Giant Panda Teacher Packet
3rd Grade - 5th Grade

Sponsored By Goldsmith's
Giant Panda Teacher Packet

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July 2003

Dear Teacher,

The Memphis Zoo would like you to join us on an exciting journey from Tennessee to China. On this journey you and your students will recognize the importance of conservation and research of giant pandas. Giant pandas are one of the most recognized animals in the world. And now, the Memphis Zoo is one of only four zoos in the United States with them on exhibition. This puts us in the unique position to educate our school children about this rare and wonderful animal.

We have developed an exciting new teacher packet that focuses on the giant pandas. The packet includes pre and post trip activities for you to conduct in your classroom. The pre-trip activities will help you prepare your students for their trip to see the pandas so they can maximally benefit from the experience. The post-trip activities will reinforce what they learned at the zoo. Each activity is correlated to the Tennessee State Science Curriculum Standards so you can meet your curriculum needs with these fun, engaging activities.

If you would like to expand your panda experience, we also offer panda classes at the zoo. Our educators use biofacts and animal visitors to engage your students in an up-close, personal experience. We hope the zoo can become an integral part of your curriculum.

Sincerely,

Kerry Carlin Morgan
Education Manager, PhD
Memphis Zoo
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Pre-trip Activities
Scent Sense

Goal: To understand that animals have adaptations that help them survive in the wild

Behavioral Objectives:
1) To define what an adaptation is
2) To name one thing a giant panda uses his sense of smell for

Curriculum Standard Correlations:
Grade 3
- 2.2 Realize that organisms use their senses to interact with their environment
- 5.2 Recognize that living things have features that help them survive in different environments
Grade 4
- 5.2 Determine that adaptations help organisms survive in their environments
Grade 5
- 5.2 Determine that adaptations help organisms survive in their environments

Time: 1 hour

Background Information:
All animals, including giant pandas, have certain features to help them survive in the wild. Adaptations are what animals have to be able to make it in the wild. An adaptation is a behavior, physical feature, or other characteristics that helps an animal or plant to survive. The giant panda has many amazing adaptations. One of those adaptations is the giant pandas keen sense of smell. Giant pandas can smell something from up to several yards away. Giant pandas use their sense of smell to locate food and mates, identify other pandas’ territories, mark territory, identify cubs, and to avoid predators and humans.

Materials:
Required:
- Empty metal cans- four for each group
- Cheese- one piece per group or you can use an extract if you would like the smell to be stronger and easier to identify

Procedures:
Preparation:
1) Begin collecting metal cans for the activity.
2) The day before this activity will take place, buy a package of cheese or a bottle of extract.

Introduction:
1) Before beginning the activity, talk about what an adaptation is. Discuss that one of the giant pandas adaptations is its sense of smell. Lastly, talk about how the giant panda uses its sense of smell to help it in the wild.
Conducting Activity:
1) Divide the students into groups and designate an area in the classroom for them to conduct their activity.
2) Pass out the metal cans and one piece of cheese for each group. Each group will have four metal cans.
3) Place the metal cans open face down on the table or desk.
4) One student places the piece of cheese under one of the cans while the other members of the group are not looking.
5) The other members try to locate the cheese by sniffing around each can.
6) After everyone in the group has had a turn making their guess, the first member of the group reveals where the cheese is.
7) Continue the activity until each member of the group has had a turn to hide the cheese.

Discussion:
1) When the students finish the activity, gather the children together and discuss what each student experienced. Was it hard or easy to locate the cheese? How do giant pandas use their sense of smell in the wild?

Extensions/Going Further:
Instead of using cheese for this activity, you can use coffee beans, broccoli, peppermint, popped popcorn, or chocolate. You can also put more than one item under the can and have the students guess what they are trying to smell.
Look Who’s Coming to Dinner

Goal: Students will learn the terms carnivore, omnivore, insectivore and herbivore.

Behavioral Objectives:
1) Students will be able identify the foods carnivores, omnivores, insectivores and herbivores eats.

Curriculum Standard Correlations:

Grade 3
- 2.3 Examine interrelationships among plants, animals, and their environment.
- Recognize the basic requirements of all living things.

Grade 4
- Realize that plants and animals can be grouped according to similarities and difference in their characteristics.

Time: 1 hour 30 minutes

Background Information:
All animals need food to live. Different types of animals eat different kinds of food. Animals can be grouped according to the foods they eat. Animals that are meat eaters are called carnivores. A snake is an example of a carnivore. Animals that eat only plants are called herbivores. An example of an herbivore is the giant panda. Their diet consists of bamboo shoots, stems, and leaves. Animals that eat only insects are called insectivores. A hedgehog is an example of an insectivore. Animals that eat both meat and plants are called omnivores. Most humans are omnivores.

Materials:
Required:
- Paper
- Art supplies

Procedures:
Preparation:
1) Supply each student with a sheet of paper, crayons, markers, etc. If you want you can provide them with a menu to look at. Discuss the terms carnivore, omnivore, herbivore, and insectivore with your students.

Introduction:
1) For this activity, ask students to imagine opening a restaurant that caters to wild animals. Tell your students they are going to plan a meal for a carnivore, insectivore, omnivore, and herbivore.
**Conducting Activity:**

1) Tell each student they should draw four meals, one for each of the different eaters. Or, you can have students make a menu for just one of the consumer groups. Have them list an example of an animal that would eat that meal. They can even write a description about each meal.

2) When the menu is complete, invite each student to present their menu of delicious dishes to the class.

3) What would a giant panda’s menu look like?

**Extensions/Going Further:**

Discuss food chains with your students. Ask, “What do all food chains start with?” Have the students draw an example of a simple food chain. Have students make a food chain with the giant panda in it.
A Giant Skull

Goal: Students will observe and make a giant panda skull.

Behavioral Objectives:
1) Students will be able to describe giant panda skull characteristics.

Curriculum Standard Correlations:
Grade 3
- 5.2 Recognize that living things have features that help them to survive in different environments.
Grade 5
- 5.2 Determine that adaptations help organisms to survive in their environments.

Time:
45 minutes

Background Information:
Giant pandas, like all bears, are descended from meat-eating (carnivore) dog relatives. Giant pandas are classified as carnivores although almost all of their diet consists of plant matter, mainly bamboo. Thus, giant pandas are truly omnivores. The giant panda’s jaw has adapted to its bamboo lifestyle. Their jawbones are quite massive and none of the cheek teeth are adapted to tearing apart flesh. The molars, even posterior molars, of giant pandas are wide and flat-topped. These features of the skull are obviously adaptations for stronger, easier crushing and grinding of bamboo.

Materials:
Required:
- scissors
- glue
- brass paper fastener
- file folder, construction paper, or poster board

Provided:
- “giant panda” skull model

Procedures:
Preparation:
1) Make copies of a giant skull worksheet.

Conducting Activity:
1) Students will make a model of a giant panda skull. Provide each student with a copy of the “Giant Panda” skull model. Students will glue the sheet to a file folder, construction paper, or poster board. Have the students cut out the skull and lower jaw along the lines. Also cut along the dashed line on the skull. Have them connect the lower jaw to the skull by matching up the two O areas and attaching them with a paper fastener. Part of the mandible will slide into the opening cut into the skull. (See the second picture for the correct positioning of the jaw and skull.) Open and close the jaws to see how they work.
Extensions/Going Further:

1) Find pictures or use real skulls of different animals to observe differences in skull shape, size, and dentition. Make sure to choose a skull from a carnivore, omnivore, and herbivore.

2) The giant panda's existence revolves around its almost exclusive diet of bamboo. The giant panda has several adaptations that help it eat bamboo. Try to have the class name some other animals that are especially adapted for their environment. For example, many desert animals have special adaptations that help them deal with the desert heat.
A Panda in my Schoolyard!?

**Goal:** Students will understand that animals are dependent on their environment for survival.

**Behavioral objectives:**
1) Students will be able to identify four basic survival needs for all animals.
2) Students will be able to define a habitat.
3) Students will be able to explain why habitats are important for the survival of the giant panda.

**Curriculum Standard Correlations:**

**Grade 3**
- 2.3 Examine interrelationships among plants, animals, and their environment.
- 3.1 Recognize the basic requirements of all living things.

**Grade 4**
- 2.1 Investigate the relationships among organisms in a specific ecosystem.

**Grade 5**
- 2.1 Investigate the relationships among organisms in a specific ecosystem.

**Time:** 1 hour

**Background Information:**
In order to survive, animals need to live in areas that provide food, water, shelter and space to raise their young. These areas are called habitats. Giant pandas live in the bamboo forest high in the mountains of southwestern China. During the winter months giant pandas move to lower levels on the mountains due to the colder temperatures and snow. They move to higher levels on the mountains during the summer months. The mountains are covered in heavy clouds with dense mist and rain throughout the year.

