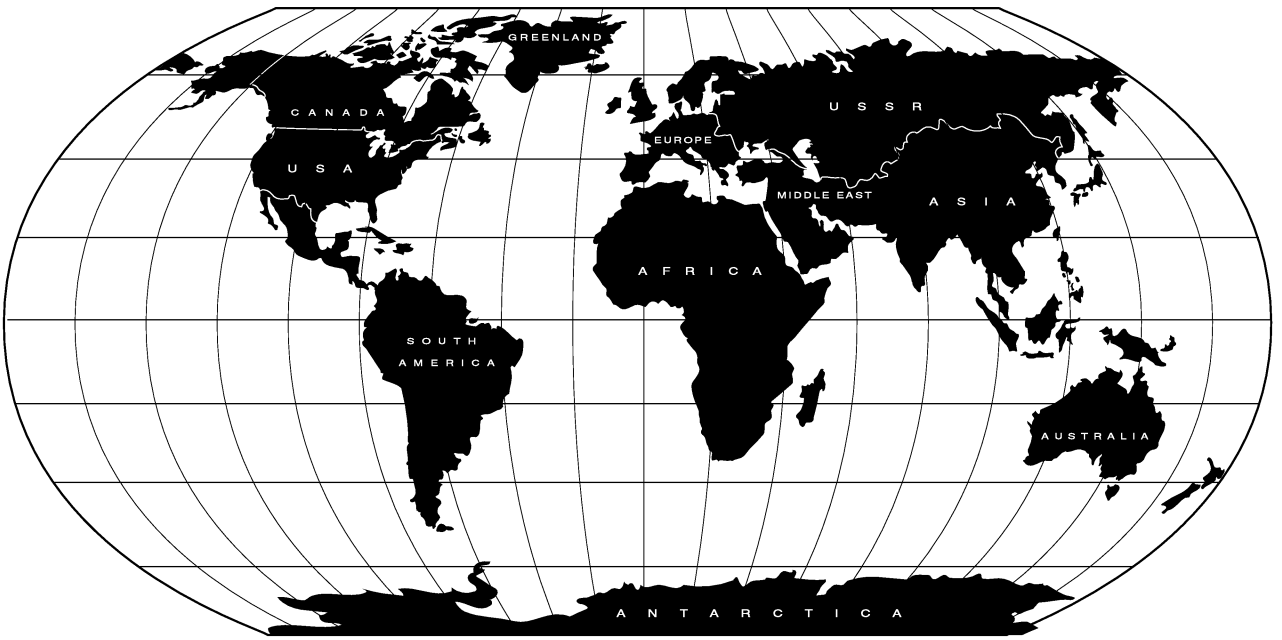
19. Conduct a two-week **recycling drive**—paper, glass, aluminum. Take the collection to a recycling center. Bring the receipt to class and tell about your experience. (K-3) **CL**

20. **Save and weigh** all the **paper** used and **thrown away** in your classroom for one week. Sort out the part that could be recycled. Record the weight at the end of that time. Calculate the amount used (at that rate) in one school year in your classroom. Use that figure to estimate the amount used by the entire school in one school year. It is estimated that one ton of recycled paper saves one acre of trees. What acreage would be saved by recycling your school's paper? (K/M-3) **CL**

21. Plan a one-month **prospecting trip into the wilderness mountains**. Tell the time period and the place you'll go, what minerals you will look for, the equipment you'll need. Plan what food and supplies will be used. Plan transportation. What techniques would you use for prospecting? Present in a written report. (W-3) **CL**

22. Create a **bulletin board** to demonstrate **the formation of coal** from the remains of ancient plant life which are subjected to heat and pressure by overlying sediments. (V-2) **CL**

