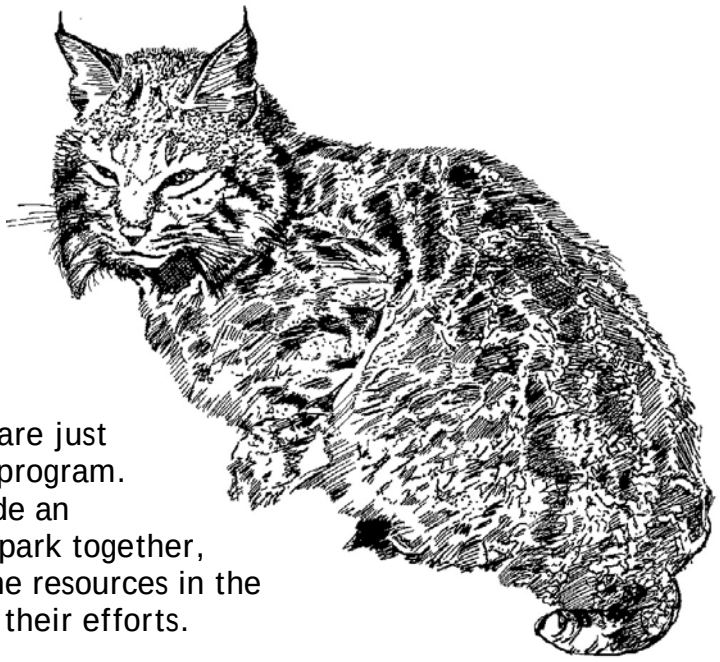
Appendix A: Self-Guided Activities for Junior Rangers

Introduction



What can you do when you have kids who want to participate in the Junior Ranger Program, but your unit currently does not have staff available to lead a program or does not currently offer any Junior Ranger programs?

Self-guided activities provide a great alternative to presented programs and are just as valuable as any other Junior Ranger program. In addition, self-guided activities provide an opportunity for families to explore the park together, become inspired and educated about the resources in the park, and receive a positive reward for their efforts.

There is no one "right way" to approach the implementation of a self-guided program. The self-guided activities can be a stand-alone Junior Ranger program for a park unit or incorporated into presented programs. Completion of the Adventure Guide, unit specific self-guided program book, or several of the worksheets included in this section should earn the participant the first level award: the Junior Ranger badge.

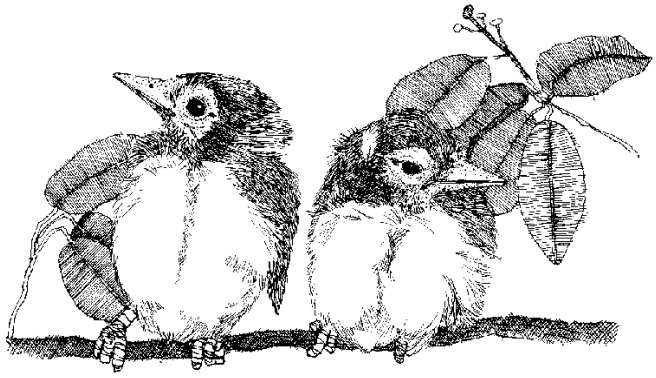
The activities should be designed to be fun and educational. When a Junior Ranger completes the activity book, have clearly identified places for the participant to receive recognition and his/her award. This can be a visitor center, kiosk, or other suitable place. In addition, park staff can carry awards with them during patrols to give the awards out during campground checks and other patrols. Park staff should look over the responses, and if you see an answer that indicates that a child misunderstands a question, inform him/her verbally, in a non-judgmental way. Remember this is a learning tool, not a test. It would be inappropriate, for example, to correct the activity with a red pen. Instead, if you see an answer that needs correcting, you might try to give the Junior Ranger some clues, and guide him or her toward the right answer. Or, you can simply (and gently) let him/her know what the expected answer is.

If the Junior Ranger has made a good attempt at the activity, and has filled in all the answers he or she could, the child has earned their badge. If you are in a visitor center or other public area, make a public announcement recognizing the Junior Ranger. For example, in a visitor center, announce out loud: "Attention everyone. I'd like all of you to stop what you're doing for a moment and recognize our park's newest Junior Ranger. Jim Smith has completed all of the requirements to become a Junior Ranger and is now presented with his Junior Ranger badge." You can officially hand the child his/her badge and shake his/her hand and begin a round of applause among the other visitors. This has the added benefit of including other visitors in seeing the positive efforts of interpretation in the park as well as providing positive feedback for the program participants.

Like the sample programs in this handbook, the self-guided activities are somewhat "generic." Self-guided activities are even more effective if designed with your unit in mind. You could take these samples and adapt them, including your park's interesting features. A specific activity could guide a Junior Ranger to a particular type of plant found on the park grounds, to the place in the museum where the cannons can be found, or to an area where a particular type of animal can often be seen. No matter how it is designed, a specific activity is preferable since it will encourage the child to notice and learn more about the special features of your unit.

Cooperating associations can be approached to help with printing the activity books. Additionally, the California State Parks Foundation will frequently help with funding for printing. Alternatively, you can request a number of copies to be printed through the regular DARC printing process.

Good luck in designing your own self-guided activities!



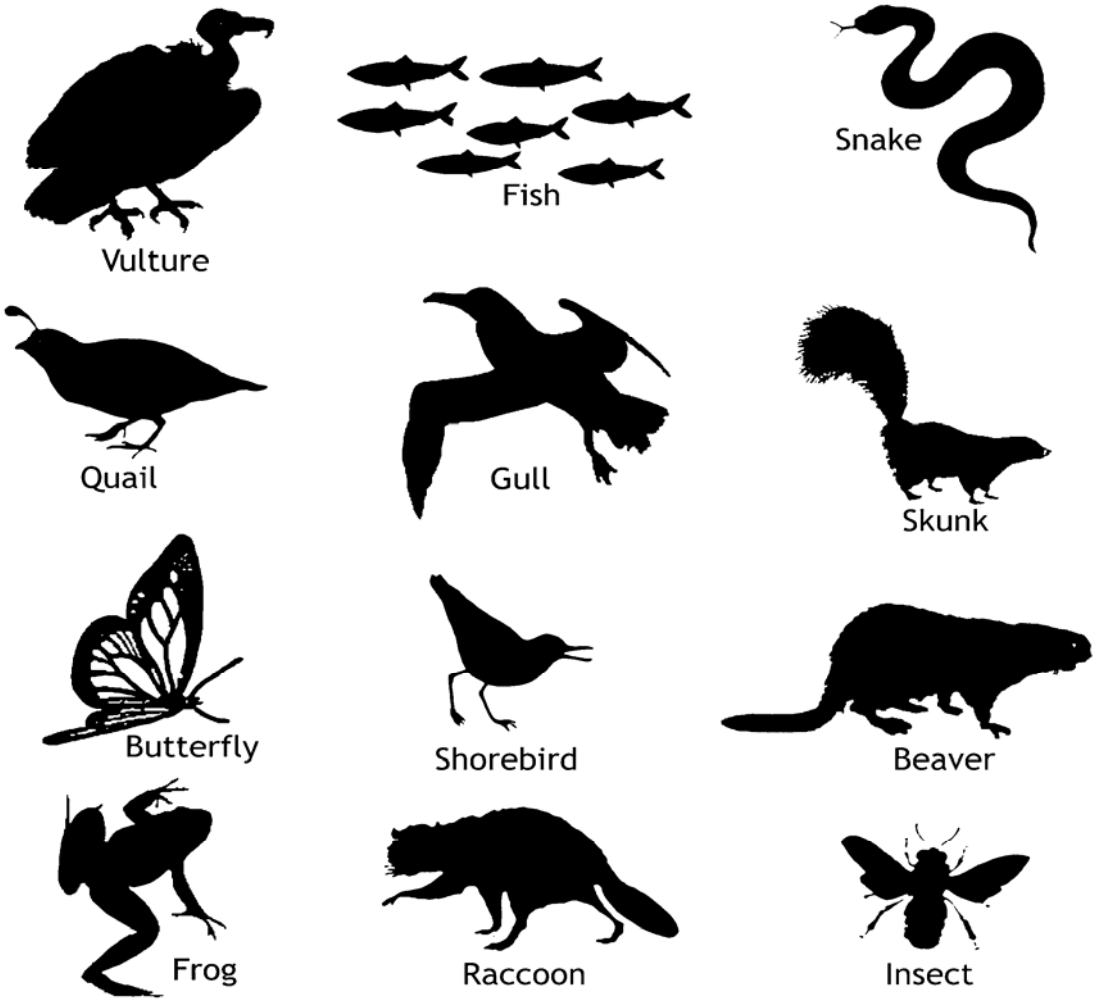
Name:_____ Park:_____ Date:_____

A Habitat is a Home

"Ecology" is a Greek word meaning "study of the home." Our home is the planet Earth. When we study our home, one of the important things to notice is that plants, animals, people, trees, water, air, and all other parts of nature work together and need each other. Get a pencil or pen and let's find out how!

1. A habitat is a location where a plant or animal lives. There must be food, shelter, and conditions that help the plant or animal survive. Describe your habitat.

2. This park may have several different habitats, each home to a variety of animals. Circle the animals below that you have seen in this park.



3. Choose one animal you circled. Describe what that animal's habitat is like. Where does it live? What does it eat and drink? Observe the animal to find out, look in the nature center if the park has one, or ask a park employee.

4. Do the animals you circled above need plants to survive? (yes/no)
   If so, what for?

5. Do plants need animals? (yes/no)
   If so, for what reasons?

6. Do plants need other plants? (yes/no)
   If so, for what reasons?

7. What about animals? Do animals need other animals to survive?
   If so, for what reasons?

8. Do people need plants and animals to survive? Why or why not?

9. Can you think of any reasons why plants and animals might need humans to survive?

You have completed this worksheet!

Name:_____ Park:_____ Date:_____

A Habitat is a Home—Part Two

Did you think of some of the reasons why plants, animals, and humans need each other to survive? If humans remove plants, or destroy habitats, we could change the lives of everything that depends on that plant or habitat to survive.

1. Why is it important to have places like this park, in which animal habitats are protected?

2. What does it mean when a species is endangered? Are there any endangered species at this park? (yes/no). If so, what are they?

3. What does it mean when an animal becomes extinct?

4. What do humans do that endangers the lives of plants and animals?

5. What can you do to help protect the homes of plants and animals?

6. Do you, or does your family, recycle:
   aluminum? (yes/no) newspaper? (yes/no)
   cardboard? (yes/no) motor oil? (yes/no)
   glass? (yes/no) other recyclable items? (yes/no)

7. How do you think recycling makes our home, the earth, a healthier place to live?

8. What else can we do to keep this world that we share with plants and animals healthy and beautiful?

You have completed this activity!

Name:_____ Park:_____ Date:_____

Endangered Species Who Me?

California has over 290 different species on the list of threatened and endangered species. As the population of California continues to grow, humans are taking over the former homes of these plants and animals. California's state parks provide safe habitats for many of these endangered species. Unscramble the following names of endangered species and uncover the hidden message.

R	**D**	**O**	**N**	**C**	**O**						**D**	**B**	**L**	**A**		**G**	**E**	**E**	**L**	**A**
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Good work—you are finished!

Endangered Species Who Me?—Answer Key

California has over 290 different species on the list of threatened and endangered species. As the population of California continues to grow, humans are taking over many of the former homes of these plants and animals. California's state parks provide safe habitats for many of these endangered species. Unscramble the following names of endangered animals and uncover the hidden message.

R	**D**	**O**	**N**	**C**	**O**					**D**	**B**	**L**	**A**		**G**	**E**	**E**	**L**	**A**
C	O	N	D	O	R					B	A	L	D		E	A	G	L	E
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R	**H**	**O**	**T**	**N**	**E**	**R**	**H**		**T**	**D**	**O**	**T**	**E**	**S**	**P**		**L**	**O**	**W**
N	O	R	T	H	E	R	N		S	P	O	T	T	E	D		O	W	L
			5	6															

O	**N**	**R**	**W**	**B**		**N**	**C**	**P**	**L**	**E**	**I**	**A**							
B	R	O	W	N		P	E	L		C	I	N							
							4				10								

N	**A**	**I**	**T**	**G**		**R**	**R**	**T**	**E**	**A**	**G**		**N**	**K**	**E**	**A**	**S**		
G	I	A	N	T		G	A	R	T	E	R		S	N	A	K	E		
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S	**E**	**E**	**D**	**R**	**T**		**E**	**O**	**S**	**T**	**R**	**T**	**I**	**O**					
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K	**B**	**M**	**U**	**C**	**H**	**P**	**A**		**L**	**W**	**E**	**A**	**H**						
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W	**S**	**Y**	**N**	**O**		**R**	**E**	**P**	**L**	**V**	**O**								
S	N	O	W	Y		P	L	O		V	E	R							
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S	**A**	**V**	**E**		**T**	**H**	**E**		**A**	**N**	**I**	**M**	**A**	**L**	**S**	**!**			
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JUNIOR RANGERS

Name:_____ Park:_____ Date:_____

Energy = Life

Everything on Earth needs energy to live. Without energy, cars would not run, television sets would not turn on, plants could not grow, and animals could not move or even breathe! In this activity, you will have a chance to explore what energy really is, and how it affects everything around you.

1. How do humans get energy to walk, talk, read, and think?

2. How do animals get their energy to move, grow, and reproduce?

3. Some animals eat plants to get energy to live. They are called herbivores. Other animals eat animals to get their energy. What is this type of animal called?

4. What are some examples of herbivores in the park?

5. What are some examples of carnivores found in the park?

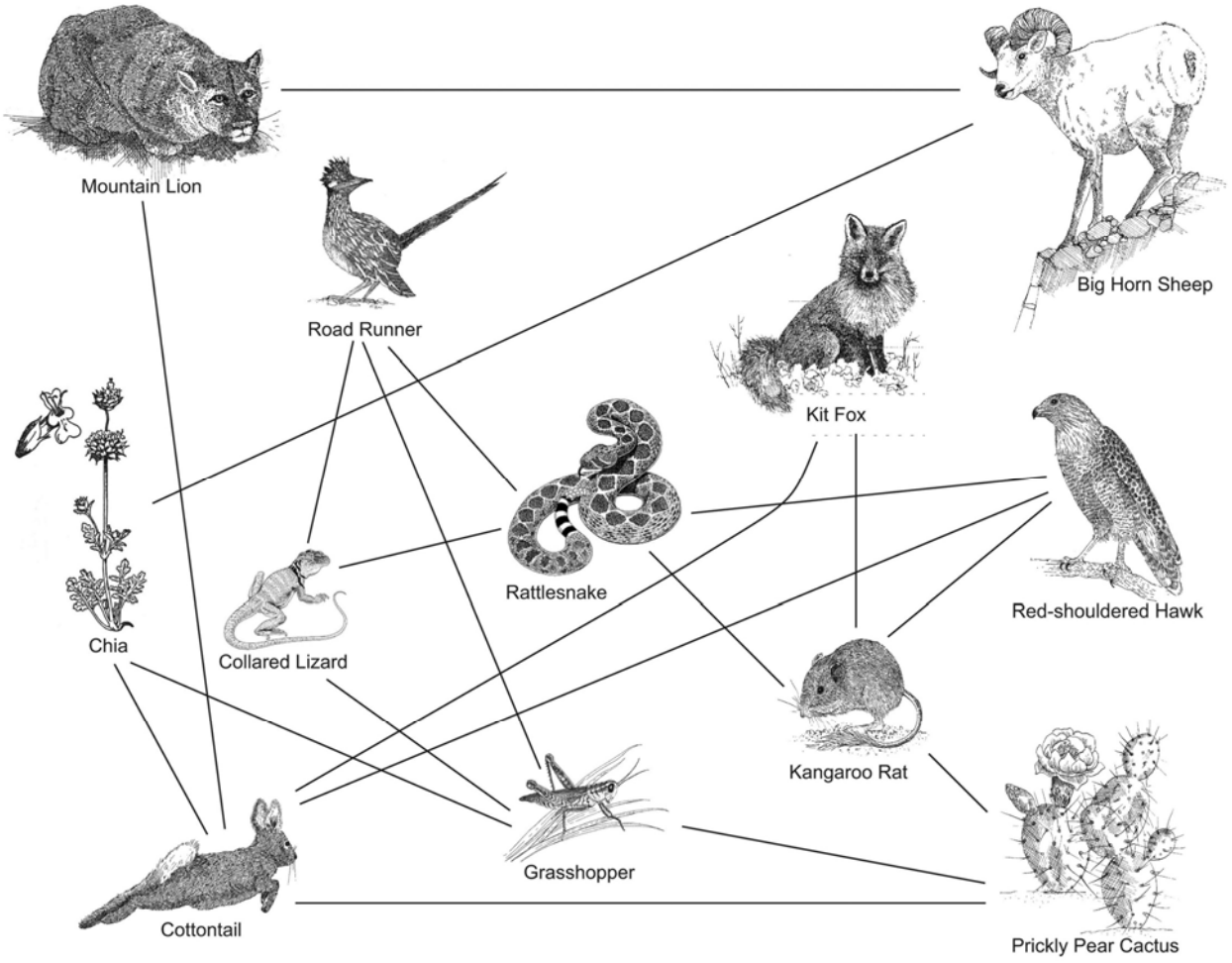
6. What is the difference between predator and prey?