Streams and rivers can be found in the mountains of China. These streams and rivers provide the giant panda with a source of water.

Giant pandas use caves, old hollowed out trees, and rock crevices for shelter. They also enjoy the shelter of the tall trees found in the bamboo forests. Caves, old hollowed out trees and rock crevices also provide the giant panda with space to give birth and raise their young.

The main food of the giant panda is bamboo. Bamboo is usually plentiful all year round. The bamboo is so thick in their habitat that it is often hard to find giant pandas.

**Materials:**

**Required:**
- pencils
- paper
- crayons or markers
- clipboards or something else hard for the children to write on.

**Provided:**
Procedures:

Preparation:
1) Make a photocopy of the Schoolyard Habitat Worksheet for each of your students. Attach each worksheet to a clipboard or another hard surface for each of the students to write on.

Introduction:
1) Ask the students what they believe an animal would need to live. Discuss the basic elements of survival with the students - food, water, shelter and a place to raise their young.

Conducting Activity:
1) Pass out the clipboards to the students.
2) Tell them that an animal’s habitat is made up of the elements in the area in which it lives. They are going to be looking for signs of wildlife in their schoolyard and those elements that would help them survive. In the natural world the word element refers to a part of a natural environment. Tell the students that each animal’s habitat must provide food, water, shelter and space to raise their young.
3) Tell the students they are going to list on their Schoolyard Habitat worksheet all the signs of wildlife they find and the signs of elements they use to supply their four basic needs. Tell them to remember that wildlife includes birds, reptiles, amphibians, fish, mammals and invertebrates like insects and worms. If they do not see any signs of wildlife, tell them to list the elements they see that could be used to meet the four basic habitat needs of local wildlife. Based on the elements they listed, have them give examples of the wildlife that would be able to live in their schoolyard habitat.
4) Take the students outside into the schoolyard.
5) Once everyone has had a chance to record some signs of wildlife and signs of the elements that they need for survival, return to the classroom and discuss the wildlife the students observed. While discussing each animal, if all four elements of survival were not observed, try to determine how the other elements are supplied. For each animal you want to try to include an example of how the animal gets it food, how it gets its water, where it finds shelter and where the female would raise her young.
6) Tell the students that they are going to study another habitat far away from their schoolyard. They are going to pretend that the class took a fieldtrip to China to see a giant panda in the wild. One of their friends asked them before they left to take a photograph of the giant panda’s habitat while they were there. They forgot to load the film in the camera and now they do not have a photograph of the giant panda’s habitat to show them. This is a good friend so they will draw them a picture of the giant panda’s habitat they saw from their memory.
7) Tell the students that if they cannot remember how the habitat looked, that you will tell them how you remember it.
8) Tell them to listen to you describe what you remember as they draw a picture of the giant panda’s habitat for their friend.
9) Read this to the students. If you want to, you can read this very dramatically. You can also
ad lib to make it funny by adding silly stories about some of the students’ behavior on the trip.

“This is how I remember it. I remember us walking through the bamboo forests of the
Wolong reserve high in the mountains of southwestern China. There was so much
bamboo that it was hard for us to find a giant panda. The man that led our hike said
we were very fortunate to have seen a giant panda in the bamboo forest because there
are not that many left living in the wild. The giant panda was pretty far away from us
when we saw it. After it finished eating some stalks of bamboo it climbed up one of
the many tall trees that were nearby. I think we probably scared it. Giant pandas are
not used to visitors. They like to live alone. We continued exploring the giant
panda’s habitat. As we hiked up the mountain it started to rain. The rain stopped after
about 30 minutes but there was so much moisture in the air that our clothes and hair
never completely dried. We were also having a hard time seeing very far due to the
cloud coverage in the mountains. Although we could not see far off in the distance at
the higher altitudes, we were able to see some caves that we passed by and a very old,
huge tree that had a hollow opening at the bottom about three feet across. It was about
then that we started getting tired and decided to return to where we were staying. The
guide did not take us down the mountain the same way we went up. He thought it
would be more exciting for us to go back a different way. He was right. It did get
pretty exciting when we came to that river and did not see a bridge to cross over it.
When our guide told us that we were going to have to swim across I told him that he
must have been kidding. He said he was and led us to an old bamboo bridge a little
further down the river. It was nice to be down from the cold and misty mountains.”

Discussion:
Have the students compare the giant panda’s habitat with the schoolyard habitat. Ask them what the
two habitats have in common. Ask them how the two habitats are different. Ask them to tell you
why habitats are so important to animals.
# SCHOOLYARD HABITAT WORKSHEET

<table>
<thead>
<tr>
<th>Type of Wildlife</th>
<th>Food Element</th>
<th>Water Element</th>
<th>Shelter Element</th>
<th>Space Element for Raising Young</th>
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Panda – Bamboo Relay Race

Goal: Students will investigate different factors that affect the giant pandas’ survival.

Behavioral Objectives:
1) Students will be able to describe a giant pandas habitat
2) Students will be able to identify factors that impact a giant panda’s survival.

Curriculum Standard Correlations:
Grade 3
- 2.2 Realize that organisms use their senses to interact with their environment.
- 2.3 Examine interrelationships among plants, animals, and their environment.

Grade 4
- Investigate the relationships among organisms in a specific environment.
- Recognize that organisms are able to change their environment.

Grade 5
- Investigate the relationships among organisms in a specific environment.
- Recognize that organisms are able to change their environment.

Time:
1 hour

Background Information:
Giant pandas live in the mountain ranges of the provinces of Sichuan, Shaanxi, and Gansu in Western China. They are found in mixed deciduous/evergreen forests with a bamboo/rhododendron understory. Giant pandas live almost solely on a bamboo diet. Females give birth to one or two young, but very rarely attempt to raise more than one. Females generally give birth in a rock cave or a tree with hollow base. The female leaves the young in the den for short periods during its first four to six weeks of life. At this time it may be particularly vulnerable to temperature changes and predation by yellow-throated marten, golden cats, snow leopards, or other predators.

Materials:
Required:
- 100 poker chips
- 4 hula hoops
- 2 orange safety vests
- 8 orange safety cones
- cotton balls (one for every student)
- playing field (30’x 60’)

Procedures:
Preparation:
1) Set up the playing field: Using safety cones, set up boundaries for two adjacent playing fields: a small area (30’ x 20’) for the giant panda den and a larger area (30’ x 40’) for the forest. Place hula hoops throughout the “forest”. The hula hoops represent trees or safe zones. Scatter poker chips along the edge of the “forest” opposite the den. Poker chips represent food such as bamboo for giant pandas. See diagram.
2) Choose two students to be predators. They can be poachers, snow leopards or wild dogs. The predators stay in the forest.

3) The rest of the students are giant pandas.

**Conducting Activity:**

1) To begin the activity, the “giant pandas” start at the edge of the forest in the den.
2) Each giant panda will get a cotton ball to represent a cub.
3) Giant pandas are to leave their cub in the den and go into the forest in search of food. Giant pandas must gather five stalks of bamboo. One poker chip represents one stalk of bamboo. The giant pandas must return to their den to check on their cub before getting another piece of bamboo.
4) At the same time, the predators can prey on the giant pandas by gently tagging them. (A predator must escort a tagged player off the playing field). Predators cannot tag giant pandas in safe zones or in the bamboo patch.
5) The game ends after the giant pandas have gathered all five pieces of bamboo.
6) Repeat the activity several times, varying the amount of food, number of predators, and number of safe zones.

**Discussion:**

1) After each game, pause and determine how many giant pandas were still alive and which had gathered enough food.
2) Discuss factors that affect the giant panda in its habitat. Discuss the life cycle of bamboo. Bamboo has die offs that occur naturally. Some bamboo species die offs occur every 20, 40, or 120 years. When this occurs, giant pandas must search for new bamboo. Sometimes this can become a problem because their habitat is fragmented. Discuss what affects this might have on the giant pandas.
Panda Game

Giant Panda Den

Forest

Safe Zone

Safe Zone

Safe Zone

Safe Zone

Bamboo

Food (poker chips)
China Conservation Trek

Goal: To examine giant panda conservation efforts in China and at the Memphis Zoo

Behavioral Objectives:
1) Students will be able to recall that giant pandas eat bamboo
2) Students will be able to name the conservation projects that are going on in China and at the Memphis Zoo

Curriculum Standard Correlations:
Grade 3
- 4.1 Recognize that living things reproduce
- 4.2 Recognize that offspring tend to resemble their parents
Grade 4
- 4.2 Realize that reproduction is necessary for the survival of species
Grade 5
- Realize that reproduction is necessary for the survival of species

Time: 15 minutes

Background Information:
Mei-Mei is the name of the giant panda in the movie. She lives in the bamboo forests of China. Mei-Mei’s habitat is full of large trees and lots of bamboo. Mei-Mei’s favorite thing to eat is bamboo. She eats forty pounds of it each day. Mei-Mei’s home was destroyed because the trees were cut down to build farms and homes. Mei-Mei moved to a new home, but the bamboo began to die. At about this time, scientists in China began to see that the giant panda’s needed help to survive. The scientists studied the growth of bamboo; they calculated how much land was needed to grow the large amounts of bamboo the giant pandas require; and they studied why there are so few giant panda in the wild. Finally, a wonderful thing happened. Mei Mei had a baby that looked like her! The birth of Mei-Mei’s baby helps the survival of their species. The land for thirty giant panda reserves was set aside throughout southern China. The Memphis Zoo is helping the giant panda by studying the nutritional content of different types of bamboo. Scientists will determine which type of bamboo species is the most nutritious for the giant panda to eat.