23. Make a **diagram** of the process of making **gasoline from oil**. Use a large poster board. (V-2) **CL**



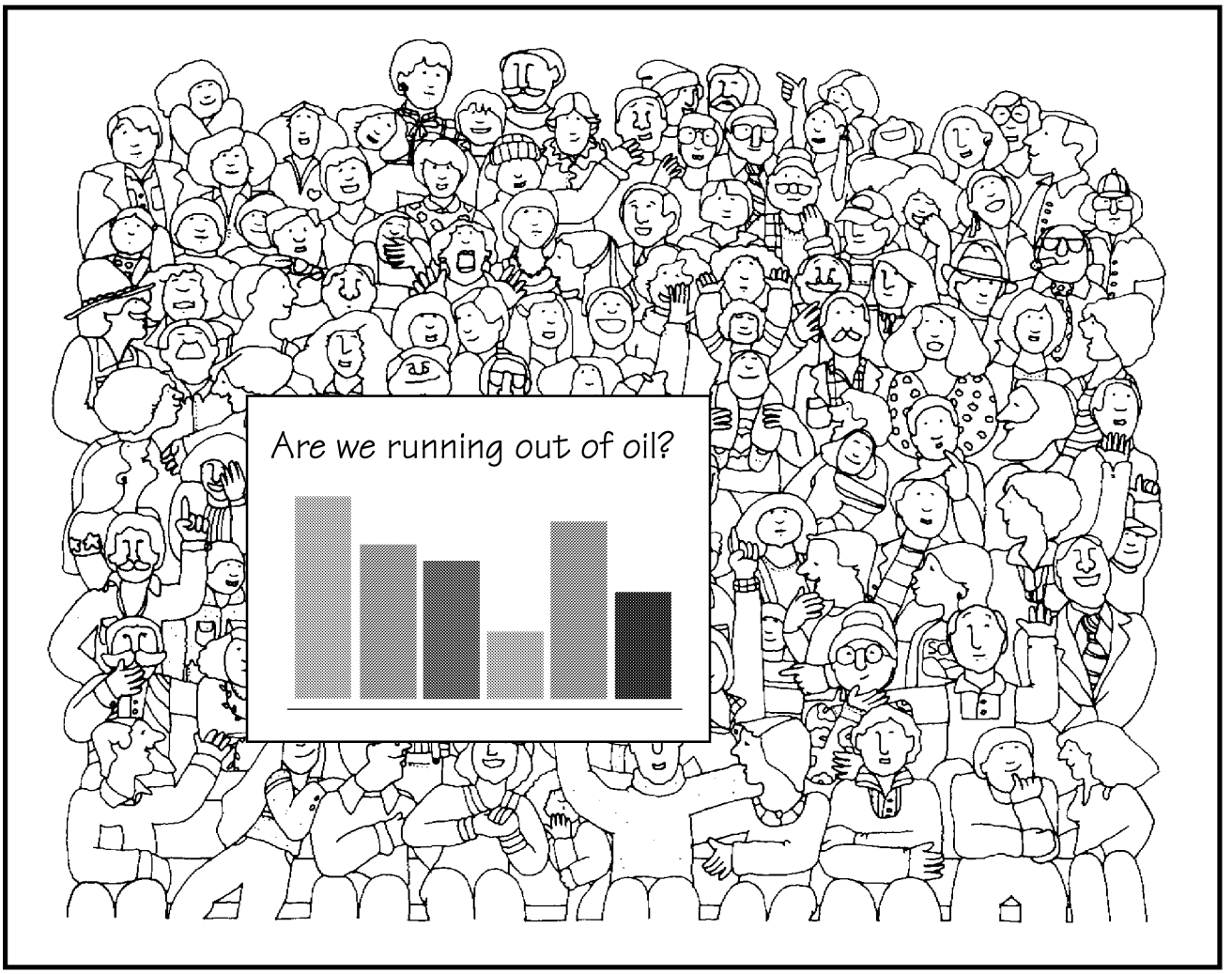
24. **Chart** the world's **transportation routes of oil**. Circle the chokepoints—construction of routes ... look it up! (V-2) **CL**

25. Design a **board game** in which **coal mining** is the **theme**. Ideas: coal is a major resource used for energy and the production of many goods. There are two types of coal and there are different mining techniques. You think of others! (K-2) **CL**

26. **Compare** the values and shortcomings of **different kinds of fuel**. Write an article for a national weekly magazine. (W-2) **CL**

27. **Observe** three hours of **television**. Make a log of each of the ads. Summarize the ways that each is **related to Earth's resources**. (W-1)

28. **Survey** at least 30 **people**. How many think we are running out of oil? Graph the results. You may want to group by age, amount of education, or some other category. (V-3) **CL**



29. **Graph** the amount of the **world's energy** that is derived from oil, coal, hydro, nuclear. This will require research from a current reference book—encyclopedia or almanac. (V-3) **CL**

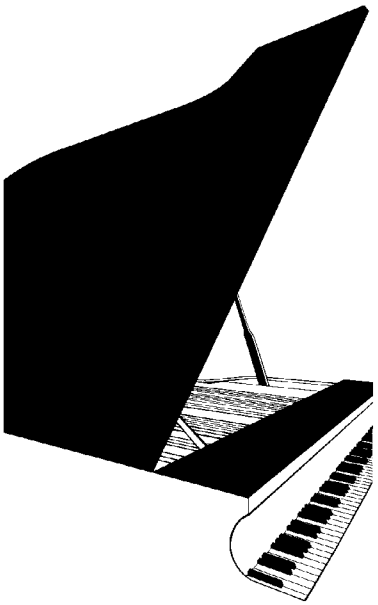
30. Study the **Earth structures** and sedimentary rocks. Then draw **diagrams** of four different ways oil is trapped. (V-2) **CL**

