

Teaching Activity Guide

BATS

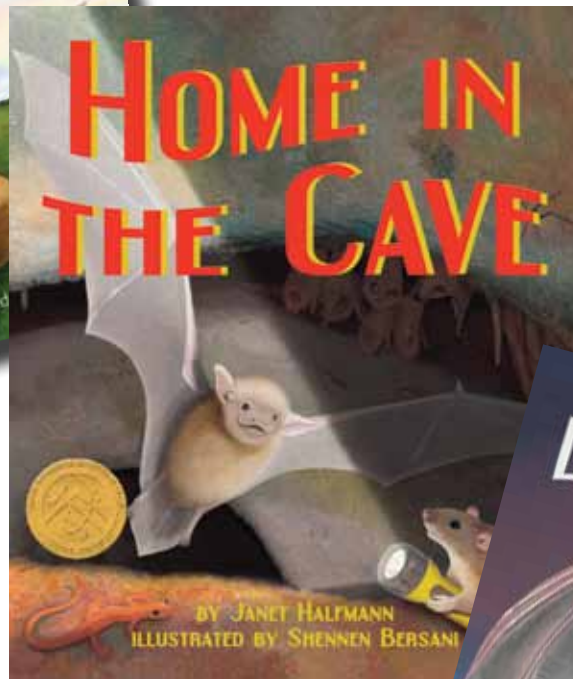
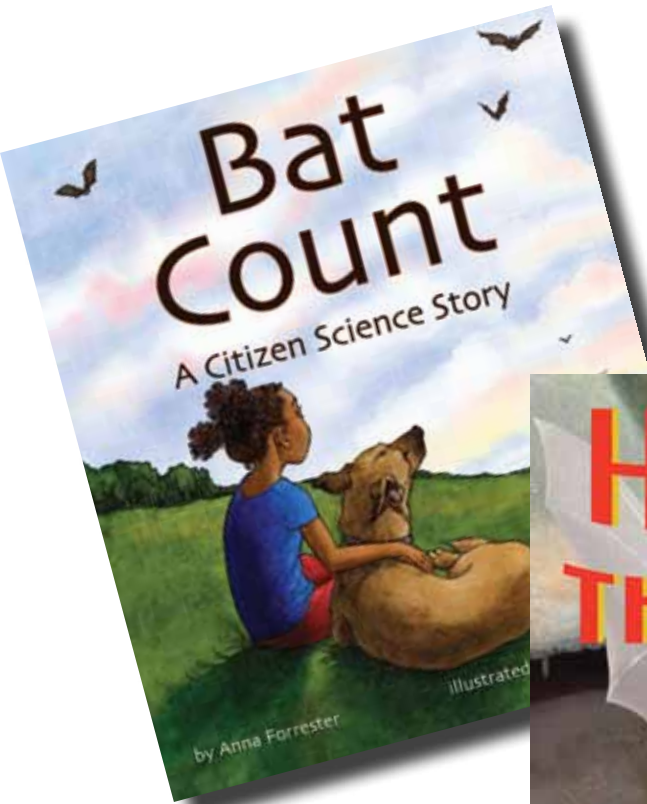


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How to Use This Activity Guide (General)

There are a wide variety of activities that teach or supplement all curricular areas. The activities are easily adapted up or down depending on the age and abilities of the children involved. And, it is easy to pick and choose what is appropriate for your setting and the time involved. Most activities can be done with an individual child or a group of children.

For teachers in the classroom: We understand that time is at a premium and that, especially in the early grades, much time is spent teaching language arts. All Arbordale titles are specifically selected and developed to get children excited about learning other subjects (science, geography, social studies, math, etc.) while reading (or being read to). These activities are designed to be as comprehensive and cross-curricular as possible. If you are teaching sentence structure in writing, why not use sentences that teach science or social studies? We also know and understand that you must account for all activities done in the classroom. While each title is aligned to all of the state standards (both the text and the For Creative Minds), it would be nearly impossible to align all of these activities to each state's standards at each grade level. However, we do include some of the general wording of the CORE language arts and math standards, as well as some of the very general science or social studies standards. You'll find them listed as "objectives" in italics. You should be able to match these objectives with your state standards fairly easily.

For homeschooling parents and teachers in private schools: Use as above. Aren't you glad you don't have to worry about state standards?

For parents/caregivers: Two of the most important gifts you can give your child are the love of reading and the desire to learn. Those passions are instilled in your child long before he or she steps into a classroom. Many adults enjoy reading historical fiction novels . . . fun to read but also to learn (or remember) about historical events. Not only does Arbordale publish stories that are fun to read and that can be used as bedtime books or quiet "lap" reading books, but each story has non-fiction facts woven through the story or has some underlying educational component to sneak in "learning." Use the "For Creative Minds" section in the book itself and these activities to expand on your child's interest or curiosity in the subject. They are designed to introduce a subject so you don't need to be an expert (but you will probably look like one to your child!). Pick and choose the activities to help make learning fun!

For librarians and bookstore employees; after-school program leaders; and zoo, aquarium, nature center, park & museum educators: Whether reading a book for story time or using the book to supplement an educational program, feel free to use the activities in your programs. We have done the "hard part" for you.

What Do Children Already Know?

Young children are naturally inquisitive and are sponges for information. The whole purpose of this activity is to help children verify the information they know (or think they know) and to get them thinking “beyond the box” about a particular subject.

Before reading the book, ask the children what they know about the subject. A list of suggested questions is below. The children should write down their “answers” (or adults for them if the children are not yet writing) on the chart found in Appendix A, index cards, or post-it notes.

Their answers should be placed on a “before reading” panel. If doing this as a group, you could use a bulletin board or even a blackboard. If doing this with individual children, you can use a plain manila folder with the front cover the “before reading” panel. Either way, you will need two more panels or sections—one called “correct answer” and the other “look for correct answer.”

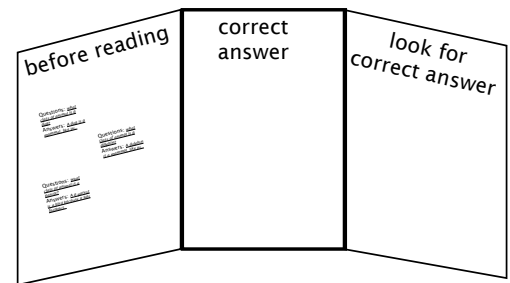
Do the children have any more questions about the subject? If so, write them down to see if they are answered in the book.

After reading the book, go back to the questions and answers and determine whether the children’s answers were correct or not.

If the answer was correct, move that card to the “correct answer” panel. If the answer was incorrect, go back to the book to find the correct information.

If the children have more questions that were not answered, they should look them up.

When an answer has been found and corrected, the card can be moved to the “correct answer” panel.



Pre-Reading Questions

Bats: General

1. In what kind of habitat do bats live?
2. What are some ways that bats help us?
3. Can you name any type of bat?
4. Are bats birds, mammals, fish, reptiles or amphibians?
5. Have you ever seen a bat? If so, where was it?

Bat Count

6. Why are bats disappearing?
7. What's a maternity roost and where might you find one?
8. During what season do bats have their babies?
9. How many babies does a mommy bat usually have at a time?
10. Why are people helping scientists count bats?

Home in the Cave

11. What are some animals that live in caves?
12. What are some things that these animals eat?
13. How do these animals get their food?
14. Can you describe some of the different zones within a cave?
15. What are some ways different animals have adapted to cave life?

Little Red Bat

16. How do some animals spend winter?
17. Are bats birds?
18. How do bats see?
19. How big are red bats?
20. What do red bats do for the winter?

Comprehension Questions & Writing Prompts

Explain major differences between books that tell stories and books that give information.

Identify basic similarities in and differences between two texts on the same topic.

Compare and contrast the most important points presented by two texts on the same topic.

With prompting and support, identify basic similarities in and differences between two texts on the same topic.

Answer questions about key details in a text read aloud or information presented orally.

Recount or describe key ideas or details from a text read aloud or information presented.

Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

Bat Count

1. Do you think this book is real (nonfiction)? If not, could it be real? Why?
2. Why did the family think that there was a bat maternity roost in the barn?
3. What was happening to the number of bats in the barn each summer?
4. What's the name of the disease that is killing so many bats?
5. How many babies does a mommy bat usually have at a time?
6. At what time of day do the bats usually leave the barn to feed?
7. How did the family know how many babies the momma bat had?

Home in the Cave

8. Do you think this book is real (nonfiction)? If not, could it be real? Why?
9. Why was Baby Bat scared to leave the cave?
10. How did Baby Bat meet Pluribus Packrat?
11. What did the two do together?
12. What are some things they saw?
13. What are some ways animals have adapted to live in the cave?
14. How do some of the deep-cave living animals rely on bats and other animals that come and go from the cave?
15. Why did Baby Bat decide that he should learn to fly and leave the cave?

Little Red Bat

16. Do you think this book is real (nonfiction)? If not, could it be real? Why?
17. What is the Little Red Bat trying to figure out?
18. If she decides to go, how will she know where to go?
19. What are some of the things the other animals warn her about?
20. How are the other animals preparing for winter?
21. What did she decide to do: stay or go?

Observation Skills: Art Scavenger Hunt

Objective Core Language Arts Integration of Knowledge and Ideas: Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g., create mood, emphasize aspects of a character or setting).

Use illustrations and details in a story to describe its characters, setting, or events.

Bat Count

1. Describe where the family lives.
2. How did the illustrator show time of day?
3. Can you find the shovels that the boys dropped in the grass?
4. What are some things the family has in their yard?

Home in the Cave

5. How did the illustrator show what the bats were thinking about?
6. What are some of the things that Pluribus Packrat had in his nest?
7. Life in deep caves is very dark. How did the author and the illustrator get light into the dark cave?