7. Humans eat both plants and animals. What are we called?

8. Arrange these animals and plants into a food chain. A food chain is a simple way to show the transfer of energy between organisms. Hint: where does each thing get their food from?
   Frog Grass Hawk Grasshopper Sun

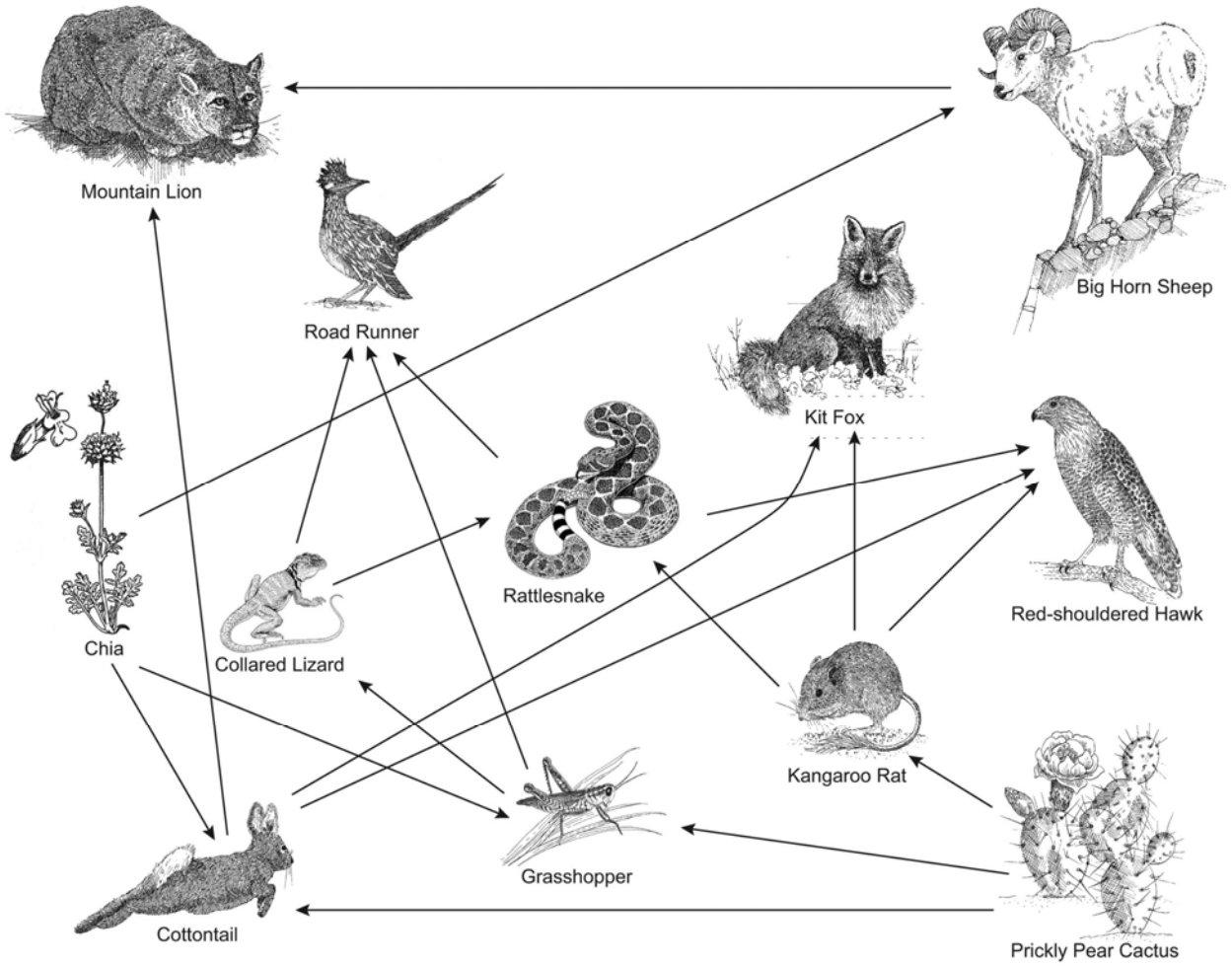
9. Why do you think there are more herbivores than carnivores (think about the transfer of energy)?

10. Plants and animals are temporary energy "vessels"—but very "leaky" ones. As plants and animals move, digest food, grow, reproduce, and maintain body heat, energy is used and lost. Animals depend on more than one species of plants and/or animals to get the energy they need to survive. A food web shows this interdependency between organisms. Complete the desert food web by drawing in the arrows. The arrows should point from a plant or animal to the animal that eats it. (For example: prickly pear ⟶ kangaroo rat ⟶ kit fox)



Good work—you are finished!

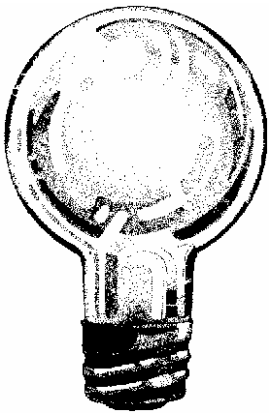
Energy = Life—Answer Key



Name:_____ Park:_____ Date:_____

Energy, Energy, Everywhere

Energy is an important resource needed by everything on earth to function. Fill in the blanks on the energy crossword puzzle by reading the clues and using the words from the list below the puzzle.



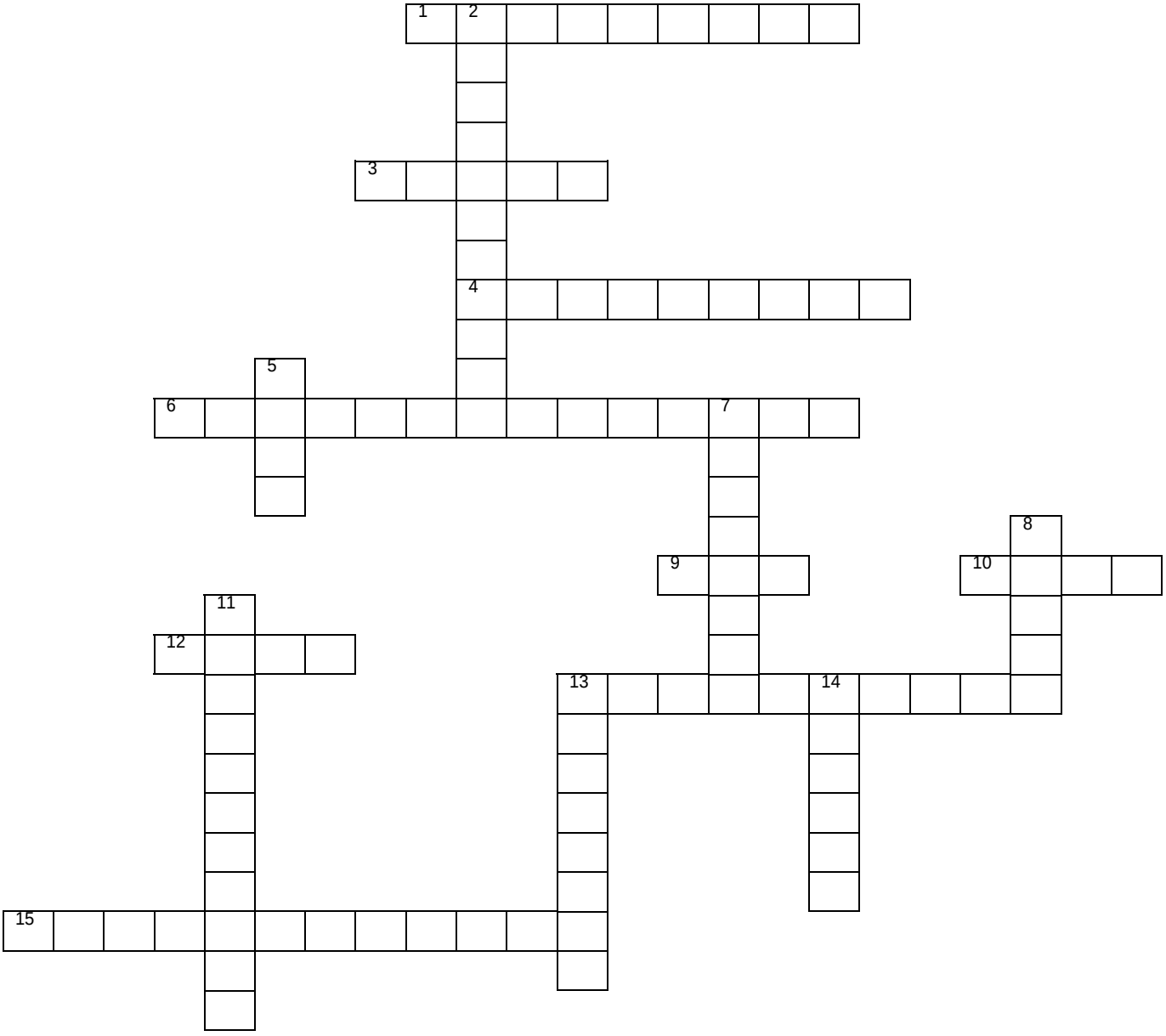
ACROSS

1. The type of animal that eats plants to get energy.
3. This is what is used to make "hydropower."
4. The type of animal that eats other animals to get energy.
6. The process plants use to get energy.
9. A fossil fuel. Hint: motor ___.
10. The type of energy that sailboats use to move.
12. Burning this (in your fireplace) creates energy.
13. The type of energy created from heat within the earth.
15. Taking care to preserve natural resources is called _____.
    Hint: energy _____, water _____.

DOWN

2. The type of energy used to turn on a hairdryer.
5. This type of fuel is black and sooty, and produces dust when it is mined.
7. One of the things plants need to photosynthesize (make energy).
8. The type of energy created by the ocean.
11. Materials from prehistoric animals and plants created, over millions of years, many types of fuel. These fuels, like coal, oil, and natural gas, are called _____.
13. The fuel used in automobiles.
14. The subject of this program.

Energy Crossword

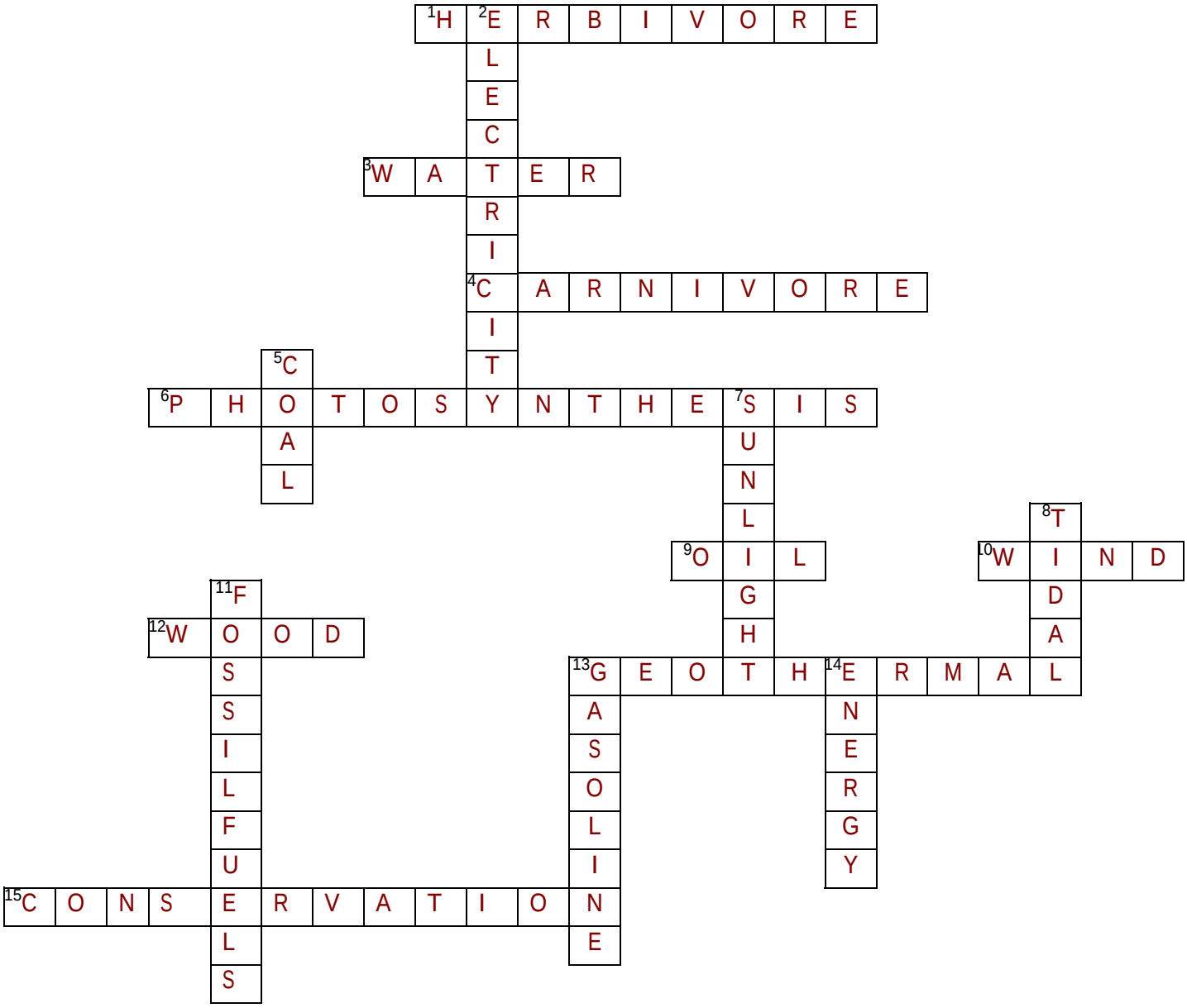


Hint: Below are the words used in this crossword puzzle.

gasoline	conservation	oil	geothermal
photosynthesis	herbivore	sunlight	fossil fuels
tidal	wind	coal	carnivore
electricity	wood	energy	water

Good work—you are finished!

Energy Crossword—Answer Key



Name:_____ Park:_____ Date:_____

More Than Just Rocks

Geology involves much more than just the study of rocks. It can include the study of the history of life on earth; earthquakes, volcanos, and tsunamis, and the formation of mountains, rivers, and valleys. The study of rocks and land formations can be fun and exciting. To complete this activity, you will need a pencil or pen and your imagination. Let's begin!

1. There are three kinds of rocks on Earth: metamorphic, sedimentary, and igneous.

   One type of rock is formed from melted rock material (called magma). Which one is it?