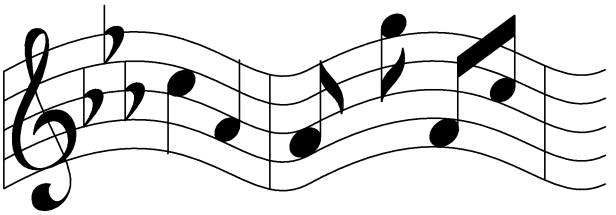
31. Imagine that the human race had never discovered **petroleum**. How would the world be different? Present **orally** to the class. (O-2) **CL**

32. Write a **diary** of a **prospector** who finds an ore deposit and over a period of time develops it into a mine. (O-2) **CL**

33. Make a **game** that will show that our way of living depends on how we use **the resources of the Earth**. (K-1) **CL**

34. Compose a **song** that would encourage the **recycling of metals**. If you play an instrument, accompany yourself. Present in person or on tape for an audience. The song should represent knowledge about the subject. (M-2)





"When you drink from a can ...
Remember the survival of man ....

35. **Invent** a better way of **discovering gold**. Share this through a model or diagram. (V-2) **CL**

36. **Invent** a new way of **mining salt** so that people would not have to go underground. Describe it in an essay. (W-2) **CL**

37. Consider **human dependence upon natural resources** for our day-to-day style of living. Consider the fact that some of those resources are not renewable. Evaluate the impact on the present and the future if people quit using those resources. Present **orally** to the class. (Consider all aspects—pro and con—of this question.) (O-2) **CL**

38. Write an **editorial** on the advantages and the disadvantages of **strip mining**. (W-2) **CL**

39. How might the **development of mineral resources** help raise the economic level and thus the standard of living in poor areas such as Appalachia, China, Ethiopia, Indonesia, etc. Form your judgment and express it in a written paper. (W-2) **CL**

Earth Science Award

Certificate

This certifies that

_____

has completed contracts in seven weeks
and is therefore honored on this

____ day of _____ _____ .

Signed: _____
Teacher

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Release Form for Photographic Images

To Teachers:

To help illustrate to others the experiential activities involved and to promote the use of simulations, we like to get photographs and videos of classes participating in the simulation. Please send photos of students actively engaged so we can publish them in our promotional material. Be aware that we can only use images of students for whom a release form has been submitted.

To Parents:

I give permission for photographs or videos of my child to appear in catalogs of educational materials published by Interact.

Name of Student: _____ (print)

Age of Student: _____ (print)

Parent or Guardian: _____ (print)

Signature: _____ Date: _____

Address:

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Phone: _____

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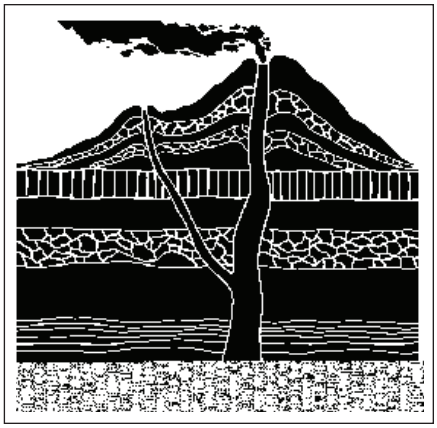

EARTH SCIENCE CONTRACTS

Earth science projects of varying difficulty for individuals and groups

Student Guide

Welcome to EARTH SCIENCE CONTRACTS! You are beginning a seven-week geology adventure. You will design a contract that will fit the learning styles you prefer. You will not simply read and write. In EARTH SCIENCE CONTRACTS you may also draw; build with your hands; experiment; demonstrate; write and sing songs; and create, act out, and video tape scripts.

Sometimes you will work alone. Other times you will be like the scientists: you will work on a team. Once you join a group, you will plan and present something as imaginative as this: Select a fossil and conduct a campaign to have the legislature name it a "state fossil." You can see how in EARTH SCIENCE CONTRACTS you will be doing more than learning science. You will also be using your artistic and verbal abilities.