Materials:
Required:
- Pencils or pens
- China conservation movie provided by the Memphis Zoo

Provided:
- China trek worksheet

Procedures:
Preparation:
1) Make each student a copy of the china conservation worksheet.

Conducting Activity:
1) Give each student a copy of the China conservation video worksheet and a pen or pencil.
2) Read the questions to the students so they will know what to be listening for.
3) As they watch the movie, have them write the answers to the questions on the worksheet.

Discussion:
1) Go over the answers to the questions. The answers are provided in the background section.

Extensions/Going Further:
Have each student draw a picture of what they think would be the perfect home for Mei-Mei. Have the children share their pictures with the class.
China Movie Worksheet

1. What is the name of the giant panda in the movie?
___________________________________________________________________
___________________________________________________________________

2. Where does she live?
___________________________________________________________________
___________________________________________________________________

3. Describe her habitat.
___________________________________________________________________
___________________________________________________________________

4. What is her favorite thing to eat?
___________________________________________________________________
___________________________________________________________________

5. How much of it does she eat in one day?
___________________________________________________________________
___________________________________________________________________

6. What happened to her home and why?
___________________________________________________________________
___________________________________________________________________

7. What happened to the bamboo?
___________________________________________________________________
___________________________________________________________________

8. Name one thing the scientists in China were studying that would help the giant panda?
___________________________________________________________________
___________________________________________________________________

9. What was the miracle that happened to Mei-Mei?
___________________________________________________________________
___________________________________________________________________

10. How many reserves were built?
___________________________________________________________________
___________________________________________________________________

11. What is the Memphis Zoo doing to help the giant panda?
___________________________________________________________________
Post-trip Activities
Red, White, and Black

Goal: Students will recognize similarities and differences between the red panda and giant panda.

Behavioral Objectives:
1) Students will be able to observe and describe similarities and differences in the anatomy of the giant panda and the red panda.

Curriculum Standard Correlations:
Grade 3
- 2.2 Recognize that organisms use their senses to interact with their environment.
- 5.1 Recognize the differences among plants and animals of the same kind.
Grade 4
- 2.1 Investigate the relationships among organisms in a specific ecosystem.
- 5.1 Realize that plants and animals can be grouped according to similarities and differences in their characteristics.
Grade 5
- 2.1 Investigate the relationships among organisms in a specific ecosystem.
- 3.2 Recognize the function of specific structures in organisms that allow them to obtain and use energy.

Time:
30 minutes

Background Information:
There are two different kinds of pandas, the giant or greater panda and the red or lesser panda. Giant pandas are one of the most recognizable animals because of their unique black and white markings. The red panda is smaller and looks very much like a raccoon. Both animals live in China and eat lots of bamboo. Also, both have special paws that help them grasp bamboo, their favorite food. For years, scientists have debated over who is the nearest relative of the giant panda. Some scientists have argued that the giant panda is related to the raccoon and therefore related to the red panda. Some scientists say that because of their size and shape they are related to bears. Recently some studies have been done using D.N.A. to test the genetic similarities and differences between the two animals. The tests revealed that the giant panda is, in fact, a bear. And the red panda is related to raccoons. They also concluded that the similarities it has to the red panda (tooth structure and skull shape) is the result of them adapting to their lifestyles and habitat.

Materials:
Required:
- Pen or pencil

Provided:
- Red, White, and Black worksheet

Procedures:
Preparation:
1) Make copies of red, white, and black worksheet.
Introduction:

1) Begin the activity by asking students, “What animal do you think the giant panda is closely related to?” Then ask them about red pandas. Have them give reasons for their answers. Have students discuss the reasons why some scientists believed giant pandas were more closely related to raccoons but now believe they are related to bears.

2) Pass out the worksheets to the students. Have them make comparisons and complete the worksheets.

3) Have students research both the giant panda and red panda to elaborate their answers on the worksheets.

Extensions/Going Further:

1) Have students research the horseshoe crab. The horseshoe crab is actually more closely related to scorpions than it is to crabs. Have them research this relationship.

2) Have students pick an animal and scientifically classify them.
Red, White, and Black

Directions: Look at the pictures of the giant panda and red panda. How are these two animals alike? How are they different? Write down some of your ideas in the space provided below.

Giant Panda:
Weight- 165-300 pounds
Height- 3-5 feet tall
Length- 5-6 feet long
Tail length- 4-6 inches

Red Panda:
Weight- 6-11 pounds
Height- 19-24 inches
Length- approximately 42 inches
Tail Length- 11-19 inches

Ways the giant panda and red panda are alike:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Ways the giant panda and red panda are different:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Giant Panda Refuges

**Goal:** To understand that an animal’s habitat has to provide water, food, shelter, and living space for its inhabitants to survive.

**Behavioral Objectives:**
1) To be able to recall that giant pandas come from China  
2) To be able to describe the giant pandas habitat in China  
3) To be able to recall that giant pandas eat bamboo

**Curriculum Standard Correlations:**

- **Grade 4**
  - 2.1 Investigate the relationships among organisms in a specific ecosystem  
  - 3.1 Realize that plants and animals use food for energy

- **Grade 5**
  - 2.1 Investigate the relationships among organisms in a specific ecosystem  
  - 3.1 Realize that plants and animals use food for energy

**Time:** One week

**Background Information:**

The giant pandas habitat is located in a few cool, snowy, rainy mountain ranges in southern China. A habitat is an area where an animal or plant lives and finds food, water, shelter, and living space. All animals must have a habitat to survive in the wild. Their habitat is made up of thick conifer forests with a bamboo understory.

The first thing giant pandas need in their habitat is water. They need water not only to drink, but they also use water for bathing and for cooling off during the warmer seasons. Giant pandas drink water in all seasons except during spring when they eat water-rich bamboo shoots.

The next thing that giant pandas need is food. Bamboo makes up 99% of the giant pandas diet. Giant pandas get energy from the bamboo they eat. To be able to get enough nutrition from the bamboo, giant pandas must eat twelve hours or more each day to reach the forty pounds or more of bamboo they must eat.

Thirdly, giant pandas need shelter. Most of the time giant pandas never leave the bamboo forest, so they use the bamboo forests as shelter. To protect themselves from the rain and snow, giant pandas will seek shelter in hollow trees or rock caves. If a female giant panda is pregnant, the mother will seek out the shelter of a hollow tree or rock cave as her den. Here, she will give birth to her cubs.

The final thing a giant panda needs is plenty of living space. By having lots of living space, the giant panda can move into other areas to find food, other pandas, or new shelter. Because so many people live in China, more homes and farms are needed. As a result, homes and farms were built were the giant pandas lived. The giant panda was running out of places to live, so they began to move into areas to find new space and food. The Chinese government realized the plight of the giant panda and began setting up refuges for the pandas to live in. A refuge is a large piece of land that has been set aside to protect certain animals or plants. Refuges provide water, food, shelter, and living spaces for all its inhabitants. Thirteen panda reserves have been set up in China to help protect the giant panda.
Materials:

**Required:**
- Shoeboxes
- Assorted construction paper
- Scissors
- Glue
- Pencils
- Crayons
- Markers
- Clay
- Tissue paper
- Pipe cleaners
- Yarn
- Buttons
- Popsicle sticks
- Any other needed craft supplies
- Pictures of the giant pandas habitat

Procedures:

**Preparation:**
1) About two weeks before beginning this project, divide your students up into groups of four. Have each group get one empty shoebox. This is what they will build their refuge in. You may also want to start gathering various art supplies at this point.
2) Tell you students that they will be building a giant panda refuge. Have the children begin researching giant pandas and their habitat. As the students are researching, have them make notes on the information that they find to use while they are putting their refuges together.
3) If possible, display pictures of the giant panda’s habitat.
4) On the day this activity will begin, set up a table and set out all the art supplies and the shoeboxes.