   One type is formed by layers and layers of sand and clay. Which one is it?

   The last type has been changed by heat and pressure deep inside the earth. Which type is it?

2. Find a rock, and draw it here.

   What does the rock feel like? Is it smooth and rounded? (yes/no) Smooth, rounded rocks usually have been shaped by water. Maybe your rock rolled down a stream.

   Does your rock have any hard edges? Has it been cracked or broken? (yes/no)

Rocks with cracks, breaks, or sharp edges may have fallen. Look around. Maybe your rock came from a nearby mountain.

Does your rock have layers that you can see? (yes/no)
Maybe your rock has fossils in it. Fossils are impressions or remains of animals that have been preserved in rocks.

3. Have you ever felt an earthquake? (yes/no)

4. Do you know what causes earthquakes? (yes/no)

5. Giant plates of land are under our feet. These plates are arranged like a jigsaw puzzle. If one piece moves out of position, it causes others to move. This is how earthquakes happen. Are there any earthquake faults in this park? (yes/no) If you don't know, ask a park employee.

The words below are scrambled. Can you figure out the geology words all mixed up below?

silsof	_____	theruqkeaa	_____
vcoolna	_____	ckor	_____
ylvlae	_____	ounmiatn	_____
gmaam	_____	neousig	_____

Hint: All of these words appear in this worksheet.

You have finished! Good job!

More Than Just Rocks—Answer Key

The words below are scrambled. Can you figure out the geology words all mixed up below?

silsof= **Fossil**

theruqkeaa = **Earthquake**

vcoolna= **Volcano**

ckor = **Rock**

ylvlae= **Valley**

ounmiatn = **Mountain**

gmaam= **Magma**

neousig = **Igneous**

Name:_____ Park:_____ Date:_____

Museum Scavenger Hunt

As you walk throughout the museum, fill in the blanks and answer the questions to complete your scavenger hunt.

1. People through the years have used many different forms of transportation to travel. Draw a picture or write the name of your favorite form of transportation.

2. In this museum I saw pictures of people who lived in a _____ home.

3. Names of places and towns often mean something (example: Point Mugu is from the Chumash Indian word "muwu" which means beach). What is a place name you learned today? _____

4. Draw a picture of your favorite outfit you saw worn in the museum. Why was it important for the person to wear this style of clothing?

5. What was the main industry in this area? _____

   Is this industry still in California? _____

6. ☑ the box below if you saw an example of an animal that was over-hunted. Put two ✓'s in the box if that animal is no longer found in California.

   ☐

7. Can you give an example that you found in the museum where people were not good stewards of the environment? (Good stewards are people who take responsibility for caring for something and using it wisely).

You have finished!

JUNIOR RANGERS

Name:_____ Park:_____ Date:_____

Park Animals

There are a million different types of animals in the world. Animals are exciting to study! You'll need a pencil or a pen to begin. When you have finished, bring this worksheet back to the entrance station or visitor center to receive a stamp in your logbook.

1. Have you seen any animals in the park today? (yes/no)
   If so, can you name them?

   If you can't name them, look them up in the park's visitor center or in a guide book.

2. There are five senses: hearing, seeing, smelling, feeling, and tasting. Which sense do you think is sharpest in:
   Humans?

   Snakes?

   Bats?

3. Predators are animals that kill and eat other animals. Can you name a predator that lives in this park?

4. Predators usually kill the sick and weak animals of other species. Why is this important?

5. The biggest threat by humans to animals' survival is when we destroy their habitats (homes). Why does habitat destruction hurt animals?

6. Can you think of any reason why you have been asked not to touch or feed park animals?

7. What does it mean when we say a species is endangered?

8. Are there endangered species at this park? (yes/no)
   If so, what are they? And why are they endangered?

   What can you do to help?

9. What does it mean when a species becomes extinct?

10. Why are places like this park important to animals?

11. Name your favorite animal that lives at this park.

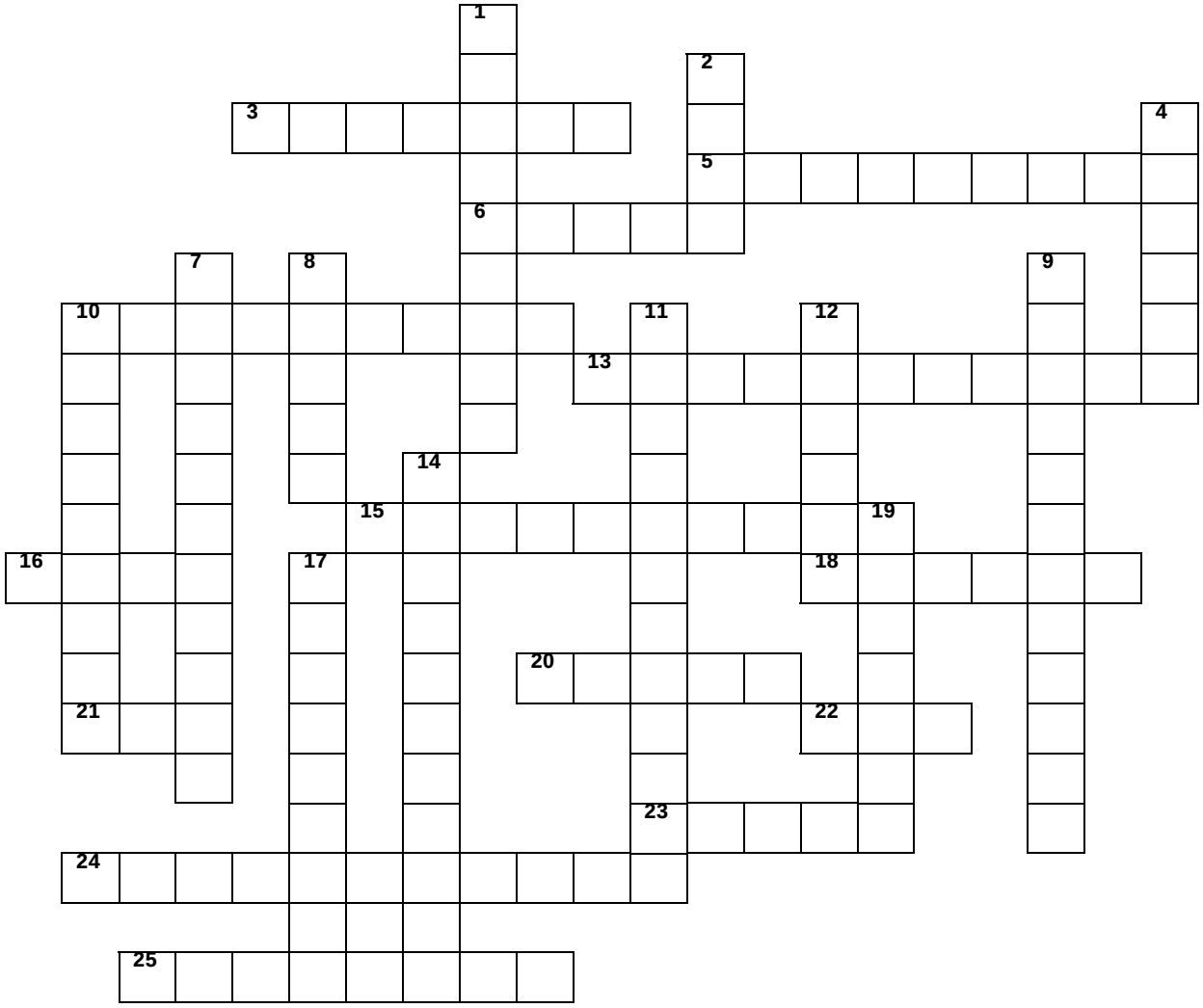
12. Draw a picture of that animal below.

You have finished!

Name:_____ Park:_____ Date:_____

Park Animals Crossword Puzzle

This crossword puzzle is all about animals! Look at the clues on the next page, and then look at the list of words under the puzzle to figure out the answers. Each word is used only one time. Good luck!



bald eagle
wild burro
hummingbird
beaver
mountain lion
bullsnake
raven
raccoon
swallow
elk
porcupine
hawk
bats
pocket mouse
rattlesnake
mule deer
golden eagle
skunk
woodpecker
coyote
skink
horned lizard
black bear
fox
swift
rabbit

Park Animals Crossword Puzzle Clues

ACROSS

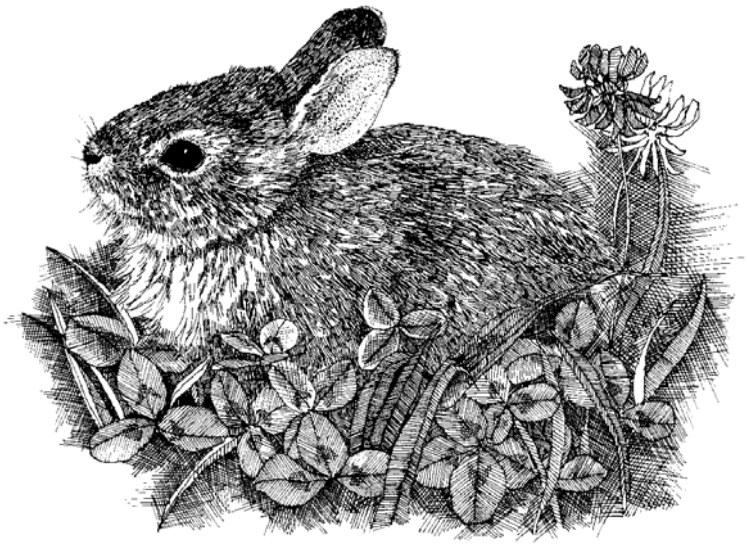
3. This is a slim, graceful bird and eats insects caught in flight. Clue: when you _____ your food, it goes to your stomach.
5. When the _____ was brought here by the Spanish, it was a tame animal. Today, it is no longer tame. It is a relative to the mule and the horse and can be found as a non-native exotic animal in some parks.
6. You know this animal by its not-so-pleasant smell and its black and white striped coat. The _____ eats mice, insects, eggs, and berries.
10. A relative of the grizzly bear, this is a smaller bear and not often seen. Though his coat is typically a brown color, his name is the opposite of "white." The _____ _____ eats berries, nuts, insects, eggs, honey, and (unfortunately) garbage.
13. This is a small rodent that looks a little like a long-tailed hamster. Its first name rhymes with "rocket."
15. This colorful bird drills holes in trees with its bill.
16. _____ are the only truly flying mammals. They have very poor vision and catch insects by using a sort of built-in radar system.
18. Two examples of these small, soft-furred animals are the jack _____ and the cottontail _____.
20. This is a small bird, swallow-like in appearance. Flight is very quick, so its name is the _____.
21. The _____ is a hoofed mammal, and it is larger than mule deer. Usually seen in large herds, these animals can often be found in the mornings and evenings around watering holes.
22. This small, dog-like creature has a reputation for being clever and sly. It eats small animals, berries and fruits.
23. Often confused with a crow, this black bird is larger. Its call is a very distinctive "caw, caw."
24. The _____ is a very tiny bird with a long bill that it uses for getting nectar from flowers. Its wings are very difficult to see because they move so quickly when the bird is flying.
25. This deer is found in forests and meadows browsing on shrubs and twigs. It has a whitish rump and large ears.

DOWN

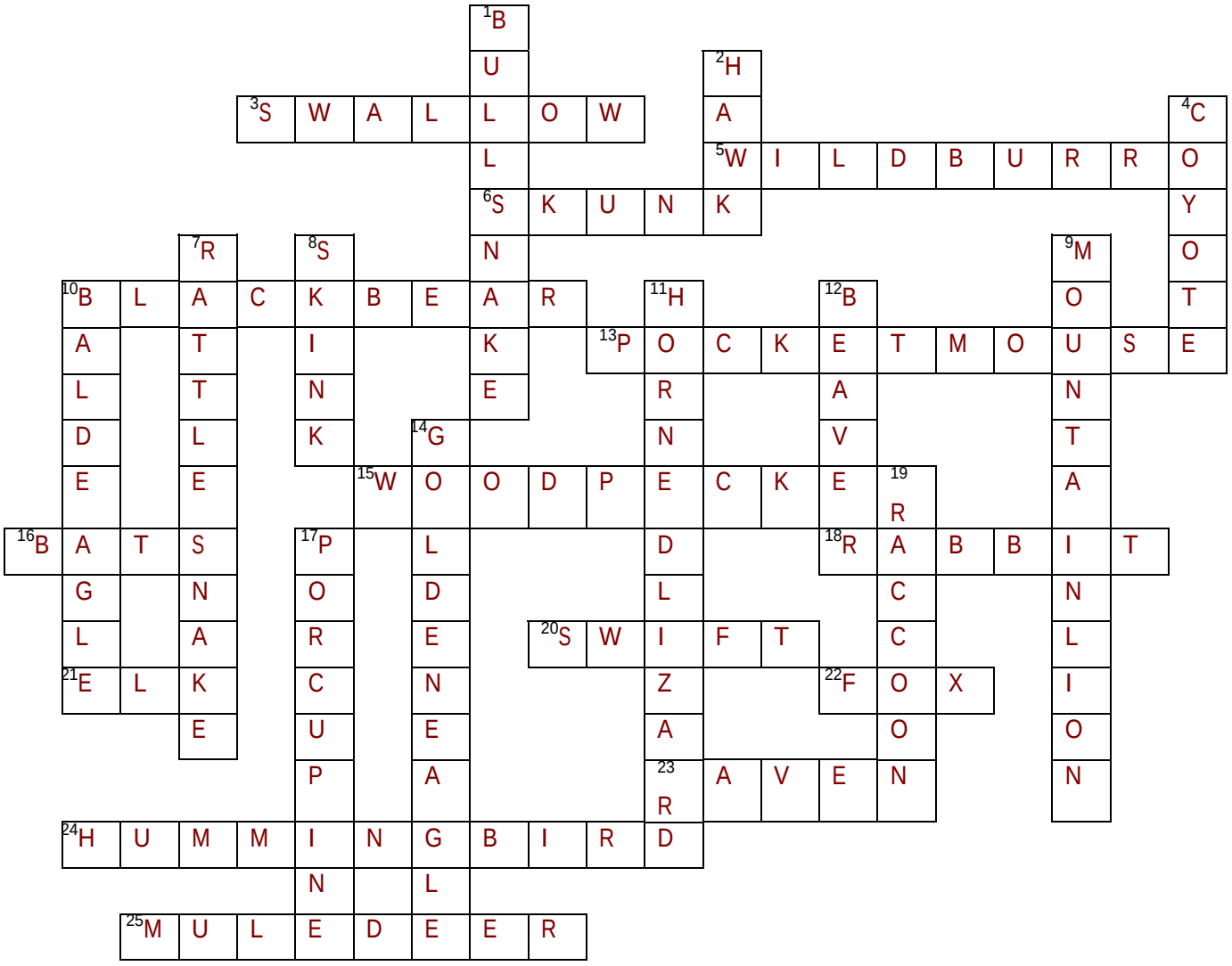
1. Another name for this reptile is "gopher snake." Clue: could we call the female a "cow" snake?
2. The _____ is a hunting bird, usually smaller than an eagle. Two varieties of this bird are the Cooper's _____ and the red-tailed _____.

4. This creature looks like a small wolf. It is often heard at night howling at the moon.
7. This poisonous reptile is famous for the noisemaker at the end of its tail.
8. This slick-scaled lizard likes moist areas such as damp soil or a spring or stream. It lives under stones, logs, and boards.
9. A member of the cat family, this creature is not often seen. It preys on deer, rabbits, and mice. It is also called a cougar, puma, or panther.
10. This creature is the United States' national bird. Its white head keeps it from being confused with #14 down.
11. Although it looks like a toad, this creature is a lizard and usually lives in desert places. His nickname is “horny toad,” and this reptile eats mostly ants.
12. This large rodent builds its house in ponds in the form of a dam. Because of this animal's hard work, we have the saying, “busy as a _____.”
14. This dark bird's name comes from the flash of gold you can see on the back of its neck when this bird turns its head. This eagle eats mostly rabbits, rodents, and other small animals.
17. The _____ is the only North American mammal with long, sharp quills. This heavy-bodied, short-legged, clumsy creature may be seen in forests, sometimes high in a tree.
19. This animal is known for washing its dinner with its “hands” before eating. It has a black mask around its eyes, and a ringed tail.