Your teacher will assist you in many ways:

- helping you choose from the many contract options;
- working with you to gather materials needed for your contracts
- suggesting how to plan and budget your time while you are discovering so much about earth; and
- explaining how you will be evaluated.

During the time that you spend doing these assignments, you will be making projects of your choosing. These projects will help you better understand rocks, minerals, fossils, earth structures, earth movements, and earth's resources.

GUIDELINES The following guidelines are important:

- Complete at least one activity each week.
- Present each week's product in a different way. When your teacher gives you the handouts for each week's work, notice the code at the end of each activity:
  w = written
  o = oral
  v = visual
  k = kinesthetic (involves moving or making)
  m = music
  a = art
- ***Important:*** *During the unit's seven weeks you must use all of the above six learning styles at least once.*

WORKING WITH OTHERS

If you select one or more projects that involve a partner or team, all of you must agree to certain behaviors before you begin:

- Every person strives to work *equally.*
- The group should choose a leader, but each person must work, share ideas, and be a positive team member.
- Each person has a right to be heard and to be treated courteously.
- A team has to reach a consensus (a conclusion reached after everyone has contributed opinions). Not everyone can win every time. There must be give and take.

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POINTS and EVALUATION

Value Points

When you examine the contract options on each week's handout, notice the numerical value (1 to 4) that appears at the end of the contract description. This number represents two things: a *difficulty factor* (how demanding this project's work will be); and the number of **value points** you can earn on the project. This difficulty factor reflects the following considerations:

- the **complexity of materials or resources** you must find, use, and understand
- the **amount of work** required to complete the project successfully
- the **level of *Bloom's Taxonomy*** the project requires ... (Your teacher will explain Bloom's six increasingly difficult levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.)
- whether **team work** is involved ... (When more than one person works on an activity, the product should be even better because there is more effort put into it. Also, additional learning often takes place when individuals interact with one another.)

Evaluation

Each activity will be graded. You will be expected to present your material in such a way that you clearly demonstrate how much work you did and what you learned.

Here is how you can earn an **A**, a **B**, or a **C** for your work in EARTH SCIENCE CONTRACTS:

- You will earn a **C** grade for a) successfully completing one activity in each of the seven weeks and for b) earning a minimum of 18 total points during the seven weeks.
- You will earn a **B** grade for a) successfully completing one activity in each of the seven weeks **plus** one additional activity and for b) earning a minimum of 22 total points during the seven weeks.
- You will earn an **A** grade for a) successfully completing one activity in each of the seven weeks **plus** two additional activities and for b) earning a minimum of 26 total points during the seven weeks.

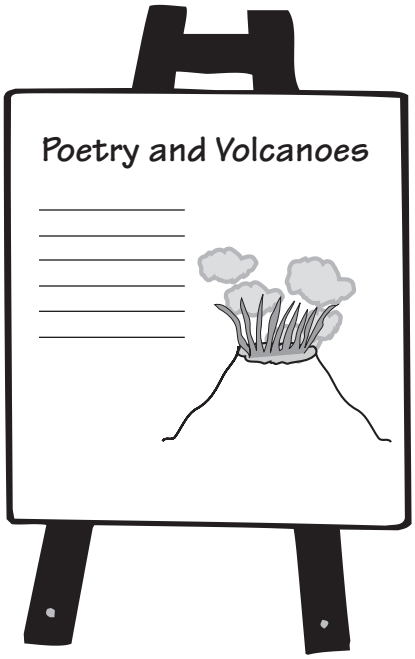
COMPLETING THE ACTIVITIES - 1

The remainder of page 2 plus pages 3 through 5 give you many suggestions on how to prepare and present your contracts. Following these recommendations will help you complete work you will be proud to show others.

Oral projects

1. These projects should be three to five minutes in length.
2. Decide upon what information you would like to present.
3. Decide upon a clear purpose. Write it in one sentence. (See #4 under Plays/Skits/Newscasts on page 3 for an example.)
4. Start your speech dramatically with an **interest catcher**: a question, some statistics, a brief story, or something visual that will capture everyone's eyes.
5. If possible, practice your speech at home in front of a mirror. Imagine that you are looking classmates *right in the eye.* And of course, try to be *enthusiastic.*
6. Be sure to schedule the presentation time with your teacher. Oral presentations are usually better if you use some kind of prop or visual aid.
7. You may wish to help your teacher prepare to videotape or audiotape the presentation if you feel it may be good enough to present at the open house.

Using something visual really helps to hold listeners' attention. You might wish to put something on poster board, the chalkboard, or an easel.



