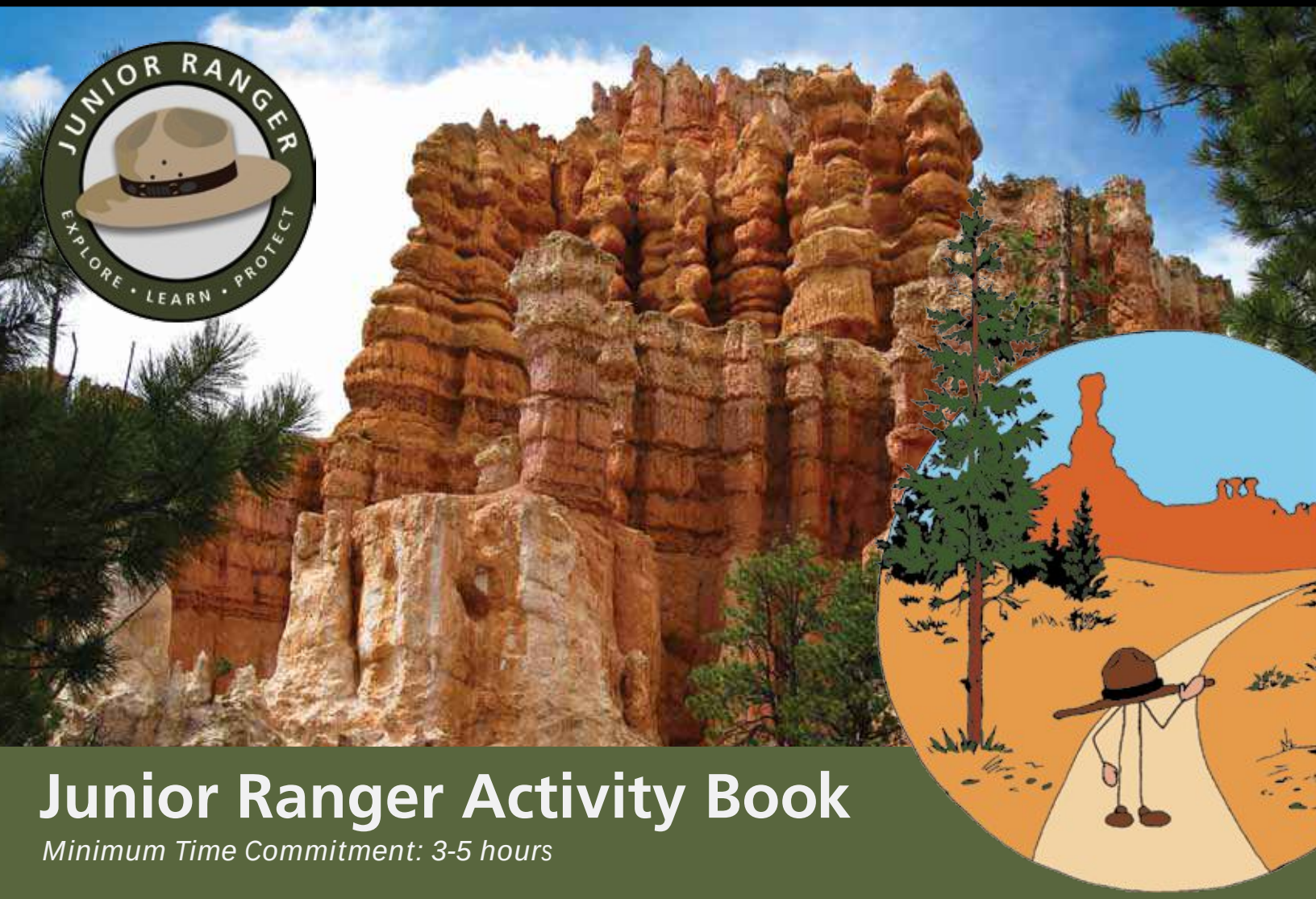
Bryce Canyon National Park

National Park Service
U.S. Department of the Interior



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:

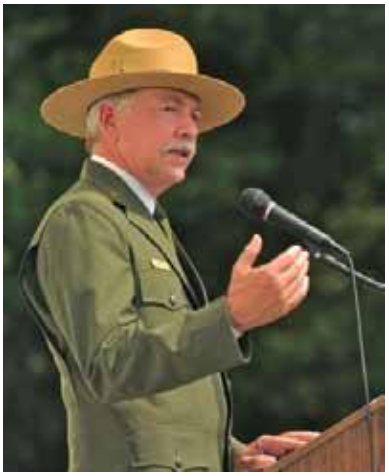
Ages 18+: Complete ALL activities in booklet.