You have finished!



Park Animals Crossword Puzzle—Answer Key



Name:_____ Park:_____ Date:_____

Redwoods!

Large forests of redwoods once covered portions of Europe, Asia, and North America. Today only small areas of these forests remain. One region is in China where the smaller Dawn redwood lives. The other two areas are in California.

The world's tallest tree is located in Redwood National Park. It stands at 378 feet tall and is called the Hyperion.

California is also the home of the world's largest tree overall. Located in Sequoia National Park, the General Sherman Tree is 272 feet tall with a 36-foot diameter. That trunk is wider than a city street!

Fill in the blanks with the correct answers:

__ __ __ R __ __ __ __ V __ __ A
The mountainous area along California's eastern border where you can find the giant sequoia, *Sequoiadendron giganteum*, the world's largest tree. Sequoias can live to be 3,200 years old!

__ __ __ S __
Area of land near water where redwood trees can grow taller than a 25-story building. These trees are called *Sequoia sempervirens*.

__ __ L __ __ __ __ N __ __ __ __ __ W __ __ __
The official state tree, found in many Northern California state parks.

J __ __ __ D __ __ __ __ M __ __ __
This famous mountain man was one of the first Americans to cross the Sierra in 1827. One of our redwood state parks is named in honor of him.

__ __ G __ __ S __ __ __ __ D __ __ __ D __
Originally founded in 1902 as California Redwood Park, this is the oldest California state park.

Good work—you are finished!

Redwoods!—Answer Key

Large forests of redwoods once covered portions of Europe, Asia, and North America. Today only small areas of these forests remain. One area is in China where the smaller Dawn redwood lives. The other two areas are in California.

The world's tallest tree is located in Redwood National Park. It stands at 378 feet tall and is called the Hyperion.

California is also the home of the world's largest tree overall. Located in Sequoia National Park, the General Sherman Tree is 272 feet tall with a 36-foot diameter. That trunk is wider than a city street!

Fill in the blanks with the correct answer:

S I E R R A N E V A D A
The mountainous area along California's eastern border where you can find the giant sequoia, *Sequoiadendron giganteum*, the world's largest tree. Sequoias can live to be 3,200 years old!

C O A S T
Area of land near water, where redwood trees can grow taller than a 25-story building. These trees are called *Sequoia sempervirens*.

C A L I F O R N I A R E D W O O D
The official state tree, found in many Northern California state parks.

J E D E D I A H S M I T H
This famous mountain man was one of the first Americans to cross the Sierra in 1827. One of our redwood state parks is named in honor of him.

B I G B A S I N R E D W O O D S
Originally founded in 1902 as California Redwood Park, this is the oldest California state park.

Name:_____ Park:_____ Date:_____

Water, Water Everywhere—Or Is It?

Water is all around. It is in oceans, lakes, and streams. It falls from the skies, and comes from faucets. Why is water important to us? You'll find out in this activity. When you have a pencil or a pen, you're ready to start!

1. What have you had to drink today?

2. Do those drinks contain water? (yes/no)

3. We should all try to drink 6-8 cups of liquid per day to keep our bodies functioning regularly. After all, our bodies are about 75% water! Do you drink 6-8 glasses of liquid each day? (yes/no)

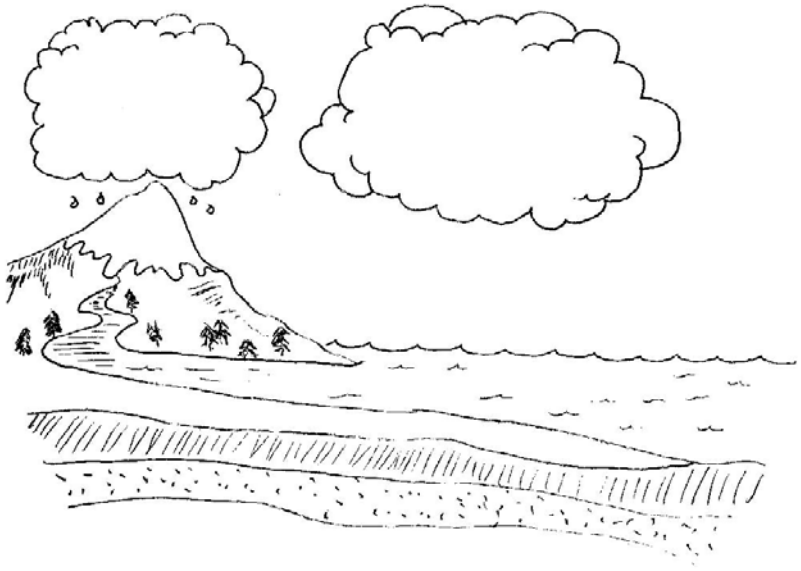
4. Do animals other than humans need water? (yes/no).
   If so, what for?

5. Do plants need water? (yes/no)
   If so, what for?

6. Although it seems like there is water everywhere, there is actually a very limited amount of fresh water that is available to humans, plants, and animals. To ensure that there is enough fresh water, we need to conserve. Name three ways that you can conserve water.
   1)_____
   2)_____
   3)_____

7. Humans use water for more than just drinking. We use boats to travel in and to carry cargo on. We fish in lakes and streams. Companies use water to make the products they sell. List five other reasons why we need water.
   1)_____
   2)_____
   3)_____
   4)_____
   5)_____

8. The picture below represents the water cycle. Water travels in a never-ending circle from clouds to rain or snow, to rivers, streams, or lakes, to the ocean, where it then again becomes part of a cloud. The four parts of the water cycle are: evaporation, condensation, precipitation, and accumulation.



9. Snow is one example of precipitation. Can you name some other types of precipitation?
   1)_____
   2)_____
   3)_____

10. Clouds are forms of condensation. For water to get from the surface of an ocean, a lake, or a stream to a cloud takes a process that is part of the water cycle. What is this process called?

Below are two water activities: a water word search and a secret message scramble. If you are 7-10 years old, try to find all of the words in the word search. If you are 11 years old or older, try to unscramble the words and uncover the secret message.

Name:_____ Park:_____ Date:_____

Water Word Search

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

stream
liquid
leak
bucket
pail
wet
cloud
washing
tub
rain
ice

1. When I am not frozen I am a _____.
2. I am a miniature version of a river.
3. Water will _____ out of a hole in a cup.
4. At a beach water can be gathered in a _____.
5. I am larger than a pail.
6. When you jump in water you get _____.
7. Rain falls from me.
8. Water is used for _____ clothes.
9. To take a bath you fill this with water.
10. I am drops of water that fall from clouds.
11. I am frozen water.

Water Word Search—Answer Key

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

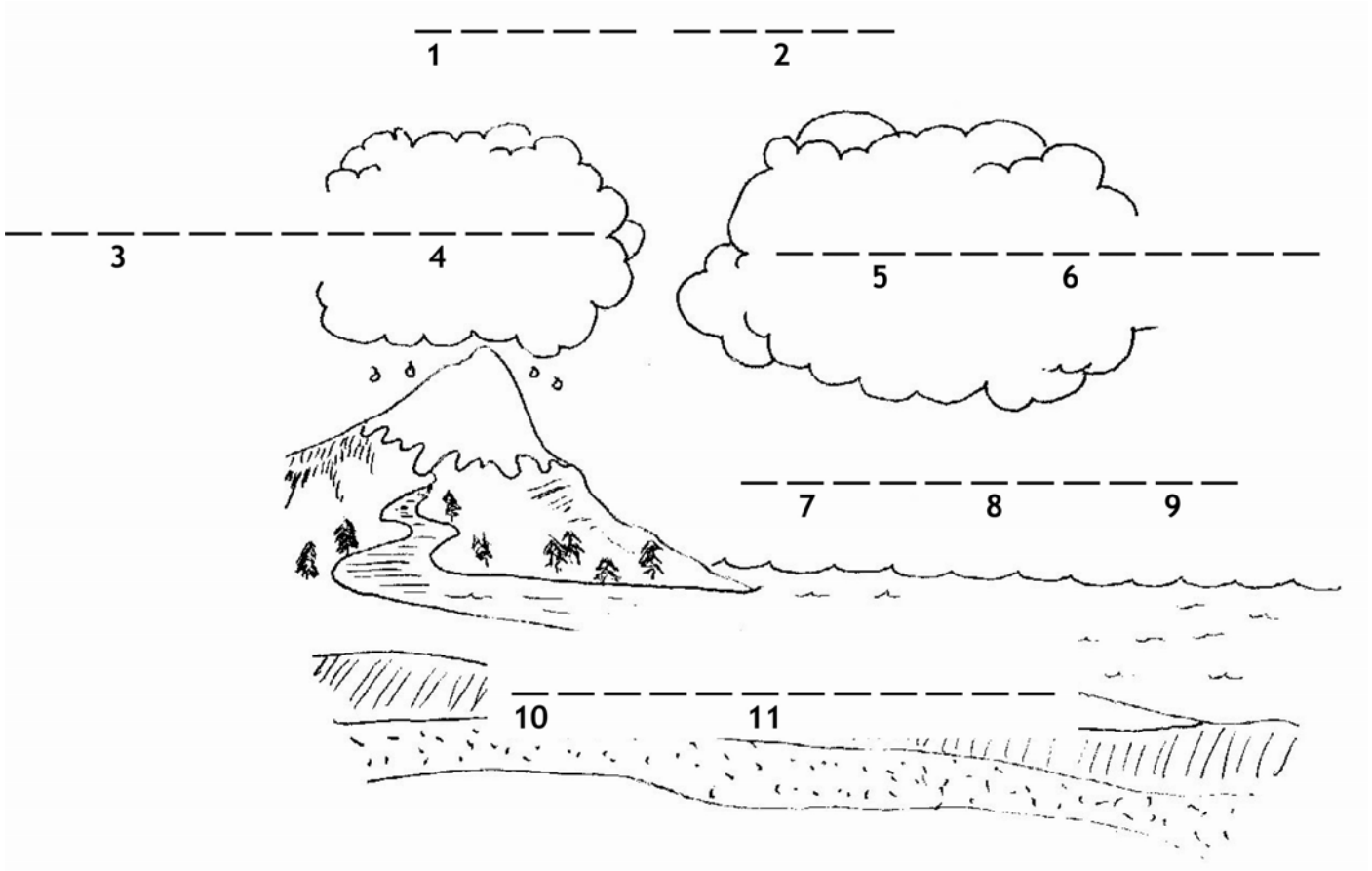
stream	bucket	cloud	rain
liquid	pail	washing	ice
leak	wet	tub	

1. When I am not frozen I am a _____. liquid
2. I am a miniature version of a river. stream
3. Water will _____ out of a hole in a cup. leak
4. At a beach water can be gathered in a _____. pail
5. I am larger than a pail. bucket
6. When you jump in water you get _____. wet
7. Rain falls from me. cloud
8. Water is used for _____ clothes. washing
9. To take a bath you fill this with water. tub
10. I am drops of water that fall from clouds. rain
11. I am frozen water. Ice

Name:_____ Park:_____ Date:_____

Water Secret Message Unscramble

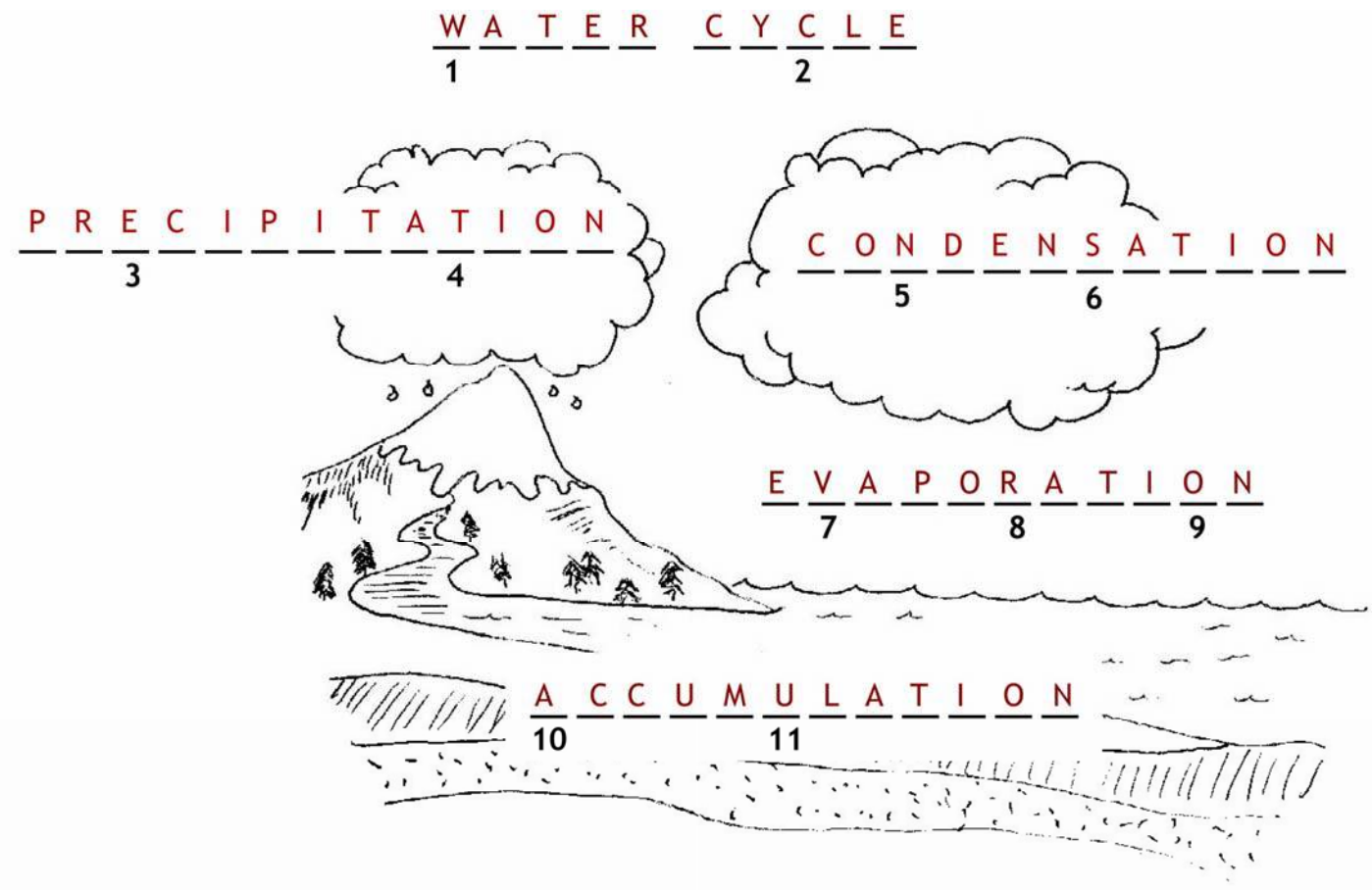
Hint: All of the words to unscramble are found in the worksheet.



1	10	6	4	3		5	9	4	,	1	10	5	4		5	9	4	,	

2	9	5	6	3	8	7	3		9	11	8		1	10	4	3	8		

Water Secret Message Unscramble—Answer Key



W	A	S	T	E		N	O	T	,	W	A	N	T		N	O	T	,
1	10	6	4	3		5	9	4		1	10	5	4		5	9	4	

C	O	N	S	E	R	V	E		O	U	R		W	A	T	E	R
2	9	5	6	3	8	7	3		9	11	8		1	10	4	3	8

Name:_____ Park:_____ Date:_____

Weather and Climate

Weather is a part of our lives every day. Sometimes the weather surprises us, and we have to adjust to it. To find out more about weather, get a pencil or pen, and start!