**Introduction:**
1) Discuss with your students what the giant panda’s habitat looks like in China. Also, talk about what all habitats need- water, food, shelter, and living space. Next, discuss what a refuge is, why they are important, and what they do. Lastly, talk about the refuges China has built to help preserve and protect giant pandas.

**Conducting Activity:**
1) Have each group pick a spot somewhere in the classroom where they can work.
2) Have each group, one by one, come up to the supply table and pick up the shoebox and chose their art supplies they will use to build their refuge. Have them take their supplies back to their designated spot.
3) Instruct the students to begin building their giant panda refuges inside their shoeboxes. They can refer to their research notes and the pictures. Encourage them to be creative and use as much of the art supplies, as they need.
4) Allow the students one week to build their giant panda refuges.
5) On the last day, have each group present their refuges to the class.
Discussion:

1) While the students are working on their refuges, remind them of the things that giant pandas need in their habitat. Giant pandas need water, bamboo to eat, a hollow tree or rock cave for shelter, and lots of living space.

Extensions/Going Further:
Set up a table in a central location of your school and display all of the giant panda refuges for the rest of the students in your school to see. If possible, have some of the students take turns sitting at the table answering questions about giant pandas and the refuges.
Bamboo Corners

Goal: Students will understand how the life cycle of bamboo affects the giant panda.

Behavioral objectives:
1) Students will understand that there are different types of bamboo that giant pandas eat.
2) Students will understand how the life cycle of bamboo and habitat fragmentation relate to one another.

Curriculum Standard Correlations:
Grade 3
- 2.3 Examine interrelationships among plants, animals, and their environment.

Grade 4
- 2.1 Investigate the relationships among organisms in a specific ecosystem.
- 4.3 Investigate the life cycles of different organisms.

Grade 5
- 2.1 Investigate the relationships among organisms in a specific ecosystem.
- 4.3 Investigate the life cycles of different organisms.

Time:
45 minutes

Background Information:
In the wild, giant pandas can be found in three provinces of China: Sichuan, Shaanxi and Gansu. A Chinese province is similar to a state in the United States of America. Giant pandas can be found in six mountain ranges located in these three provinces. The names of these mountain ranges are the Min Mountains, Qionglai Mountains, Qinling Mountains, Liang Mountains, Daxiang and Xiaoxiang Mountains. The majority of these mountain ranges are located in the province of Sichuan. The Min or Minshan Mountains extend into Gansu and the Qinling Mountains are outside of Sichuan in the province of Shaanxi. The World Wildlife Fund and the Ministry of Forestry estimated in 1988 that there were about 1,000 giant pandas living throughout these mountain ranges.

The giant pandas live in the bamboo forests of these mountain ranges. The bamboo growing in these forests makes up 99% of the giant panda’s diet. The other 1% may consist of fish, mushrooms and small rodents. The giant panda has several adaptations for its bamboo diet. It has an enlarged and extended wrist bone on the inside of each front paw. This wrist bone helps the giant panda to hold onto a bamboo stalk as it is eating. It has thick, strong muscles attached to its massive jawbone and wide, flattened back teeth that work together to help crush and grind the bamboo.

In order to survive, a giant panda must eat 20-40 pounds of bamboo a day depending on its size. The giant panda requires this much bamboo for a couple of reasons. One reason is bamboo is low in nutrients. The other reason is that the stomach of a giant panda is designed for a carnivore so it does not digest plant material very effectively. It only digests on average about 17% of the bamboo it eats. The indigestible part of the bamboo passes through its short digestive tract in less than eight hours. The giant panda usually has no problem consuming the 20-40 pounds of bamboo it needs because bamboo is usually plentiful and available all year round in the six mountain ranges where giant pandas live.
The only time a specific type of bamboo may not be available year round is after it has flowered. There are about 33 different types or species of bamboo that are eaten by giant pandas in the wild and each one flowers when it is ready to sexually reproduce. The bamboo eaten by giant pandas usually produces new vegetation from its horizontal roots called rhizomes, but every 15-120 years the bamboo reproduces sexually. Flowers bloom on the branches near the top of the main woody stem and then the bamboo starts to die-off. New bamboo stems start to grow from the seeds that were produced during pollination of its flowers. Usually when a species of bamboo flowers, every member of that same species flowers at the same time regardless of its location. As a result, an entire species of bamboo can die off simultaneously. This can be a major threat to giant pandas that do not have an alternative source of bamboo in the area they live in.

Entire species of bamboo have been flowering and dying for millions of years. It has not been until recently that bamboo die-offs have become a threat to healthy giant pandas. In the past, the bamboo die-offs have actually benefited the giant pandas. Giant pandas do not like to travel far from where they were born which can increase the chance of related giant pandas mating. Inbreeding can result in genetic defects, reduced fertility and still-births. The bamboo die off would decrease the chances of inbreeding by forcing them to move out of their home territory in order to find another source of food.

Unfortunately today, many of the giant pandas living in the wild do not always have the option of moving to a new territory when an entire species of bamboo they depend on dies off. Roads, railways, farmlands and forests that have been cleared of its vegetation have fragmented the habitats of giant pandas. It is this human intervention in the giant pandas’ habitat that causes bamboo die-offs to be a major threat to their survival. In the Min Mountains between 1974 and 1977 at least 138 giant pandas were found dead when the main source of bamboo flowered and died. Since then there have been other deadly bamboo die-offs in other mountain ranges but fortunately the number of deaths was lower.

Based on these past experiences, it is clear that the giant pandas’ habitat must be preserved in order to ensure its survival. It is estimated that there are 25 populations of giant pandas remaining in the wild. These populations must be able to move to other territories to find food if there is ever a food shortage in their home territory and to find other giant pandas for mating. As of today, there are thirteen nature reserves located throughout the Min, Qionglai, Liangshan and Qinling mountain ranges that offer protection for the giant panda and its habitat. In these areas, forests cannot be cleared for timber harvesting and land cannot be used for agriculture. It is estimated that 35% of the giant panda population lives in these reserves. Conservationists and Chinese government officials want to establish additional panda reserves so that a greater percentage of giant pandas will have protection.

Materials:
Required:
• apples
• signs

Procedures:
Preparation:
1) Go to the grocery store and buy different types of apples: red delicious, golden delicious, Rome, granny smith, etc. You will only need one of each type.

2) Make four separate signs with writing large enough to be read across a room and tape each one in one of the corners of your room.
Sign #1 Arrow Bamboo
Sign #2 Stone Bamboo
Sign #3 Sword Bamboo
Sign #4 Umbrella Bamboo
Introduction:
1) Show the students the different types of apples that you brought to class. Tell the students the names of the apples and discuss how each one tastes.

2) Ask the students if they decided to eat only apples for breakfast, lunch and supper, which type of apple would they want to eat?

3) Tell the students that they are going to discuss a situation that involves the apple they just chose. This created or "made up" situation should help them understand one reason it is difficult for giant pandas to survive.

4) Tell the students that apples grow throughout the United States and the world, but you want them to pretend that apples only grow in West Memphis, Arkansas and Memphis, Tennessee. The type of apple they decided to eat for breakfast, lunch and dinner is the only type of apple that grows in Memphis, TN. It also grows in West Memphis, AR along with other types of apples.

i. They wake up one morning and hear on the news that all the apple trees in Memphis are starting to die. The same type of apple trees that are starting to die in Memphis are also starting to die in West Memphis, AR. They need to keep eating apples. Ask the students what do they need to do in order to survive. They should say …go to West Memphis, AR. If they say go to the grocery store tell them that grocery stores do not exist in this story.

ii. After they say go to West Memphis, AR, ask them how they would get there. They should say that they would cross over one of the bridges that cross the Mississippi River. You may have to remind them that the Mississippi River is the borderline between Arkansas and Tennessee. Once they get to the river they learn that all bridges that cross the Mississippi River have been closed for construction and will not be open for a while. They do not have access to a boat or a plane and they cannot swim across the river because it is too dangerous.

iii. Ask the students what they should do now. Some may say go around the river. They cannot do that because the states that border Tennessee have become too crowded and no additional people are allowed to enter those states.

iv. Ask the students what happens now. The only other option is to wait for the apple trees to grow back from the seeds that remained after the dying apples rotted into the ground. It takes years for an apple tree to grow from a seed into a tree that is able to produce apples. That is too long to wait. Explain to them that since they are unable to get out of Tennessee in order to get to the other apple trees in Arkansas they die of starvation.
Conducting Activity:

1) Tell the students that this is what can happen and has happened to giant pandas that live in an area with access to only one type of bamboo. Just like there are different types of apples, there are different types of bamboo. Although all the apple trees of a particular type of apple would never die at the same time across the United States, this does happen to the types of bamboo that giant pandas eat in China. Each different type of bamboo dies off naturally at about the same time. It can happen every 15-120 years depending on the type of bamboo. The bamboo grows back eventually from the seeds that are left behind after the bamboo stalks die, but this can take up to five years. Giant pandas that have more than one type of bamboo growing in their habitat do not have to worry about moving to another area when one type dies off. They just start eating the other bamboo in their habitat. Giant pandas that have only one type of bamboo growing in their habitat used to be able to move quite easily from one mountain range to another to find a different type of bamboo to eat. Now it is not so easy.