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

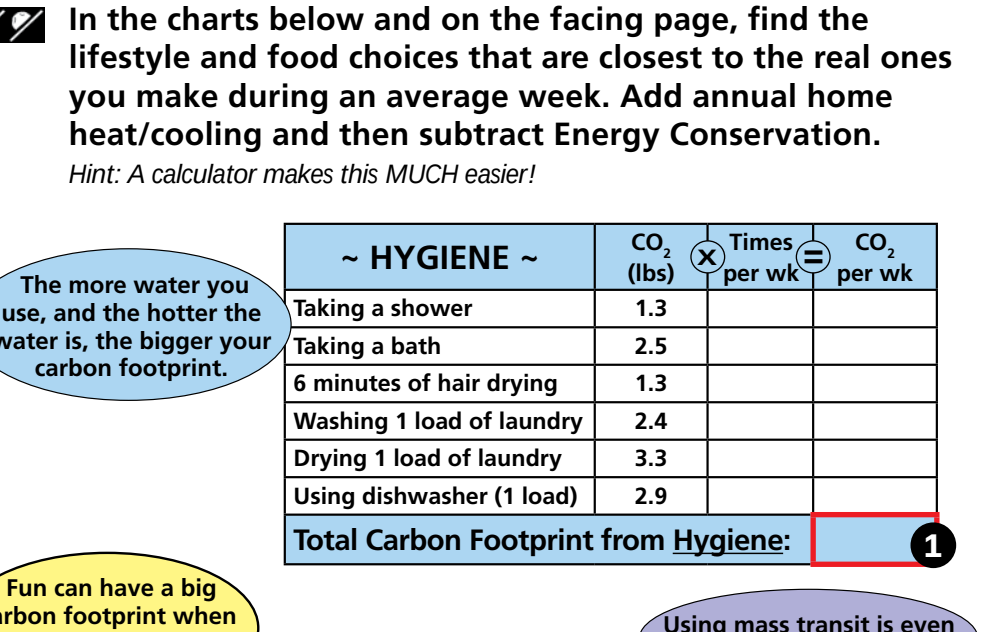
Carbon dioxide (CO_2) traps heat. The best way to stop Global Climate Change is to reduce CO_2 emissions. Did you know that by using less energy, getting more exercise, and eating healthy food you can help protect national parks and the whole world? After you make all the calculations below, look for 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 CO_2 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) (X)	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 (X)	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 (X)	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 (X)	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!

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

Next, add the four CO_2 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 CO_2 total is: _____ 5

Double-pane windows, extra insulation & weatherstripping can reduce CO_2.

~ 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 CO_2**

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 CO_2 total is:

5 + 8 – 9 = _____ lbs CO_2

(divided by 2000) = _____ tons CO_2

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 CO_2 per year.

How many trees would you have to plant to offset your carbon footprint? (Divide your adjusted yearly lbs of CO_2 total by 50.)

Write your answer here: _____

4 Much Ado About Hoodoos!

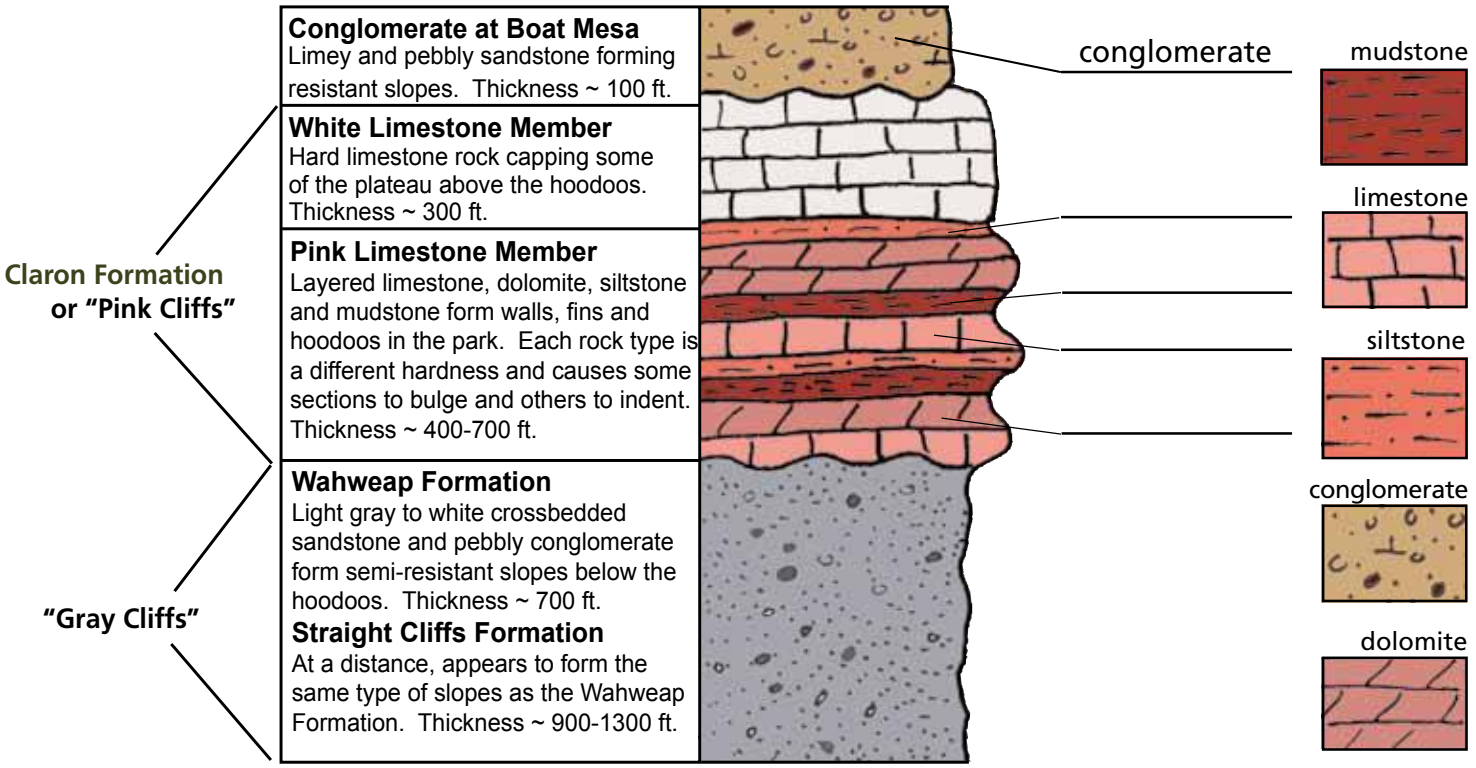
The drawing below shows geologic layers of rock. Geologists call this a stratigraphic column. On the the left side of the column are the rocks' names and descriptions.

