



Junior Ranger Activity Book

Minimum Time Commitment: 3-5 hours

1 You **MUST** attend at least one Bryce Canyon Ranger Program.

Next Program:

Write something you learned from the program (*details please!*).

Ranger Signature:

2 Ages 6-10: Complete 4 activities with this symbol: 

Ages 11-17: Complete 5 activities with this symbol: 

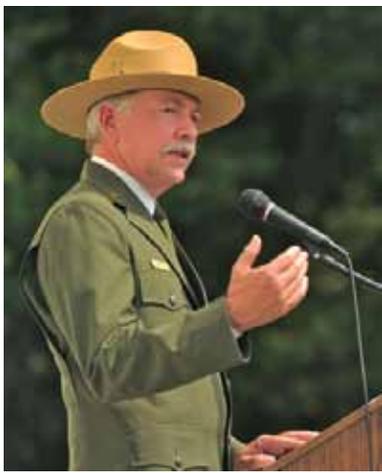
Ages 18+: Complete ALL activities in booklet.

Note: The activities on pages 2-3 and 8-9 count as **TWO** activities each!

3 Using enclosed glove, pick up and dispose of at least 10 pieces of litter.

Adult Signature:

Protecting Parks from Your Home



"I think that climate change is the greatest threat to the integrity of the National Park System that we have ever faced."

~ Jon Jarvis, National Park Service Director

Carbon dioxide (CO₂) traps heat. The best way to stop Global Climate Change is to reduce CO₂ emissions. Did you know that by using less energy, getting more exercise, and eating healthy food you can help protect national parks and the whole world? After you make all the calculations below, look for ways to lower your carbon footprint and then stick to that plan! Then invite your friends and family to do same.

What's Your Carbon Footprint?

Your **"carbon footprint"** is the total amount of CO₂ you create from the way you live. A big carbon footprint is bad for the planet.

In the charts below and on the facing page, find the lifestyle and food choices that are closest to the real ones you make during an average week. Add annual home heat/cooling and then subtract Energy Conservation.
Hint: A calculator makes this MUCH easier!

The more water you use, and the hotter the water is, the bigger your carbon footprint.

~ HYGIENE ~	CO ₂ (lbs)	×	Times per wk	=	CO ₂ per wk
Taking a shower	1.3				
Taking a bath	2.5				
6 minutes of hair drying	1.3				
Washing 1 load of laundry	2.4				
Drying 1 load of laundry	3.3				
Using dishwasher (1 load)	2.9				
Total Carbon Footprint from Hygiene:					1

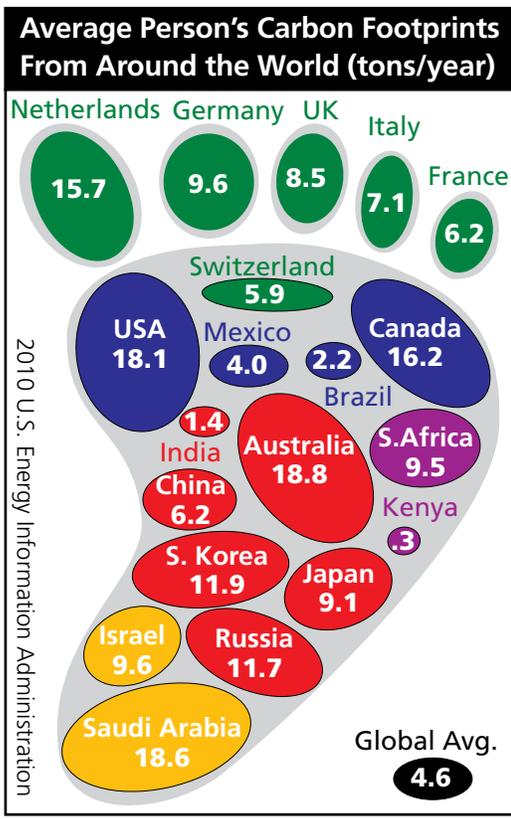
Fun can have a big carbon footprint when electricity and/or fossil fuels are used!

~ FUN ACTIVITY ~	CO ₂ (lbs) per hour	×	Hours per wk	=	CO ₂ per wk
Watching TV	1.4				
Video game (includes TV)	2.0				
Desktop Computer	1.4				
Laptop Computer	0.7				
Reading, board/card games *	0.3				
Hiking, bicycling, swimming, canoeing, snowshoeing	0.0				0.0
ATV, Boating, Snowmobiling (400cc 4-stroke motor)	6.2				
Total Carbon Footprint from Fun:					2

* only count the hours when you are using a light

Using mass transit is even better than a hybrid car!

~ TRANSPORTATION ~	CO ₂ (lbs) per mile	×	Miles per wk	=	CO ₂ per wk
Walking, bicycling, skateboarding	0.0				0.0
Electric Car (50% Coal electricity)	0.2				
Bus (School or Metro), Train/Subway	0.3				
Hybrid Car (40mpg)	0.4				
Car (40mpg)	0.5				
Car (20mpg)	1.0				
Vacation/Holiday Travel	Segments per yr	×	CO ₂ per segment (wk equivalent)	=	CO ₂ per wk
Jet Plane (1000-mile segment)			13.5		
Bullet Train (1000-mile segment)			2.1		
Total Carbon Footprint from Transportation:					3



Note: The activity on these two pages counts as TWO activities!

Double-pane windows, extra insulation & weatherstripping can reduce CO₂.

Eating less meat & dairy reduces carbon footprint.

Remember you eat about 20 meals per week!