Little Red Bat

8. How does the illustrator show us how little the red bat is?
9. How does the illustrator show us the different animal faces?
10. Find as many animals as you can on the page where the little red bat is thinking about what she learned from the squirrel, the deer, the rabbit, the chipmunk, the field mouse, the turkey and the sparrow.
11. On that same page, how does the illustrator show us things underground?
12. Did any other bats join the group of birds flying south? (Look at the illustration on the last page of the story).

Cross-Curricular Vocabulary Activities

Objective Core Language Arts:

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content.

Identify new meanings for familiar words and apply them accurately (e.g., duck is a bird & the verb to duck).

Use words & phrases acquired through conversations, reading/being read to, and responding to texts.

Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade-level topic or subject area.

Explain the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in particular sentences.

Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

Use frequently occurring adjectives.

Vocabulary Game: This activity is a very general idea and is designed to get children thinking of vocabulary words that will then be used as the beginning vocabulary list for a science lesson.

Select an illustration from the book and give the children a specific length of time (five minutes?) to write down all the words they can think of about the particular subject. It is helpful to project an illustration on a whiteboard. Use eBook or book preview found at www.ArbordalePublishing.com.

The children's word list should include anything and everything that comes to mind, including nouns, verbs, and adjectives. At the end of the time, have each child take turns reading a word from his/her list. If anyone else has the word, the reader does nothing. However, if the reader is the only one with the word, he/she should circle it. While reading the list, one person should write the word on a flashcard or large index card and post it on a bulletin board or wall.

At the end, the child with the most words circled "wins." And you have a start to your science vocabulary list. Note: if a child uses an incorrect word, this is a good time to explain the proper word or the proper usage.

Glossary/Vocabulary Words: Word cards may be used (see Appendix) or have children write on index cards, a poster board, or on a chalkboard for a "word wall." If writing on poster board or chalkboard, you might want to sort words into nouns, verbs, etc. right away to save a step later if using for Silly Sentences (on the next page). Leaving the words posted (even on a refrigerator at home) allows the children to see and think about them frequently.

Using the Words: The following activities may be done all at once or over a period of several days.

- Sort vocabulary words into nouns, verbs, adjectives, etc. and write what they are on the backs of the cards. When the cards are turned over, all you will see is "noun," etc. (these can then be used for the "silly sentences" on the next page).
- After the cards have been sorted, go over the categories to ensure that all cards have been placed correctly. (Mistakes are a great opportunity to teach!)
- Choose two words from each category and write a sentence for each word.
- Write a story that uses at least ten vocabulary words from the word sort.
- Have children create sentences using their vocabulary words. Each sentence could be written on a separate slip of paper. Have children (individually or in small groups) sort and put sentences into informative paragraphs or a story. Edit and re-write paragraphs into one informative paper or a story.

Silly Sentence Structure Activity: This "game" develops both an understanding of sentence structure and the science subject. Use words from the "word wall" to fill in the blanks. After completing silly sentences for fun, have children try to fill in the proper words by looking for the correct information in the book.

Word Bank

Build a word bank using words found in the story or For Creative Minds.

Adjective	Noun			Verb
alive	flock (birds)	egg	packrat	blow
awake	acorn	entrance zone	pesticide	born
blind	antenna	eye	pollination	bounce
cold	baby (ies)	feathers	pup	burrow
diurnal	bacteria	fertilizer	rabbit	dart
endangered	bark	fingers	raccoon	drink
furry	basic needs	food	red bat	eat
long	beak	fox	rock	echo
many	bird	fungus	roost	echolocate
narrow	blackness	fur	scent	flap
natural	blind cavefish	guano	season	fly
nocturnal	blind salamander	habitat	seed	follow
orange	bridge	hair	sonar	go
red	burrow	hand	sparrow	grows
shiny	cat	hawk	species	hand
sick	cave	human	speleothem	hatch
smelly	cave salamander	humans	spelunker	hibernate
thick	cave swallow	Insect	squeeze	hunt
upside down	cave zone	karst	squirrel	migrate
warm	cavity	ledge	stalactite	move
windy	chipmunk	light	stalagmite	pollinate
yellow	Chiroptera	mammal	sunlight	raise
	claws	milk	teeth	see
	column	mine	tree	sense
	dark zone	moss	trinket	sleep
	darkness	mother	twigs	spelunking
	day	mouse	twilight zone	spread
	deer	noses	wild turkey	stay
	digit	nursery	wing	swarm
	disease	nut	wings	to cave
	dusk	opossum		wake
	ears	owl		
	echoloatopm	opossum		

Cross-Curricular Silly Sentences Bat Count

1. White-nose syndrome is a _____ noun that affects _____ verb ing bats.
2. It's caused by a _____ noun that _____ verb in cold, wet environments like _____ noun, mineshafts, and rock crevices.
3. Many bats _____ verb in these places through the winter.
4. The fungus grows on bats' _____ noun, _____ noun, and ears.
5. When bats _____ verb together to stay _____ adjective, the disease spreads to other _____ noun hibernating in the same space.
6. When bats have white-nose syndrome, they _____ verb up and _____ verb around when they should be sleeping.
7. Sometimes _____ adjective bats even _____ verb out into the cold, winter air.

Cross Curricular: Silly Sentences Home in the Cave

1. Like _____
noun, bats are _____
noun. But unlike us,
bats can _____
verb. Most _____
noun fly too.
2. There are almost _____
number _____
noun (different types)
of _____
noun and around _____
number species of _____
noun.
3. Bat _____
noun have _____
number digits—just as we
have five _____
noun.
4. Bats have a _____
adjective skin covering their _____
noun,
turning their _____
noun into _____
noun.
5. Bats are _____
verb alive and _____
verb _____
noun
from their mothers, just like human babies. _____
noun

verb from _____
noun.
6. Bats _____
verb upside down in _____
noun,

noun, _____
noun, under bridges, or even in bat
houses. Most humans _____
verb in _____
noun, and

noun sleep in _____
noun, trees, or bushes.
7. Most bats use _____
noun and _____
noun to see.
8. Bats and humans have _____
noun (_____
noun is hair), and
birds have _____
noun.
9. Bats and humans have _____
noun but birds have _____

noun.

Cross-Curricular Silly Sentences Little Red Bat

1. The squirrel _____ verb _____ noun to eat during the winter. He stays.
2. The _____ eats twigs and bark during the winter. He stays.
3. The _____ looks for _____ all winter. She stays.
4. The chipmunk _____ in his _____ for most of the winter but wakes up to eat every once in a while. He stays.
5. The mouse stays warm in his _____ and looks for food. He stays.
6. The wild _____ roosts high in a _____ and looks for food during the winter. He stays.
7. The sparrow follows her _____ south for warmer weather and food. She goes.

Language Arts: Sequence Sentence Strips Bat Count

Cut into sentence strips, laminate if desired, and place in a “center.” Have children put the events in order. Children may work alone or in small groups. Cards are in order but should be mixed up when cut apart.

Objective Core Language Arts:

Use temporal words and phrases to signal event order.

Describe the overall structure of a story, including describing how the beginning introduces the story and the ending concludes the action.

When I was little, mom used to sweep bat droppings
from the barn once a week.

Before the twins were born, mom and I saw a mama
bat hanging upside down in the hayloft.

The year the twins came, there were fewer droppings.

The next year, there were even fewer droppings.

The summer after that, we only counted ten bats.

This summer we didn't sweep up any droppings.

We watch the barn to see if any bats fly out.

We see one bat leave.

The bat flew back into the barn.

Three bats flew out of the barn.

It was time for me to go to bed.

Language Arts: Sequence Sentence Strips Home in the Cave

Cut into sentence strips, laminate if desired, and place in a “center.” Have children put the events in order. Children may work alone or in small groups. Cards are in order but should be mixed up when cut apart.

Objective Core Language Arts:

Use temporal words and phrases to signal event order.

Describe the overall structure of a story, including describing how the beginning introduces the story and the ending concludes the action.

On a ceiling deep within a cave, Baby Bat held tight to his mom. Thousands of other moms and babies crowded close, looking like a furry blanket.

Soon it was dusk and time for the mother bats to leave the cave to hunt insects.

To make the night go faster, the little bats told stories: Baby Bat was scared.

Baby Bat flapped his wings but fell into a messy nest on a ledge that belonged to Pluribus Packrat.

Baby Bat and Pluribus Packrat went exploring. First they climbed up to the entrance zone where they saw a phoebe nesting on a ledge.

A little further inside the cave, the two saw bright-orange cave salamanders and a cave cricket.

Deeper in the cave, they were back in the bat nursery where guano covered the floor. The smelly guano swarmed with thousands of critters.

A nearby stream held more ghostly creatures. Pluribus rippled the cold water with his paw. A blind cavefish swam over, expecting to find a water critter to eat.

Pluribus took Baby Bat back to the nursery. The two hugged goodbye and promised to explore together again. Then Pluribus was off to fill his stomach, and perhaps find another shiny treasure.

Mom soon returned, and Baby Bat snuggled with her, drinking warm milk. For the first time, he realized that his mom needed to eat insects to make milk for him.

Baby Bat decided he was ready to go hunting with his mom.

Language Arts: Sequence Sentence Strips Bat Count

Cut into sentence strips, laminate if desired, and place in a “center.” Have children put the events in order. Children may work alone or in small groups. Cards are in order but should be mixed up when cut apart.

Objective Core Language Arts:

Use temporal words and phrases to signal event order.

Describe the overall structure of a story, including describing how the beginning introduces the story and the ending concludes the action.

Little Red Bat and her leaf fall to the ground.

She wonders if she should stay or go.

The Little Red Bat talks to the squirrel who is going to stay for the winter. He has buried nuts for food.

The Little Red Bat talks to the deer. He is going to stay too. He'll eat twigs and bark.

The rabbit will stay.

The chipmunk will stay too.

The mouse will stay.

The wild turkey will stay, living high in a tree.

The sparrow will go. She's leaving that night with her flock.

Little Red Bat makes up her mind. She takes a little nap.