COMPLETING THE ACTIVITIES - 2

Plays/Skits/Newscasts

1. Arrange for the other members, if you are allowed to have partners or teams.
2. Set a time and place to work. Have materials you will need.
3. Determine the information that you would like to present.
4. Now plan your presentation's purpose. Write it in one *clear* sentence. For example, you should not write something fuzzy such as this: Our purpose is to know more about geology. A better (more sharply focused) purpose statement might be like this: Our purpose is to present a humorous and serious skit of the bewilderment persons from prehistoric times feel when they first see a volcanic eruption.
5. Write a rough draft of your presentation. Be sure all members participate equally and that there is agreement on the rough draft.
6. Check the approximate time needed for your draft and adjust according to the teacher's directions. (Most skits are to be about five minutes long.)
7. Consider the dialog. Ask tough questions such as these: Does it sound real? Would these persons talk like this? Does one speech flow out of the previous speech?
8. Consider props: What will you need? Are you able to get them or make them?
9. Write the final copy.
10. All of you should practice your lines at home *over and over* until you all have memorized your parts.

Here's a chance for all your groups' members to be really creative!

11. Schedule several practice sessions with your team. Practice where classmates cannot see you. Use your props until the performance is smooth.
12. Discuss videotaping possibilities with your teacher. If possible videotape your presentation, if only to see it as others are going to see it.
13. If you have time, design a handout giving the presentation's title, writers, and speakers. Print or type it and hand it out just before you present it.

Interviews

1. Study the directions carefully.
2. Write your purpose (why you are interviewing the people) in one sentence. (See #4 under Plays/Skits/Newscasts above for an example.)
3. Decide whom you need to interview (and their ages) in order to accomplish your purpose. Plan possibly to interview a few more persons than you need in order to have substitutes.
4. Plan and *write down* what questions you need to ask.
5. Determine if you will conduct the interview in person, by correspondence, or over the telephone.
6. Consider your friends, neighbors, and relatives. Would any of them be good persons to interview?
7. Approach any potential interviewees courteously and at a convenient time and place.
8. Explain what your project's purpose is and how they might help you.
9. Write or tape record the person's responses. *(Do the interview right the first time.)*
10. Thank each person when you're finished.
11. Collect all your responses.
12. Write your report.

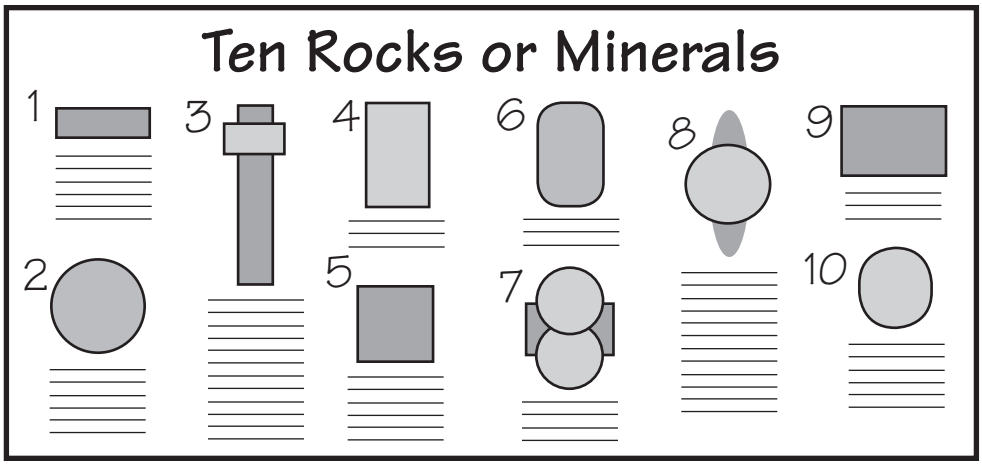
Interview some persons your own age ...

Interview some adults ...

COMPLETING THE ACTIVITIES - 3

Bulletin board or poster board display

1. Read and understand the directions.
2. Decide what your purpose or message will be. Write it in one clear purpose statement. (See #4 under Plays/Skits/Newscasts on page 3.)
3. Discuss with your teacher which bulletin board you will be able to use or where you will stand up your display.
4. Ask for a schedule of the day and time of day that you can put up your bulletin board or display without disrupting others.
5. Determine the exact size of the board or display. Using these measurements as a guideline, make a rough draft sketch of your plan.
6. Use colors, shapes, pictures. Use words sparingly. Art work, including lettering, must be attractive.
7. Think of what good photographers tell themselves: *Simplicity is important.* Don't try to put too much on the bulletin board or display.
8. The captions, particularly the heading, need to be large enough to be read. Be sure the words are "catchy" and to the point.
9. Revise your rough draft and have someone (parent, teacher, etc.) check it for you.
10. Gather background paper, caption letters, and pictures. Prepare and cut them out.
11. Use mounting frames or colored construction paper behind your pictures/illustrations.
12. Allow time to put up your bulletin board or display neatly and carefully.



