



DO OR DIE

SUBJECTS: Science, English/Language Arts, Health

GRADES: 6-8

DURATION: 2-3 class periods

GROUP SIZE: One class of 25-30 students (or less)

SETTING: Indoors

KEY VOCABULARY: adaptation, troglodite, troglobite, trolophile

ANTICIPATORY SET: Today we are going to learn how cave animals adapt to the environment in which they live.

OBJECTIVES: The students will be able to: 1) list what they already know about a specific cave animal; 2) list what they want to know about a specific cave animal; 3) list what they learned, after conducting research, about a specific cave animal.

MATERIALS: pen or pencil, KWL Chart Worksheet.



BACKGROUND: From the beginning, thousands of animals and plants have evolved, lived, reproduced and died. Species disappear if they are not able to adapt to our ever-changing world. Fire, flood, drought, earthquakes or changes in climate may alter an environment. If plants and animals are not able to adjust or flee the area in which the hazard is taking place they may eventually disappear or become extinct.

When change occurs in the environment, individual characteristics of a species may help or hinder the survival of an entire population. If a characteristic is beneficial, the species survives the changing situation and passes on the genetic code to assure the survival of its offspring. If the plant or animal is hindered by a particular characteristic, the species must either change or face possible extinction. The best known example of a species that was not able to adapt to a changing world is the dinosaur. Organisms able to cope with stress over time are the ones that tend to survive.

Adaptations to a changing environment can take varying amounts of time to occur. Some adaptations happen quickly. The immunity of insects to pesticides is one example. Other adaptations can take thousands of generations or even millions of years to occur. The loss of eyes by true cave dwellers (troglobites) is an example of a slow adaptation.

Cave animals are masters of adaptation. Some species living deep within a cave are often white or pink and blind or eyeless. These cave-adapted species have been isolated from the surface environment for many thousands of years. They have lost the ability to produce pigment in their skin or outer layer of the body, as well as the ability to produce eyes.

Cave animals often have intriguing differences in their biology. Sensory structures (other than eyes) often are more developed in true cave animals than in similar species that have never lived in a cave habitat. Often their antennae and legs are much longer than their above ground counterparts and their metabolism has slowed down considerably as an adaptation to the extremely nutrient-poor environment of a cave.

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PROCEDURE:

1. The teacher explains that there are three categories of animals that live in caves. They are troglobites, troglaphiles, and troglaxenes.



Troglobites are true cave dwellers. These animals live their entire lives in caves. They are found nowhere

else! They usually lack skin pigment and are blind or eyeless. In the Mammoth Cave area, troglobites include the eyeless crayfish (*Orconectes pelucidus*), the northern cavefish (*Amblyopsis spelaea*), the southern cavefish (*Typhlichthys subterraneus*), the Kentucky Cave Shrimp (*Palaemonias ganteri Hay*), an aquatic isopod (*Asellus stygius*), amphipods (like *Stygobromus exilis* or *S. vitreus*), blind cave beetles (*Neaphaenops tellkampfi*), and the blind cave harvestman (*Phalangodes armata*), among others.

Troglaphiles are called cave lovers. These animals live in caves or in places on the surface that are dark and damp like caves. These animals are able to

complete their entire life cycle in a cave or in suitable habitats on the surface.



Examples include the cave salamander (*Eurycea lucifuga*), a surface crayfish (*Cambarus bartoni*), some amphipods (*Crangonyx sp.*), sculpins (*Cottus carolinae*), and the spring cavefish (*Chologaster agassizi*).

Troglaxenes are cave visitors. These animals live only a part of their lives in caves. Most troglaxenes leave the cave to find their food. All troglaxenes have eyes and use them to spot predators and to locate food. Bats (including the big and little brown bats, Indiana bat, gray bat, eastern pipistrelle), camel crickets (*Ceuthophilus gracilipes*), the common cave cricket (*Hadenocerus subterraneus*), and pack rats (*Neotoma pennsylvanica*), are found in Mammoth Cave National Park.