She follows the sparrow and her flock.
They are all going south for the winter.

Little Brown Bats—Bat Count

Little brown bats were once one of the most common bats found in North America. Their numbers have been decreasing rapidly because of white-nose syndrome hitting their hibernation locations.

Their wingspan ranges from 8 to 11 inches...up to the height of this page.

Little brown bats mostly eat insects.



Photo credit NY Dept. Environmental Conservation

Cave-Dwelling Bats—Home in the Cave

This story is about a gray myotis, an endangered species. Thousands of these female bats gather in certain caves to raise their pups. Some of the other types of bats that gather in large numbers in caves to raise their young include the Mexican free-tailed bat, cave myotis, lesser long-nosed bat, and the southeastern myotis.

Gray myotis have gray fur.

They are about 3 inches with a wingspan of 10-12 inches.

Photo credit: Missouri Department of Conservation



Mexican free-tailed bats, also called Brazilian free-tailed bats, are found in the western US, throughout Mexico and Central America into South America. They migrate to the US to give birth in the spring/summer and then return south when fall arrives.

Some maternity roosts can contain millions of bats that then eat tons (up to 250 tons!) of insects every night!

Their wingspan is 12-14 inches.

This image is of Mexican free-tailed bats leaving Carlsbad Cavern National Park; photo credit NPS Photo by Nick Hristov.



Red Bats—Little Red Bat

Eastern red bats and Western red bats live in trees throughout North, Central and South America.

As the story shows us, these bats may migrate or may hibernate.

Red bats eat insects.

Red bats are only 3 1/2 to 4 1/2 inches long with a wingspan of 13 inches (just longer than the length of this page).



Photo Credit Brock Fenton

Animal Sorting Cards--Little Red Bat

Objective: Classify organisms according to one selected feature, such as body covering, and identify other similarities shared by organisms within each group formed.

Describe several external features and behaviors of animals that can be used to classify them (e.g., size, color, shape of body parts).

Identify observable similarities and differences (e.g., number of legs, body coverings, size) between/among different groups of animals.

Animal Card Games:

Sorting: Depending on the age of the children, have them sort cards by:

where the animals live (habitat)	tail, no tail
number of legs (if the animals have legs)	colors or skin patterns
how they move (walk, swim, jump, or fly)	animal class
type of skin covering (hair/fur, feathers, scales, moist skin)	
what they eat (plant eaters/herbivores, meat eaters/carnivores, both/omnivores)	

Memory Card Game: Make two copies of each of the sorting card pages and cut out the cards. Mix them up and place them face down on a table. Taking turns, each player should turn over two cards so that everyone can see. If the cards match, he or she keeps the pair and takes another turn. If they do not match, the player should turn the cards back over and it is another player's turn. The player with the most pairs at the end of the game wins.

Who Am I? Copy and cut out the cards. Poke a hole through each one and tie onto a piece of yarn. Have each child put on a "card necklace" without looking at it so the card hangs down the back. The children get to ask each person one "yes/no" question to try to guess "what they are." If a child answering the question does not know the answer, he/she should say, "I don't know." This is a great group activity and a great "ice-breaker" for children who don't really know each other.

Charades: One child selects a card and must act out what the animal is so that the other children can guess. The actor may not speak but can move like the animal and imitate body parts or behaviors. For very young children, you might let them make the animal sound. The child who guesses the animal becomes the next actor.



Red Bat
mammal

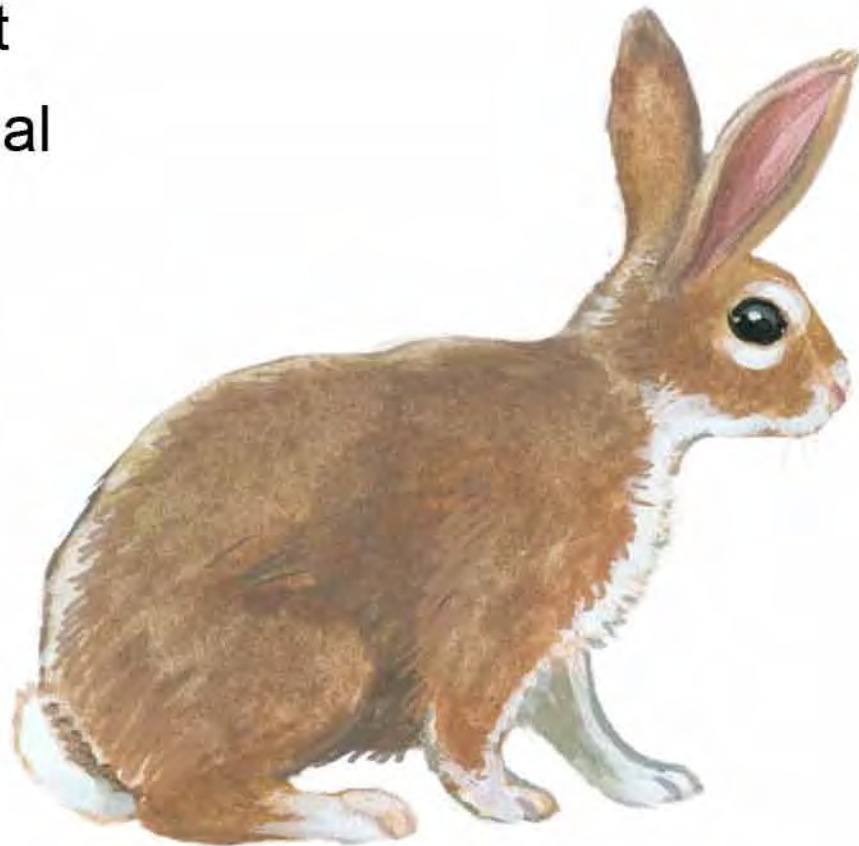
squirrel
mammal



deer
mammal



rabbit
mammal



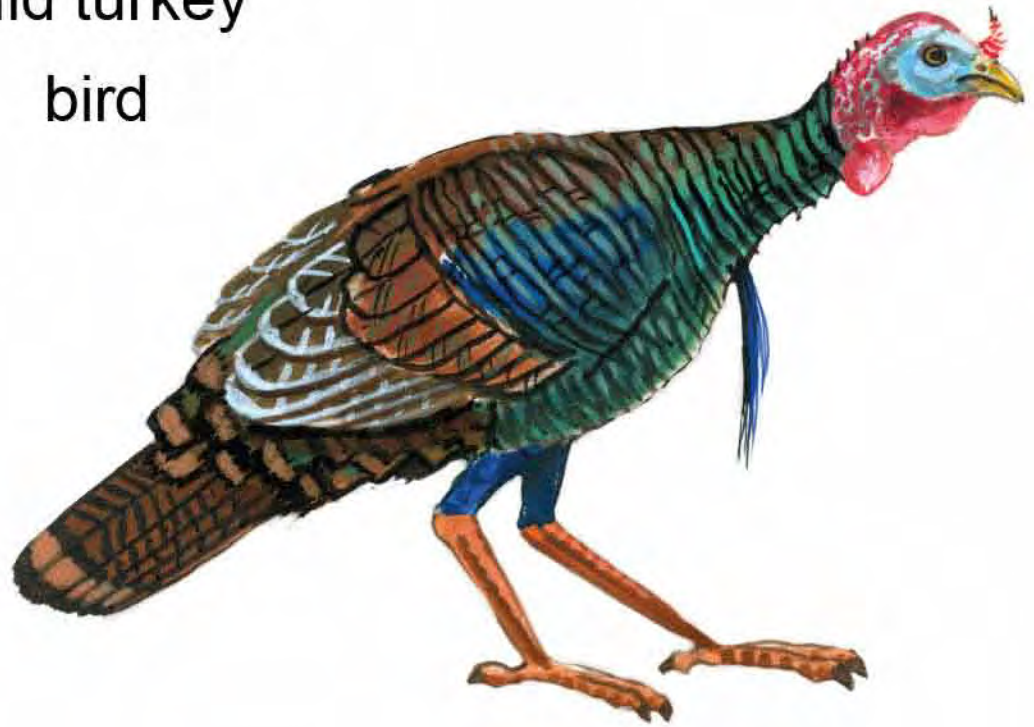


chipmunk
mammal



mouse
mammal

wild turkey
bird



sparrow
bird

Habitats

Objective: Identify and describe physical characteristics of a place (physical features, climate, vegetation and animal life)

Identify natural characteristics of places: landforms, bodies of water, natural resources, and weather.

Geography includes the study of Earth's physical features including climate and the distribution of plant, animal, and human life.

Habitats are more than just the plants and animals that live there. They are communities of plants, animals and non-living things that interact in certain locations. There are many different types of habitats all over the world.

What are some of the non-living things in each habitat?

- Water: freshwater or saltwater? Deep water or shallow water? What kind of precipitation? How often and how much?
- Elevation above sea level
- Climate (temperate, tropical, polar)
- Rocks: how big, how many
- Soil

Plants and animals (living things) live in habitats that meet all of their basic needs.

- Animals need food, water, oxygen to breathe, and a safe space for shelter and to give birth to their young.
- Plants need sunlight and heat (temperature), water, soil to grow, and a way for seeds to move (disperse).

Living things have body parts and behaviors (adaptations) that help them live in their habitats and meet their basic needs.

