



SUM(IT)-UP

VEGETATION

GREEK
AND
LATIN

WATER

GEOLOGY

POTPOURRI



SUBJECTS: Science, Social Studies, Math, English/
Language Arts, Foreign Language

GRADES: 6-8

DURATION: One class session

GROUP SIZE: One classroom of 25-30 students

SETTING: Indoors

KEY VOCABULARY: Organic Act, mandate, protect, provide, aquatic, groundwater, watershed, runoff, tributary, spring, sinkhole, karst, Sinkhole Plain, pit, dome, vertical shaft, carbonic acid, pollution, scientific investigation, science conference, natural resources, canopy, adaptation, subterranean, troglobite, troglophile, troglone, herbicide, biologist, centipede, prefix, suffix, limestone, sandstone, historic, cemetery, carrying capacity

ANTICIPATORY SET: We have been studying about Mammoth Cave and the unique karst region of south-central Kentucky. Today, as a review, we are going to have a quiz game competition. How many of you have ever watched, or are familiar with, the game show "Jeopardy"?

OBJECTIVES: The students will be able to answer questions on a variety of topics from Mammoth Cave curriculum activities, culminating with one final question.

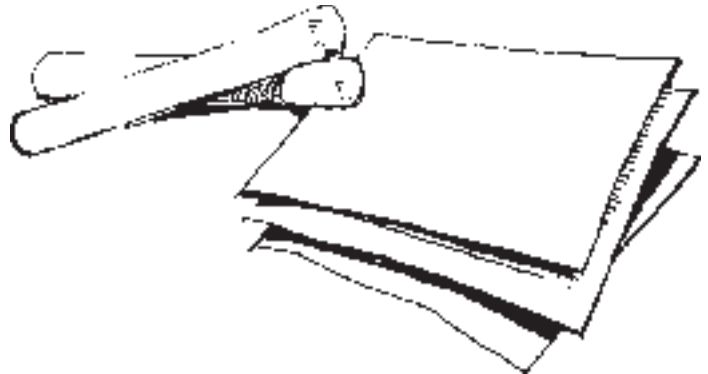
MATERIALS: Chalk or dry erase markers, Category Cards, Question Cards, Questions & Answers

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BACKGROUND: Previous material from the Mammoth Cave curriculum has focused on the protect and provide mandates of the National Park Service and on ways that a balance between these two concepts is constantly juggled at Mammoth Cave National Park. Protection of the groundwater resources depends upon understanding the unique Karst geology found within the Sinkhole Plain area of south-central Kentucky. This unique geology presents special challenges to some of the life forms found in the region, especially to those creatures living all or part of their lives in caves. An understanding of these natural resources and possible hazards can assist community planners in making the best decisions in regard to expansion. This understanding can help officials (city council members, magistrates, etc) as well as citizens protect natural and cultural resources and still provide for the economic, social, health needs and other concerns of its residents and visitors.

In order to understand their resources, community leaders and scientists must first learn as much as possible about the plants, animals, and geology of their region. Students practiced various scientific methods of investigation for both natural resources (**That's My Tree!**) and for historical research (**Back to the Past**) as they worked with this curriculum. They learned the basis for scientific expressions and realized that the Greek and Latin root words used in science could help them with their scientific research and with their native language skills (**It's All Greek (and Latin) to Me!**).

The caves that draw visitors from around the world can create conflicts for national park and community managers as they attempt to protect the special features that lure visitors - sometimes beyond the capacity of the resource! In the lesson, **Mammoth Math**, students learned the importance of using statistical data in making these decisions. And from **Making Headlines**, students learned to gather their information carefully as they practiced sorting facts from opinions.



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PROCEDURE:

1. Prior to class the teacher should choose any five Sum(it)-Up Category Cards. These should be taped in a line across the top of the board or other area easily seen by the students. Tape five numbered cards, in numerical order from one to five, under each category. The teacher may wish to tape or write the question on the back of the card prior to hanging or they may elect to simply read the corresponding question as the students choose the category. Note: Additional questions and/or categories may be added if the class has more than 25 students.
2. The teacher asks: Are you familiar with the game show "Jeopardy?" After dividing into teams, team members will take turns answering questions on topics they have studied. These topics focus on caves and the south-central Kentucky area.
3. Divide the class into three teams. Station each group in separate areas of the room.
4. The teacher explains that each team will send one student at a time to the front of the room to write their answer on the board. In order to score, students must write their answer in the form of a question.
5. Send the first rotation to the board and have the three student contestants pick up a piece of chalk or a dry erase marker. Team one picks the category. The first question is read. (Questions and answers for each category are found on the Questions & Answers Sheet. Some alternate, correct answers are also given.) The first of the three "contestants" to correctly write the answer in the form of a question, put the chalk/marker down, and turn around and face the class gets the points.
6. The next player from each team now goes to the board for the second question.
7. This process is continued until all the questions are answered. Like the television program, the winning team selects the next category. But in this version, contestants do not select the level of the question. They will just answer each question in order.
8. All questions are worth the same point value (100 points) but questions will increase in difficulty as the category progresses.
9. After all the questions are exhausted, the final Sum(it)-Up topic will be read. Teams vote on a final Sum(it)-Up representative. Each team will decide on the number of points to wager. Use the same procedure as above in asking the question, but this round is worth double points for correct answers.

CLOSURE: We have reviewed the topics we have been working on. Prizes include -- Mammoth Cave knowledge, the challenge of competition, and the thrill of victory!

EVALUATION: The teacher is able to evaluate the students through observation, points earned, and each student's participation.

EXTENSIONS:

Have the students create questions to use in a second game.

SUM(IT)-UP

QUESTIONS & ANSWERS

CATEGORY: CAVE LIFE: "Location, Location, Location"

1. In the darkness of a cave, animals can not rely on their sense of sight. Name three other senses these animals might rely upon.

What are touch [feeling], smell, and hearing?

2. These are elongated to assist animals in dark caves to "feel".

What are antennas?

3. Bats aren't blind, but they use this to "see" in the dark.

What is sonar? [echolocation]

4. These aquatic cave animals have no eyes. Their name reflects this inability to see.

What are blind cavefish? [eyeless crayfish]

5. These creatures live their entire life in a cave. They are true cave dwellers.

What is a "troglomite"?

6. As a cave visitor, people and bats would be classified as this.

What is a "troglome"?

CATEGORY: GEOLOGY: "Rock-n-Roll"

1. This stone was deposited by an ancient sea.

What is limestone?

2. This rock forms the protective "roof" over Mammoth Cave.

What is sandstone?

3. These are found where underlying rock layers have collapsed to form depressions.

What are sinkholes?

4. This is the name of the rolling plain found in south-central Kentucky, near Mammoth Cave National Park.

What is the Sinkhole Plain? [Karst; karst topography]

5. Caves are formed when the carbonic acid found in water does this to limestone rock.

What does it dissolve?

6. This is an area of land that collects rainwater and melted snow as it drains to the lowest point. HINT: Don't shed a tear if you're wrong.

What is a watershed?

SUM(IT)-UP

QUESTIONS & ANSWERS

CATEGORY: POTPOURRI: "In the 'C'"

1. A subterranean cavity full of life, history, and wonder.

What is a cave? [Mammoth Cave]

2. An insect commonly found in a cave.

Where are cave crickets? [cave beetle]

3. The living visit this place to honor and learn about the people who lived before.

What is a cemetery?

4. A meeting of scientists where they present and discuss new research.

What is a (science) conference?

5. They are found deep within the cave in an aquatic habitat.

What are blind cavefish? [eyeless crayfish]

6. Created by tree tops competing for sunlight.

What is a canopy?

7. The maximum number of people that can go in the cave each day.

What is capacity?

8. To preserve, to protect, to avoid destructive use of natural resources, to maintain a constant environment.

What is conserve?

CATEGORY: WATER: "Water, Water Everywhere"

1. Underground it's the Echo River. Above ground it's called this.

What is the Green River? [Echo River Spring]

2. This finds holes and cracks in the rock as it moves over the ground.

What is water?

3. It carries toxins from farms, highways, and the railroad to the ground water.

What is runoff? [water; sinkhole]

4. When this floods it carries needed nutrients to underground organisms for food.

What is the Green River?

5. These are mini rivers that feed into larger ones.

What are tributaries? [anastomosis]

6. This is the spot where water comes out of the ground to empty into a surface stream or river.

What is a spring?