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.



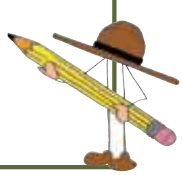
2 Create a Hoodoo

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.



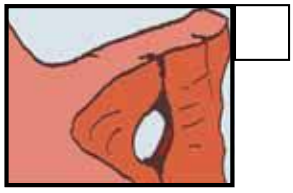
Attend a Geology Talk, watch the park movie, or look in the visitor center for clues! Answer the questions below and complete all the parts to finish this activity.

1) What mineral gives our rocks their red color? _____

2) Why is Bryce Canyon not really a canyon? _____

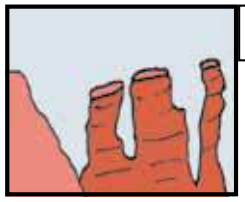
Life of a Hoodoo

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

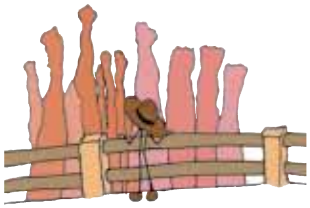

hoodoos

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.

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

6 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.

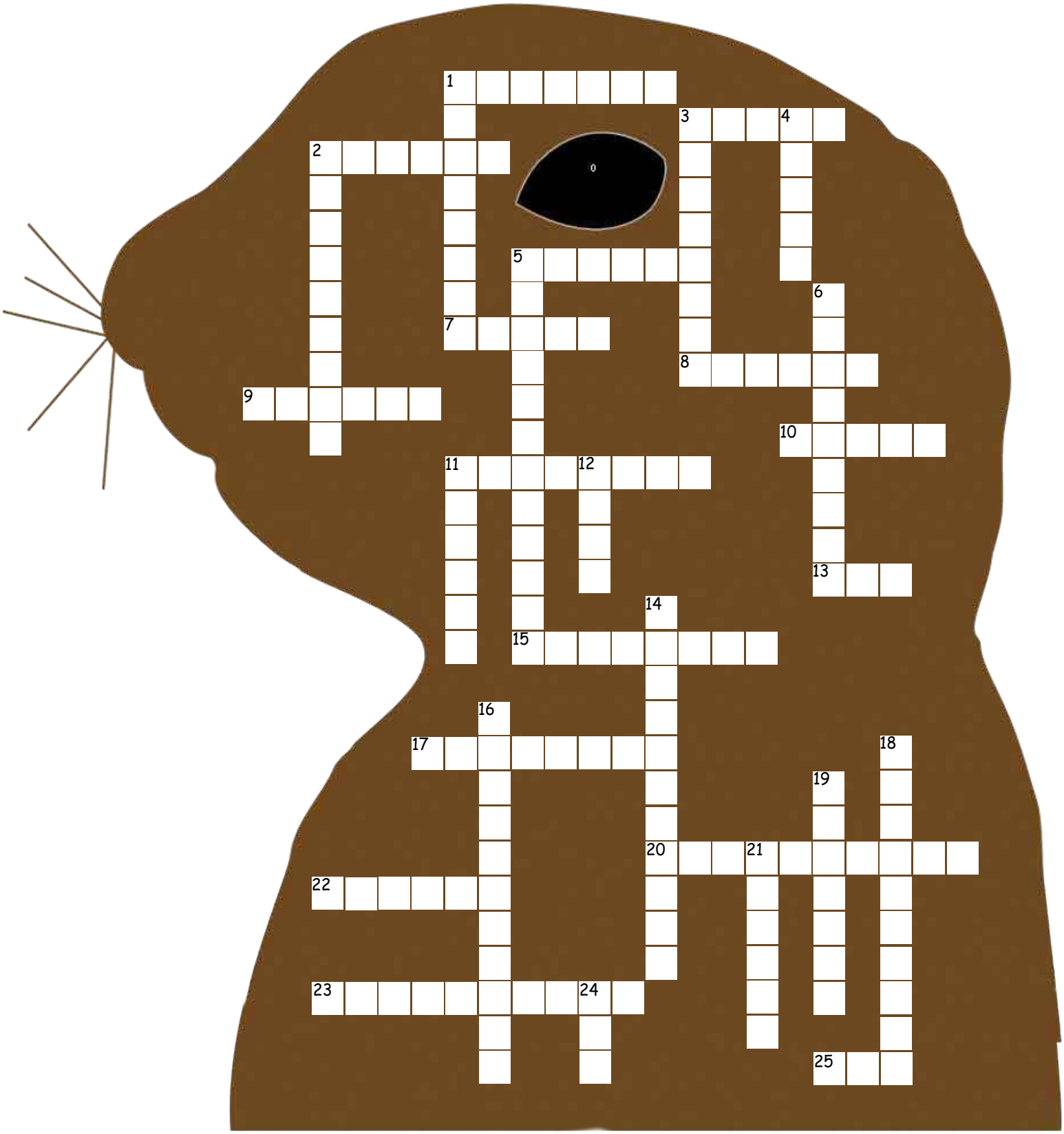
18. The J_____ is a member of the hare family. It has extra-large ears to help it keep cool, and long legs to help it move fast to escape predators.

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



8 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.)