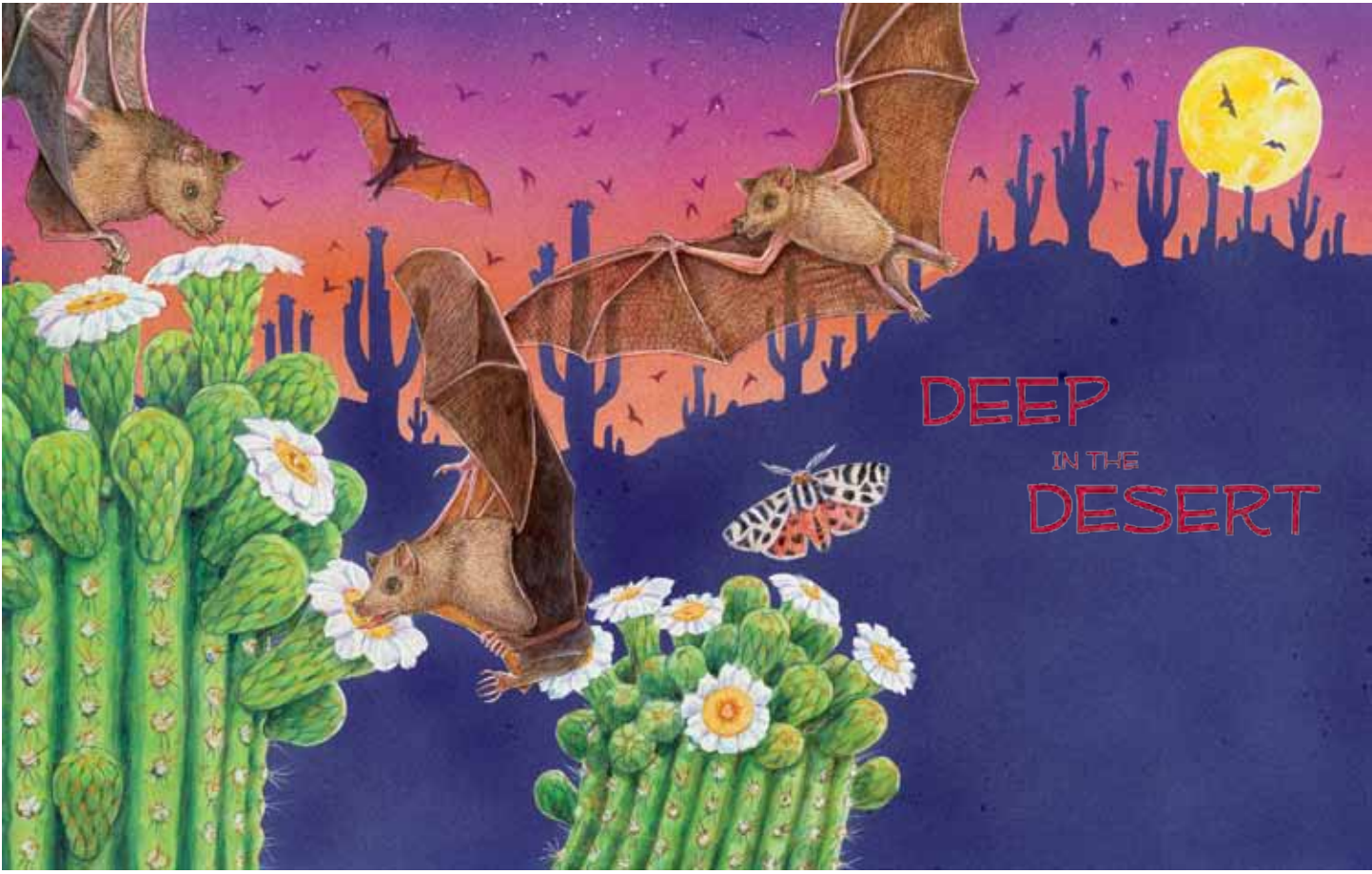
- Animals need oxygen to breathe. Animals get their oxygen from either the air or the water. What body parts do they use to get the oxygen? What behaviors do they have? (Mammals or reptiles that live in water must come to surface of the water to get the oxygen from the air).
- Living things have body parts or behaviors to protect themselves from predators or things that might hurt them.
- Most animals move from one place to another. Special body parts help them move in their habitat but not easily in other habitats. For example, which body parts help animals move in the air, land, or water?
- All living things need energy to grow and have body parts to help them get food.

Food for thought: Some animals live in more than one habitat. For example, a cougar (also called mountain lion, puma, or panther) and bighorn sheep might live in the desert and mountains.

In which habitats do you think bats live? Look at the images of habitats on the next few pages and determine whether bats live there or not. Why or why not?



The Rainforest Grew All Around



DEEP IN THE DESERT



Adaptations

Objective: Identify adaptations that help plants and animals survive and grow in their environment

Identify external parts of plants and animals

Observe and compare the structures and behaviors of different kinds of plants and animals

Adaptations help animals to live in their habitat: to get food and water, to protect themselves from predators, to survive weather, and even to help them make their homes. Here are a few different types of adaptations.

Physical Adaptations

Use the illustrations in the book to see how many physical adaptations you can see for each animal.

body parts

teeth—depends on type of food eaten
feet, flippers, fins—ability to move
placement of eyes
gills, lungs, or other—how does the animal get oxygen
ears—or how the animal hears/senses

body coverings

hair or fur
feathers
scales
moist skin

camouflage and protection

color of skin or pattern to blend into background
body structure resembles another organism to fool predators
poisonous or stinky smells

Behavioral Adaptations

instinct: behaviors or traits that the animals are born with
learned behavior: traits that animals learn to improve their chances of survival or to make their life easier
social groups versus solitary living
communication with other animals
defense
hiding in an area that provides camouflage
reaction to cycles (day/night, seasons, tides, etc.)
migration: the seasonal movement of animals from one location to another
hibernation: a long, deep sleep in which the animal's breathing and heartbeat are slower than usual

What are some of the animal adaptations you see?

Do you think packrats really carry flashlights? Why or why not? If not, how do you think they see in the dark?



There are almost 1,100 species (different types) of bats. Bats live in habitats all over the world except for the Poles (Arctic and Antarctic).

Each bat has different adaptations to help it live in its habitat and to eat its food.

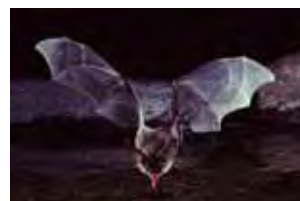
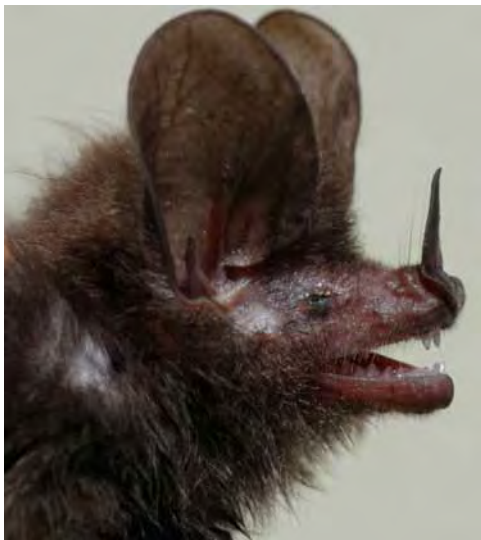
Teeth: Nectar-eating bats may only have teeth on the top of their mouths and will use extra-long tongues to reach into the plants. Insect-eating bats have more teeth than the nectar-eating bats. Vampire bats have sharp front teeth to bite through animal skin.

Noses: Many fruit- or nectar-eating bats have long, thin noses or tubes to help them reach into the flowers. In fact there are some bats that have “long-nose” in their name! Leaf-nose bats, on the other hand, have shorter noses but have triangular flaps used for echolocation. Scientists believe that the bats use the flap to direct the sound.

Ears: There are two major groups of bats, megabats and microbats. Megabats are fruit-eating or nectar-eating bats and most do not use echolocation and have small ears. Microbats, however, include the insect-eating bats and other prey-hunting bats. Because these bats rely on echolocation to find their prey, they tend to have large ears. The bigger the ears, the easier to hear.

Hands/Wings: Humans and bats both have five digits in their hands/wings. But as part of their wings, bat “fingers” are much longer than human fingers. Bats use their “thumbs” like hooks to hold onto things.

Look at the bat images on the next few pages and compare and contrast some of the bat adaptations.





Animal Observation Journal

Researcher Name: _____

Location: _____

Date: _____

Time	Notes

Bat Count Form

Site Name: _____

Name of Bat Counter: _____

Address: _____

Phone: _____ Email: _____

Roost Site Property Owner:

Name: _____

Address: _____

Phone: _____ Email: _____

Roost Information

Structure Type: *(circle one)*

Barn

Church

House (occupied)

House (unoccupied)

Utility Building

Bat box

Bridge

Tree

Other

If "Other," describe: _____

Is the structure regularly used by people? _____ Yes _____ No

Is the structure scheduled for renovation or demolition? _____ Yes _____ No

Is bat eviction planned? _____ Yes _____ No

Comments: _____

Guano sample enclosed? _____ Yes _____ No

Photographs enclosed? _____ Yes _____ No

Have you observed bats at this site before? If so, please describe the history of this bat colony and note the number of bats in previous years: _____

Site Name: _____

Surveyor's Signature: _____

Count Date	Sky Conditions	Wind Speed	Start Temp. (°C)	Start Time	End Time	Total Bats Counted	Technique (visual or video)

Formato para el conteo de muciélagos

Nombre del lugar

Nombre de la persona que realiza el conteo: _____

Dirección: _____

Teléfono: _____

Correo electrónico: _____

Datos del propietario del refugio:

Nombre: _____

Dirección: _____

Teléfono: _____

Correo Electrónico: _____

Información del refugio

Tipo de Estructura: *(circule una)*

Granjero

Edificio de servicios públicos

Caja para murciélagos

Casa (no habitada)

Árboles

Otro

Puente

Casa (habitada)

Iglesia

Si es "otro lugar", descríballo: _____

¿Es el lugar utilizado por personas regularmente? _____ Sí _____ No

¿Está el lugar programado para una remodelación o demolición? _____ Sí _____ No

¿Hay un plan de desalojo? _____ Sí _____ No

Comentarios: _____

Muestra de excremento de murciélago: _____ Sí _____ No

Fotografías incluidas: _____ Sí _____ No

¿Ha observado murciélagos en este sitio anteriormente? Si es así, por favor describa la historia de este grupo de murciélagos y anote el número de murciélagos de los años anteriores: _____