In order to get to another mountain to find the food, the giant pandas would come down to the mountain valleys and go back up the other mountain. Today, there are people living in these valleys. Giant pandas are shy and usually do not go into areas where people live. They will also not go into areas where people are farming or harvesting trees for furniture and lumber. As a result, giant pandas confined in a habitat with one type of bamboo starve when all the bamboo dies off.

2) Tell them that you are going to play a game called “Bamboo Corners”. Point out the signs in the corners of the room and tell the students that those are four types of bamboo that grow in one of the mountain ranges where giant pandas live. Tell them that they are going to pretend that each type only grows on a different mountain in the mountain range.

3) Choose one person to be “It”. Tell them that everyone in the class is going to represent the giant pandas that live in this mountain range. The person that is “It” goes to the middle of the room and closes his eyes. The other students go to one of the bamboo forests represented by each corner.

4) After the students have had time to go to one of the bamboo forests, the person that is “It” calls out one the name of one of the bamboos. That bamboo becomes the bamboo that has died off. All the students or “giant pandas” that were eating in that bamboo forest will be out of the game. They starve because they cannot move to another bamboo forest because there are people living, harvesting trees and farming in the valleys below them.

5) The person that is “It” closes his eyes again and the “giant pandas” move to another bamboo forest. The bamboo forest that was just called can be used again. Pretend that after each round enough time has passed for the bamboo to grow back. The person that is “It” calls the names of one of the bamboos and again the “giant pandas” that were eating that bamboo are out of the game. This process continues until there is just one “giant panda” left in the mountain range. This person gets to be “It” for the next game of “Bamboo Corners”.

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Discussion:

1) After the game is over, ask the students if they have any ideas on how people can help the giant panda survive bamboo die offs.

2) Tell them that when people visit LeLe and YaYa at the Memphis Zoo, the money they pay to get into the China Exhibit is given to scientists. Many of these scientists are working to improve the habitat of the giant pandas in China so that bamboo die offs will not threaten their survival.

3) Listed below are some of the ideas that scientists have thought of that may help the giant panda survive future bamboo die offs.
   
a) Maintain “bamboo corridors”-strips of undisturbed land through which pandas can comfortably travel from mountain to mountain.
   
b) Reduce the amount of human activities in the giant panda habitats and in mountain valleys.
   
c) Help people that live in mountain valleys near panda habitats find new places to live.
   
d) Restore the giant panda habitats on abandoned farmlands and in forests disrupted by timber harvesting.
Explorer Talk Show

Goal: Students will become more familiar with the men and women who explored China when it was still a mystery to people that lived in other countries.

Behavioral objectives:
1) Students will be able to recall the names of some of the men and women that explored China.
2) Students will be able to identify the explorers that brought world- wide attention to the giant panda.

Curriculum Standard Correlations:

Grade 3
- 5.01 Identify major events, people, and patterns in Tennessee, United States, and world history.
- 5.02 Understand the place of historical events in the context of past, present and future.
- 6.01 Recognize the impact of individual and group decisions on citizens and communities.

Grade 4
- 5.02 Understand the place of historical events in the context of past, present and future.
- 6.01 Recognize the impact of individual and group decisions.

Grade 5
- 2.04 Understand the patterns and results of international trade.
- 6.01 Recognize the impact of individual and group decisions on citizens and communities in a democratic republic.

Time:
45 minutes

Background Information:
China is home to the oldest recorded civilization on earth. But for thousand of years, China was a mystery to the rest of the world. Its secrets of silk and gunpowder were closely guarded. By the 13th century, curiosity about China was growing. Trade routes had expanded: merchants from Europe were eager to purchase tea, spices, silk and fine porcelain. European explorers wanted to know more about China’s culture, plants and animals.

Marco Polo was an Italian merchant who lived nearly 700 years ago. At that time, Chinese civilization was already more than four thousand years old, but few outsiders had visited China. The Mongolian emperors, called Khans, ruled China. The great Mongol emperor, Kublai Khan, invited Marco Polo’s father and uncle to China. At the age of 17, Marco Polo went with them. It took them three years to travel from Italy to the emperor’s palace in northeastern China. Kublai Khan noticed the abilities and enthusiasm of Marco Polo and began sending him on important missions. It was on these missions that Marco Polo had the opportunity to explore the mysteries of China. He wrote about the people, languages, customs and strange animals that he encountered on these missions. These writings helped increase the spirit of exploration in future generations. He paved the way for other men and women to come and explore the wonders of China.
Pere Armand David was a French Catholic priest who went to China as a missionary in the late 19th century. Even then, China was still very much a mystery to the western world. After defeating the Mongols around 1600, the Chinese had replaced the Mongol rulers with their own emperors. China was once again closed to the rest of the world for several hundred years. It was not until after 1860 that westerners like Pere Armand David were again allowed to travel in China. In 1869, Pere Armand David was the first westerner to describe a giant panda. By the 1930’s, panda pelts had become popular sporting trophies for European and American hunters.

Su-Lin Young is a Chinese-American woman and was born in New York in 1911. She currently lives in San Francisco, California. She was one of only a few women explorers in the early 20th century. In 1934, she went on a ten-month long expedition to China with her husband, Jack Young. They were hired by the American Museum of Natural History to collect Chinese plants and animals. The Young’s expedition was paid for by Theodore Jr. and Kermit Roosevelt. Theodore Jr. and Kermit were two of President Theodore Roosevelt’s three sons.

In 1934, Ruth McCombs married William Harkness and became Mrs. Ruth Harkness. Her husband liked exotic travel and adventure. Two weeks after they were married he traveled to China with the hopes of bringing back a live giant panda from the wild for the Bronx Zoo. Ruth’s husband died while he was in China before he was able to complete his mission. Ruth decided to try to complete her husband’s mission. She had not done any exploring in the past but what she needed to do to get prepared. She asked Jack and Su-Lin Young to give her advice based on their past exploration of China. They made the recommendation that she travel with Quentin Young, who was Jack’s brother. Quentin led the expedition in China. In 1936, American explorers Ruth Harkness and Quentin Young returned to the U.S. with an infant giant panda that they named Su-Lin. It was the first live panda seen by the western world.

Materials:
Required:
- three copies of each explorer’s interview

Provided:
- scripts for each explorer’s interview

Procedures:
Preparation:
1) Make three photocopies of each skit. One for the interviewer, one for the mystery explorer guest and one for you to follow along with in case they need help pronouncing some of the words.

Conducting Activity:
1) Ask the students if they explored the Explorers’ Trail while they were at the Memphis Zoo’s China exhibit.
2) Tell them that you are going to play a game and those students that explored the Explorers’ Trail should have an advantage.
3) Tell the students that they are going to play a game called Explorer Talk Show. Ask ten people that will be willing to enthusiastically act out a skit to volunteer. Once they have volunteered, tell them to pair up. One person is going to be the interviewer and the other person is going to be the guest on the talk show. Have them decide which one will be the interviewer and which one will be the guest. Everyone else will be a part of the audience.
4) Divide the audience into two groups. Have your ten volunteers return to one of the groups. Assign the interviewers to one group and the talk show guests to the other group.
5) Tell them that they are going to pretend that they are the audience for a live television talk show. The object of the game is to be the first group to guess the name of the person that is being interviewed. All of the guests will be explorers that were featured on the Explorers’ Trail at the Memphis Zoo’s China exhibit.

6) The group that guesses correctly first gets a point. If a group guesses the wrong explorer, they are not allowed to guess again. The other group gets the opportunity to guess once before the name of the explorer is revealed. If the name of the explorer is guessed correctly before the interview is over, complete the interview just for informational purposes. If the explorer’s name is not guessed correctly neither group gets a point.

7) Write the names of the following explorers where the students can see them: Ruth Harkness, Jack Young, Theodore Roosevelt, Quentin Young, Su-Lin Young, Pere Armand David, William Harkness. Tell them that the names of the explorers being interviewed are on this list. Also tell them that not all the explorers on the list will be interviewed. You can make up some silly names to add to the list if you want to like Pan-Dee Bahr or add the names of other explorers that were not featured on the Explorers’ Trail like Christopher Columbus.