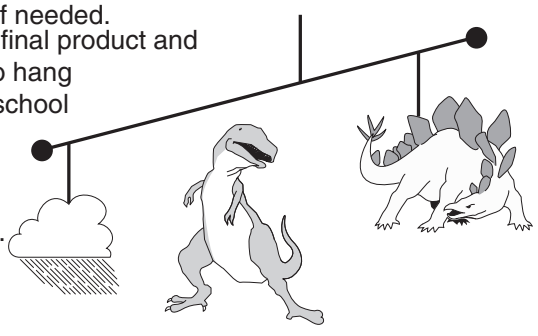
*Do you think the example at the left is **simple** and therefore easily understood?*

Shadow box

1. Be sure you understand this project's *purpose.* What information will you be sharing through this art form? (See #4 under Plays/Skits/Newscasts on page 3.)
2. Make a rough draft plan.
3. Collect materials. A shoe box or similarly styled box is ideal. (You need a box with a lid.)
4. Line the box with paper. Dark lining (black, dark blue, or purple) will make it look like night or outer space. It will be dramatic, but will need a larger light hole. (Light lining is easier to work with.)
5. Place artwork in three-dimensional fashion with objects not blocking others. Objects at the front will appear near the viewer.
6. Convey the purpose with your artwork. If necessary, you may want or need to make a small information statement to attach to the outside.
7. Arrange all objects and artwork before gluing. Objects can be mounted on lid, on floor, or on sides and back wall.
8. Cover the light hole with white tissue or clear plastic.
9. Cover the outside of the box with plain paper.

Mobiles

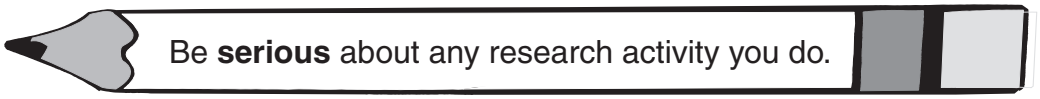
1. Read and understand the directions.
2. Decide what your purpose or message will be and write it in one sentence. (See #4 under Plays/Skits/Newscasts on page 3.)
3. Determine the materials needed. (Fishing line makes a very good "string"). The material should be colorful and strong, yet not heavy.
4. Check with your teacher on how, where, and when it can be hung in the classroom.
5. Discuss your plans with a parent or teacher. Make revisions if needed.
6. Make the final product and arrange to hang it in your school building where everyone can see it.



COMPLETING THE ACTIVITIES - 4

Research reports

1. Your goal is to write a report of at least two pages (unless otherwise noted).
2. Be sure you really understand the directions and your purpose. To make sure your purpose is clear, write it in one sentence. (See #4 under Plays/Skits/Newscasts on page 3 for an example.)
3. Gather the references you will need. You must use at least three resources (books, magazines, etc.). Be sure to get several more than the minimum set by your teacher.
4. Read the material and take notes in an organized manner.
5. After your have read a paragraph or page, close the book and decide on a *heading* (a title) for the notes you are going to take.
6. Place this heading on top of a note card or sheet of paper. For example, if you have read on the Vesuvius and Pompeii eruptions, you might make one heading called *Pompeii Eruption.* Next you would write in your own words a summary of what you read about the eruption on Pompeii. ***Important:*** *Most of the time you should put what you have read into your own words. Avoid copying word for word what you have read.* In rare circumstances, you may use a few words or phrases exactly as they appear on the page—but *only* if you use quotation marks and tell the reader *who* wrote it.
7. On a separate note card (or on a sheet of paper) keep a list of all your references—the titles and authors of each book/article you read.
8. When you read more on your topic, put your notes on another note card or note sheet with a different title. For example, after reading on Pompeii, you would also need a note sheet or note card with a title such as *Vesuvius Eruption*
9. Finally, when you write your report, at its end have a title, a clear statement of your report's purpose, and a bibliography (a list of authors and books/articles you consulted).