~ DIET ~ (Food Item, one serving)	CO ₂ (lbs)	×	Times per wk	=	Total CO ₂ per wk
Eggs, scrambled	1.8				
Bacon or sausage	1.0				
Toast with butter & jam	0.3				
Pancakes/waffles with syrup	2.8				
Cereal with milk	2.7				
Hot dog with bun	0.8				
Peanut butter & jelly sandwich	0.5				
Tuna fish sandwich	1.2				
Cheeseburger	6.2				
Turkey burger	1.5				
Veggie burger	1.0				
Spaghetti & meatballs	3.6				
Macaroni & cheese	2.0				
Pizza with meat, 1 slice	1.4				
Pizza no meat, 1 slice	1.2				
Fish sticks	1.0				
Salmon, fresh wild regional	0.2				
Chicken tenders	1.1				
French Fries	0.3				
Salad (garden)	0.9				
Fruits/vegetables	0.2				
Yogurt with fruit	0.7				
Nuts	0.01				
Ice cream , 2 scoops	3.0				
Slice of cake or 2 cookies	0.3				
Tap water	0.01				
Bottled water	0.2				
Soda pop	0.5				
Milk	0.3				
Orange Juice	0.9				
Total Carbon Footprint from Food:					4

~ HOME (Heating & Cooling) ~	Months per yr	×	CO ₂ (lbs)	=	CO ₂ per yr
Heat with wood/pellet stove*			100		
Heat with natural gas/LPG furnace			300		
Heat with electric furnace#			500		
Cool with air conditioning#			125		
Cool with evaporative cooler or fans#			25		
Heat/Cool with wind/solar electricity			0		0

Home Carbon Footprint (per bedroom): **6**

*wood is 100% renewable (carbon=0) but it takes energy to transport
#assumes electricity is 50% coal-generated

6 _____ multiplied by # of bedrooms _____ = **7**

7 _____ divided by # of people _____ = **8**

8 is my portion of my home's yearly CO₂

Energy saving bulbs also last MUCH longer!

~ ENERGY CONSERVATION ~	Yearly Deductions CO ₂ (lbs)
Turn off water while brushing teeth (2 mins)	-275
Replace 10 light bulbs with CFL bulbs	-650
Replace 10 light bulb with LED bulb	-750
Recycle all paper	-105
Recycle glass	-10
Recycle plastics	-20
Recycle aluminum & steel cans	-85
Using Energy Star™ appliances	-500
Total Carbon Footprint Reduction:	9

FINALLY, my ADJUSTED yearly CO₂ total is:

5 + 8 - 9 = _____ lbs CO₂

(divided by 2000) = _____ tons CO₂

Next, add the four CO₂ lifestyle totals from **1, 2, 3, and 4**. Write the sum here: _____

This is your Carbon Footprint for **ONE WEEK**.

Multiply the weekly number by **52** for your **YEARLY** total.

My lifestyle yearly CO₂ total is: _____ **5**

BONUS: What Else Can You Do?

The best thing to do is use LESS fossil fuel energy. Planting trees helps, but not as much as you think. 1 tree only makes up for (offsets) 9 cheeseburgers!

Can you plant enough Trees?

One tree "eats" about 50 pounds of CO₂ per year.

How many trees would you have to plant to offset your carbon footprint? (Divide your adjusted yearly lbs of CO₂ total by 50.)



Write your answer here: _____

Much Ado About Hoodoos!

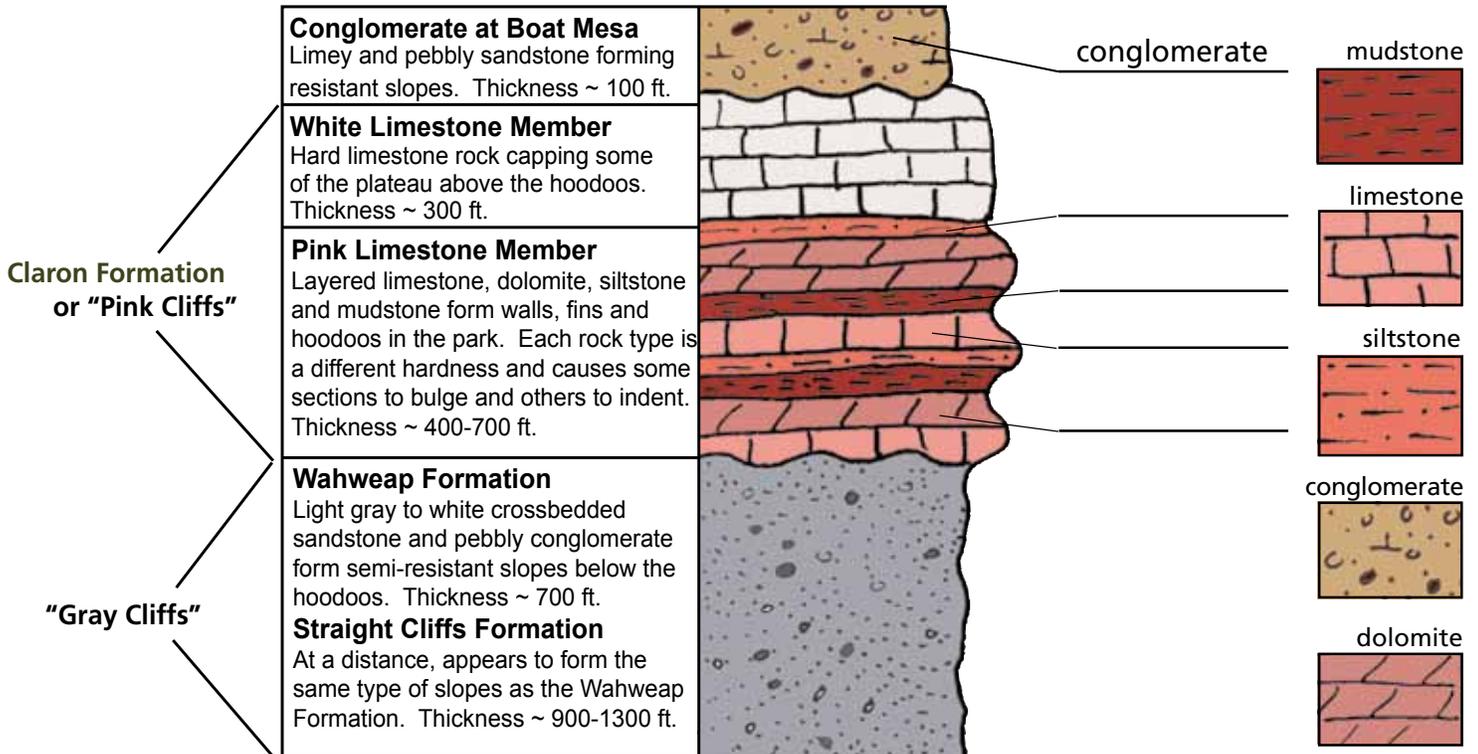
The drawing below shows geologic layers of rock. Geologists call this a stratigraphic column. On the left side of the column are the rocks' names and descriptions.