1. Describe the weather conditions outside today.

2. Did you consider the weather today when you picked out what you are wearing? (yes/no)

3. What is normal body temperature for humans?

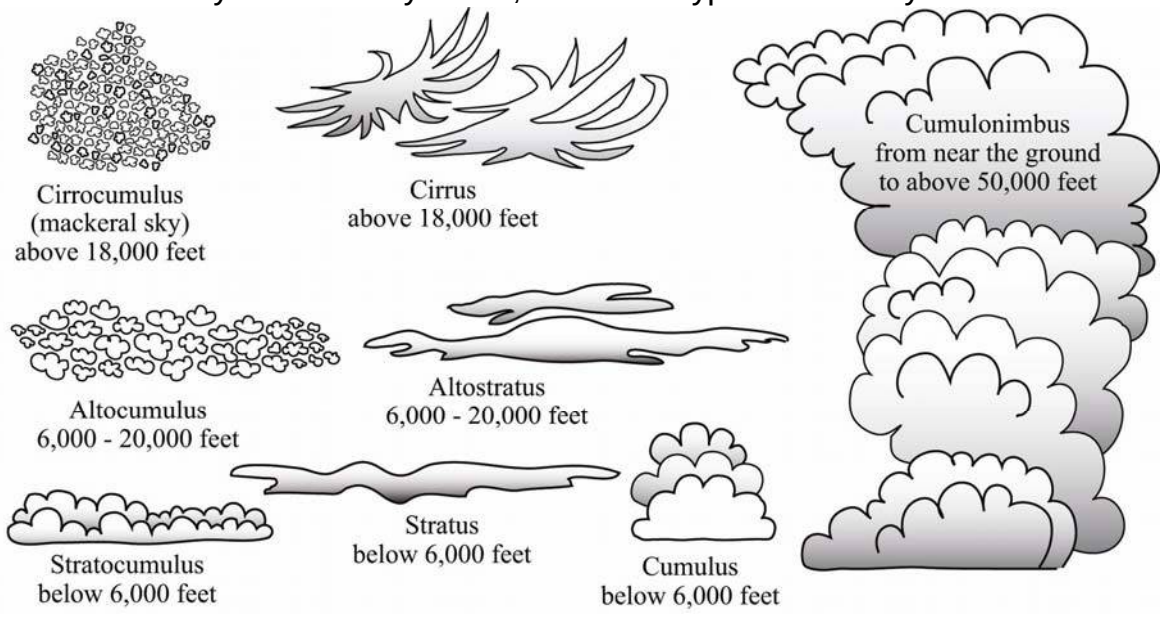
4. Describe how your body feels when you get too hot.

5. When a person gets much too hot, that condition is called hyperthermia (hyper = high, thermia = temperature). How can you prevent getting too hot?

6. Describe what your body feels like when you get too cold.

7. When a person gets too cold, that condition is called hypothermia (hypo = low, thermia = temperature). How can you prevent getting too cold?

8. Are there any clouds today? If so, circle the types of clouds you see below.



9. Cumulonimbus clouds are often called "thunderclouds" because they signify that heavy rains and thunderstorms are likely. Should you stand under a lone tree during a thunderstorm? (yes/no)

10. Are you safe in the car during a thunderstorm? (yes/no).

10. Does the park you are in get a lot of rain? (yes/no).

11. What type of climate does this park have? Is it dry? Is it moist? Is it hot, or cool?

12. Do you think it snows at the park you are in? (yes/no)

Some of those questions were tough! Here's some information you can use to fill in any answers you didn't know.

Hyperthermia is when your body gets too hot! First you sweat a lot, then your temperature will go above your normal body temperature (about 98.6 degrees). To make sure you avoid hypothermia, drink lots of water on a hot day, especially if you are hiking or doing any other kind of exercise. Wear a hat in the sun, and rest in the shade if you feel shaky, hot, or tired.

Hypothermia is when your body gets too cold. Your body temperature will drop below 98.6 degrees, you will begin to shiver, and your skin will get very pale. This happens because your blood is trying to keep your insides (like your heart and lungs) warm. To avoid hypothermia, make sure to bring lots of warm clothing with you when you will be outside. Even if it looks like it will be a warm day, the best idea is to bring several layers of clothing with you (for example, an extra shirt, a sweater, a windbreaker, and/or a jacket). Then, if it gets too hot, you can tie the extra clothes around your waist.

Lightning, although it can be dangerous, rarely hurts anyone. You just have to be careful. The worst places to be during a lightning storm are under the tallest objects, since lighting tends to strike the tallest thing in the area. You should not touch metal objects during a lightning storm, because if the object got hit by lightning, you would get shocked. Cars, though, are safe. Although you are surrounded by metal, you aren't usually touching metal inside the car (seats, dashboards, etc. are usually made out of cloth, plastic, vinyl, or leather).

You have finished!

Name:_____ Park:_____ Date:_____

Jobs in Parks

Park employees have an important job: they take care of the places that have special scenic or historic value in California. See how many different jobs you can observe while you are at the park!

1. Watch an employee of this park as that person works, and answer the following questions.

   Make a check mark beside the special skills that the employee needs to do his or her work.

   _____ Strong muscle

   _____ A smile

   _____ Speaking

   _____ Counting money

   _____ First aid

   _____ Knowledge of plants, animals, or history

   _____ Knowledge of park rules/safety

   _____ Safe use of equipment

   _____ Swimming

   _____ Other skills? Please list below

2. Safety is important in our parks to both employees and visitors. One way to play and work safely in the sun is to wear a hat and use sunscreen. Write down three other things you can do to have a safe visit in the park.

   1.

   2.

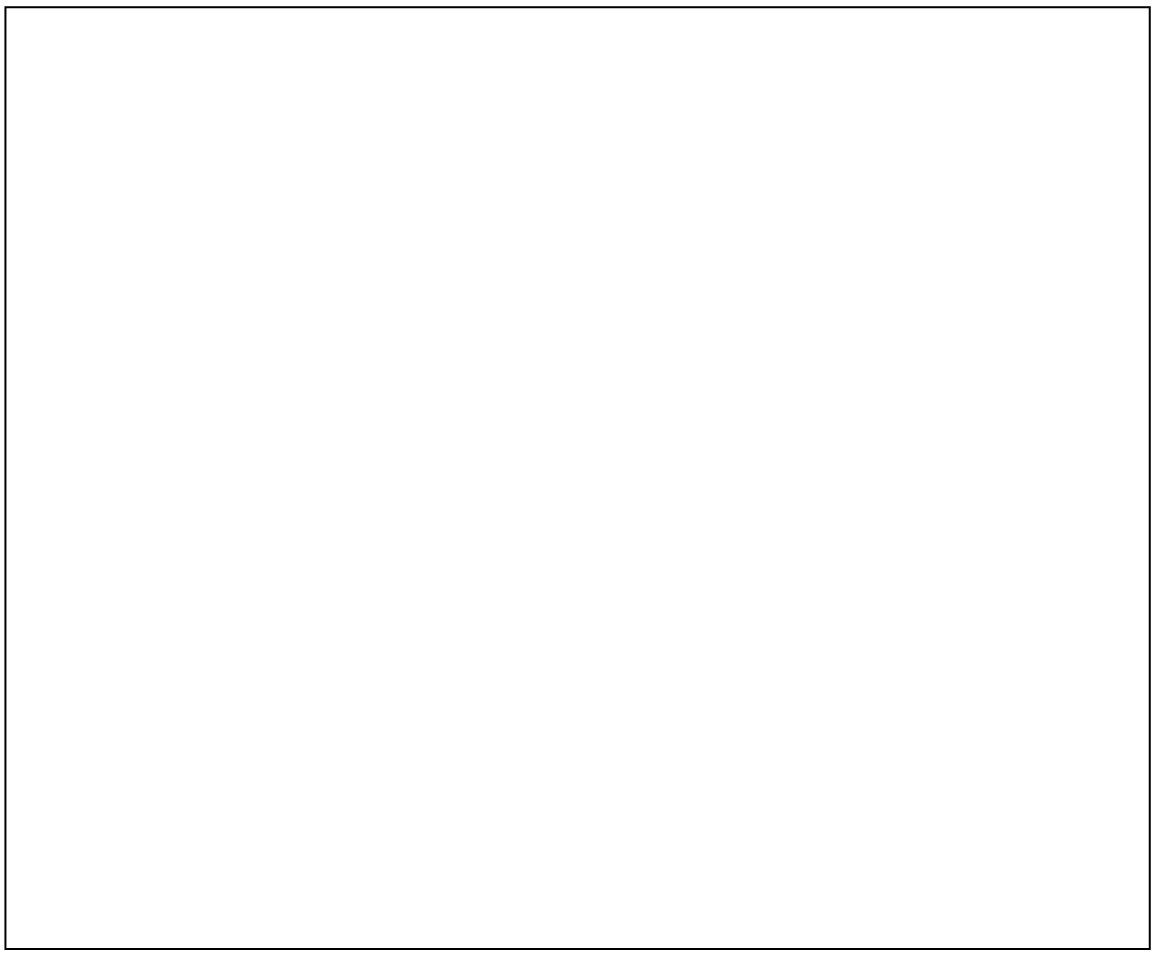
   3.

3. State parks hire many people with different talents. List two talents or abilities you have that would help you if you worked in this park.

    1.

    2.

4. Draw a picture to show you doing the job of a park employee. Show in the picture whether you think this job would be fun to do or not.



Good work!

Name:_____ Park:_____ Date:_____

Working in Parks

California's state parks depend on many people to help them function smoothly. Learn about different state park careers as you complete this crossword puzzle. Use the following clues:

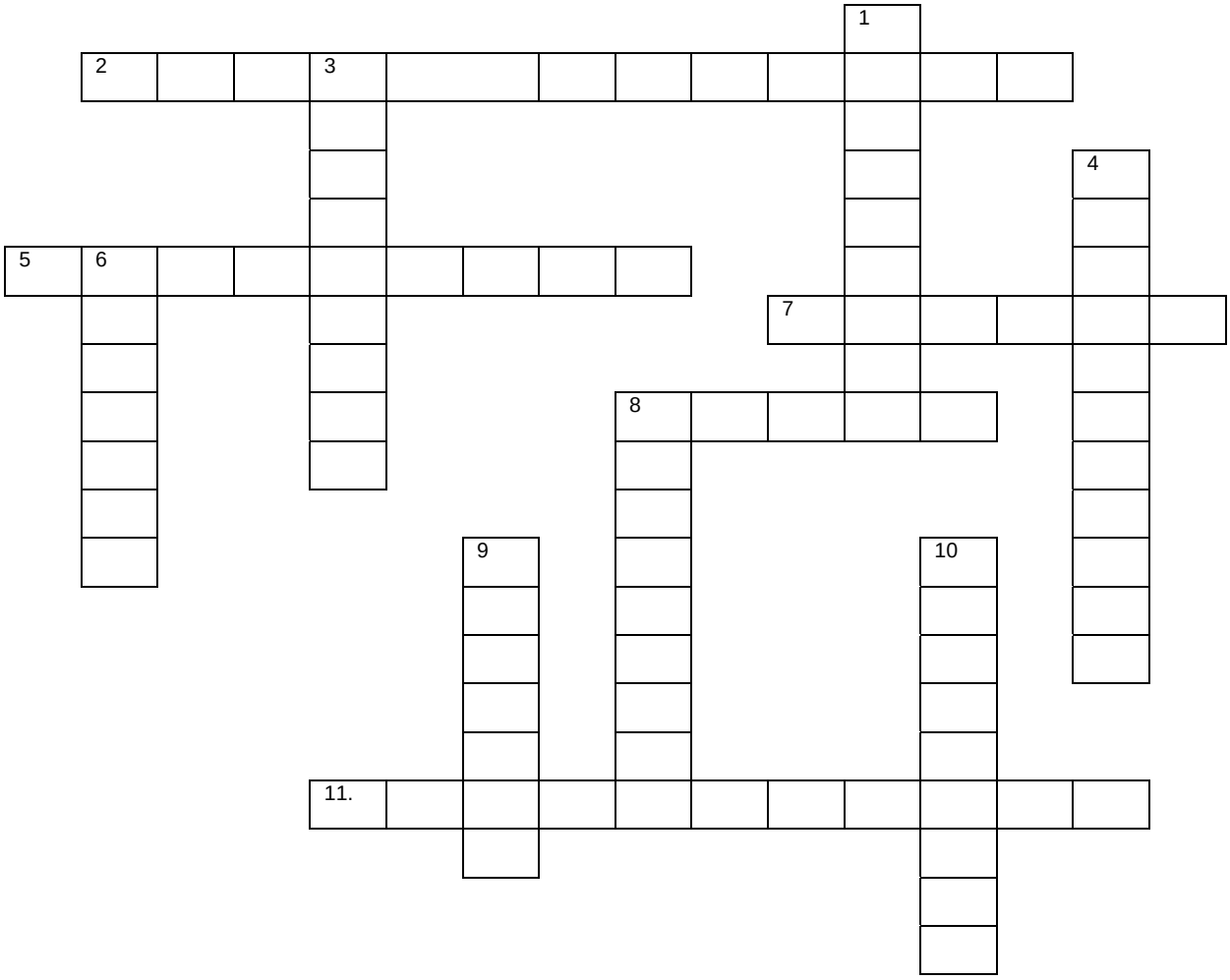
ACROSS

2. My job involves carefully digging in the dirt to find artifacts that tell me about other people.
5. A Resource _____ works to protect, restore, and maintain the natural resources in state parks.
7. Even though I wear a badge, I also do interpretation and resource management.
8. I explain exhibits and historic objects to the public during a tour.
11. As a _____ Worker, I keep park buildings, campgrounds, roads and trails in good condition.

DOWN

1. I rescue people who are in trouble in the water.
3. History is my job. Who am I?
4. I work to make connections between the interests of the audience and the park resources.
6. As a Museum ____ I take care of artifacts that are used in exhibits to tell the history of the park.
8. Rocks are fascinating to me.
9. As an _____ Designer, I create educational and interpretive displays using photographs, text, and artifacts.
10. I build buildings and structures for parks.