8) Pick one of the interviewers and have their partner on the other team come up front with them. Give each of them a copy of the first skit and have them act it out in front of the audience. The skits need to be performed in the order listed at the top of the script. You can have the students stand or sit while they read the scripts. You could even have the interviewer sit behind a desk with a chair next to it for the guest. This should give the “stage” the appearance of a talk show that you would see on television.

9) Have the students begin acting out their skit while the two groups in the audience try to determine the name of the talk show guest.

Discussion:

Explain to the students that many of the activities of the explorers that they met would be considered illegal today. In 1987 a law was passed in China stating that anyone convicted of killing a giant panda or smuggling its skin could face the death penalty. Taking a live giant panda from the wild is also illegal because all giant pandas are property of the Chinese government. Any giant pandas that you see outside of China are on loan. China loans giant pandas to other countries for conservation work.

Tell the students that although the actions of some of the explorers they met would be inadvisable and illegal in today’s world, they all worked with good intentions. It was their appreciation for nature that inspired them all. Thanks to their efforts, the giant pandas are known and loved around the world. It is this love for the giant panda that drives scientists today to study them in order to maintain and hopefully increase the giant panda population in China.
Interviewer:  Today we are talking with some special people.  They are all explorers.  To our first guest, let me say welcome to our show.  It is very nice to meet you.

Marco Polo:  Thanks. It is nice to be here.

Interviewer:  Can you tell us where you are from?

Marco Polo:  I am from Italy…you know that country shaped like a boot.

Interviewer:  Can you tell us about your travels to China?

Marco Polo:  Well, while I was living in Italy I would look for items to buy around the world that people in Italy might want or need and then I would sell them to people at my store and make money by charging them more than what I paid for it.

Interviewer: Oh really?  How much more?

Marco Polo: That’s not really important. Let me finish telling you about my travels to China.

Interviewer: ok.

Marco Polo: In 1271, my father, uncle and I traveled to China to purchase silks, jewels and spices for our store and to visit with the emperor of China.  My father and uncle had met the emperor of China on their first visit to China in 1260 and when it was time for them to leave, the emperor, Kublai Khan asked them to return for a visit.

Interviewer: You had some pretty good connections in China.

Marco Polo: Yes, we did.  The emperor of China even gave us gold passports to China.  When the local people saw that we had these passports, they knew that we were friends of Kublai Khan and did not harm us.  At that time, people from other countries were not very welcome in China.

Interviewer: Tell me more about your journey.

Marco Polo: It was a really long journey for us.  It took us three years to travel from Italy to the northeastern part of China. You know we didn’t have cars or airplanes back in 1271 like you have now.

Interviewer: How did you get there if you didn’t have any cars or airplanes back then?

Marco Polo: We used camels to cross the deserts and mules to cross the mountains.

Interviewer: Was it worth the trip?

Marco Polo: Yes, it was.  Everything I saw in China was new and different.  I was fascinated with the people, languages and customs, and the many strange animals.  I even wrote a book about my travels.

Interviewer: So that book will tell me all about your travels?

Marco Polo: It will not tell you everything. I did not tell half of what I saw, for I knew I would not be believed.

Interviewer: How long were you in China?

Marco Polo: We were there for about 20 years.

Interviewer: That is a pretty long time.  How did you keep yourself busy?

Marco Polo: I did some work for the emperor of China while I was there.  Kublai Khan sent me on a number of special missions.

Interviewer: Did you see a giant panda on any of those special missions?

Marco Polo: It is not documented that I did.

Interviewer: Then why were you featured in the China exhibit at the Memphis Zoo?  I thought you had something to do with the giant panda.

Marco Polo: I am featured in the China exhibit because my explorations in China helped paved the way for the explorers that went to China centuries later and documented encounters with the giant pandas.  I think you might meet some of them a little later in your show.

Well, I have got to go.  I think I hear someone calling my name.

Interviewer: I hear it too but I think they are just playing a game.  It is called Marco Polo.
Interviewer: Welcome back to the show.
Pere Armand David: Can we go ahead and get started? I have to get back to the church.
Interviewer: What is going on at the church?
Pere Armand David: That is where I work. I thought you knew that since people use the French word for father in front of my name.
Interviewer: I thought that just meant you had some children.
Pere Armand David: No, no, no. I am a Catholic priest. Catholic priests are referred to as Father.
A priest does the same job as a minister, pastor or reverend in other religions.
Interviewer: Oh, I knew that. So tell us a little more about yourself.
Pere Armand David: Well, I was sent to Italy from my home in France to teach science at a college. I taught there for about ten years and then finally the church sent me to China to tell people about my religion. Some of the scientists back home in France heard that I was going to China and knew that I loved to study nature. They asked if I would be willing to collect plants and animals from China for the Museum of Natural History in Paris, France.
Interviewer: Why didn’t they go and get the animals and plants themselves?
Pere Armand David: People that were not from China had not been allowed in China since the 1600’s. After 1860, visitors were finally allowed to travel to China once again but they were not made to feel welcome. They did not want to go a country where they would feel unwelcomed.
Interviewer: That is understandable. Did you send them anything?
Pere Armand David: In 1865, I found a deer that was unknown outside of China in a Chinese park. I sent a couple of the deer’s skins back to the museum. I also sent several live deer back to England. It was a good thing that I sent some of them because all of the deer in the Chinese park were later killed by floods. Scientists decided to name the surviving deer in England after me.
Interviewer: That is pretty cool to have an animal named after you. I am pretty sure that I saw that type of deer in the China exhibit at the Memphis Zoo.
Pere Armand David: Oh… if you have been to the Memphis Zoo, then you saw another animal that was unknown to people outside of China until my visit to China.
Interviewer: Was it black and white?
Pere Armand David: Yes, it was. In 1869, I had heard about this “white bear” from the local people in China and some hunters brought me the skin of this black and white animal. I sent this skin to the museum and when they received it the scientists thought it was a fake.
Interviewer: How did you convince them that it was not a fake?
Pere Armand David: A few weeks later local hunters brought me a dead giant panda. Now I could show the museum the actual animal.
Interviewer: Did they name that animal after you too?
Pere Armand David: No. It was named giant panda. I have been told that the panda part of its name may have come from a word meaning “eater of bamboo”. That is what giant pandas eat 99% of the time.
Interviewer: I guess panda does sound a little better than Pere Armand David Bear.
Third Script (Su-lin Young)

Interviewer: Welcome back from the break. We have another very special guest with us today.

Su-lin Young: Thank you for having me here today.

Interviewer: Will you tell us where you are from?

Su-Lin Young: I was born in New York in 1911 but my parents were both Chinese and born in China. I am a Chinese-American.

Interviewer: Wow! 1911? So that makes you 92 years old!

Su-Lin Young: Yes, it does. But don’t you think I look good for my age?

Interviewer: I cannot argue with that. I hear that you were one of only a few women explorers in the early 1900’s.

Su-Lin Young: That is correct. I went on a ten-month exploration of China with my husband, Jack. He was also a Chinese-American. Have you heard of him?

Interviewer: The name sounds familiar.

Su-Lin Young: My husband was a hunter and an explorer. He was known for the guidance he gave to President Theodore Roosevelt’s sons when they traveled to China to hunt the giant panda.

Interviewer: So why were you in China?

Su-Lin Young: We were hired by the American Museum of Natural History to go there to collect Chinese plants and animals.

Interviewer: That must have been an expensive trip.

Su-Lin Young: I suppose it was but we did not have to pay for it. Our travel expenses were paid for by two of Theodore Roosevelt’s sons. Their names were Theodore Jr. and Kermit.

Interviewer: So did you collect any plants or animals to bring back?

Su-Lin Young: Yes, we did. My husband and I brought back some birds and some plants.

Interviewer: So I guess that is why the China exhibit at the Memphis Zoo had a lot of birds on display.

Su-Lin Young: Yes, a lot of remarkable birds do live in China but we mainly collected pheasants. Did you see any of those at the Memphis Zoo?

Interviewer: Yes, I liked that one with the real long tail.

Su-Lin Young: Oh, you mean the Reeve’s Pheasant. That pheasant has the longest tail of all pheasants.

Interviewer: I have one more thing to ask you about. Is it true that the first live giant panda ever seen in the United States was named after you?

Su-Lin Young: That is true.

Interviewer: That must have made you happy.

Su-Lin Young: It did. My name was a good name for a baby giant panda. My name means “a little bit of something cute” and if you have ever seen a picture of a baby giant panda they are definitely cute.

Interviewer: Was that the reason that the baby giant panda was named after you?