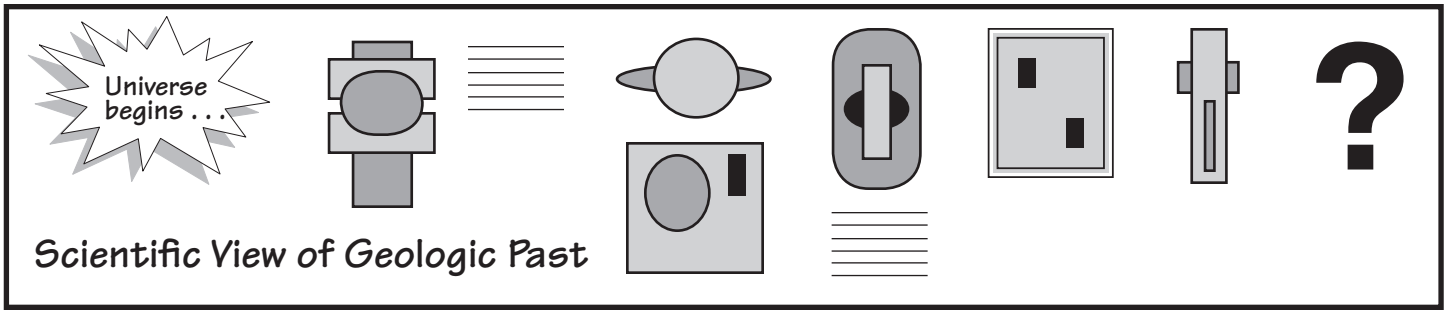


*As mentioned above, use several sources and take notes on **separate** note sheets or note cards.*

*This second sheet should have a heading differing from **Pompeii Eruption.***

Timeline

1. Determine how much time you will cover and how much detail you plan to include.
2. Plan whether or not to include illustrations.
3. Use a long strip of paper (adding machine tape? ... butcher paper?) or glue together pieces of paper to make your own strip. A reasonable length might be three or four feet.
4. Research your information.
5. Make a rough draft of your information on a mockup of your TIME LINE. Have an adult check over your draft and give you suggestions.
6. Make any necessary revisions.
7. Use a pencil to plan the spacing on your strip. Mark the middle of the strip and plan for halfway through the time period to be placed there. Mark the quarter and three-quarter marks on the strip.
8. Carefully plan and mark the strip to create balance.
9. Check your final product. It should be attractive, should be legible (carefully printed), and should clearly convey important information.



EARTH SCIENCE UNIT CONTRACT (Sample)

I understand that each week I must complete at least one activity on or before the due date. I also must use six different learning styles during this EARTH SCIENCE CONTRACTS unit. See the code system: **w** ... **o** ... **v** ... **k** ... **m** ... **a** ...

Weeks 1-2: Rocks and Minerals

		Code	Value Pts.	Due Date	Completed on	Parent's Initials
*	Activity # 6	O	3	10/5	10/4	LR
*	Activity # 19	V	3	10/12	10/11	LR
	Activity #					

* = required activity — Total: 6

Week 3: Fossils and Dinosaurs

		Code	Value Pts.	Due Date	Completed on	Parent's Initials
*	Activity # 3	K	3	10/19	10/17	LR
*	Activity # 13	OW	3	10/19	10/18	LR
	Activity # 16	W	2	10/19	10/19	LR

= required activity — **Total:** 8

Total:

Weeks 4-5: Earth Structures and Movements

		Code	Value Pts.	Due Date	Completed on	Parent's Initials
*	Activity # 22	K	2	10/26	10/25	LR
*	Activity # 28	M	3	11/5	11/4	LR
	Activity #					

* = required activity — **Total:** 5

Weeks 6-7: Earth Resources

		Code	Value Pts.	Due Date	Completed on	Parent's Initials
*	Activity # 18	W	4	11/12	11/12	LR
*	Activity # 20	KM	3	11/19	11/19	LR
	Activity # 37	O	2	11/19	11/18	LR

* = required activity — **Total:** 9

Total Points for 7 weeks: 28 = A

I understand this grading scale:

C = 18 points
B = 22 points
A = 26 points

Signed by Shirley Raines (student)

I have reviewed the above requirements with my son or daughter.

Signed by Lesley Raines (parent)

C = 7 activities (min. of 1 per wk.) ... each completed at satisfactory level + all adding up to 18 value or difficulty level pts.

B = 8 activities (min. of 1 per wk. + 1 additional) ... each completed at satisfactory level + all adding up to 22 value or difficulty level pts.

A = 9 activities (min. of 1 per wk. + 2 additional) ... each completed at satisfactory level + all adding up to 26 value or difficulty level pts.