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2. The teacher explains to the students that the class will be divided into three groups. Group one will investigate an animal from the troglobite classification, group two will investigate an animal from the troglophile classification and group three will investigate an animal from the troglaxene classification.
3. The investigation will begin by making a KWL chart. See example below for bats.
4. Each group of students will decide which animal in their classification they will investigate. Note: Teachers may want to divide the class into six groups instead of three if they feel the groups are too large.
5. Using the chart, each group will list what they know about their animal choice. One person will need to act as the recorder.
6. Using the chart, each group will make a list of questions about what they want to know about their animal choice.
7. Students will use various reference books, science text books, the internet and other reference tools to answer questions and gain knowledge with regard to their animal choice. Using the chart, information learned is recorded in the What We Learned column.
8. Each group will appoint a spokesperson (or persons) to report to the entire class what they learned about their chosen animal.

CLOSURE: Today we have taken a close look at cave animals and their ability to adapt to the harsh environment of the totally dark world of a cave. By conducting this investigation we have learned that if an animal is not able to change it stands a good chance of becoming extinct. Only those animals that are able to adapt or adjust to the ever-changing world are able to survive.

EVALUATION: The teacher is able to evaluate the students through participation within their small groups, by looking at their charts, and by listening to group discussions and reports.

EXTENSIONS:

1. Using information learned from this lesson students could create an imaginary animal that possessed the same or similar adaptations as cave animals.
2. Use the same KWL chart method to investigate other animals or plants.

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KWL CHART WORKSHEET

K – What we know	W – What we want to know	L – What we learned

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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-3.4.2** 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.
- RD-H-4.0.10** Follow the sequence of information.
- RD-H-4.0.9** Apply the information contained in practical/workplace materials.
- RD-H-4.0.8** Identify essential information needed to accomplish a task.
- RD-H-2.0.13** Analyze the content as it applies to students' lives and/or real-world issues.
- RD-H-x.0.6** Paraphrase important parts of a passage.
- RD-H-x.0.1** Locate, evaluate, and apply information for a realistic purpose.
- RD-M-4.0.13** Explain how organizational patterns and/or text features (e.g., pictures, charts, graphs, format) relate to the content of a practical/workplace passage.
- RD-M-4.0.12** Identify the sequence of activities needed to carry out a procedure.
- RD-M-4.0.11** Locate and apply information for a specific purpose (e.g., following directions, completing a task).
- RD-M-2.0.14** Summarize information from a passage.
- RD-M-2.0.13** Identify supporting details and explain their importance in a passage.
- RD-M-2.0.12** Apply knowledge of organizational patterns (e.g., cause and effect, comparison, contrast, sequence) to understand a passage.
- RD-M-2.0.11** Use text features (e.g., lists, charts, graphs, tables of contents, indexes, glossaries, captions, diagrams, headings) to understand a passage.
- RD-M-x.0.10** Connect information from a passage to students' lives and/or real-world issues.
- RD-M-x.0.9** Reflect on and evaluate what is read.

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CORE CONTENT

RD-M-x.0.7 Skim to get the general meaning of a passage.

RD-M-x.0.6 Scan to find key information.

WR-M-1.4 Transactive writing is informative/persuasive writing that presents ideas and information for authentic audiences to accomplish realistic purposes like those students will encounter in their lives. In transactive writing, students will write in a variety of forms such as the following:

- letters
- speeches
- editorials
- articles in magazines, academic journals, newspapers
- proposals
- brochures
- other kinds of practical/workplace writing.

Characteristics of transactive writing may include :

- text and language features of the selected form
- information to engage/orient the reader to clarify and justify purposes
- ideas which communicate the specific purpose for the intended audience
- explanation and support to help the reader understand the author's purpose
- well-organized idea development and support (e.g., facts, examples, reasons, comparisons, anecdotes, descriptive detail, charts, diagrams, photos/pictures) to accomplish a specific purpose
- effective conclusions.