On the right side of the column are the rocks' symbols. You can tell how hard or soft a rock is by how far it sticks out in the column. Harder rocks bulge out; softer rocks indent.

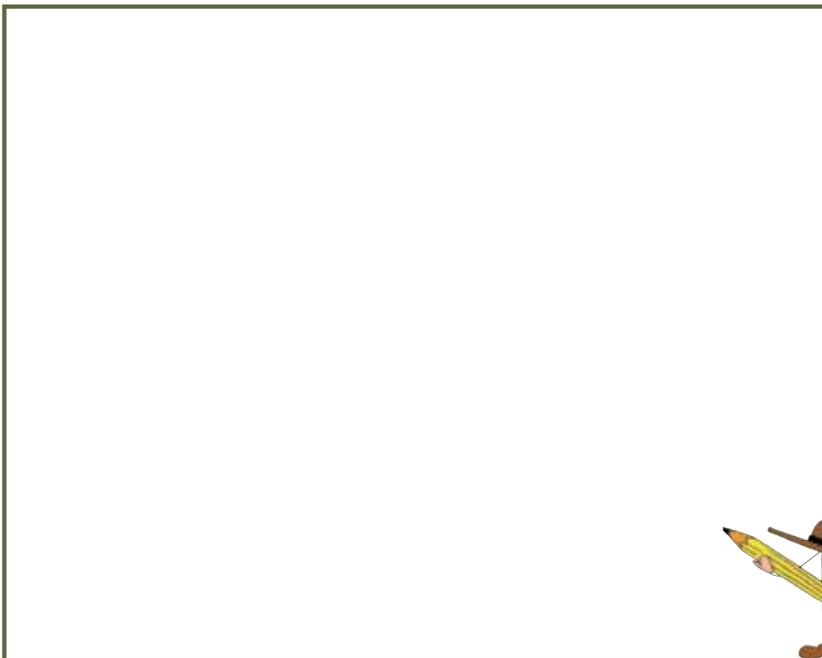
THIS ACTIVITY HAS TWO PARTS. COMPLETING BOTH PARTS COUNTS AS ONE ACTIVITY.

1 Label the Layers

 Use the rock symbols to label all of the rock layers.



2 Create a Hoodoo



Hoodoo: *noun*.

A pinnacle or odd-shaped rock left standing from the forces of weathering and erosion.

 Draw and label a hoodoo in the space at left. Use at least **two** different rock types from the stratigraphic column and rock symbols as shown above.

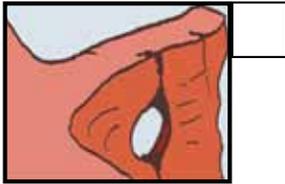
 Draw and label a hoodoo in the space at left. Use at least **four** different rock types from the stratigraphic column and rock symbols as shown above. Show different thicknesses and hardnesses of rock in your hoodoo.

-  Attend a Geology Talk, watch the park movie, or look in the visitor center for clues!
-  Answer the questions below and complete all the parts to finish this activity.

- 1) What mineral gives our rocks their red color? _____
- 2) Why is Bryce Canyon not really a canyon? _____

Life of a Hoodoo

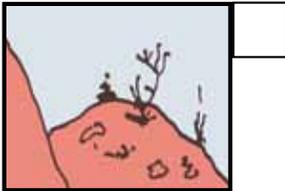
The sketches below show the life cycle of **hoodoos**. Place a number in the box to show which event happens first, second, third and fourth in the life of a hoodoo.



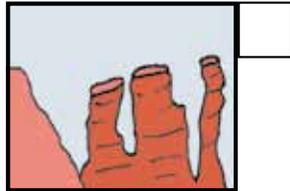
window/arch



wall/fin



rounded hills



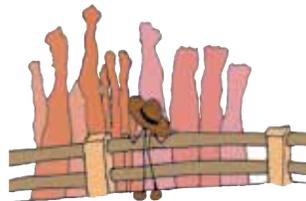
hoodoos

Did you know?

After Bryce Canyon's rocks were formed, weathering and erosion began sculpting the rocks into strange-looking pinnacles called hoodoos. From the words below, circle all the sources of erosion that are **NOW** carving Bryce Canyon's hoodoos.

rain fish deer snow
 tornadoes waves bulldozers hurricanes
 ice chipmunks gravity people tree roots
 aliens wind

Inspiring Words



The wonders of Bryce Canyon inspire many artists, photographers, writers, and poets. **Haiku** is an easy form of Japanese poetry that contains only 3 lines. The first and third lines have 5 syllables (or beats) and the second has 7. Think of something that you found inspiring about Bryce Canyon and write your own Haiku! Below are some examples to help you get started:

Beautiful red spires
 Reaching for the deep blue sky
 How long can they last?

In the dark of night
 I marvel at brilliant stars
 In the Milky Way!



Wildlife Crossword



Using the information provided, test your knowledge of Bryce Canyon's wildlife by completing this puzzle. For clues, attend a ranger program, look in the visitor center museum or the Hoodoo newspaper!