Sample contract completed by sixth grader

The Diary of Goruban

Navigator/Geologist
Mexas III spacecraft
Planet WVZ 13

What makes this a particularly good contract is the boy's imagination.

Notice how he didn't call our planet ***Earth.*** *Instead he remembered that Earth is the third planet from the sun.*

Two other details also make his diary come alive: the clever names he created for his spacecraft's commander and the woman whom he finds attractive ... and the way he attaches ***quake*** *and* ***ling*** *after the Earth's name....*

Booboo 9 We landed on XQR 3 today in our Mexas III spacecraft. We call this planet XQR 3 because it is the third planet revolving around XQR—this system's star. Our government back home on planet WVZ 13 has sent a team of us on an exploration to learn more about the geologic features of XQR 3. After we rest a few hours and make a few repairs on Mexas III, we will be begin our scientific study. I am hoping for some time alone with Yahawanna.

Booboo 10 We awoke today to find our spacecraft rocking. In fact, all the buildings on and the surface of XQR 3 seemed to be shaking. The disturbance lasted only a short time. When it ended, we went outside to discover that bricks had fallen off some buildings, windows were broken, some buildings had fallen down, some XQR 3 people had been injured, and giant cracks were in the ground. Captain Zerastro said we had survived what is called a "XQR 3-quake." Our scientific research team met with XQR 3 scientists late today to learn what causes these quakes. A full report will be issued in three days.

Booboo 11 At twilight as XQR slowly sank beyond the horizon, I sat with the lovely Yahawanna. She and I listened to the XQR 3 news reports and heard about a huge sea wave in XQR 3's giant peaceful ocean. (They call it the Pacific Ocean.) Captain Zerastro assigned Yahawanna and me to research this event and prepare a report for the government of WVZ 13. One XQR 3-ling scientist whom we talked with said this giant sea wave is called a tsunami and is caused by an undersea XQR 3-quake or volcanic eruption.

Booboo 12 Zabupa! This planet XQR 3 has many geologic events happening. Its surface seems to be constantly changing from many sources. For example, volcanic eruptions took place today in countries they call Indonesia and Mexico. These countries are far apart. We are told that volcanoes are caused by molten rock deep in XQR 3 that expands until it is forced out through weak spots in XQR 3's crust.. Some of these erupt in the form of ash, while others have lava flowing out. More later. It is time for the beautiful Yahawanna and me to get on with our research. This project is one I will enjoy. Trabootha!

VOCABULARY

Use these words while working on this unit's varying contract activities and you will expand your learning..

Basic list

clay
copper
core
crust
diamond
dinosaur
erosion
fossil
geology
hardness scale
igneous rock
lava
limestone
magma
metamorphic
minerals
ore
petrified wood
pollution
prehistoric
quartz
sandstone
sedimentary rock
solar energy
topsoil
weathering

Advanced list

abrasion
bauxite
biotite
calcite
cast fossil
crude oil
decay
feldspar
flint
fossil fuels
geologic history
granite
graphite
gushers
halite
hematite
hornblende
humus
mantle
marble
mica
mold fossil
muscovite
natural gas
obsidian
open-pit mining
petroleum
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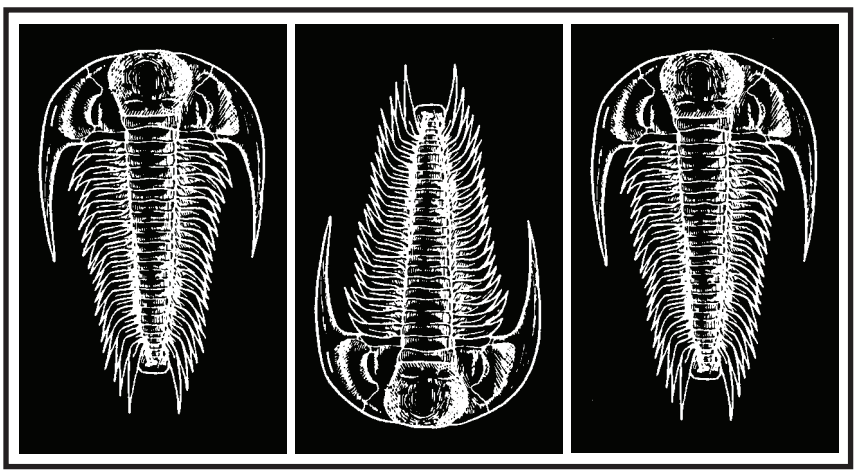
shaft mining
shale
slate
smelting
strip mining
sulfur
tactonite
talc
tungsten
uranium
vein



How many years ago?