Su-Lin Young: No, that was not the reason but I think one of your other guest will be able to explain to you why the first live giant panda in the United States was named after Su-Lin Young.
Interviewer: Are you the guest that can tell me the reason that the first live giant panda seen in the United States was named after Su-Lin Young?
Ruth Harkness: Yes, I am.
Interviewer: So what is the reason?
Ruth Harkness: Don’t you want to hear about my explorations first?
Interviewer: Explorations? I thought you were a New York dress designer.
Ruth Harkness: That is true but that is not what most people remember about me.
Interviewer: Well, what do most people remember about you?
Ruth Harkness: Before I tell you, I need to give you a little background information.
Interviewer: Like why the first live giant panda ever seen in the United States was named Su-Lin?
Ruth Harkness: No, but I am getting there. First, I want to tell you about the man I married in 1934.
Interviewer: Is this going to get mushy?
Ruth Harkness: No, I am just going to give you the facts.
Interviewer: Oh, good.
Ruth Harkness: The man I married was named William Harkness. He was a scientist and an explorer. Have you ever heard of Komodo dragons? He actually went to the Indonesian island of Komodo and captured some Komodo dragons for the New York Bronx Zoo. He wanted to do the same thing with the giant panda so only two weeks after we were married he left to go to China to search for the giant panda.
Interviewer: How long was he gone?
Ruth Harkness: That is the sad part of the story. He never came home. He died of an illness after searching 18 months for a giant panda.
Interviewer: That is sad. I am sorry to hear that.
Ruth Harkness: I was pretty upset at the time, but once I recuperated from the shock of his death, I decided to try and complete my husband’s mission to bring a live giant panda back to the United States.
Interviewer: How did you plan on doing that with just a background in dress design?
Ruth Harkness: I found someone with experience to go with me.
Interviewer: Who was that?
Ruth Harkness: Have you met Su-Lin Young yet?
Interviewer: Yes, I have. She went with you?
Ruth Harkness: No, she didn’t go with me. Did she tell you about her husband Jack?
Interviewer: Yes, she did. So Jack went with you?
Ruth Harkness: No, Jack did not go with me. His brother Quentin Young went with me.
Interviewer: That was nice of him. How did you arrange that?
Ruth Harkness: I contacted Jack because I knew that Jack and his wife Su-Lin had recently returned from their own expedition to China. Jack could not go and recommended that I work with his brother. Jack and his wife Su-Lin gave his brother and me advice on traveling in uncharted territory in China. Jack helped us map out our route and Su-Lin loaned me the clothes that she wore on her travels. I guess she knew that as a dress designer I really didn’t have clothes that were made for adventures in the thick bamboo forests of China.
Interviewer: Sounds like they were very helpful.
Ruth Harkness: Yes, they were and I never forgot that. Do you know how I made sure they knew how thankful I was for their help?
Interviewer: No, how?
Ruth Harkness: Did I mention yet that on our expedition to China in 1936 that Quentin and I found a baby giant panda that appeared at the time to be abandoned by its mother?
Interviewer: No, you didn’t.
Ruth Harkness: I thought I was forgetting to tell you something. Anyway, Quentin and I brought that baby giant panda back to the United States and named it after Su-Lin as a way to say thank you to both Jack and Su-Lin Young for all of their assistance.
Interviewer: Finally, I know the reason that the first live giant panda seen in the United States was named Su-Lin.
Ruth Harkness: Now you also know what most people remember about Ruth Harkness.
Interviewer: Yes, I do.
Interviewer: Looks like it is time for our last guest.
Quentin Young: I guess you saved the best for last.
Interviewer: If you say so.
Quentin Young: So what do you want to know?
Interviewer: I want to know about your explorations in China.
Quentin Young: I went on an expedition in China with a woman from the United States. I think she was just here.
Interviewer: You must be talking about Ruth Harkness.
Quentin Young: Yes, that is correct. I was with her when Su-Lin was found. Did she tell you about Su-Lin?
Interviewer: Yes, she did. She said Su-Lin was the baby giant panda you found and took back to the United States.
Quentin Young: Ruth told you that I found it?
Interviewer: She said that you both found it.
Quentin Young: I guess you could say we both found it. I was the one that actually heard the baby giant panda’s cry and pulled it from the bottom of a hollow tree.
Interviewer: You were? Sounds like you should have gotten all the credit.
Quentin Young: I share the credit with Ruth because it was really her mission, inspired by the death of her husband, to find a giant panda. I would not have been out in that bamboo forest if it weren’t for Ruth. She was a very brave and courageous woman to travel to China to search for a giant panda in the thick bamboo forests.
Interviewer: I hate to cut you short but it looks like we are out of time.
Quentin Young: I understand. Thanks for having me on your show.
Interviewer: Thanks for being willing to come and talk with us. In the future, if I hear someone telling the story of Ruth Harkness bringing back the first live giant panda to the United States I will be sure to tell them that she did not do it alone. She had the assistance of a young man named Quentin Young.
Giant Panda Book Scavenger Hunt

Goal: To research the natural history of the giant panda

Behavioral Objectives:
1) To identify where giant pandas come from
2) To recognize that giant pandas reproduce
3) To define adaptation
4) To name one of the giant panda’s adaptations
5) To be able to recall that giant pandas eat bamboo

Curriculum Standard Correlations:
Grade 3
• 4.1 Recognize that living things reproduce.
• 5.2 Recognize that living things have features that help them survive in different environments
Grade 4
• 3.1 Realize that plants and animals use food for energy
• 5.2 Determine that adaptations help organisms to survive in their environments
Grade 5
• 3.1 Realize that plants and animals use food for energy
• 5.2 Determine that adaptations help organisms to survive in their environments

Time: 2 hours

Background Information:
Giant pandas live in the cool, snowy mountains of China. Their habitat is made up of large conifer trees with a thick bamboo understory. All living things need food, which provides energy. Giant pandas get energy from the bamboo they eat. The giant pandas diet is 99% bamboo. Because bamboo is very low in nutritional value, giant pandas have to eat forty pounds of bamboo a day to be able to sustain itself. When giant pandas eat, they eat sitting up. They grasp the bamboo stalks with their paws and hold the bamboo, while they are eating it, using their pseudo thumb. The giant panda pseudo thumb is an extended wrist bone. The pseudo thumb is an adaptation. An adaptation is a behavior, physical feature, or other characteristic that helps an animal or plant to survive in its habitat. Giant pandas have unique eyes. Most bears’ eyes have round pupils, but the giant panda has slit-like pupils, like cats’ eyes. By having the slitlike pupils, it allows the giant panda to see better at night while they are eating. Giant pandas reproduce at a very slow rate. Giant pandas usually give birth to one or two cubs. The cubs weigh around four to six ounces and are only a few inches long, about the size and weight of an apple. Giant pandas do not hibernate since their food is available year round and the bamboo does not have enough nutrients to fatten them up for the winter. When it does get cold, the giant pandas go to the lower altitudes where it is warmer.

Materials:
Required:
• Pencils
• Large assortment of giant panda books

Provided:
• Giant panda questions worksheet
Procedures:

Preparation:
1) Photocopy one of the giant panda worksheets for each student
2) In your classroom or school library, set aside a large assortment of giant panda books

Conducting Activity:
1) **Give each student a copy of the giant panda book worksheet**
2) Instruct the students to use the books that are provided to answer the questions on the worksheet

Discussion:
1) Once all of the students have answered the questions on the worksheet, go over the answers, which are located in the background information section.

Extensions/Going Further:
Using all of the information that each child has gathered, each child should write a fictional story about giant pandas. Each answer they have on their worksheet should be used in the story.
Giant Panda Book Scavenger Hunt Worksheet

1. What country do giant pandas come from?
   __________________________________________________________
   __________________________________________________________

2. Describe the giant pandas habitat.
   __________________________________________________________
   __________________________________________________________

3. What do giant pandas eat?
   __________________________________________________________
   __________________________________________________________

4. How much of it do giant pandas eat in one day?
   __________________________________________________________
   __________________________________________________________

5. When giant pandas eat, do they lie down, sit up, or stand up?
   __________________________________________________________
   __________________________________________________________

6. What is special about the giant panda’s paw?
   __________________________________________________________
   __________________________________________________________

7. Do giant pandas have eyes with round or slit-like pupils?
   __________________________________________________________
   __________________________________________________________

8. How many cubs can a giant panda have at one time?
   __________________________________________________________
   __________________________________________________________

9. How small are giant panda cubs?
   __________________________________________________________
   __________________________________________________________

10. Do giant pandas hibernate?
    _________________________________________________________
    _________________________________________________________
Panda Puzzle

**Goal:** Students will be familiar with the giant pandas that they saw at the Memphis Zoo.

**Behavioral objectives:**
1) Students will be able to recall the names and ages of the giant pandas at the Memphis Zoo.
2) Students will be able to recall where giant pandas can be found.
3) Students will be able to recall what the giant pandas eat.