7. Water quickly travels down these "directional" paths to the water table

What is a vertical shaft? [dome; pit]

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QUESTIONS & ANSWERS

CATEGORY: VEGETATION: "Make Like a Tree"

1. Below ground it was made into pipes that carried water. Above ground it has tulip shaped blossoms. It is very straight and tall. HINT: The Kentucky state tree.

What is a Tulip Poplar tree?

2. The dominate trees in the forest of Mammoth Cave National Park.

What are the oak and hickory trees?

3. The journey of these fallen parts provides nutrients for underground microbes.

What are leaves? [decaying vegetation]

4. This is created by tree tops competing for sunlight.

What is a canopy?

5. A good variety of this is necessary to have a healthy forest.

What are tree species? [vegetation]

6. Decaying leaves and water combined to create this chemical responsible for dissolving limestone.

What is carbonic acid?

CATEGORY: GREEK & LATIN: "Getting to the Root of it all"

1. This is a root word that means "cave".

What is "troglo" "[speleo]"?

2. The location of something (like a cave or ant nest) that is under the ground.

What is "subterranean"?

3. To the cave I am a true lover.

What is a "troglophile"?

4. In places other than national parks, I'm used to kill pesky plants.

What is "herbicide"?

5. A person who studies living things.

Who is a "biologist"?

6. Using your Latin, name a surface creature with 100 feet.

What is a "centipede"?

7. Life that is dependent upon water.

What is "aquatic"?

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QUESTIONS & ANSWERS

CATEGORY: MIND YOUR P's & Q's: "P' is the Word"

1. This is a segment found at the beginning of a word.

What is a prefix?

2. A Latin word meaning "before".

What is "pre-"?

3. In the United States, these can find their ancestors in cemeteries.

What are people?

4. The two missions of the National Park Service.

What are to "protect" and to "provide"?

5. This has a negative affect on the water quality.

What is pollution?

6. An educated guess about the outcome of an experiment, based on data already collected.

What is a prediction?

CATEGORY: Reaching the Summit

TOPIC #1 - IT RULES

QUESTION: The Act that established the National Park Service.

ANSWER: What is the Organic Act?

TOPIC #2 - NEIGHBORHOOD NEEDS

QUESTION: The source of drinking water in south-central Kentucky.

ANSWER: What is groundwater?

TOPIC #3 - DOWN THE DRAIN

QUESTION: The bowl-shaped depression that swiftly carries water under ground.

ANSWER: What is a sinkhole?

TOPIC #4 - A LITTLE CHANGE

QUESTION: This change over time helps an animal to survive.

ANSWER: What is adaptation?

TOPIC #5 - SCIENTIFIC RESEARCH

QUESTION: To be certain they really understand, scientists ask a lot of these.

ANSWER: What are questions?

SUM(IT)-UP
CATEGORY CARDS

LOCATION, LOCATION,
LOCATION

ROCK-N-ROLL

WATER, WATER
EVERYWHERE

MAKE LIKE A
TREE

IN THE "C"

GETTING TO THE
ROOT OF IT ALL

"P" IS THE WORD

REACHING THE
SUMMIT

SUM(IT)-UP
QUESTION CARDS

1

2

3

4

5

6

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CORE CONTENT

- SC-M-3.5.4** The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.
- SC-M-3.5.3** For most ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
- SC-M-3.5.2** Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans, are consumers, and obtain their food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.
- SC-M-3.5.1** A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
- SC-M-3.4.2** Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Extinction of species is common; most of the species that have lived on Earth no longer exist.
- SC-M-3.4.1** Biological change over time accounts for the diversity of species developed through gradual processes over many generations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.
- SC-M-2.3.4** The Sun is the major source of energy for Earth. The water cycle, winds, ocean currents, and growth of plants are affected by the Sun's energy. Seasons result from variations in the amount of the Sun's energy hitting Earth's surface.
- SC-M-2.2.1** The Earth's processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth's history is also influenced by occasional catastrophes such as the impact of an asteroid or comet.
- SC-M-2.1.7** Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.
- SC-M-2.1.5** Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. Water dissolves minerals and gases and may carry them to the oceans.
- SS-M-4.4.4** Individual perspectives impact the use of natural resources (e.g., watering lawns, planting gardens, recycling paper).
- SS-M-4.4.3** The natural resources of a place or region impact its political, social, and economic development.
- SS-M-4.4.2** The physical environment both promotes and limits human activities (e.g., exploration, migration, trade).