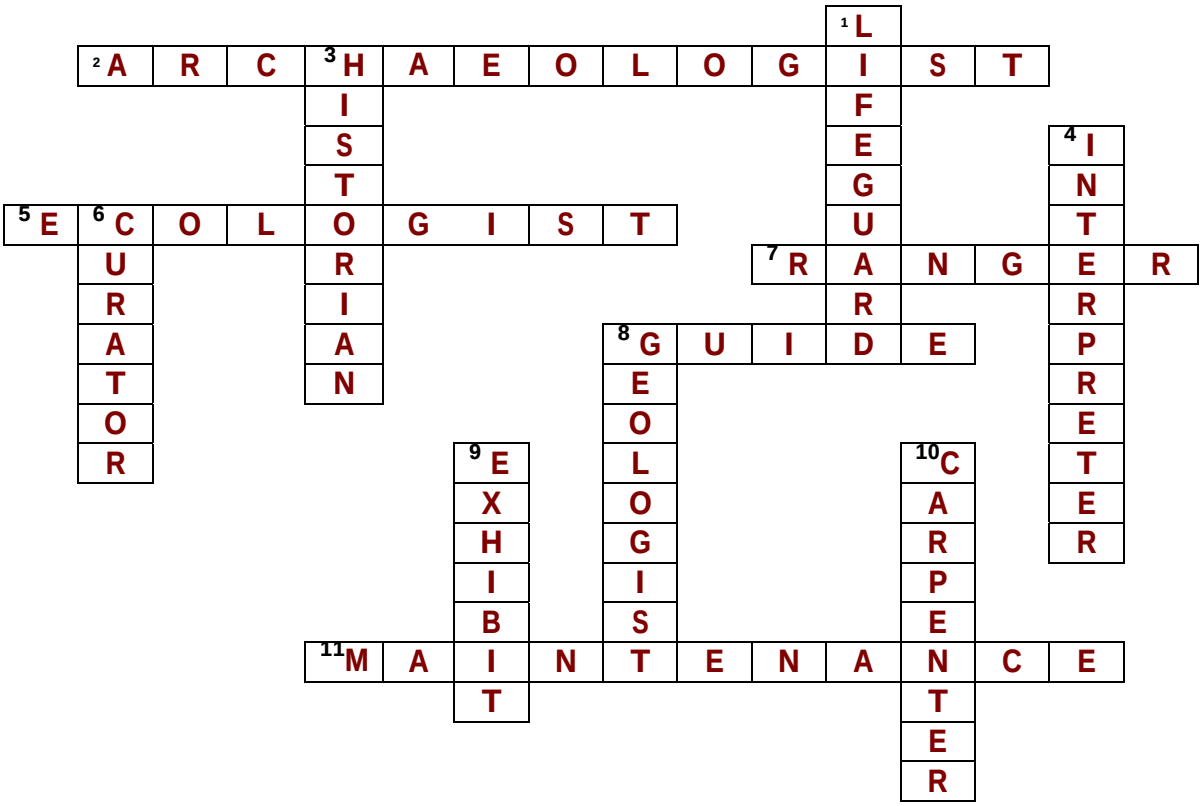
Working in Parks Crossword Puzzle



Archaeologist
Carpenter
Curator
Ecologist
Exhibit Maintenance
Geologist
Guide
Historian
Interpreter
Lifeguard
Ranger

Good work—you are finished!

Working in Parks—Answer Key



Across

2. My job involves carefully digging in the dirt to find artifacts that tell me about other people. **Archaeologist**
5. A Resource _____ works to protect, restore, and maintain the natural resources in state parks. **Ecologist**
7. Even though I wear a badge, I also do interpretation and resource management. **Ranger**
8. I explain exhibits and historic objects to the public during a tour. **Guide**
11. As a _____ Worker, I keep park buildings, campgrounds, roads and trails in good condition. **Maintenance**

Down

1. I rescue people who are in trouble in the water. **Lifeguard**
3. History is my job. Who am I? **Historian**
4. I work to make connections between the interests of the audience and the park resources. **Interpreter**
6. As a Museum ____ I take care of artifacts that are used in exhibits to tell the history of the park. **Curator**
8. Rocks are fascinating to me. **Geologist**
9. As an _____ Designer, I create educational and interpretive displays using photographs, text, and artifacts. **Exhibit**
10. I build buildings and structures for parks. **Carpenter**

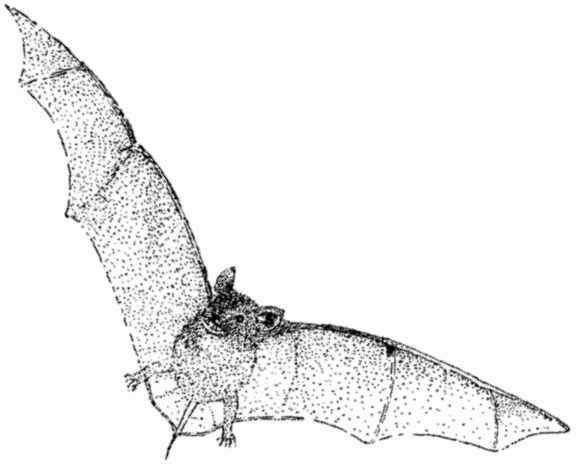
Appendix B: Directed Activity Handouts

Each chapter of the handbook contains sample programs and directed activities related to the topic. Some activities have a corresponding handout. Those handouts are located in this Appendix for ease of reproduction for programs.

Handout	**Program Title**	**Page Number**
Bats Eat Bugs Song	Junior Cub Sample Program	2-18
Animal Tracks	Animal Tracks	3-10
Cross Cultures List	Sample Program: California Indians	4-4
Song: There Once Was a Daisy	Sample Program: Energy	6-4
Lanternfish Pattern	Schooling Fish	13-8
Determination of Wind Speed	Sample Program: Weather & Climate	14-3

Name:_____ Park:_____ Date:_____

Bats Eat Bugs Song[1]



Chorus:
Bats eat bugs, they don't eat people.
Bats eat bugs, they don't fly in your hair.
Bats eat bugs, they eat insects for dinner,
That's why they're flyin' up there.

Coyotes eat rabbits, they don't eat people.
Coyotes eat rabbits, 'cause you're too big to bite.
Coyotes eat rabbits, they eat bunnies for dinner,
That's why they're out in the night.

Snakes eat mice, they don't eat people.
Snakes eat mice, that's why they crawl on the ground.
Snakes eat mice, 'cause you're too big to swallow,
So they don't want you hangin' around.

Bears eat berries, they don't eat people.
Bears eat berries, they won't eat you and me.
Bears eat berries, and they'll steal your dinner,
So you best hang it up in a tree.

Nothing out there wants to eat you.
Nothing out there wants to make you its meal.
Nothing out there wants to have you for dinner,
'Cause they know just how sick they would feel.

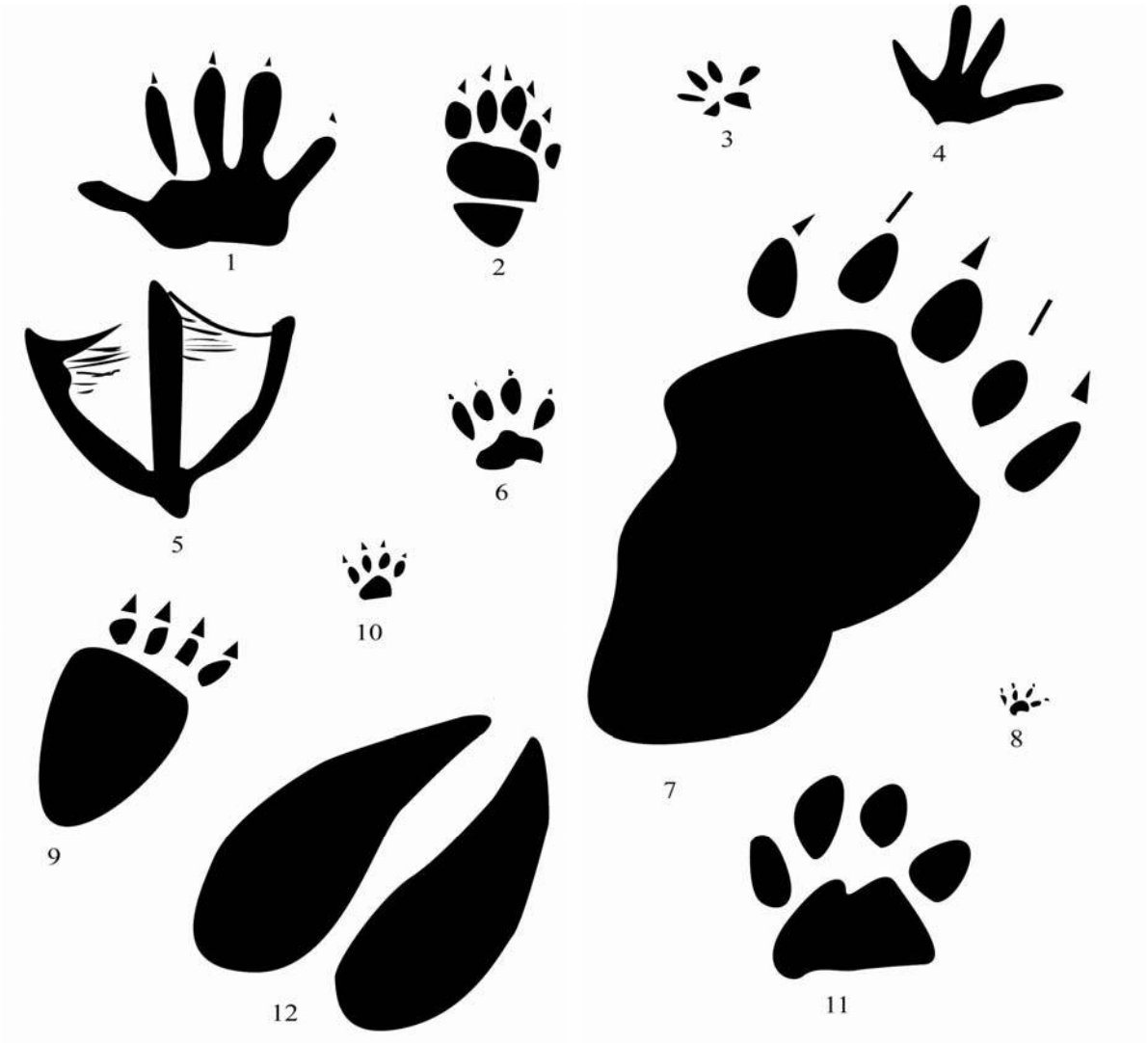
Chorus

[1] Song by Steve Van Zandt and the Banana Slug String Band. *Dirt Made My Lunch.* [Cassette tape, 1988].

Name:_____ Park:_____ Date:_____

Animal Tracks

Which tracks belong to which animals? (Answers below)



___ Rat

___ Mule Deer

___ Black Bear

___ Mouse

___ Bobcat

___ Skunk

___ Chipmunk

___ Duck

___ Raccoon

___ Muskrat

___ Porcupine

___ Weasel

Animal Tracks—*Answer Key*

Which tracks belong to which animals? (Answers below)

_3_ Rat

_12_ Mule Deer

_7_ Black Bear

_8_ Mouse

_11_ Bobcat

_2_ Skunk

_10_ Chipmunk

_5_ Duck

_1_ Raccoon

_4_ Muskrat

_9_ Porcupine

_6_ Weasel

Name:_____ Park:_____ Date:_____

Cross Culture List

California Indians found everything they needed in nature. Can you guess which Indian materials were used in place of our contemporary items? Try to match what we use to what the California Indians used. Some things have more than one use.

Contemporary Items

___ Money

___ Baseball Cards

___ Insect Repellent

___ Glue

___ Tea

___ Soap

___ Aspirin

___ Rug

___ Matches

___ Tooth Brush

___ Blender

___ Drill

___ Earrings

___ Vitamin C

___ Graffiti

California Indian Materials

1. Feathers as Trade
2. Clamshell Discs
3. Petroglyphs/Pictographs
4. Willow Bark
5. Bone Awl
6. Tule Mat
7. Yerba Santa Leaves
8. Men's Ear Plug
9. Pine Pitch
10. Bay Leaves
11. Rose Hips
12. Ceanothus Leaves
13. Fire Starting Kit
14. Peeled Dogwood Twigs
15. Mortar and Pestle

Cross Culture List—Answer Key

California Indians found everything they needed in nature. Can you guess which Indian materials were used in place of our contemporary items? Try to match what we use to what the California Indians used. Some things have more than one use.

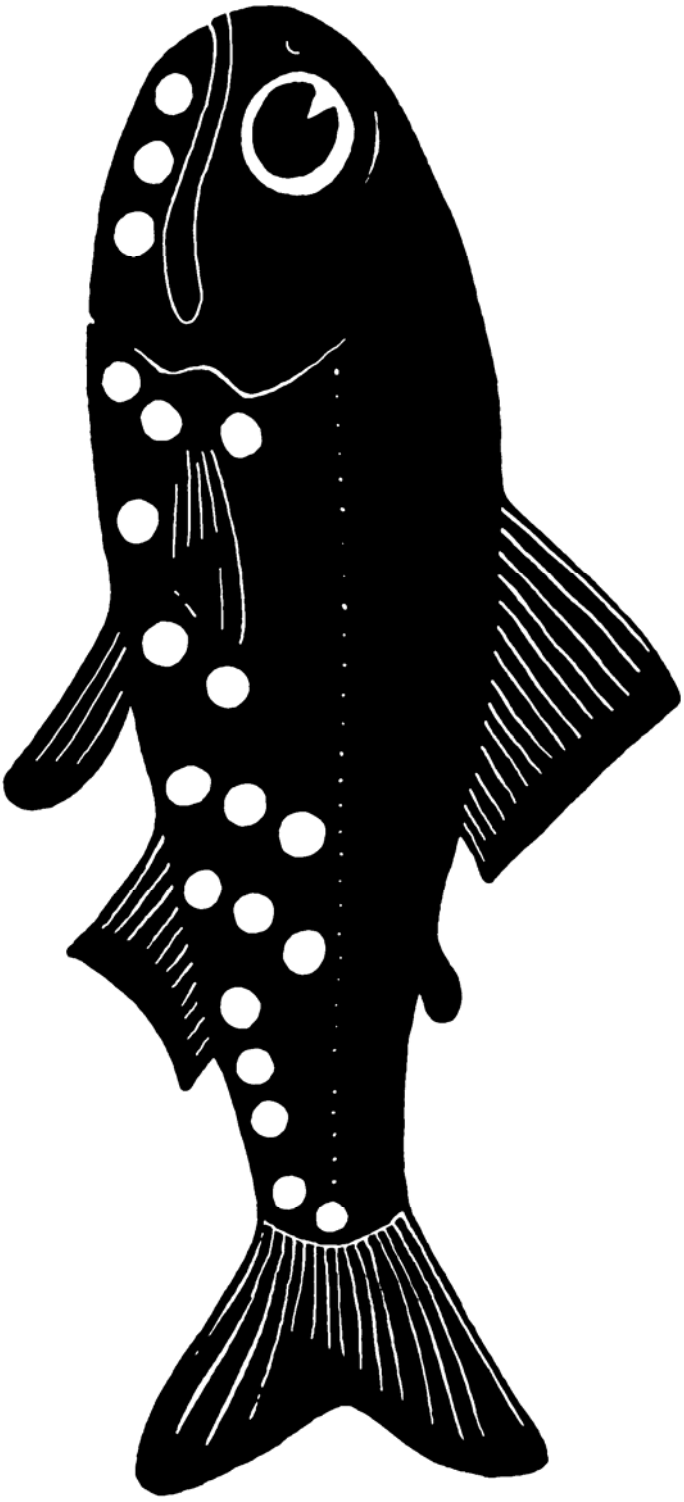
Contemporary Items	**California Indian Materials**
_2_ Money	1. Feathers as Trade
_1_ Baseball Cards	2. Clamshell Discs
_10_ Insect Repellent	3. Petroglyphs/Pictographs
_9_ Glue	4. Willow Bark
_7_ Tea	5. Bone Awl
_12_ Soap	6. Tule Mat
_4_ Aspirin	7. Yerba Santa Leaves
_6_ Rug	8. Men's Ear Plug
_13_ Matches	9. Pine Pitch
_14_ Tooth Brush	10. Bay Leaves
_15_ Blender	11. Rose Hips
_5_ Drill	12. Ceanothus Leaves
_8_ Earrings	13. Fire Starting Kit
_11_ Vitamin C	14. Peeled Dogwood Twigs
_3_ Graffiti	15. Mortar and Pestle