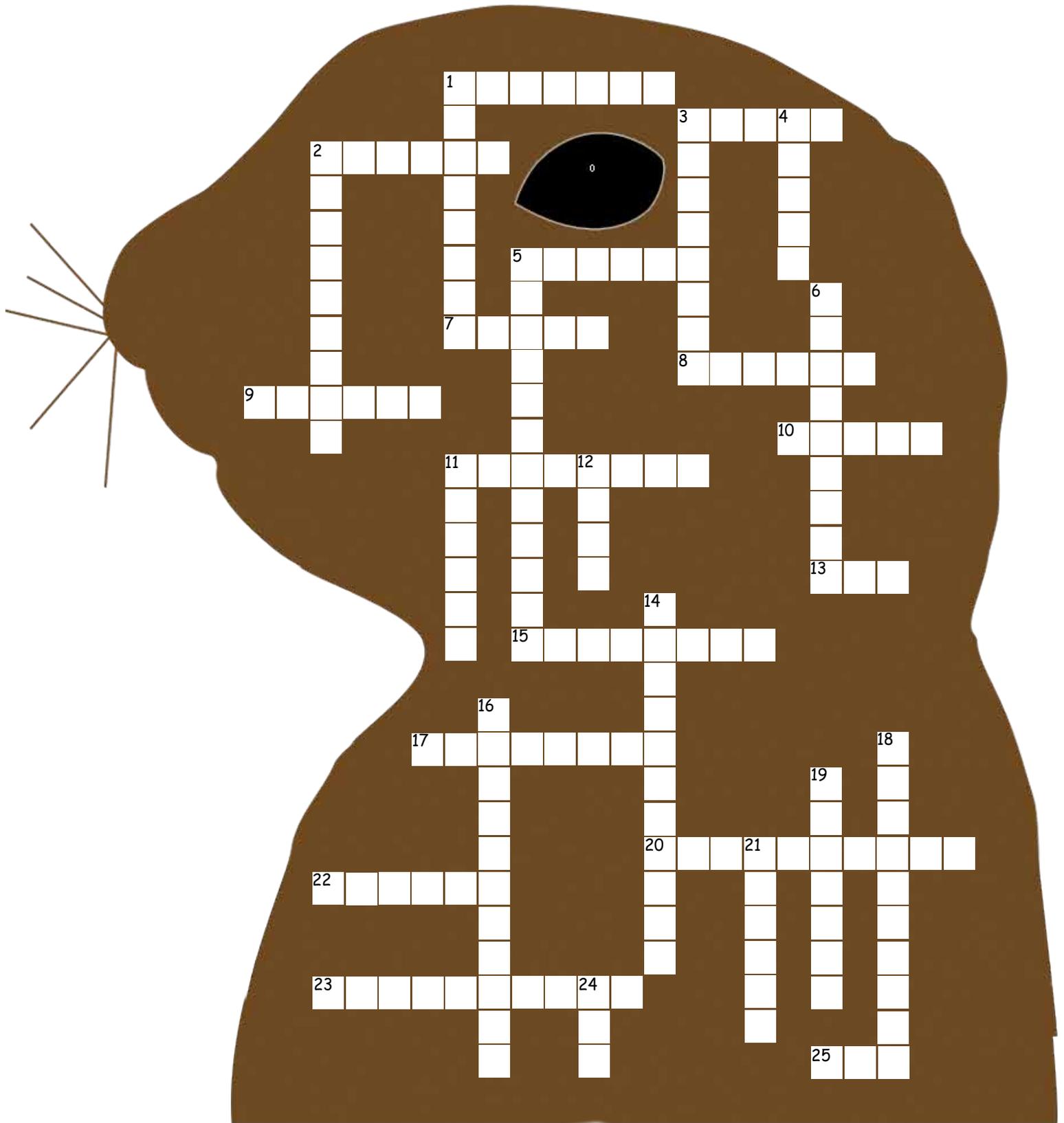
Across

1. The Violet-green S catches and "swallows" insects as it flies among the rock pinnacles.
2. The B is a mammal with yellow-gray fur and a white stripe (like a "badge") across the top of its head. It uses its long claws to dig out rodents to eat.
3. The R is a large black bird, cousin to the crow, with a call that sounds like a "croak."
5. The Yellow-bellied M is sometimes called a "rock chuck." It looks like a beaver, except for its bushy tail.
7. The S is a small, black and white nocturnal (active at night) animal that defends itself with a powerful, smelly scent it sprays from glands beneath its tail.
8. A four-legged, fast-moving reptile, the L.
9. The W is a long, slender mammal with short legs. Its fur is tan in summer and white in winter, with a black tip on its tail.
10. A small gray bird, belonging to the Sparrow Family, often seen hopping on the ground picking up seeds. Dark-eyed J.
11. The C looks a lot like its cousin, the Golden-mantled Ground Squirrel, but it's smaller and has stripes on its face.
13. The E is a member of the deer family and is the largest mammal at Bryce Canyon. Bulls are known for their loud "bugle."
15. A small, plump bird with a black cap, white breast and gray back. It is often seen climbing down tree trunks headfirst! White-breasted N.
17. This chubby, striped rodent is always begging for food, even though human food is unhealthy and there are plenty of natural things to eat. Golden-mantled Ground S.
20. A large gray, black and white bird that "cracks nuts" open with its bill. Clark's N.
22. Once endangered, this bird of prey has pointed wings, a narrow tail, and dives at 200 miles an hour! Peregrine F.
23. The P D is member of the rodent family. It lives in burrows in small meadow "towns." It often sits atop its mound and "barks" to warn others of danger.
25. On summer evenings, this flying mammal swarms out of cave entrances and eats many insects. Little Brown B.

Down

1. A dark blue bird with a black crest on its head. S Jay.
2. The B B is a large, furry mammal which eats fruits, nuts, insects and small animals. Its name comes from a common color of its fur. In winter, it hibernates in a den with its cubs.
3. The R is a nocturnal predator from the raccoon family. Its name comes from its long, bushy tail which has black and white bands (or "rings").
4. This large bird of prey is our national symbol. Bald E.
5. The M L is a large member of the cat family who can weigh up to 175 pounds. It preys on deer, rabbits and other mammals. Other names include puma and cougar.
6. The P is a slow-moving mammal who eats tree bark and defends itself with sharp quills.
11. The C is a member of the dog family. It's known for its howling and yipping sounds.
12. M Deer can be seen at dusk and dawn, browsing in meadows and along roadsides. They get their name from their large ears.
14. The R is a venomous snake named for the sound it makes when it shakes its tail.
16. The H is a tiny bird that eats nectar from red flowers. Its name comes from the sound made by its rapidly-beating wings.
18. The J is a member of the hare family. It has extra-large ears to help it keep cool, and long legs to help it move fast to escape predators.
19. The G F is a member of the dog family. It is mainly nocturnal and eats rodents, fruits and seeds. It's good at climbing trees, which helps it "outfox" its predators and prey!
21. This is the largest bird in North America. It has black feathers and a naked pink head. The California C was almost extinct, but its numbers are slowly increasing. A few of these birds have been spotted in Bryce Canyon!
24. The Great Horned O is a nocturnal bird whose call is a series of "hoots." It has an almost silent flight because of its fluffy feathers.