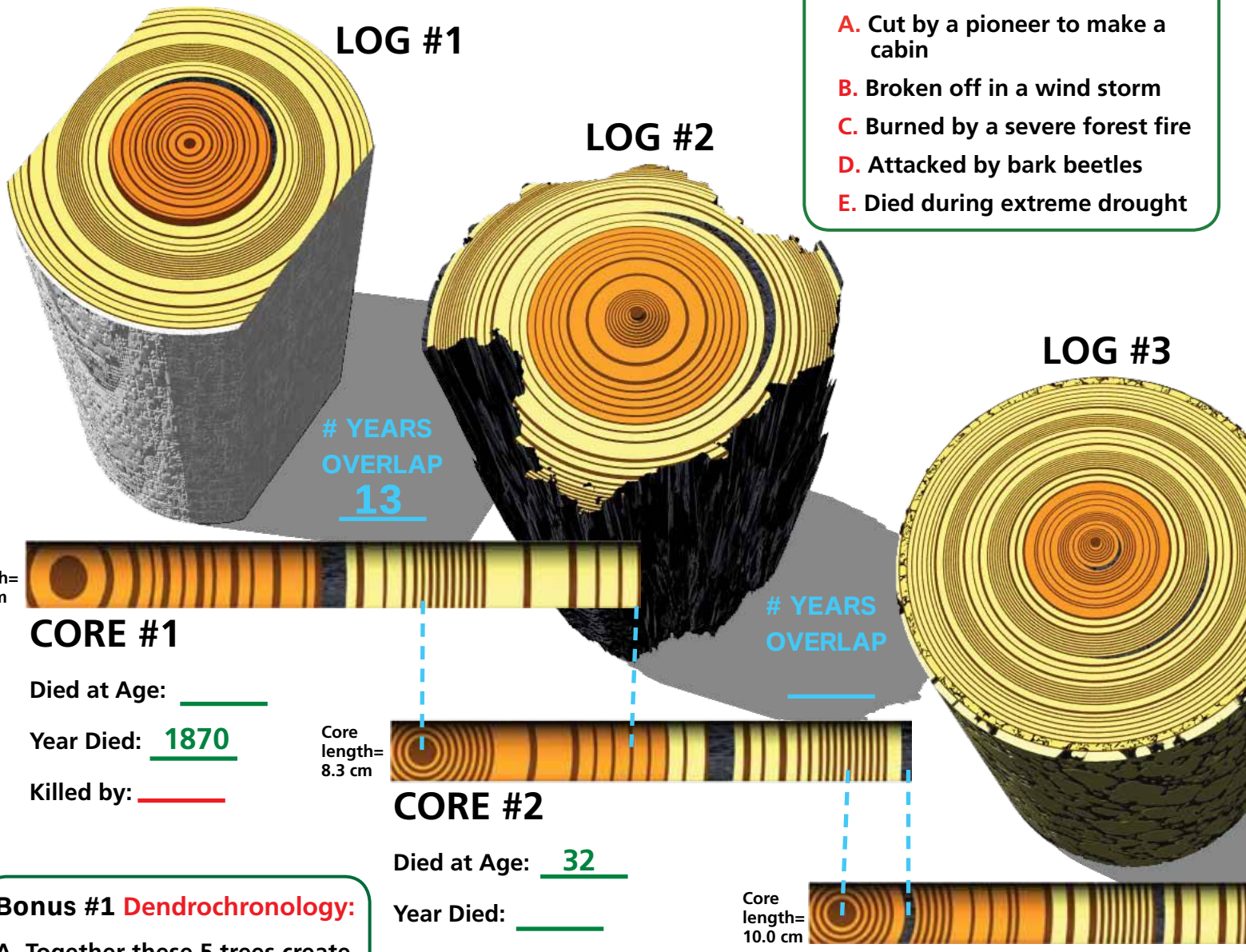
A. Cut by a pioneer to make a cabin

B. Broken off in a wind storm

C. Burned by a severe forest fire

D. Attacked by bark beetles

E. Died during extreme drought



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 occured.

B. The longest drought began in _____.

C. _____ fires have occured.

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!

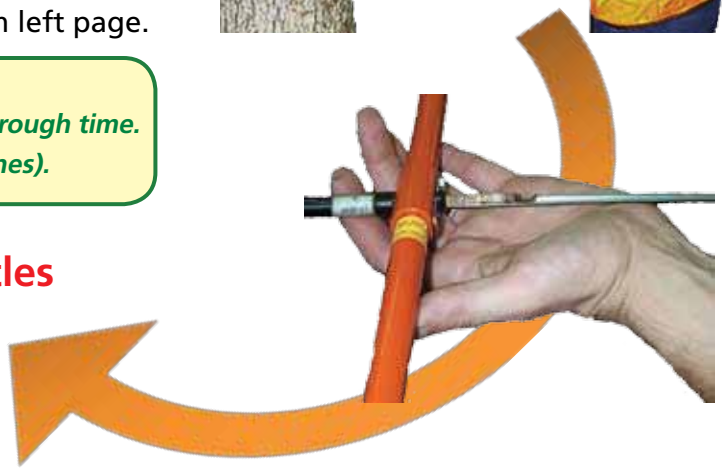
Instructions: Study the logs and their cores below to figure out what happend to the 5 dead trees they represent. Fill in the blanks where needed to create a tree sequence of time — a dendrochronology.

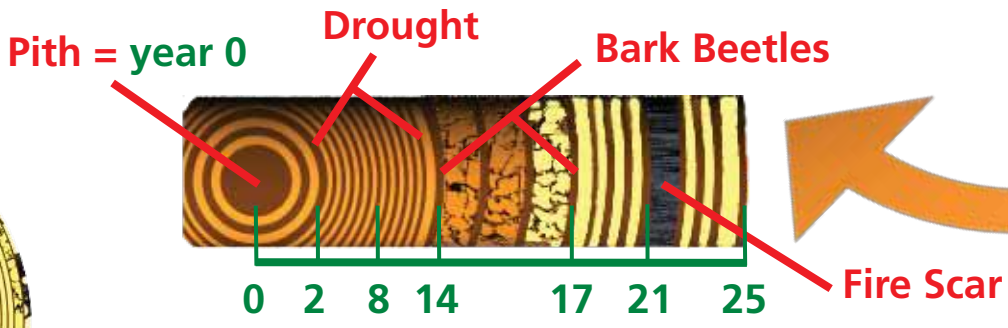
1. Look at the shape of the logs and the last rings on right end of the cores to determine **how each tree died** (see letter choices at left).
2. Count dark brown rings on the cores to determine the **age of each tree** when it died (count the rings to right of the pith which = year 0).
3. Compare the 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:

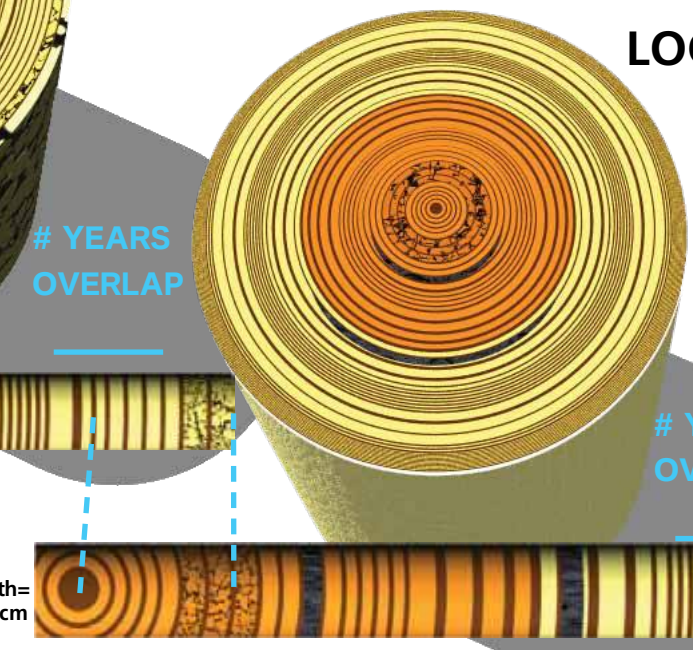
1. It's easier if you start with log/core #1 and work forward through time.