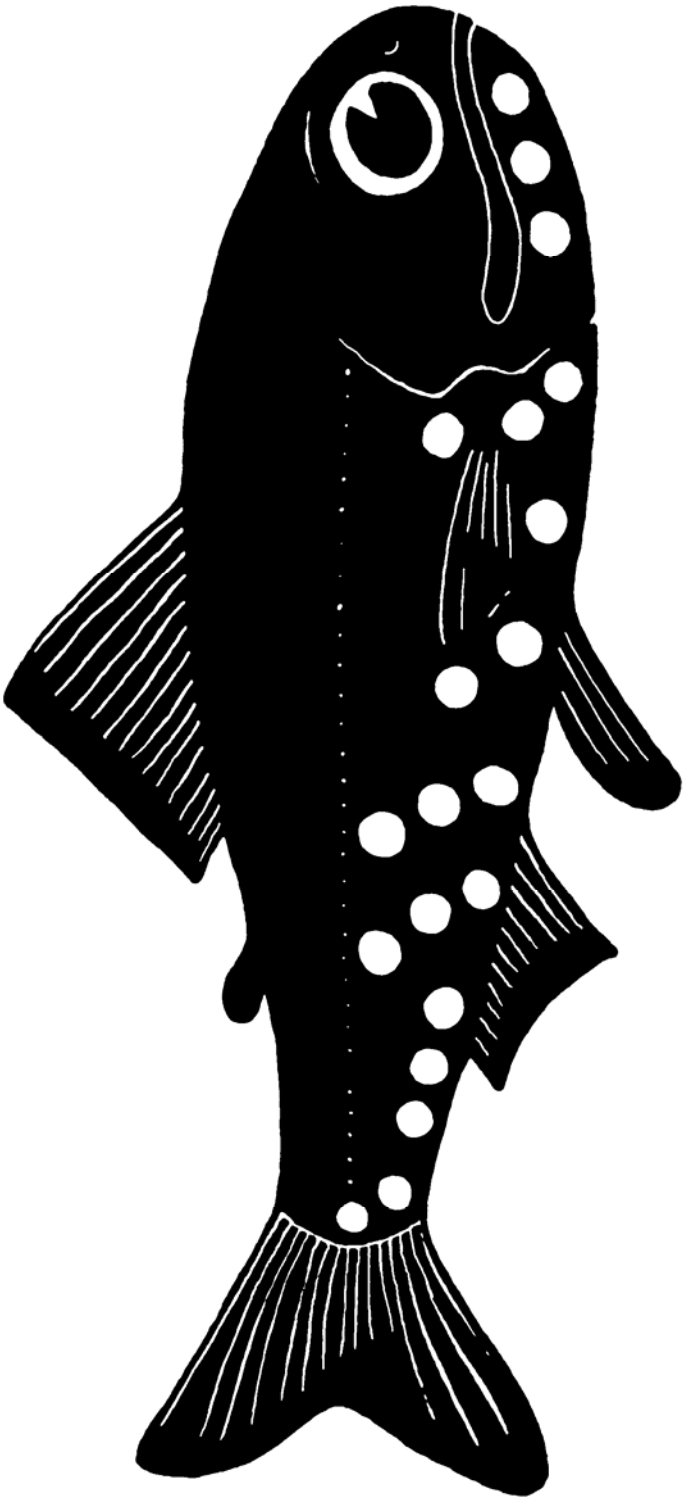
Name:_____ Park:_____ Date:_____

Determination of Wind Speed

Wind Speed (Miles per Hour)	Description of Effects
Under 1	Smoke from a fire rises straight up; no perceptible motion of anything.
1-3	Smoke drift shows direction; tree leaves barely move; wind vane shows no direction.
4-7	Leaves rustle slightly; wind felt on face; ordinary weather vane moved by wind.
8-12	Leaves and twigs move; loose paper and dust raised from the ground.
13-18	Small branches are moved; dust and paper raised and driven along. Good beginner windsurfer speed.
19-24	Small trees sway; large branches in motion; dust clouds raised. Good speed for more advanced windsurfers.
25-31	Large branches move continuously; wind begins to whistle; umbrellas used with difficulty.
32-38	Whole trees in motion; walking difficult.
39-46	Tree twigs break; walking progress slow.
47-54	Slight structural damage.
55-63	Exposed trees uprooted; heavy structural damage.
64-75	Widespread damage.
Above 75	Severe damage and destruction.

Schooling Fish Cutouts





Name:_____ Park:_____ Date:_____

Song: There Once Was a Daisy

(sung to the tune of "There was an Old Lady who Swallowed a Fly")

Daisy Team	There once was a daisy that grew on a plain, Where the sun helped it grow, and so did the rain-
All	Links in a food chain.
Bug Team	There once was a bug who nibbled on flowers, Nibbled on flowers for hours and hours!
Daisy Team	The bug ate the daisy that grew on the plain, Where the sun helped it grow, and so did the rain-
All	Links in a food chain.
Wren Team	There once was a wren who gobbled up bugs, And creepies and crawlies and slimies and slugs.
Bug Team	There once was a bug who nibbled on flowers, Nibbled on flowers for hours and hours!
Daisy Team	The bug ate the daisy that grew on the plain, Where the sun helped it grow, and so did the rain-
All	Links in a food chain.
Snake Team	There once was a snake who often grabbed birds, And swallowed them whole, or so I have heard.
Wren Team	There once was a wren who gobbled up bugs, And creepies and crawlies and slimies and slugs.
Bug Team	There once was a bug who nibbled on flowers, Nibbled on flowers for hours and hours!
Daisy Team	The bug ate the daisy that grew on the plain, Where the sun helped it grow, and so did the rain-
All	Links in a food chain.
Fox Team	There once was a fox, and I'll make a bet: He'd eat anything he could possibly get.
Snake Team	There once was a snake who often grabbed birds, And swallowed them whole, or so I have heard.
Wren Team	There once was a wren who gobbled up bugs, And creepies and crawlies and slimies and slugs.
Bug Team	There once was a bug who nibbled on flowers, Nibbled on flowers for hours and hours!
Daisy Team	The bug ate the daisy that grew on the plain, Where the sun helped it grow, and so did the rain-
All	Links in a food chain.
Last Verse Team	The fox, he grew older and died one spring day, But he made the soil rich when he rotted away. A new daisy grew where he died on the plain. The sun helped it grow, and so did the rain-
All	Links in a food chain.

Appendix C: Additional Program Information

As additional information is developed by Department staff on topics related to their areas of expertise, this appendix will be used to provide more detailed information about the various programs areas discussed in the main chapters of this handbook.

Park Careers: Archaeology

Introduction

Saying the word "archaeology" can arouse a child's imagination, conjuring up images of roaming dinosaurs, ancient fossils, and even Indiana Jones leaping across a pit of snakes. While all of these representations about the discipline are entirely false, archaeology is still one of the most exciting and inspiring Junior Ranger topics to participate in. This is a great opportunity to remove any fictitious and popular misconceptions about the subject and help instill in children a conservation ethic that will help preserve and manage cultural resources for future generations.

Park staff conducting Junior Ranger programs can emphasize many different topics related to archaeology in California State Parks. Out of the 278 state park units, 235 of them contain cultural resources of one type or another, so the probability is very high that a Junior Ranger program will take place in a park with a rich collection of archaeological resources and/or historic structures. Whether it is an archaeological site, a historic building, a cultural preserve, or a historic landmark, State Parks preserves California's rich heritage and employs a staff of archaeologists, historians, and curators to help achieve this mission.

An important emphasis while interpreting this subject is to clearly define the role, actions, and responsibilities of archaeologists. Archaeologists do not study dinosaurs and fossils, which paleontologists specialize in, nor are they treasure hunters. Rather, archaeologists study how humans lived in the past by looking at material remains left behind by different cultures. They do this using various scientific techniques including surveying, excavation, and research. Archaeology reinforces the concept of a shared human heritage and provides people today with perspectives on their own place and time in history.

All prehistoric archaeological sites are very sacred and important to related California Indian tribes. Teaching young children about archaeology can also instill in them a respect for other people's beliefs, history and the natural environment.

The great thing about this subject is that archaeology tends to borrow from many disciplines (i.e., history, California Indian studies, geography, geology, environmental studies and math); therefore, the staff conducting Junior Ranger programs can relate many topics at once. Archaeologists do not claim to have the one and only view to the past and rely on California Indian groups, specialists from all disciplines, and the public when they draw their reconstructions.

Many topics related to archaeology like California Indians and History are already covered by the Junior Ranger Program. This chapter focuses more on archaeology as a discipline with regards to the stewardship roles of archaeologists, their ethics, and the diverse interests in the past that they explore.

Interesting California Archaeology Facts

- 235 of the 278 park units in California State Parks contain significant cultural resource features.
- California State Parks is responsible for 1 million museum objects, more than 3 million archival documents, and 2 million archaeological specimens.
- At the time early Spanish settlers arrived in California, it is estimated that there were as many as 300,000 Indians present.
- The bedrock mortar at Indian Grinding Rock SHP is one of the largest in the state with at least 1,185 mortars and 363 petroglyphs present.
- The only preserved remnant of a Chumash canoe came from an archaeological site on State Park lands.
- Sumeg Village at Patrick's Point SP is a reconstructed Yurok village that was built in cooperation with the Yurok Tribe.
- The cultural heritage of California begins no less than 12,000 years ago.
- California archaeology is not just all prehistory, but also includes Spanish exploration and the establishment of the Missions, Russian expansionism, the Mexican Ranchero or "Californio" period, the Gold Rush and the 49ers, and the agricultural, urban, and industrial developments of the 19th and early 20th centuries.

Basic Information

Be able to answer the following questions for the Junior Rangers:

- How many archaeological sites exist in your state park?
- What California Indians are represented in your area?
- How many archaeologists work for State Parks? Do any work for your particular district or sector?

Also, feel free to read the "background information" section as it provides a brief examination of archaeology, its techniques and practices, and its ethics.

Sample Program

I. Introduction
   Introduce yourself.
   Introduce the Junior Ranger Program.

II. Objectives
   Today we are going to learn about archaeology in California and this particular park. We are going to take a trip back through time and explain the history under your very feet. Every archaeological site or historic building talks, telling a story about the people who created it and lived there. Archaeology is the study of people in the past and not about dinosaurs, fossils, or other resources studied by paleontologists.

III. Focus the group
   A. To get the group in the mood think about what would it be like to be an archaeologist. Who are archaeologists, what do they do, and how do they work?
   B. Archaeology is the study about what people did in the past by looking at artifacts and sites as well as the relationships between them. Future archaeologists will study us and the artifacts that we leave behind. Maybe one day your house, room, even trash will become artifacts and an archaeologist will learn about you and the world you lived in.
   C. If possible, show replicas of artifacts. If hand-on museum collections are available in your area, those are great.

IV. Inquiry/Discussion
   A. Activity
      1. First, have a bag of "artifacts" with describable objects that the Junior Rangers can handle and look at. These items can be museum replicas, or everyday objects found at a local store (good examples of store goods are plastic items like insects, balls, rings, etc.). The important thing is to have a unique item for each participant to hold on to for the entire program.
      2. Next, ask the following questions: Do you think archaeology is important? Why are archaeological sites important?
      3. Then, pass out an "artifact" for every response—one "artifact" per child. Every Junior Ranger should have one "artifact" at the end of the activity, so make sure that even the shy or younger children receive an "artifact." This will be important during the session.
   B. Interpreting archaeological clues:
      1. What kind of artifacts do you think archaeologists find in sites?

2. Do you think items like baskets or clothing would be preserved in archaeological sites? What about wooden objects? What about stone or objects made from shell? What about a plastic button, a glass bottle, or a coin?
3. Certain places like pine tree forests tend to have very acidic soils. These soils tend to disintegrate organic items like baskets, wood, and clothing, so by the time archaeologists get to look at the site, these items no longer remain.
4. Now, let's look at our artifacts that were handed out earlier. What kinds of material do we have here? Which artifacts might preserve better than others—which artifacts might archaeologists locate 10 years from now? 50 years from now? 100 years from now? Over 100 years from now?

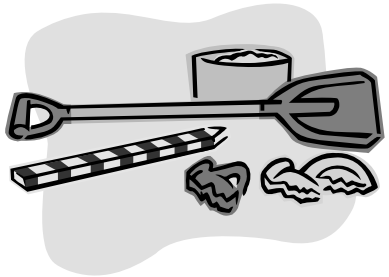
D. How do archaeologists interpret that past?
1. Clearly, not everything people made in the past survives for archaeologists to find.
2. Can you imagine trying to put a puzzle together with missing puzzle pieces? Archaeologists realize that the artifacts they uncover piece together only a portion of the puzzle. Therefore, they have to infer what the missing pieces might have looked like.
3. Let's say, an archaeologist finds a bone awl in an archaeological deposit. Awls were used to make basketry and baskets were normally made by women. So an archaeologist would infer that women were present at the site making baskets even though the baskets no longer remain.
4. What would an archaeologist infer if they found a projectile point? What about a shell bead or a piece of groundstone? What about a coin with a date of 1936?
5. Activity: What story do your artifacts tell?
   Use the artifact passed out at the beginning of the program to help answer these questions.
   a. Are there any time defining objects? (What time period does the sample represent? A coin with a date helps.)
   b. What kind of people were present? (How old were the people, old or young, or a mix of ages? How many people were there?)
   c. Are there any habitation objects? (Were these people living in a house, or camping out on vacation?)
   d. Let the items tell the story. Every group of children might interpret the same artifacts differently.

E. Diverse Interests:
1. Do you think archaeologists are the only people who can interpret the past? What about historians, biologists, and Native Americans?
2. Everyone can interpret the past differently. Some people use history books or old photographs to define the past, whereas other people use oral stories to retell their history.
3. Activity: Read a creation story from a California Indian tribe in your area; if no story is available, select any Indian creation story to read.

V. Application/Conclusions
   A. Preserving Archaeological Sites:
      1. Do you think it is important to preserve archaeological sites? Why? Each archaeological site has a unique story to tell, like individual fingerprints across the landscape. When one is lost, a piece of the puzzle is lost forever.
      2. What would you do if you found what you thought might be an archaeological artifact? Would you bring it back to show a State Park employee? It is very important when an artifact is found that it is left in its original place until an archaeologist can look at it. If it is moved, all information that could be gathered from the object and its surroundings will be lost. The best thing to do when coming across artifacts is to do what archaeologists do. They record the artifact by taking photos and plot the location on a map. If a map is not available, simply count your paces from the artifact to the nearest identifiable location, i.e. a restroom, a trail marker, etc. Then tell a parks person or leave them a note at the park's kiosk. This allows them to relocate the artifact, and archaeologists can be consulted to see what kind of preservation efforts need to be taken.
      4. Do you think archaeologists can dig wherever they want? Archaeologists need to get permission from landowners before they dig. There are also many State and Federal Laws that not only protect archaeological resources but set guidelines that archaeologists must follow while they dig.
      5. Would you like a person digging in your backyard or campsite without your permission? Why is this offensive? Archaeologists must also consult (or talk) with Native American groups before they excavate because many projects tend to take place in these groups ancestral "backyard."
      6. Do you think archaeologists excavate randomly? California State Parks protects thousands of archaeological sites and recognizes these sites as non-renewable resources. Basically, what this means is that once an archaeological site is destroyed, there is no way to get it back again. So archaeologists only excavate sites as a last resort.
   B Let's face it, archaeologists have to get DIRTY! . . .
      1. If there is enough time and resources, do the Archaeological Dig Activity (see activity section below).

Suggested Program Aids

Artifact replicas, hands-on museum replicas or artifacts are great. If you cannot locate these materials, feel free to contact the Cultural Heritage Section of the Archaeology, History & Museums Division for more information. The location of archaeological sites is confidential and should not be distributed to the public.



Activities/Games

Charades

Number of children: 5 or more
Environment: Open space
Equipment Needed: None
Purpose of Activity: To learn about archaeology tools, artifacts and other associated terms
Activity:

Here's an old favorite that most people will know, but keep the theme archaeological. Fill a bucket with slips of paper on which are written archaeological terms and definitions such as trowel, measuring tape, trench, pottery, dig, and artifact. Or you might want the theme to be cultural and include words and ideas relevant to the particular culture you are teaching.

Estimation Game

Number of children: 2 or more
Environment: Open space
Equipment Needed: metric measuring tape
Purpose of Activity: To understand how to use the metric system in measuring distance.
Activity:

1. You will need a metric measuring tape for this one. Have all the team members estimate how far it is to the nearest tree, telephone pole, car, cactus. A little introduction to the metric system may be necessary here. But they will catch on quickly, especially if they know that best guesses get tootsie rolls or jolly ranchers as prizes.
2. Another variation to this game: Have children figure out how many meters, their pace is and then count their paces to get the distance (most paces will be under a meter, so a calculator will be handy!). Distance = (# of paces) x (amount pace equals in meters), so for example if my pace is 0.83 meters and I walked 10 paces, then the distance = (10) x (0.83), which equals 8.83 meters.