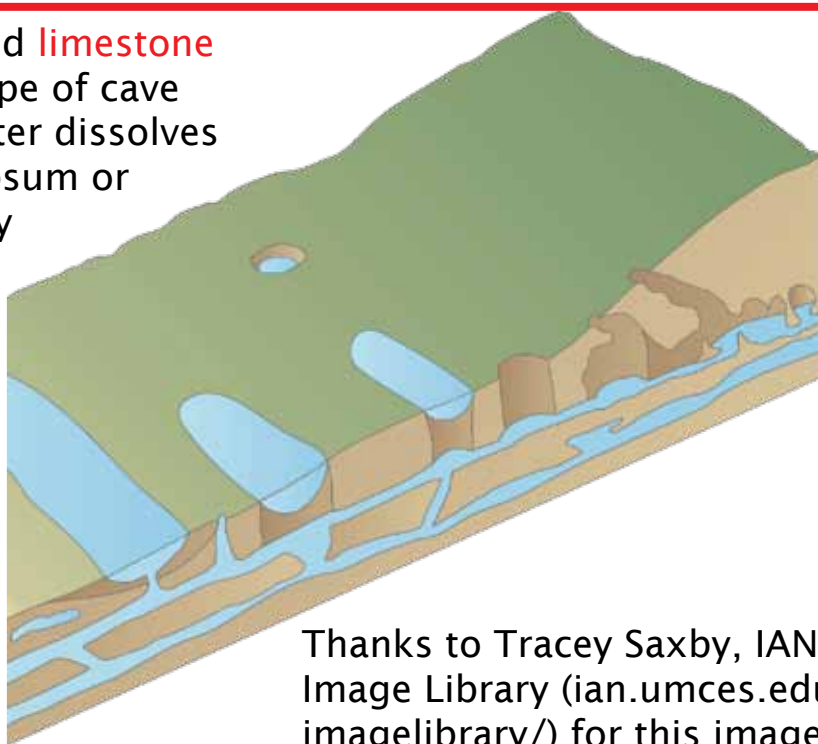
Nombre del sitio: _____

Firma del inspector: _____

Fecha del conteo	Condiciones del cielo	Velocidad del viento	Temperatura inicial (°C)	Hora inicial	Hora final	Total del conteo de murciélagos	Técnica (visual o video)

Science: Cave Types and How They Are Formed

Solution caves, sometimes called **limestone caves**, are the most common type of cave and are formed when acidic water dissolves rocks (limestone, dolomite, gypsum or marble). As this water eats away at the rock, it forms tunnels, passages, and even large caverns. Earthquakes can cause cracks through which this acid water moves also. As the water dries, it leaves the empty tunnels, passages, and caverns.



Thanks to Tracey Saxby, IAN Image Library (ian.umces.edu/imagelibrary/) for this image



Lava tube caves form during the cooling of lava flows from a volcanic eruption. As the lava starts to cool, a crust forms but lava might continue to move through the crust, like drinking through a straw. As the moving lava leaves the crusty lava, a tube or the cave is left.



Sea caves form from waves that break or erode away the rocks.



Glacier caves form by melting waters moving through glaciers.



Talus caves form from huge rocks that have fallen from cliffs.



Tectonic caves form by the action of earthquakes.



Wind caves form from wind erosion in sandy cliffs or hills. They don't go very deep or dark. Ancient people often used these caves for homes because they provided protection from weather.



Science: Cave Formations / Speleotherms

Some of the most beautiful and interesting features of caves are rock formations that either hang down from the cave ceiling or grow up from the cave floor. Smaller stalactites and stalagmites take hundreds to thousands of years to grow, while really large formations take hundreds of thousands of years.



Stalactites hang "tight" from the cave's ceiling.



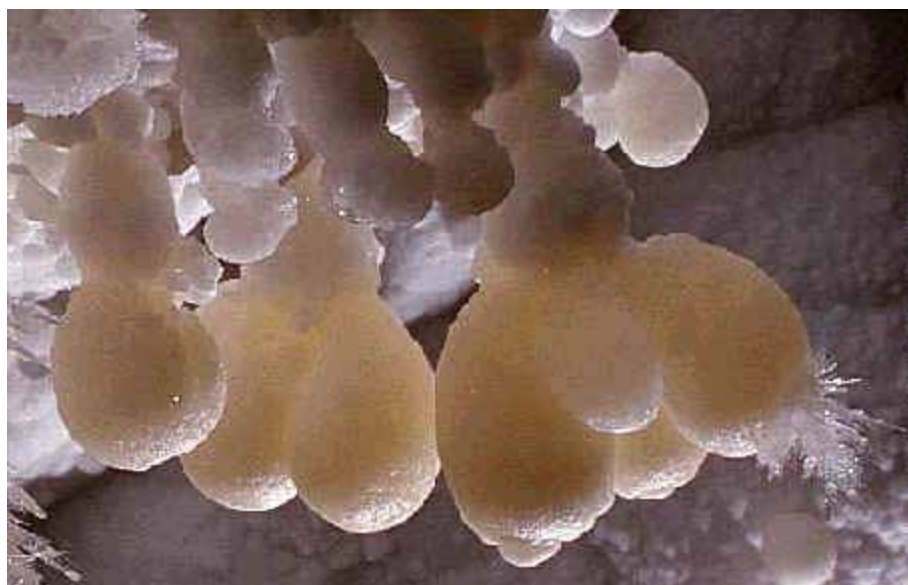
Stalagmites grow "mightily" from the cave floor up.



When stalagmites and stalactites grow together, they form a column.

Stalactites and stalagmites come in a wide variety of shapes and sizes. See if you can match the names to the formations.

- popcorn
- draperies
- soda straws
- bacon



Science: Echolocation

Have you ever made an echo? You heard your own voice bouncing back to you, just like a bat.

LITTLE RED BAT ECHOLOCATION



The bat sends out a high-pitched sound (too high for us to hear), that bounces off objects.



The sound returns to the bat, letting it know where things are. Bats can tell the size of the insect and whether it is to the right or left, just by listening.

Critical Thinking: Which Cave Statement Is True?

Which of the two statements is true? Answers are upside down, below.

1A: All animals that live in caves are blind because it is so dark.

or

1B: Some animals that live in the dark zones of caves are blind but use other senses to “see.”

2A: All animals spend part of their day in the cave but go out to get food and water.

or

2B: Many animals spend part of their day in the cave but go out to get food and water; other animals live their entire lives deep in the cave.

3A: Birds, brown cave crickets, and bright-orange cave salamanders live in the entrance or twilight areas of caves.

or

3B: Cavefish and blind salamanders live in the entrance or twilight areas of caves.

4A: Bats only live in caves.

or

4B: Bats can live in caves, trees, under bridges, or in mines.

5A: Animals living in the twilight zone rely on water to bring them their food.

or

5B: Animals living in the dark zone rely on bat guano or other food carried to them by water or wind.

True Statements: 1B, 2B, 3A, 4B, 5B

Math Cards

Objective Core Mathematics Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (up to 10)

Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Use numbers, up to 10, to place objects in order, such as first, second, and third, and to name them. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

Math Card Games

(Make four copies of the math cards to play these games):

Tens Make Friends Memory Game is a combination of a memory and adding game.

- Play like the memory game, above.
- If the animal numbers add up to 10, the child keeps the pair and takes another turn.
- If they do not add up to ten, the player should turn the cards back over and it is another player's turn.

Go Fish for Fact Families is a twist on "Go Fish."

- Shuffle cards and deal five cards to each player. Put the remaining cards face down in a draw pile.
- If the player has three cards that make a fact family, he/she places them on the table and recites the four facts related to the family. For example, if someone has a 2, 3, and 5, the facts are: $2 + 3 = 5$, $3 + 2 = 5$, $5 - 2 = 3$, $5 - 3 = 2$.
- The player then asks another player for a specific card rank. For example: "Sue, please give me a 6."
- If the other player has the requested card, she must give the person her card.
- If the person asked doesn't have that card, he/she says, "Go fish."
- The player then draws the top card from the draw pile.
- If he/she happens to draw the requested card, he/she shows it to the other players and can put the fact family on the table. Otherwise, play goes to the next person.
- Play continues until either someone has no cards left in his/her hand or the draw pile runs out. The winner is the player who then has the most sets of fact families.

1



2



3



4



5



6



7



8



9



Math: How Big and Deep Are the Caves?

Objective Core Mathematics Measurement:

Order three objects by length; compare the lengths of two objects indirectly by using a third object. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end

Reading and interpreting graphs and charts

This information comes from <http://www.caverbob.com/usalong.htm>. Figures are rounded for ease of reading by young students. While we are only showing the top 15 US caves (by length), Caver Bob has put together information on over 1,000 caves in the US and we recommend you check his site if you would like to create higher-level, more involved cave charts for older students.

Cave	State	Length		Depth	
		Miles	KM	Feet	Meters
Binkley's Cave System	IN	26	43	140	43
Blue Spring Cave	TN	37	60	233	71
Carlsbad Caverns	NM	28	33	1035	316
Crevice Cave	MO	30	48	0	0
Cumberland Caverns	TN	28	44	200	61
Fisher Ridge Cave System	KY	114	18	356	109
Friars Hole Cave System	WV	46	73	628	191
Hellhole	WV	36	58	694	212
Jewel Cave	SD	154	247	632	193
Kazumura Cave (Lava Tube)	HI	41	65	3614	1102
Kipuka Kanohina (Lava Tube)	HI	29	46	762	232
Lechuguilla Cave	NM	130	209	1604	489
Mammoth Cave System	KY	390	63	379	116
Omega System	VA	26	42	1263	385

1. Pick three cave systems and put them in order by length and/or depth.
2. Which cave system is longest? In what state is it located?
3. Which cave system is deepest? In what state is it located?