Wildlife Crossword



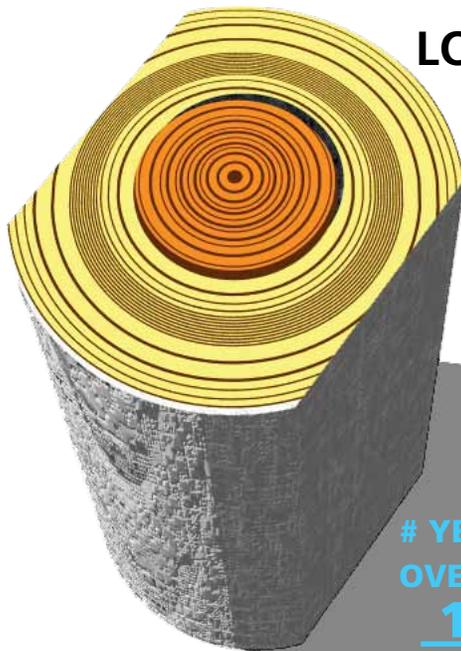
Tree Rings Reveal the Past

Each year trees add a new growth ring. Using "increment borers," scientists extract cores from trees to learn about the past. Thin rings form during droughts. Thick rings grow during wet years. Because logs rot slowly in the desert, the rings of living trees can be matched with rings in trees that died long ago. The example logs and cores illustrated below represent 5 young Ponderosa Pines. The longest dendrochronology record goes back 12,000 years using Bristlecone Pines which can live thousands of years!

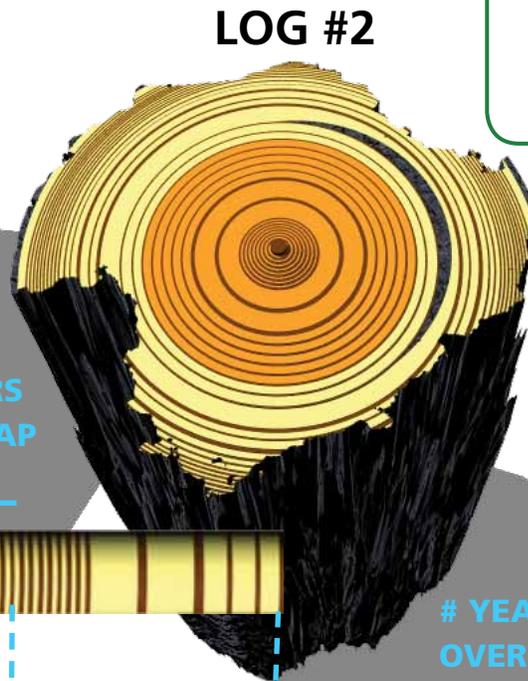
dendrochronology (noun) First used by archeologists to age buildings, this science also studies what life was like in the past as it was experienced and recorded by trees.

How did each tree die?
(Place the correct letter in the blank next to each tree.)

- A. Cut by a pioneer to make a cabin
- B. Broken off in a wind storm
- C. Burned by a severe forest fire
- D. Attacked by bark beetles
- E. Died during extreme drought

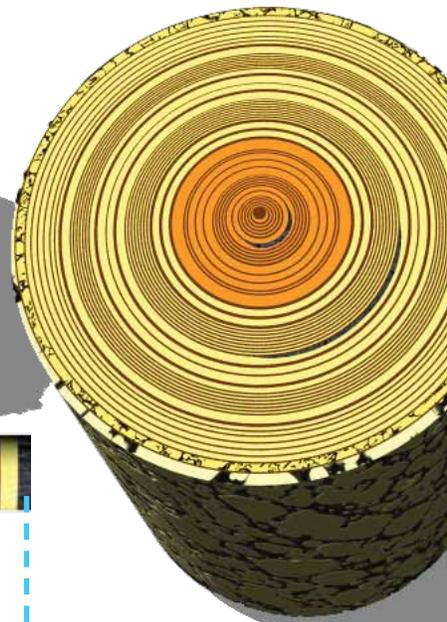


LOG #1



LOG #2

LOG #3



YEARS
OVERLAP
13

YEARS
OVERLAP

Core
length=
9.8 cm

CORE #1

Died at Age: _____

Year Died: **1870**

Killed by: _____

Core
length=
8.3 cm

CORE #2

Died at Age: **32**

Year Died: _____

Killed by: _____

Core
length=
10.0 cm

CORE #3

Died at Age: **44**

Year Died: _____

Killed by: _____

Core
length=
11.3

Bonus #1 Dendrochronology:

A. Together these 5 trees create a dendrochronology that spans _____ years.

(= total ages - total overlap)

B. Tree # _____ grew fastest.
(a longer core but fewer rings)

C. Tree # _____ grew slowest.
(smallest average gap between rings = # of rings ÷ core length)

Bonus #2 Fire and Drought:

A. _____ droughts have occurred.

B. The longest drought began in _____.

C. _____ fires have occurred.

D. On average, a fire occurs about once every _____ years.

(length of dendrochronology ÷ # of fires)

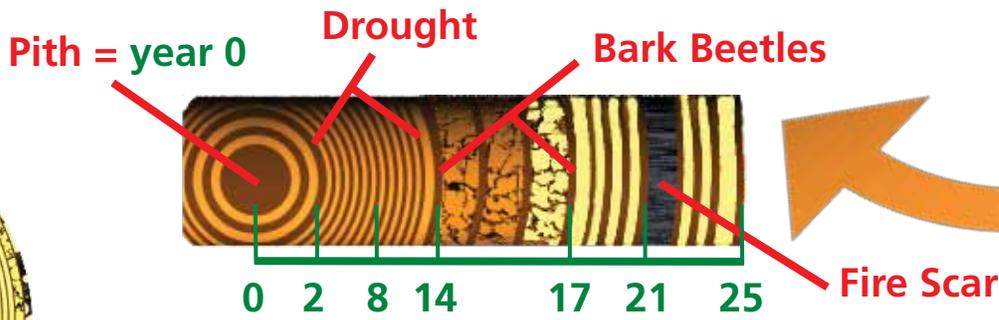
Note: The activity on these two pages counts as TWO activities!

Instructions: Study the logs and their cores below to figure out what happened to the 5 dead trees they represent. Fill in the blanks where needed to create a tree sequence of time — a dendrochronology.

1. Look at the shape of the logs and the last rings on right end of the cores to determine **how each tree died** (see letter choices at left).
2. Count dark brown rings on the cores to determine the **age of each tree** when it died (count the rings to right of the pith which = year 0).
3. Compare the ring patterns to calculate the **years of overlap** shared between trees (count rings between **blue dotted lines**).
4. For a real challenge, try the bonus questions at bottom left page.