**Curriculum Standard Correlations:**

Grade 3
- 2.3 Examine interrelationships among plants, animals and their environment.
- 4.3 Recognize that the appearance of animals changes as they mature.
- 5.2 Recognize that living things have features that help them to survive in different environments.

Grade 4
- 3.1 Realize that plants and animals use food for energy.
- 3.2 Recognize the function of specific structures in organisms that allow them to obtain and use energy.
- 5.2 Determine that adaptations help organisms to survive in their environments.

**Time:** 30 minutes

**Background Information:**
On April 7, 2003, thanks to efforts initiated by zoo officials and former Tennessee U.S. Senator and former U.S. ambassador to China, Jim Sasser, Ya Ya and Le Le arrived at the Memphis Zoo. Ya Ya, which means “girl”, is the smaller of the two and is a female. She was born on August 3, 2000 at the Beijing Zoo. Le Le, which means “happy”, is a male and was born on July 18, 1998 at the Chongqing Zoo. One of the reasons that these two giant pandas were chosen for a loan to the Memphis Zoo was because they were born in captivity. Only captive-born pandas are eligible for loans. Although she was not captive-born, the very first live giant panda to be seen in the United States was an infant named Su-Lin. Su-Lin means “a little bit of something cute.” Today, in the United States, you can see live giant pandas in a total of just four zoos.

The giant panda has become a symbol of peace, harmony and good luck. China views its giant pandas as ambassadors of friendship and goodwill when they are on loan. China is the only country that has giant pandas in the wild. The number of giant pandas living in China has decreased so much over the years for various reasons that the giant panda was listed as an endangered species on January 23, 1984. Giant pandas live in the mountains of three different provinces of China: Sichuan, Shaanxi and Gansu. They are rarely seen in the wild. You are more likely to see evidence of a giant panda’s presence than the actual animal. An oily surface on a tree with bark rubbed away and with many scratch marks is one sign that a giant panda has been in the area. Male and female giant pandas let one another know that they are in the area by scent-marking trees with their scent glands. The males may even do a handstand when scent-marking to let the females know who is the largest male in the area. The higher a male panda can scent-mark, the larger it must be. Other signs of a giant panda’s presence are its large paw prints and its droppings. You can see the partially digested bamboo in a giant panda’s droppings.
The weather in the mountains of China is usually cold and rainy but the coarse and wooly fur of the giant panda repels water and protects it from the cold. Its fur is in a black and white pattern that helps to break up its outline from a distance in order to confuse predators. The black and white fur pattern of a giant panda does not appear on a newborn giant panda until it is about one month old. When giant pandas are born they are pure white.

The giant panda eats bamboo 99% of the time. Bamboo is available all year, which is one of the reasons that giant pandas do not hibernate in the winter. A giant panda must eat about 40 pounds of bamboo a day in order to get the nutrition that it needs. The giant panda must eat such a large amount because its digestive tract does not effectively absorb the bamboo and because bamboo is low in nutrients. Since it has to eat so much bamboo, the giant panda has developed several adaptations for eating bamboo. The jaw muscles of giant pandas have become thick and strong to help them break down bamboo and as a result the jawbone of the giant panda has become massive. It has the largest jawbone in the bear family. Its back teeth are also wider and flatter than other bears. In addition to the large jawbone and wide, flattened back teeth, the giant panda has also developed an extended and enlarged wrist bone that helps it to hold onto bamboo. It is sometimes referred to as a “false thumb” and looks like a “sixth finger” on the giant panda’s front paws.

Materials:
Required:
• pencils

Provided:
• “Search for the Giant Panda” word search that can be photocopied
• “Panda Crossing” crossword puzzle that can be photocopied
• List of questions that can be photocopied and used with either the crossword puzzle or word search

Procedures:
Preparation:
2) Make photocopies of the word search or crossword puzzle depending on the students’ preference or make enough copies of each for all the students.
3) Make a photocopy of the list of questions for each student.

Introduction:
1) Ask the students what they thought about their visit to the China exhibit at the Memphis Zoo.
2) Go around the room and see if they can each tell you one fact that they learned about the giant pandas.

Conducting Activity:
1) Tell the students that you are going to give them a list of questions based on the giant panda signs they saw in the Memphis Zoo’s China exhibit. Tell them that the questions will help them remember what they learned about the giant pandas.
2) Tell them that you are going to pass out a couple of activities that will help them answer the list of questions.
3) Pass out the photocopies of the word search, crossword puzzle and the list of questions. If the students want to do both of the activities, have them do the crossword puzzle before they do the word search.
4) After everyone has had enough time to work on the activity, go over the answers together as a class.
Discussion:
1) Once you have reviewed the answers to all of the questions, ask if anyone would like to share something else that they learned about giant pandas that was not on the list of questions.
2) Tell the students that Ya Ya and Le Le appreciated them visiting their home. Each time someone visits them, money is given to scientists that are trying to improve the quality of life for giant pandas in the wild. Tell them that they should be proud of themselves because by going to see Ya Ya and Le Le they have helped the lives of giant pandas around the world.

Extensions/Going Further:
You could do this activity as a race by rewarding the student that completes either the word search or crossword puzzle first.
PANDA CROSSING & SEARCH FOR THE GIANT PANDA QUESTIONS

Across
3. The giant panda lives in the _______ ______ of China.
6. The _______ ______ of a giant panda is larger than all other bears in order to support the muscles that it needs for crushing and grinding tough bamboo.
7. Its ______ repels water and protects the giant panda from the cold.
11. In 1999 zoo officials worked with ______ ______ who was the U.S. ambassador to China at the time and a former U.S. senator for Tennessee. He helped the Memphis Zoo get permission from Chinese officials for a ten-year loan of giant panda bears.
12. YaYa will be ______ years old on August 3, 2003.
13. ______ is our male giant panda who was born at the ChongQing Zoo in China and was later moved to the Shanghai Zoo.
15. The giant panda needs to eat about ______ pounds of bamboo per day to get enough nutrition.
17. A male giant panda sometimes does a ______ ______ when rubbing its scent glands against a tree.
18. The first live giant panda seen in the United States was an infant giant panda named ______ ______ which means “a little bit of something cute”.
20. Over time, giant pandas developed an enlarged wrist bone to help them eat bamboo more efficiently. This enlarged wrist bone is also referred to as a false ______.
21. When a giant panda cub is born, it is pure ______, blind and helpless.
22. The weather in the giant panda’s habitat is best described as cold and ______.
23. The ______ ______ ______ is China’s ambassador of friendship and goodwill as well as a symbol of peace, harmony and good luck.
24. ______ is our female giant panda who was born at the Beijing Zoo in China. She is also smaller than our male giant panda.

Down
1. ______ ______ is the only country in the world that has giant pandas in the wild.
2. The giant panda is an _______ _______ species which means that there are not many of them left in the wild.
4. ______ are the giant pandas’ closest relatives. In the past, scientists thought that red pandas were their closest relatives, but it has been determined that most of their similarities were due to adaptations they each developed for living in the mountain forests of China.
5. The black and white pattern on a panda breaks up its outline in order to confuse ______ ______ ______.
7. The Memphis Zoo is one of _______ zoos in the United States that has pandas. The others are in San Diego, CA, Atlanta, GA and Washington D.C.
8. YaYa’s name means _______.
9. Some bears ______ _______ during the winter but giant pandas do not.
10. ______ ______ is a type of grass and what giant pandas eat about 99% of the time.
14. Only giant pandas born in ______ _______ are eligible for loans to zoos.
16. LeLe (pronounced Luh Luh) will be ______ years old on July 18, 2003.
19. LeLe’s name means _______.
Panda Crossing
Panda Crossing
Answer Sheet

CH

MOUNTAINS

JAWBONE

P

ENDANGER

GIRL

JIMSASSER

H

R

BLUE

LELE

R

FORTY

HANDSTAND

AP

THUMB

RAINY

AYA

GIANTPANDA

WHITE
Search for the Giant Panda
Web Sites For Additional Panda Information

www.memphiszoo.org

www.giantpandaonline.org/

www.sandiegozoo.org/special/pandas/index.html

www.panda.org

www.giantpandabear.com

www.nationalgeographic.com

www.first-school.ws

www.giant-panda.com

www.fedex.com/cgi-bin/pandas_track.cgi

www.kidsplanet.org/factsheets/giant_panda.html

www.zoomschool.com/subjects/mammals/panda/

www.bearbiology.com/specdesc.html (site with information on all bear species)