1. Pick three cave systems and put them in order by length and/or depth. **Answers will vary**
2. Which cave system is longest? In what state is it located? **Mammoth Cave System in Kentucky**
3. Which cave system is deepest? In what state is it located? **Kazumura Cave (Lava Tube) in Hawaii!**

How Big and Deep Are the Caves?

Math: Armspan & Wingspan

Wingspan and armspan are measured from the tip of wings/fingers across to the other.

What standard measuring tool would you use to measure something in:

Inches or centimeters

Feet or meters

Pounds or kilograms

Try to imagine how big or small the wingspan is compared to something you know:

If it is small, what are some other things about the same size? How many pennies, paperclips, quarters, hands, shoes, etc.)

If it is very big, how many “things” would equal it?

How big is that 6-foot wingspan?

Using the right measuring tool (yard stick or measuring tape) and chalk, mark off how big 6 feet is on the playground, sidewalk, or driveway.

If you were to lie down on or next to the line, how many times would you have to lie down in order to equal the size of the wingspan?



wingspan/armspan	inches/feet	centimeters/meters
Old world flying fox	up to 6 feet	up to 1.8 meters
red bat	up to 13 inches	up to 33 centimeters
bumblebee bat	up to 6.7 inches	up to 170 millimeters
common vampire bat	up to 15.8 inches	up to 40 centimeters
you		
an adult (parent/teacher)		

Which bat has the biggest wingspan?

Which bat has the smallest wingspan?

Which bat has a wingspan closest to your armspan?

Which bat has a wingspan closest to an adult’s armspan?

Can you put the bats in order of wingspan from smallest to biggest?

Find items around the house/school that are similar in size to the bats’ wingspans.

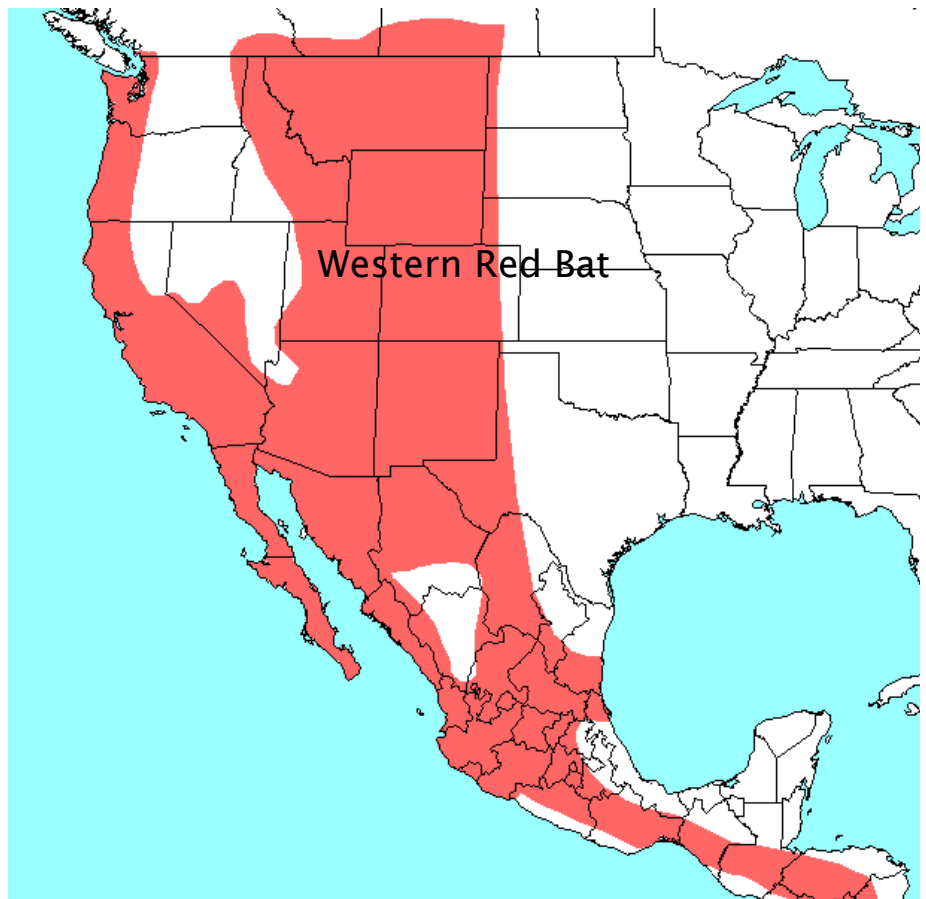
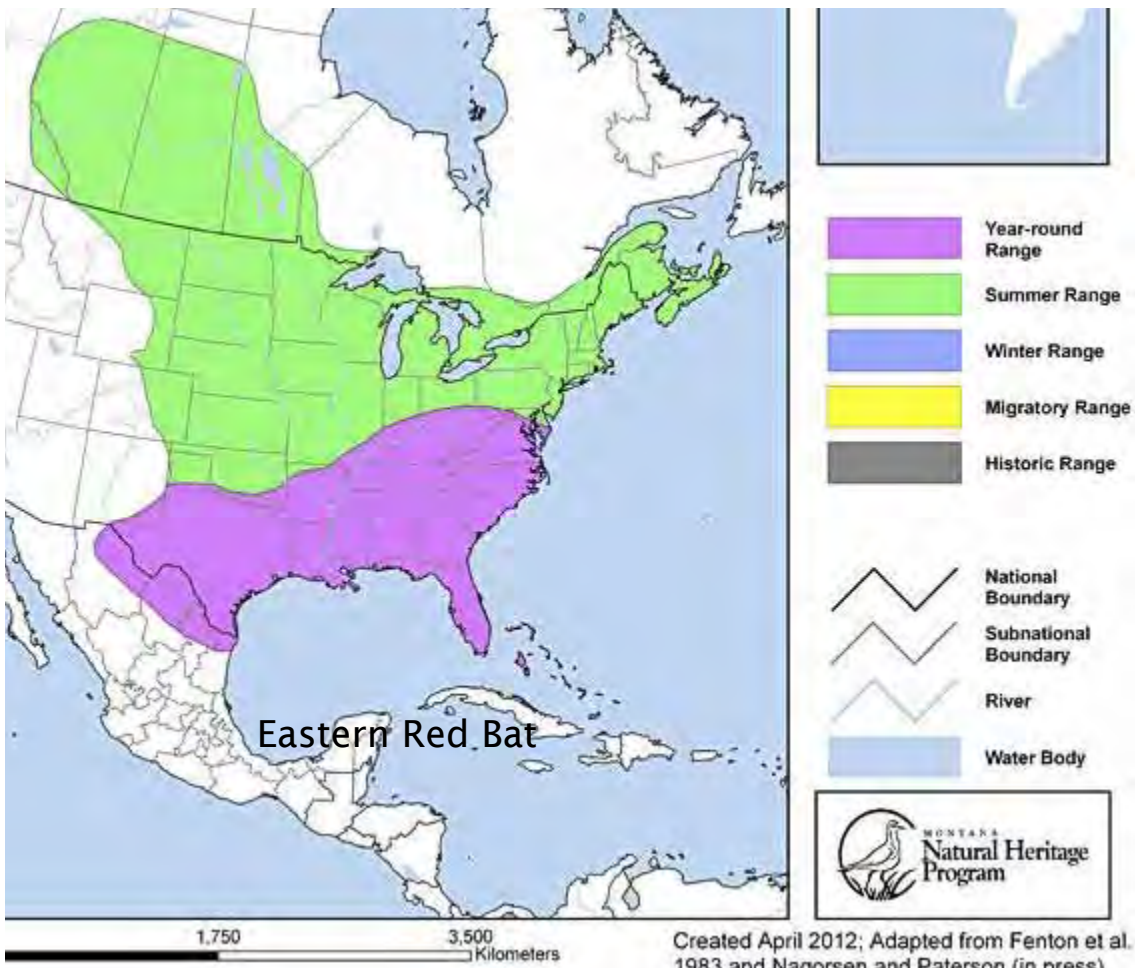
Geography

Objectives: geography, learning the 50 states, reading maps and charts

Caver Bob lists caves in 35 of the 50 states. Using the map of the United States found in Appendix C and the list below, color each state in which Caver Bob lists at least one cave.

1. Is there a cave listed for the state in which you live?
2. If not, what is the closest state that has a cave listed?
3. Which states don't have caves listed?
4. Do you know of any caves in the states not listed?

Alabama	Iowa	Oklahoma
Alaska	Kansas	Oregon
Arizona	Kentucky	Pennsylvania
Arkansas	Minnesota	South Dakota
California	Missouri	Tennessee
Colorado	Montana	Texas
Florida	Nevada	Utah
Georgia	New Hampshire	Virginia
Hawaii	New Mexico	Washington
Idaho	New York	West Virginia
Illinois	North Carolina	Wyoming
Indiana	Ohio	



Which type of red bat lives in your area or closest to you?

Are there any locations where both the Eastern and Western red bats could both be found?

STEM: Build a Bat House

Objectives: measuring, engineering

Not all bats live in caves. Many bats live in trees. As trees are cut down, there are less roosting places for bats. You can help bats by building and putting up a bat house.

There are several websites with plans. Look at the different plans and information and see if you can design and build your own bat house.