Hints:
 1. It's easier if you start with log/core #1 and work forward through time.
 2. Don't count fire scars (black wood) as ring years (brown lines).



LOG #4

LOG #5

YEARS OVERLAP

YEARS OVERLAP **12**

CORE #4

CORE #5

Died at Age: _____

Died at Age: _____

Year Died: **1965**

Year Died: **2001**

Killed by: **E**

Killed by: **B**

Core length= 9.5 cm

th= cm

Good Darkness = Good Habitat

Bryce Canyon is one of the last grand sanctuaries of natural darkness. Here nocturnal animals thrive in a habitat free from light pollution. It isn't easy protecting the night, because a little light can spoil lots of darkness. To save the night, Rangers need help from both park visitors and people who live far away.



Draw lines from each predator to its prey (some prey might have several predators).

Draw lines from each predator to its prey (some prey might have several predators). Put an 'X' through anything that ruins night sky or nocturnal habitat.

Name the two constellations above: _____ & _____

Circle the North Star (Polaris) in the constellations above. *(Hint: Attend an astronomy program or ask a ranger for help.)*

In the space below, name two things in the picture that need darkness and explain why. Write two things that spoil night sky or nocturnal habitat and describe how to fix them.

What needs darkness? Why?

1. _____

2. _____

What spoils the dark? How can we fix it?

1. _____

2. _____

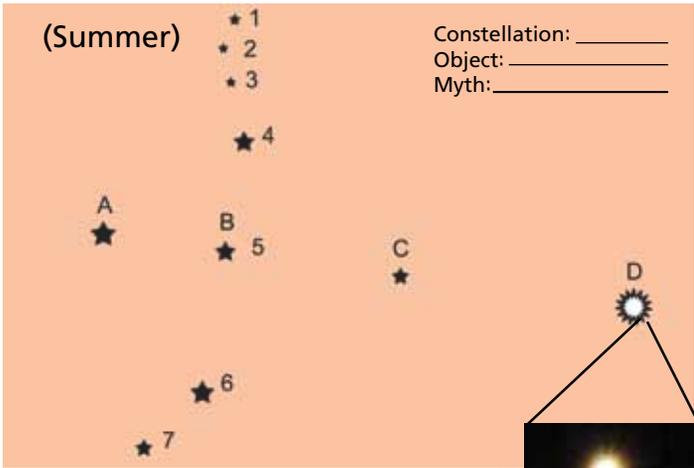
Constellation Connect-the-Stars

Bryce Canyon is one of the darkest places in the world. On a moonless night you can see 2500 stars! All of these extra stars can make it hard to find constellations, but makes it easy to see galaxies, globular star clusters, nebulae, and other deep sky objects even with just binoculars.

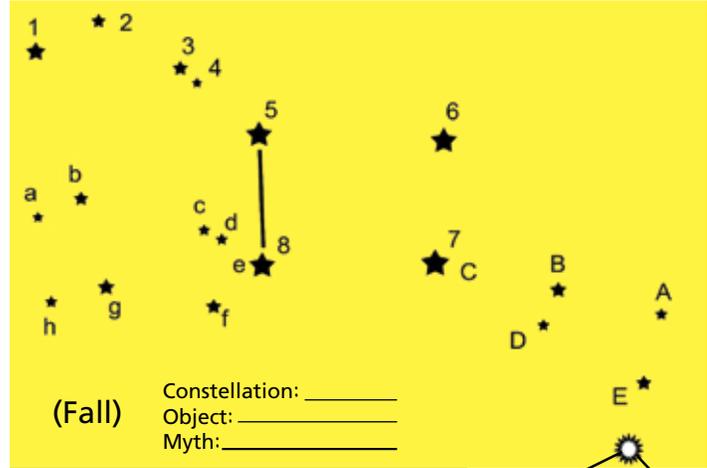
Connect the stars; enter the numbers from the lists below that correctly name each constellation.

Connect the stars; enter the numbers from the lists below that correctly name each constellation, its famous deep sky object (see photographs), and its mythology.

(Summer)

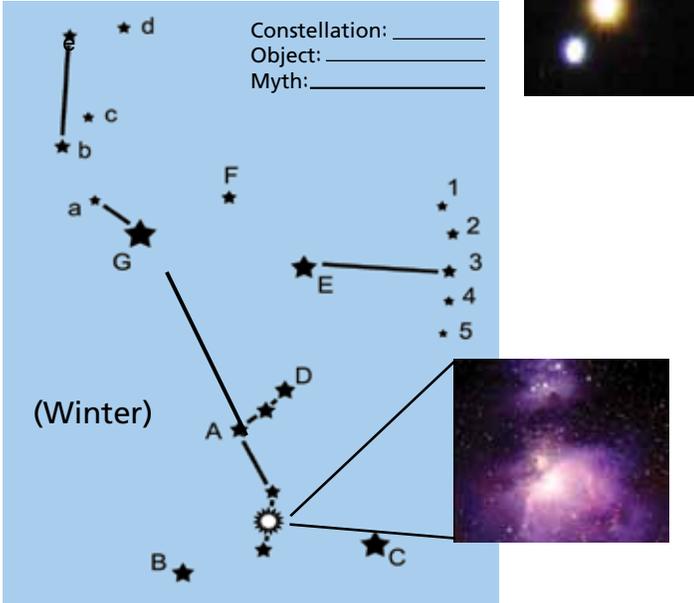


Constellation: _____
Object: _____
Myth: _____



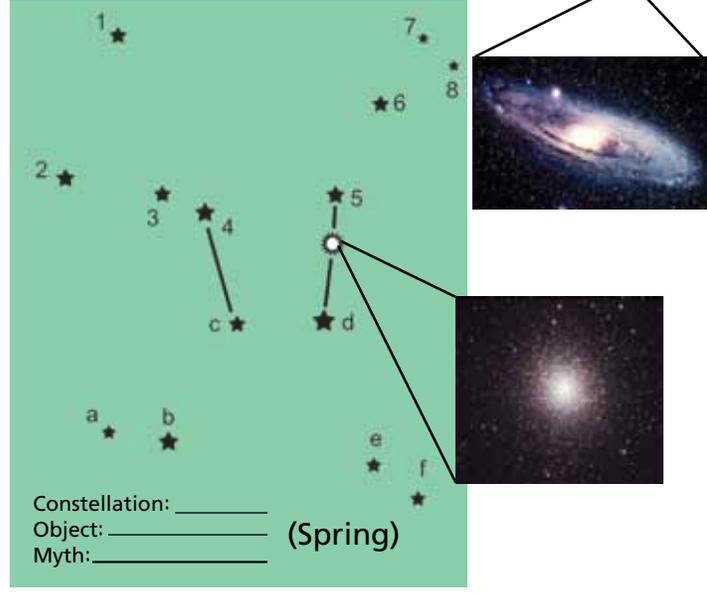
(Fall)