2. Don't count fire scars (black wood) as ring years (brown lines).





LOG #4



YEARS OVERLAP

_____

th= cm

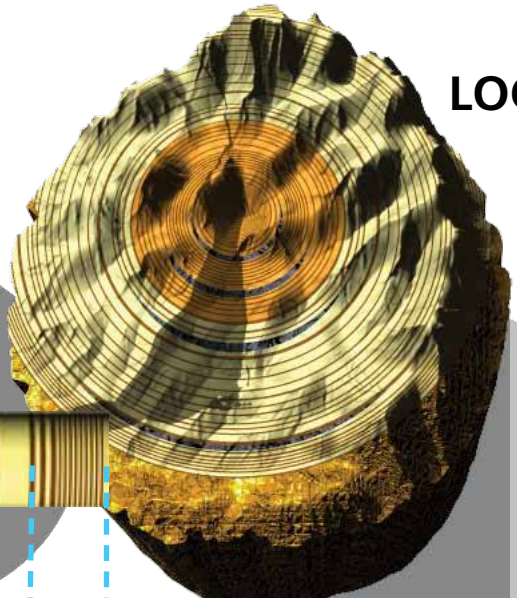
CORE #4

Died at Age: _____

Year Died: 1965

Killed by: E

LOG #5



YEARS OVERLAP

12

CORE #5

Died at Age: _____

Year Died: 2001

Killed by: B

Core length= 9.5 cm

10 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. _____

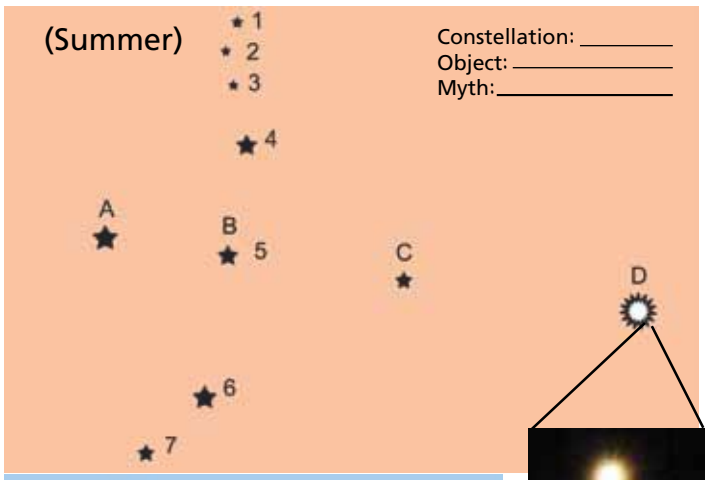
_____

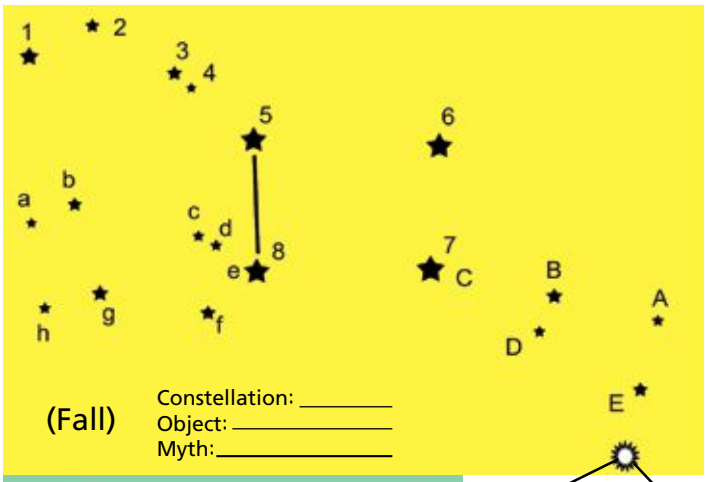
Constellation Connect-the-Stars

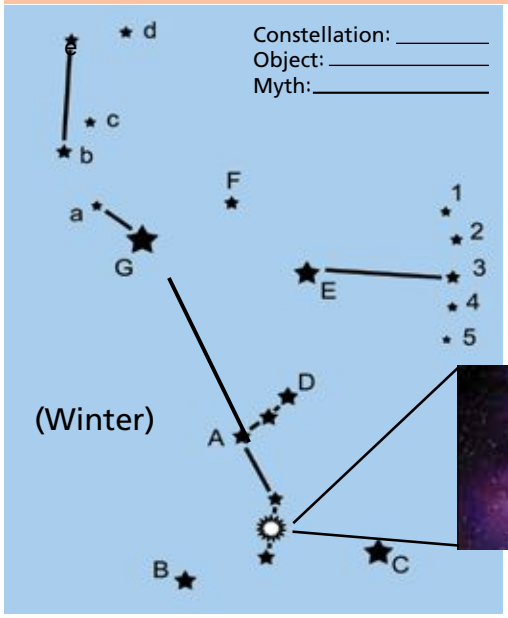
Bryce Canyon is one of the darkest places in the world. On a moonless night you can see 2500 stars! All of these extra stars can make it hard to find constellations, but makes it easy to see galaxies, globular star clusters, nebulae, and other deep sky objects even with just binoculars.