Archaeological Dig

Number of children: 3 or more
Environment: Open space with tables
Equipment Needed: 6 plastic bins (16" x 11" x 6") filled with about 5 inches of sand, 6 - 7 "artifacts" buried at different levels. Each bin should contain artifacts taken from a specific location, i.e. a child's room, a school, a tool shed, a garage etc. Each station should have popsicles sticks, small trowel, ruler, grid paper, sifter, and newspapers.
Purpose of Activity: To simulate an actual archaeological dig, measure and record finds, and make inferences about the site uncovered.
Activity:

1. Use groups and assign each group a bin to excavate and record findings. Give exact directions on the correct way to excavate. Remove layers of soil slowly one inch at a time with a trowel.
2. When discovering an artifact, use popsicle sticks to push dirt away from the artifact without breaking or destroying the artifact. When the artifact has been mostly uncovered, find its location on the grid paper.
3. If time allows, using a predetermined scale, draw the artifact. Next to the drawing of the artifact record the depth at which it was found.
4. Each layer of soil removed should be sifted on newspaper to make sure all artifacts have been discovered. When students have excavated to the bottom of the bin, carefully return soil to the bin and put the found artifacts on top.
5. Each group should look at the artifacts and make inferences about the site where the finds were made. Can something be inferred about the people who lived there, what they did, how old the people who lived there were? etc.
6. Point out that sites and artifacts can be messengers from the past. If we know how to read their messages, material remains can tell use about the people who made and used them and then left them behind. The Junior Rangers can explain how they drew their conclusions.

These activities were developed at www.digonsite.com/drdig/index.html.

Background Information: Archaeology

Archaeological Skills

Every artifact talks, telling a story about the people who created it. Archaeology is the study about past cultures and what people did in the past by looking at artifacts and sites. Archaeology is not a study about dinosaurs, fossils, or other resources studied by paleontologists. Even though archaeologists might come across fossils while digging, they are more interested in the remains of ancient people. Future archaeologists will study us and the artifacts that we have left behind. Maybe one day your house, room, even trash will become artifacts and an archaeologist will learn about you and the world you lived in.

Archaeologists uncover the past through a scientific process called excavating. Over time, things get buried under layers of dirt from various processes like floods, landslides, or just the natural accumulation of soil. Excavating is scientific digging, neat and organized in square holes or units. Permission from the landowners is also required before excavating takes place. After gaining permission, archaeologists also need to talk with the area's ancestral Native American tribe. This process is called consultation and sometimes monitors from the tribe will participate in the archaeological excavation. Knowledge from Native American tribes is invaluable and archaeologists cannot properly study the past without help from the tribes.

Archaeologists use many different tools when excavating. Some tools are as simple as a toothbrush, whereas others are sophisticated machines that can only be used by a trained specialist. The most common tool is a flat masonry trowel which is used to scrape layers of dirt away in an excavation unit. Dust pans and brushes are used to sweep loose soil into buckets and small handpicks and shovels help loosen the soil. The dirt is then taken away in buckets or wheelbarrows where it can be put through a screen to catch small artifacts. When delicate items are discovered in excavation units, smaller tools, like dental picks and tiny brushes, are used. Some archaeologists excavate underwater sites and use different tools. Instead of shoveling dirt into buckets, underwater archaeologists use tools called dredges or airlifts that suck up sand and loose sediment to uncover artifacts. Heavy artifacts are lifted to the surface using gigantic balloons called lift bags. Underwater archaeologists usually wear standard diving gear and also have special plastic notepads that let them write underwater (see Dr. Dig's online web site reference for more).

Inferential Skills

Archaeologists need to infer human behavior from the artifacts recovered from excavating. What do certain artifacts say about the cultures that deposited them? Projectile points found in archaeological sites are very important to archaeologists. They can be used as time indicators by looking at their shapes and sizes. A point that fits a certain type can tell an archaeologist when it was used. Projectile points also indicate that hunters, normally men, were present at the site.

Bone awls were used to make basketry, and since baskets rarely survive in the archaeological record, a bone awl would give the archaeologist a lot of insight. The presence of awls in a deposit would lead to the conclusion that basket-makers, generally women, were present at the site. Wooden awls were also used in the past, but do not preserve well in the ground. Evidence of basketry and wooden awls normally come from dry cave deposits in the desert areas.

Grinding stones likes manos (handstones), metates (grinding slab), pestles, and mortars are found in many California archaeological sites. The presence of these artifacts normally suggests that food processing was taking place in the area, normally by women.

Stewardship

Looters or "pothunters" are very destructive to archaeological sites. When encountering an archaeological site, they might think that they have discovered treasure, but the damage they do is irreparable, and the information that an archaeologist can learn from the site is lost forever.

Archaeologists tend to use the term "*in situ*" a lot when collecting artifacts, meaning the place where an item was originally deposited. An artifact being *in situ* is critical to the interpretation of that artifact and, consequently, to the culture which formed it. Once an artifact's provenience (or original location) has been recorded, the

artifact can then be moved for conservation, further interpretation or display. An artifact that is not discovered *in situ* is considered out of context and will not provide an accurate picture. It is very important when an artifact is found that it is left in its original place until an archaeologist can look at it. If it is moved, all information that could be gathered from the object and its surroundings will be lost.

Archaeologists do not get to keep the items that they find because they don't belong to them. In California, artifacts belong to the owner of the land where the artifacts were found, and the owner may donate them to a museum or park. If the artifacts are discovered on public lands, then they belong to the respective city, county, state, or federal government. There are also strict laws to remind archaeologists that they cannot excavate sites to acquire artifacts for their own enjoyment or profit. Taking anything away from an archaeological site is against the law.

Conservation Ethic

Knowledge of past cultures helps to teach us where we come from, what it means to be human, and how we are all connected; every archaeological site can teach this. The loss of archaeological sites through natural processes and modern development takes place everyday. Therefore, the need to protect and preserve the past is extremely important. State Parks protects and preserves almost 10,000 archaeological sites and 3,000 historic structures for California's future generations.

Archaeological sites record past human interactions with the environment and help us understand how we can preserve the world and its resources for many thousands of years to come.

Archaeological sites are non-renewable resources, and archaeologists consider excavation to be a last resort when testing their hypotheses. Any investigation of a Native American cemetery, grave, or other sacred site is done only AFTER detailed consultation has taken place with the representative(s) of the Native American tribe.

Science in Archaeology

Radiocarbon dating: This is by far one of the most important dating methods for archaeologists. As long as there is organic material present, radiocarbon dating is a universal dating technique that can be applied anywhere in the world. It is good for dating for the last 50,000 years to about 400 years ago and can create chronologies for areas that previously lacked calendars. In 1949, American chemist Willard Libby, who worked on the development of the atomic bomb, published the first set of radiocarbon dates. His radiocarbon dating technique is the most important development in absolute dating in archaeology and remains the main tool for dating the past 50,000 years.

Radiocarbon is produced in the upper atmosphere of Earth. Radiocarbon is then taken in by plants through photosynthesis, and these plants in turn are consumed by all the organisms on the planet. So every living thing has a certain amount of radiocarbon

within it. After an organism dies, the radiocarbon decreases through a regular pattern of decay. This is called the half-life of the isotope. The time taken for half of the atoms of a radioactive isotope to decay in Carbon-14's case is about 5730 years. So, 100% of radiocarbon in a sample will be reduced to 50% after 5730 years. In 11,460 years, half of the 50% will remain, or 25%, and so on.

There are, however, limits to this process, and a certain amount of calibration is required. When Libby was first determining radiocarbon dates, he found that before 1000 BC his dates were earlier than calendar dates. He had assumed that amounts of Carbon-14 in the atmosphere had remained constant through time. In fact, levels of Carbon-14 have varied in the atmosphere through time. One good example would be the elevated levels of Carbon-14 in our atmosphere since WWII as a result of atomic bombs testing. Therefore, radiocarbon dates need to be calibrated with other dating techniques to ensure accuracy.

Obsidian Hydration: This is a technique used by archaeologists to date obsidian artifacts. California archaeologists depend heavily on this dating technology because of the overwhelming presence of obsidian in the archaeological record.

When an piece of obsidian is broken, for example by a flintknapper, the newly exposed surface collects microscopic amounts of water and forms a band. The idea here is that the thicker the band, the older the artifact.

Geochemical sourcing: Volcanic and igneous rocks have a certain signature that can only be found at the source, and every source is unique. So archaeologists can determine the location of sources, understand trade routes and subsistence patterns, and determine where pottery materials originated.

Protein Residue Analysis: This technique helps archaeologists understand what animals or even plants were processed by prehistoric people. Lithic artifacts are used most often in these studies to understand what people were hunting. This technique is so valuable that governments throughout the world use it to track down poachers.

DNA studies: There are many applications of ancient DNA analysis. It helps with sexing specimens, gives insight into infectious and genetic disease within populations, can help with migration studies, and assists in diet and environmental reconstructions—just to name a few!

DNA can be extracted from bones, teeth, mummified tissue, and even coprolites (fossilized scat). Although this science has its share of preservation and contamination problems, it is a booming part of archaeology and reveals many of the missing puzzle pieces not found in the archaeological record.

Diet analysis using faunal remains: Currently, this is a very popular research issue in archaeology, especially in California. Faunal remains are animal remains, such as bones, associated with human activity, but not used as tools. These remains, when present in the archaeological record, can shed light on the diets, seasonal migration patterns, and the population density of prehistoric communities.

Diet analysis using stable isotopes: As mentioned in the radiocarbon dating section, isotopes are atoms with the same number of protons, but different numbers of neutrons, thus resulting in a different atomic mass. By looking at what isotopes are found in everyday food like corn, shellfish, and the animals that feed on these resources, archaeologists can reconstruct the diets of past people.

Another amazing result of this research is that stable isotopes can reconstruct migration patterns. Some isotopes enter the body only when a person is born and remain in the body, thus leaving a geographical fingerprint from their birthplace. Sometimes a water source can leave an isotopic fingerprint in children's teeth enamel. If a person's isotopic signature does not match the local geological record, then archaeologists infer that they were migrants to the region.

Archaeobotanical studies: Archaeobotanicals are plant materials found in the archaeological record. These remains are recovered during excavations through a process called flotation where soil samples are placed in a bucket of water and then screened through a variety of different screen sizes designed to collect even the minutest sized seeds. Later in the laboratory, these seeds are sorted out by type and help archaeologists reconstruct diets, the environment, and even climatic events.

Dendrochronology: This is the study of tree rings and helps archaeologists date sites, set up climate histories, and reconstruct the environment. Dendrochronology studies also help calibrate radiocarbon dates. This technique can date wood to actual calendar years!

Palynology: This is the study of fossil pollen and is used by archaeologists to reconstruct past environments. Fossil pollen can also be found on food processing artifacts like manos and metates and help archaeologists understand ancient diets. Palynology not only helps answer questions about food and the environment, but it can help answer questions about past climate activity too.

Evolution of linguistics: Although not really a science, the history of linguistics is very important for archaeological research. The preservation of ancient languages still spoken by native people is important for reconstructing past cultures and migration studies.

Vocabulary

Archaeological site: A place where human activity occurred and material remains were deposited. This can include village sites, smaller camp sites, caves, collecting areas, and processing areas. Historic buildings and structures are also considered archaeological sites when a buried deposit is present.
Archaeologist: A scientist who studies archaeological sites and how people lived in the past.
Artifact: An object or specimen made, modified or used by humans in the past.
Debitage: Flakes of stone that are discarded during the flaked tool reduction process (flintknapping).
Excavate: The process of recovering artifacts and other evidence from an archaeological site in a scientific manner.
Flintknapping: The process California Indians used to make tools and weapons from different rocks. Basalt (a fine-grained igneous rock), chert (a cryptocrystalline variety of quartz that comes in many colors), and obsidian (a volcanic rock that looks like glass) are all major sources for flintknapping in California.
Lithics: A general category to include all stone artifacts like projectile points, spear points, and ground stone; basically any worked or flaked stone.
Mano and Metate: A handstone (mano) is used to grind grass seeds and other foods on a flat slab of stone (metate). (See mortar also)
Midden: An area used for trash disposal. Sometimes a midden is composed mostly of shell refuse (shell midden).
Mortar: A conical depression in a rock or bedrock created by a pestle during acorn and food processing. A pestle is a cylindrical shaped groundstone with rounded ends used with mortars to process acorns and other food stuffs.
Prehistoric: The period of time before written records.
Provenience: The specific location of archaeological data within a site.
Record: To measure, draw, photograph, videotape, or otherwise document the remains at an archaeological site.
Site: Any place, large or small, that shows evidence of previous human activity or occupation.

Suggested Resources: Archaeology

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Other Sources of Information

Archaeologyfieldwork.com. www.archaeologyfieldwork.com. Lists fieldwork opportunities throughout the world.

Archaeological Institute of America. www.archaeological.org.

Archaeology Magazine. www.archaeology.org.

"Ask Dr. Dig." www.digonsite.com/drdig/index.html. This is a great resource for archaeology and young children.

California Department of Forestry and Fire Protection, Archaeology. www.indiana.edu/%7Ee472/cdf.

California State Parks, Archaeology, History and Museums Division. www.parks.ca.gov/?page_id=22491.

National Geographic. www.nationalgeographic.com

Public Broadcasting Station. www.pbs.org. A good source of information on various archaeological projects. Also look at NOVA programs.

Society for American Archaeology. www.saa.org.

Society for California Archaeology. www.scahome.org.

University of Arkansas. "Archaeological Parks in the United States." www.uark.edu/misc/aras.

Appendix D: Sample Press Releases for Junior Ranger Programs

See the following pages for some sample press releases that can be adapted for use in getting the word out about Junior Ranger program offerings.

News Release

FOR IMMEDIATE RELEASE
Date

Contact: Name
Phone Number

Kids Participate in California State Park's "Junior Rangers" Program During Summer 2005

San Luis Obispo Coast District, CA: Children between the ages of 7 and 12 years of age can earn their "Junior Rangers" award this summer. (Insert your SP unit name) will begin their traditional guided Junior Rangers program on (Insert Date). There are 12 different activities to the Junior Rangers Program. Geology, ecology, history, safety, plants, and wildlife are some of the activity areas that kids will be exploring in the program.

"Junior Rangers" is a statewide educational program in which children aged 7 to 12 may participate. The program emphasizes stewardship of park resources and connects park resource issues to global concerns. Awards such as pins, certificates, and patches are given to participants as they progress through the program. This exciting program is designed to help children discover the rich natural and cultural heritage preserved in California State Parks.

For more information, please call (Insert your name & classification) at (Area code) Phone Number.

# # #

News Release

FOR IMMEDIATE RELEASE
Date

Contact: Name
Phone Number

Kids Can Participate in California State Park's Self-Guided "Junior Rangers" Program During Summer 2005

San Luis Obispo Coast District, CA: Children between the ages of 7 and 12 years of age can earn their "Junior Rangers" award this summer. (Insert your SP unit name) will begin their self-guided Junior Rangers program on (Insert Date). There are 12 different activities to the Junior Rangers Program.

Using the ***Junior Ranger Adventure Guide***, children can start at one California State Park, and then at another time go to a different California State Park to complete the program. The 12 activity areas that kids will be exploring in the program include geology, ecology, history, safety, plants, and wild life.

"Junior Rangers" is a statewide educational program in which children aged 7 to 12 may participate. The program emphasizes stewardship of park resources and connects park resource issues to global concerns. Awards such as pins, certificates, and patches are given to participants as they progress through the program. This exciting program is designed to help children discover the rich natural and cultural heritage preserved in California State Parks.

For more information, please call (Insert your name & classification) at (Area code) Phone Number.

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