Constellation: _____
Object: _____
Myth: _____



(Winter)

Constellation: _____
Object: _____
Myth: _____



(Spring)

Constellation: _____
Object: _____
Myth: _____



Constellation

- 1) Orion the hunter
- 2) Pegasus the winged horse
- 3) Cygnus the swan
- 4) Hercules the strong man

Deep Sky Object

- 1) Globular Star Cluster
- 2) Andromeda Galaxy
- 3) Double Star Albireo
- 4) Great Orion Nebula

Constellation Myth

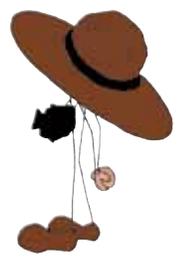
- 1) Earth Goddess's giant scorpion chases this trophy hunter every night, keeping him so busy he never has time to kill any more animals.
- 2) He diverted two rivers to clean the stables of 3000 oxen, carried the world on his shoulders so Atlas could rest, and broke Zeus's unbreakable chains to free Prometheus. His name means strength and power.
- 3) This hooved animal flew Perseus to rescue princess Andromeda from the sea monster. The constellation Andromeda is also its hind legs.
- 4) Also called the Northern Cross, it swims the river in the sky called Milky Way. Its colorful head is nick-named the "Cub Scout Double Star."

Match the Tracks!

Some of the animals in Bryce Canyon are rarely seen, but we know they are here because they leave footprints or other signs behind. Use your knowledge of these animals to try to match them to their tracks!

 Match at least five animals to their tracks.

 Match all animals to their tracks.



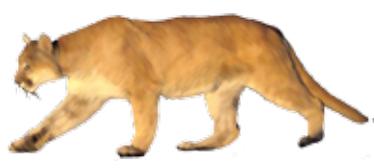
Ringtail



Coyote



Prairie Dog



Mountain Lion



Golden-mantled Ground Squirrel



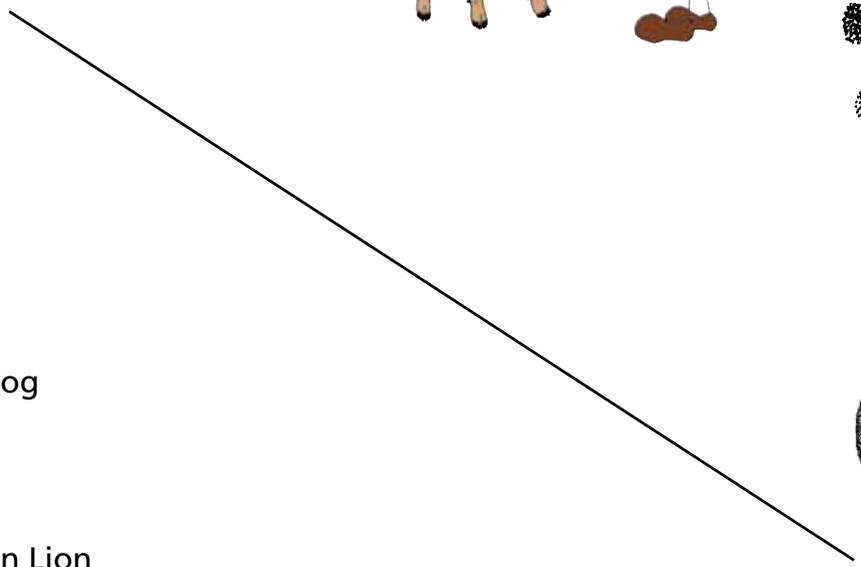
Mule Deer



Weasel



American Black Bear



  The Southern Paiute Indians lived in the Bryce Canyon area for centuries during Spring, Summer, and Fall. They were experts in using many different resources in order to eat, build shelters, make clothing, pieces of art, and tools for gathering food and collecting water. Read about the Southern Paiute Indians in the text box, then answer the question (in red) below.



nampa



kahn



awdung'kupeets

Food: Southern Paiutes ate many things, including: jackrabbit (*ku'moo*), pronghorn (*wunts*), sego lily (*kogge*), pinenuts (*too'vuts*), and crickets (*awdung'kupeets*).

Home: They used small domed shelters known as *kahns* when they needed temporary shelter. Kahns were made of branches, bark, and grasses.

Method of Travel: On foot (*nampa*).

Clothing: They wore clothing made of animal hides and sometimes plants. Men wore clothing known as *madooha koosa* and women wore clothing called *kumoo'muhdoo'e*.

Art: Southern Paiutes are known for their beautiful baskets (*yuh'up*) which were woven from twigs and reeds. Baskets were used to gather nuts and berries and to carry water.



kumoo' muhdoo'ee



wunts



ku'moo



madooha koosa



yuh'up



kogge



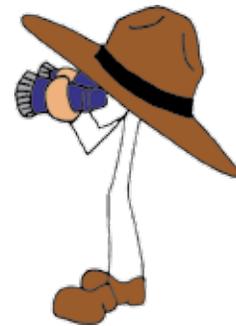
too'vuts

Everything the Southern Paiutes used came from nature. Even today, every man-made item we possess is made from natural materials. **Can you name 5 man-made items you own and the natural materials they came from?**

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

Bryce Canyon Bingo

As you explore Bryce Canyon, look for the things shown below. When you see one of the items, draw a circle around it. Try to get 5 in a row (horizontally, vertically, or diagonally) to finish this activity. Can you find them all?



"Hike the Hoodoos!"