Bat Conservation

National Wildlife Federation

Missouri Department of Conservation

US Fish and Wildlife



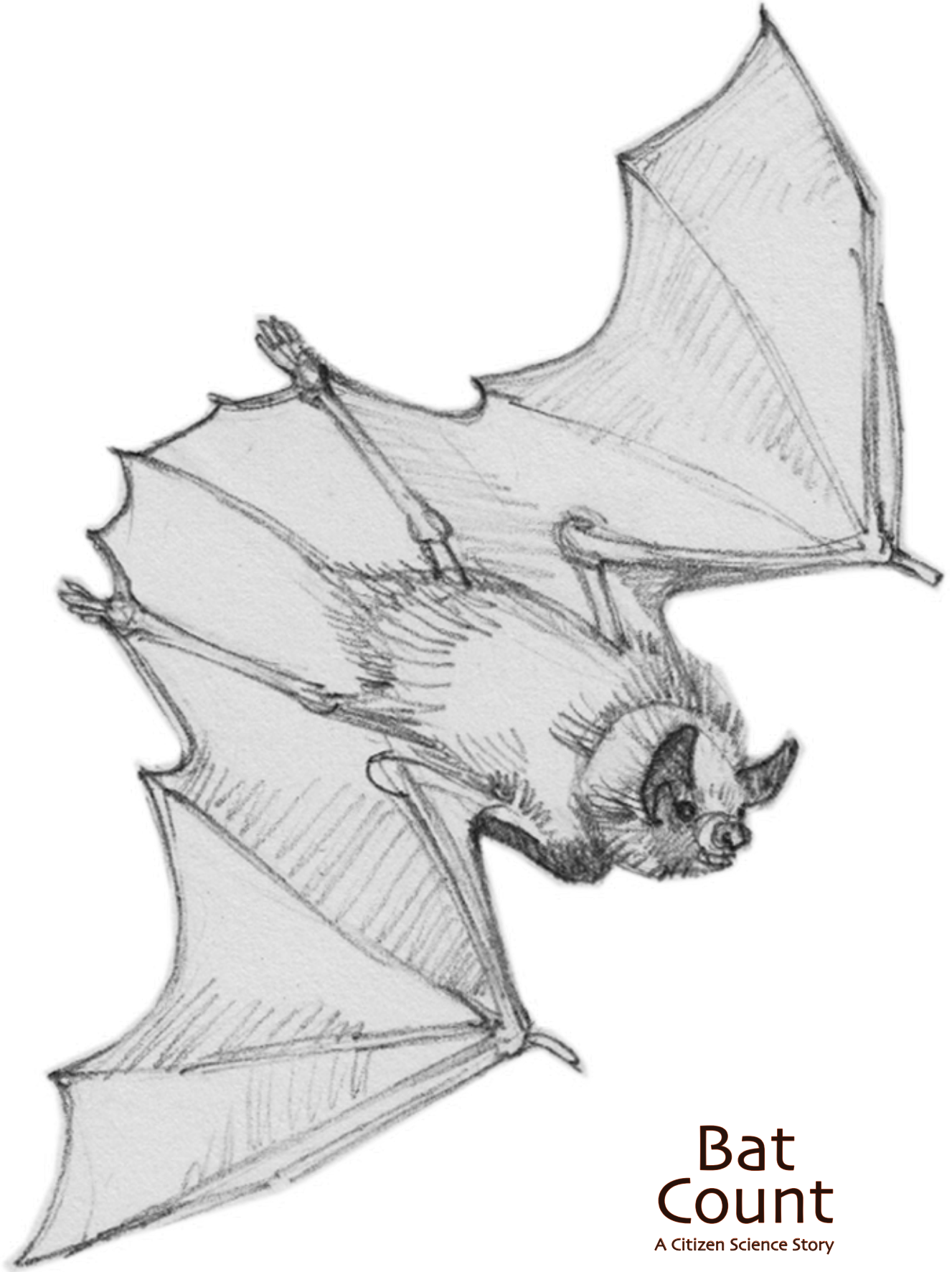
What will the bats hold onto when sleeping?

Where will you hang it?

How will the bats get in and out?

How high off the ground should it be?

How big will it be?



Bat Count

A Citizen Science Story

Bat Count

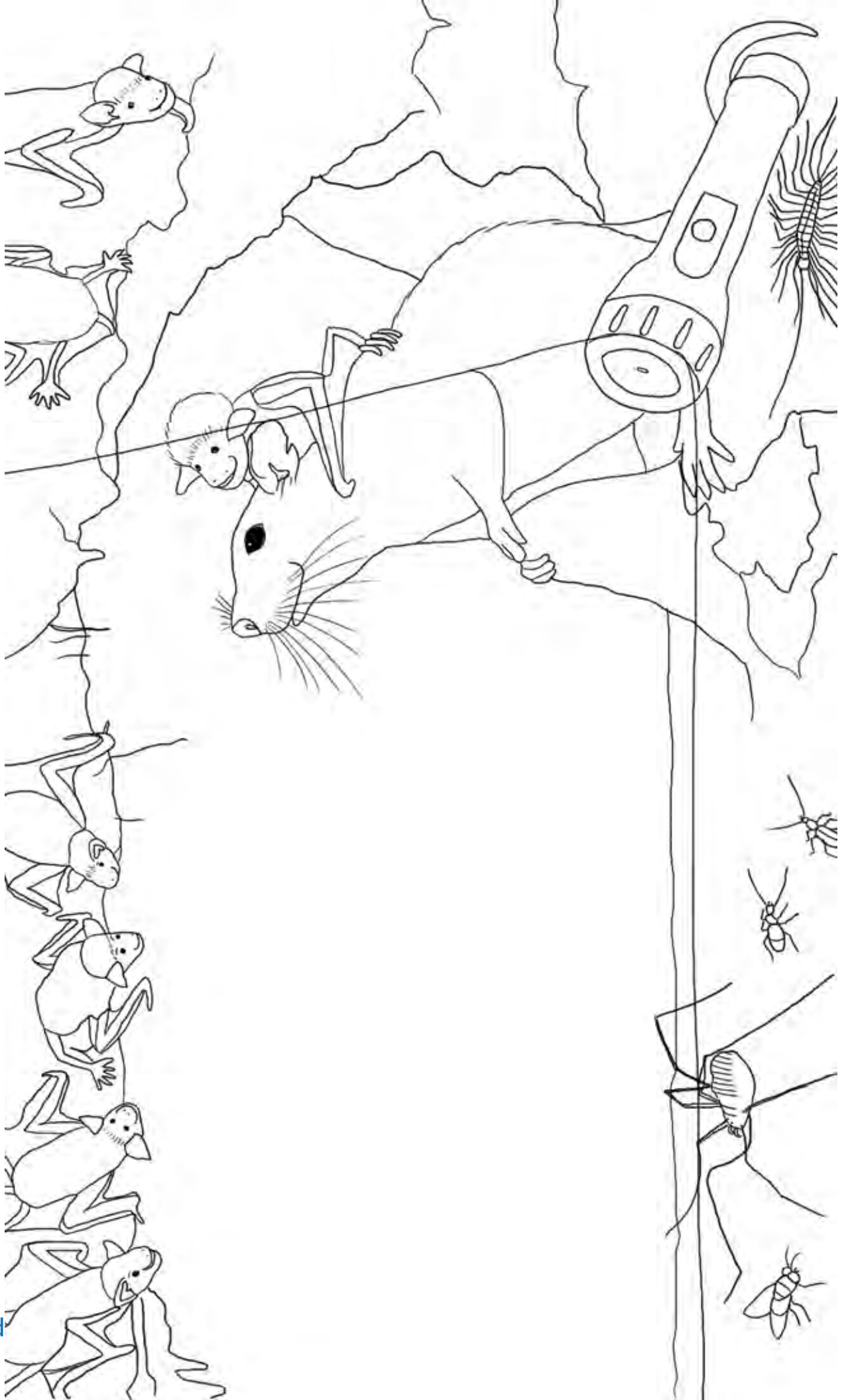
A Citizen Science Story



HOME IN THE CAVE



HOME IN THE CAVE



HELP LITTLE RED BAT
DECIDE WHETHER TO
FLY SOUTH OR HIBERNATE
FOR THE WINTER



BE CAREFUL TO AVOID
THE DANGEROUS ANIMALS!



WHAT WILL
SHE CHOOSE???

OWL



FLY SOUTH WITH
THE SPARROW!



RACCOON



FOX



HIBERNATE!



CAT



Silly Sentences Answers

Bat Count

1. White-nose syndrome is a disease that affects hibernating bats.
2. It's caused by a fungus that grows in cold, wet environments like caves, mineshafts, and rock crevices.
3. Many bats hibernate in these places through the winter.
4. The fungus grows on bats' noses, wings, and ears.
5. When bats squeeze together to stay warm, the disease spreads to other bats hibernating in the same space.
6. When bats have white-nose syndrome, they wake up and move around when they should be sleeping.
7. Sometimes sick bats even fly out into the cold, winter air.

Home in the Cave

1. Like humans, bats are mammals. But unlike us, bats can fly. Most birds fly too.
2. There are almost 1,100 species (different types) of bats and around 10,000 species of birds.
3. Bat hands have five digits—just as we have five fingers.
4. Bats have a thick skin covering their “fingers,” turning their “hands” into wings.
5. Bats are born alive and drink milk from their mothers, just like human babies. Birds hatch from eggs.
6. Bats sleep upside down in trees, caves, mines, under bridges, or even in bat houses. Most humans sleep in beds, and birds sleep in nests, trees, or bushes.
7. Most bats use echolocation and eyes to see.
8. Bats and humans have hair (fur is hair), and birds have feathers.
9. Bats and humans have teeth but birds have beaks.

Little Red Bat

1. The squirrel buries nuts to eat during the winter. He stays.
2. The deer eats twigs and bark during the winter. He stays.
3. The rabbit looks for food all winter. She stays.
4. The chipmunk sleeps in his burrow for most of the winter but wakes up to eat every once in a while. He stays.
5. The mouse stays warm in his underground tunnel and looks for food. He stays.
6. The wild turkey roosts high in a tree and looks for food during the winter. He stays.
7. The sparrow follows her flock south for warmer weather and food. She goes.