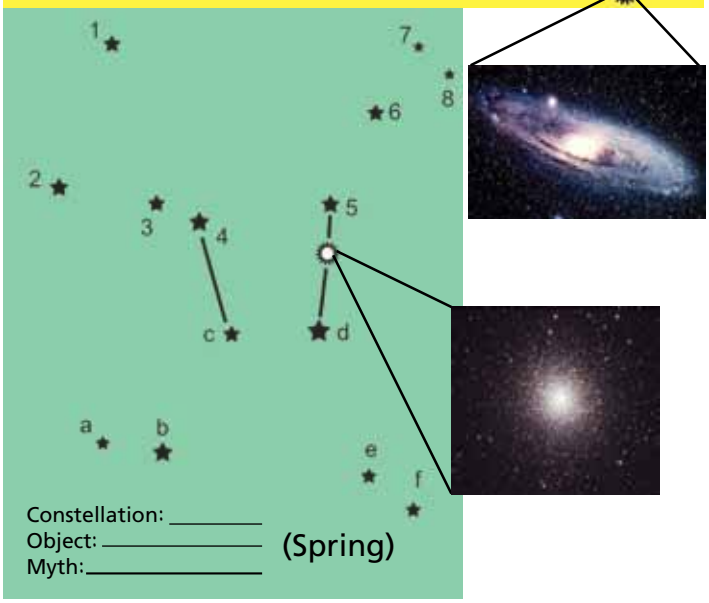
.....Connect the stars; enter the numbers from the lists below that correctly name each constellation.

.....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.









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 hoofed 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

Southern Paiutes

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) _____

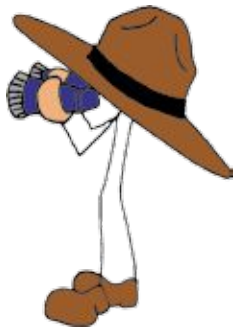
3) _____

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?



Moon	Columbine	Juniper	Steller's Jay	Evening Primrose
Golden-mantled Ground Squirrel	Ranger Hat	Short-horned Lizard	Pine cone	Mule Deer
Violet-Green Swallow	Lightning	**Free Space**	Prairie Dog	Butterfly
Hoodoos	Pronghorn	The Milky Way	Aspens	Bryce Canyon Lodge
Shuttle	Manzanita	Raven	Table Cliff Plateau	Bench Mark