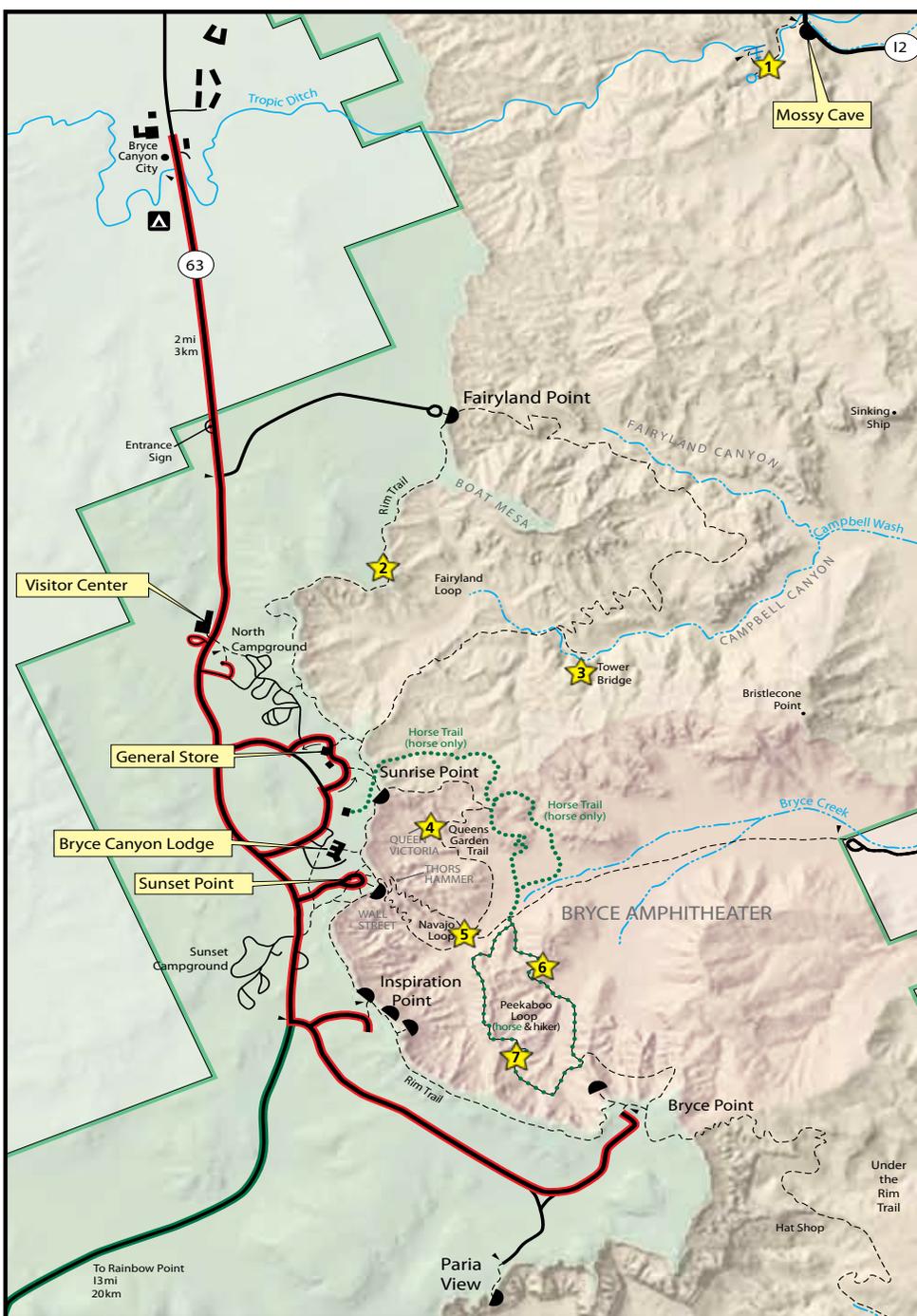
Are you ready for adventure? Take the "I Hiked the Hoodoos" challenge!
This activity is for visitors of ALL ages, and allows you to explore Bryce Canyon's trails, have fun, and get healthy at the same time.



To meet the challenge, you must do **BOTH** of these things:

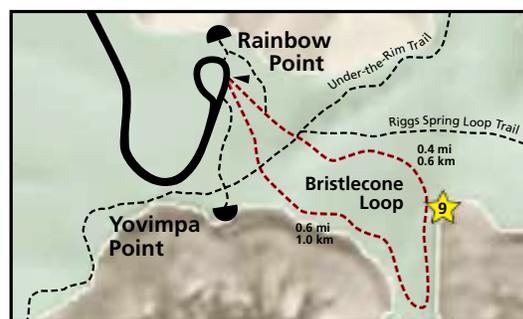
- 1** Hike a minimum of 3 miles/4.8 km on trails that have special "I Hiked the Hoodoos" benchmarks as shown at right (see chart below).
- 2** Use the **back page** of this booklet to make pencil rubbings of the benchmarks. Bring the rubbings (or if you prefer, photos of yourself with the benchmarks) to the visitor center to receive a small reward. Also, this activity counts as a Junior Ranger Booklet requirement if you answer the question (#4) in the box on the **back page**.

Benchmark locations are designated on the maps below by the **★**. More detailed trail information and further instructions about the "Hike the Hoodoo" activity can be found in the park newspaper, *The Hoodoo*.



Benchmark	Distance*	
	miles	km
1. Mossy Cave	0.8	1.3
2. Rim Trail	2.5	4.0
3. Tower Bridge	3.0	4.8
4. Queens Garden	1.8	2.9
5. Navajo Loop	1.3	2.2
6. Peekaboo Loop (from Sunset Point)	2.4	3.9
7. Wall of Windows (from Bryce Point)	3.2	5.1
8. Sheep Creek	4.0	6.4
9. Bristlecone Loop	1.0	1.6

Trail difficulty: Easy, Moderate, Strenuous *round trip



"Hike the Hoodoos" (continued)

1. Benchmark rubbing

2. Benchmark rubbing



3. Benchmark rubbing

4. What is one thing you learned from reading one of the "Hike the Hoodoos" panels?



FREE to Junior Rangers who meet all program requirements

Junior Ranger Pledge

As a Bryce Canyon Junior Ranger, I promise to do all I can to help protect our national parks. I will collect litter when I'm out exploring, and show respect for nature by not disturbing anything wild.

Junior Ranger's Signature

Date



Available to Junior Rangers for \$1



Bryce Canyon's Junior Ranger Program is funded by a generous donation from the Bryce Canyon Natural History Association.