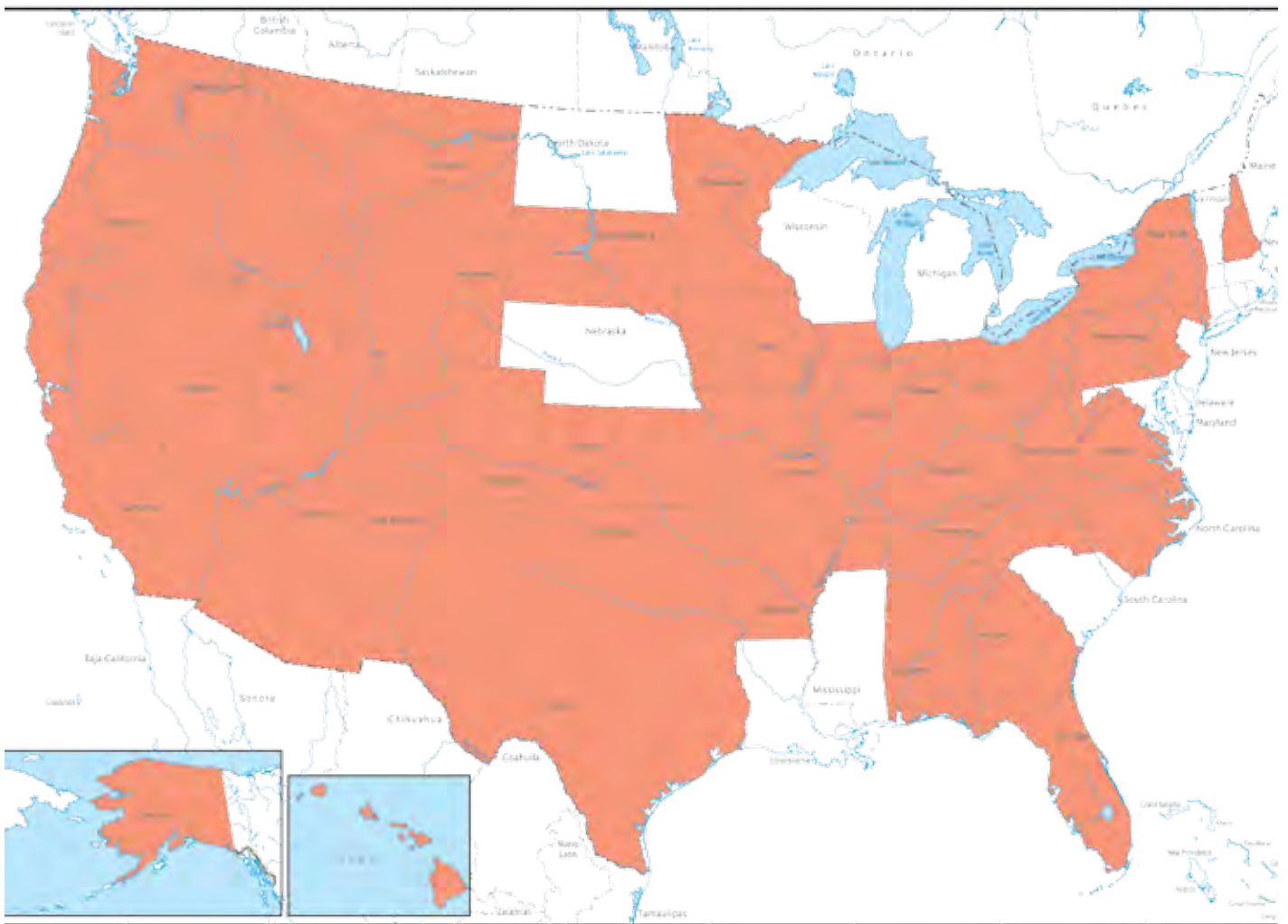
Home in the Cave Map Activity Answers

Is there at least one cave in the state in which you live? **Answers will vary.**

If not, what is the closest state that has a cave? **Answers will vary.**

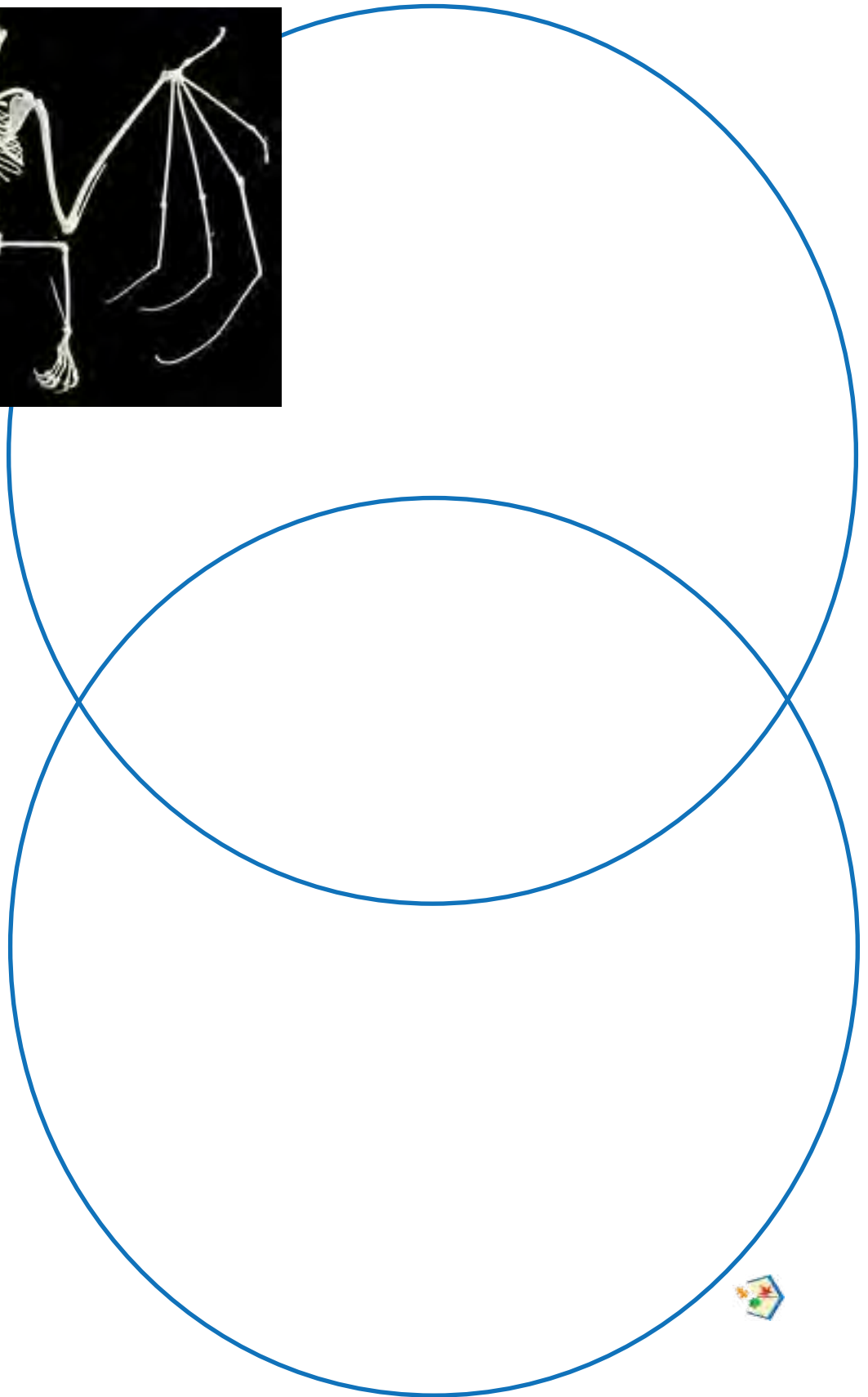
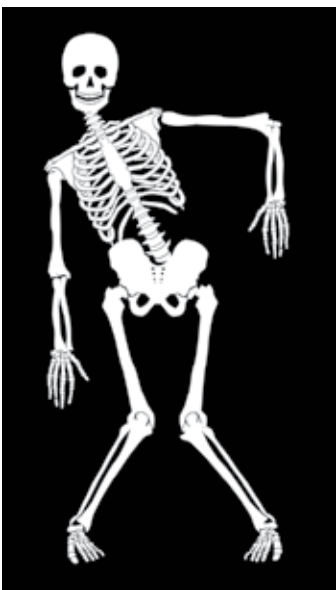
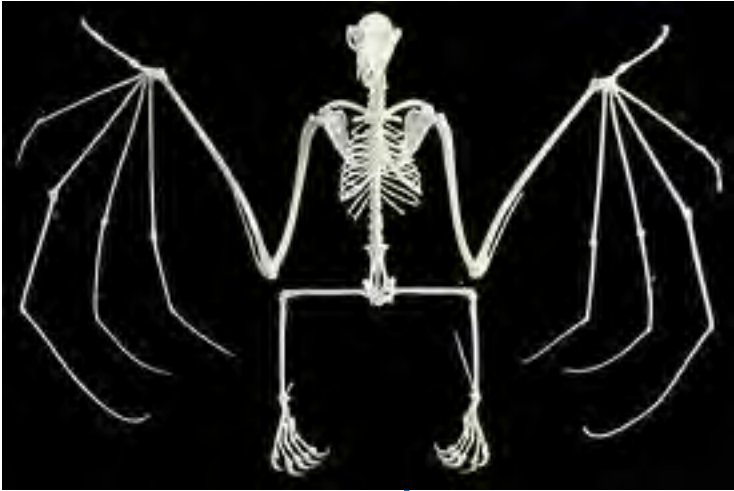
Which states don't have caves listed? **Connecticut, Delaware, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Nebraska, New Jersey, North Dakota, Rhode Island, South Carolina, Vermont, and Wisconsin**

Do you know of any caves in the states not listed? **Bear Cave in Michigan and Cave of the Mounds in Wisconsin. . . any others?**



Appendix B—Bat/Human Skeleton Venn Diagram

Compare and contrast the human and bat skeletons.



Appendix C—U.S. Map



Appendix D—Vocabulary Cards

**maternity
roost**

**white-nose
syndrome**

**Citizen
Science**

hibernation

migration

echolocation

cave

dark zone

adaptation

**food
web**

bat

mammal