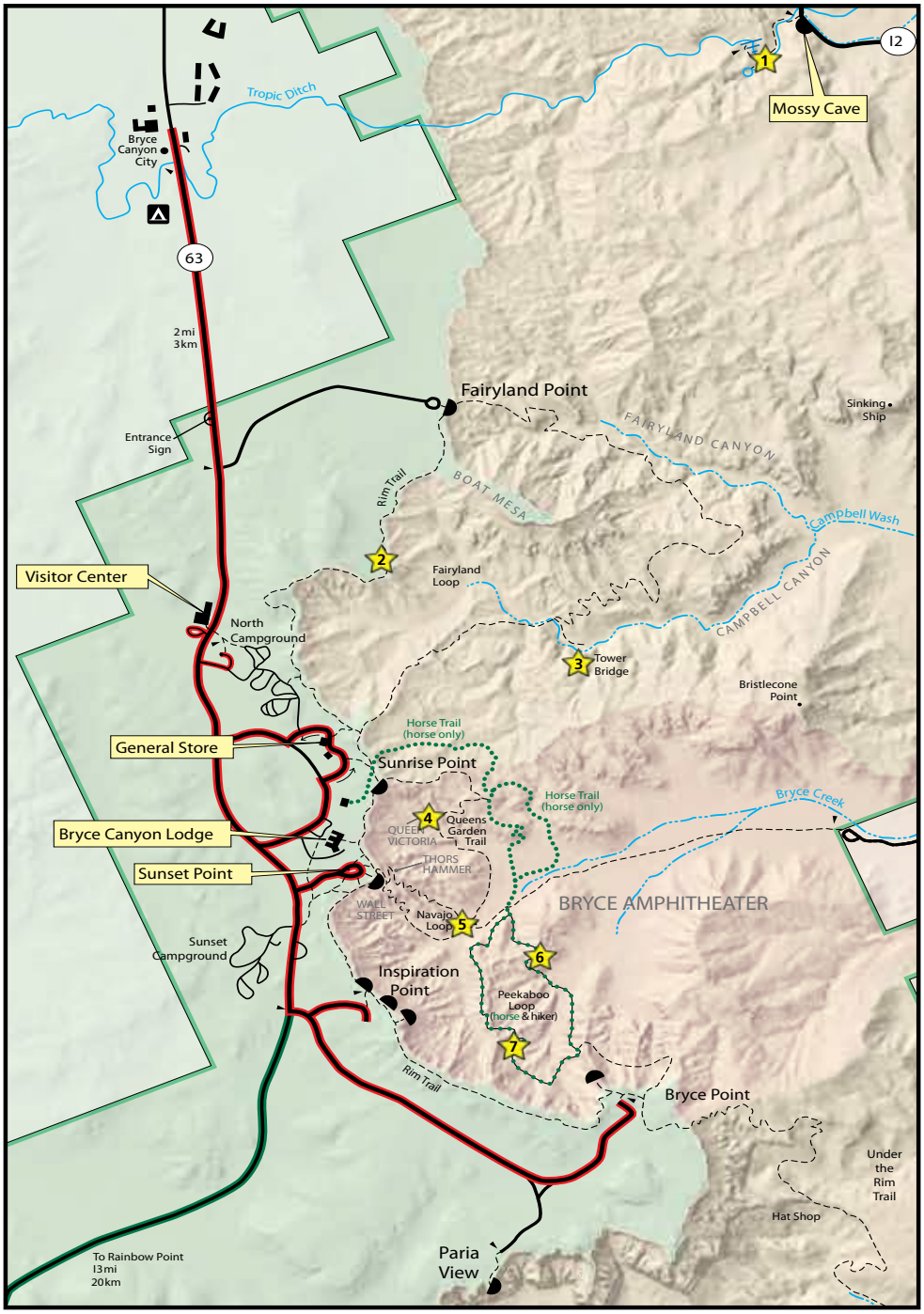
"Hike the Hoodoos!"

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:

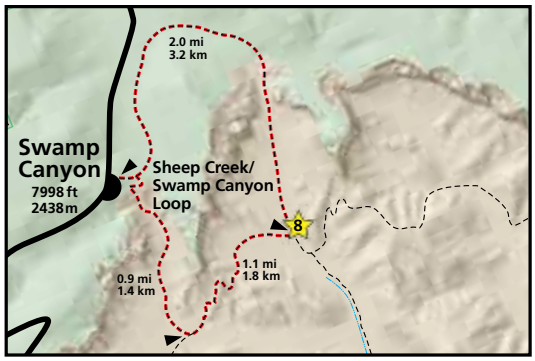
1. Hike a minimum of 3 miles/4.8 km on trails that have special "I Hiked the Hoodoos!" benchmarks as shown at right (see chart below).
2. Use the back page of this booklet to make pencil rubbings of the benchmarks. Bring the rubbings (or if you prefer, photos of yourself with the benchmarks) to the visitor 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.

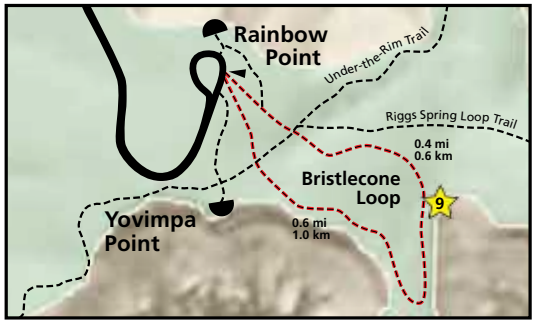
Benchmark locations are designated on the maps below by the ★. More detailed trail information and further instructions about the "Hike the Hoodoo" activity can be found in the park newspaper, *The Hoodoo*.



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?

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

FREE to Junior Rangers who meet all program requirements

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.

04-2015 10K