

Arctic Lesson
The Toledo Zoo



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Polar Bear Aware

Objective:

Students will observe a polar bear at the Zoo, recording the various observed behaviors on a data sheet. Students will then create a time budget pie graph to visually represent the % of time the bear spent at various activities and draw conclusions based on their observations.

Materials:

Clip boards • Pencils • Data sheet • Computer

Preparation:

Make arrangements with your principal for transporting your class to the Zoo •
Make arrangements with the Zoo

Procedure:

Engagement: The day before your field trip to the Zoo, show the video *The Great White Bear* to the class (National Geographic Society (1998). *The Great White Bear*. [VHS]. Washington, D.C.: The National Geographic Society.) Ask the students to pay close attention to the daily activities of the bears: walking, swimming, hunting, etc. Explain to students that they will be conducting a scientific observation of polar bears at the Zoo the next day. Divide the class into teams of two students. Distribute a polar bear data sheet, clipboard, and directions to each team.

Directions:

- Make sure that your team has a watch, the polar bear data sheet, a clipboard and a pencil with eraser.
- Find a comfortable place in the Arctic/Polar Bear exhibit for observing a polar bear for at least 20 minutes.
- Fill out the top portion of the data sheet.
- Review the recording portion of the data sheet with your team mate.
- When you are ready to begin, write the beginning time in the space provided.
- When you observe an activity, time the duration of the activity from beginning to end. Place the time in the box next the activity description. For example, if you observed the polar bear swimming for one minute 20 seconds, record it as 1:20.
- If there is a break between activities, record the new occurrence in the next box.
- When complete, record the end time in the appropriate box.

Exploration: During the Zoo visit, have the teams complete their observations of a polar bear on the data sheet. Explain that each team can observe only one bear. If possible, you should probably have no more than two or three teams at a time in the Arctic exhibit to do their observations. Also, some observed behaviors may be difficult to interpret. Teams should do their best and not spend a lot of time worrying whether they interpreted the behavior properly.

Explanation: After the field trip, each team should set about the task of interpreting the results of their observations. Each team will need to do a time budget analysis to determine the percentage of the total time that the bear spent at a particular activity. For example, if the bear spent a total of 3 minutes and 17 seconds swimming out of a 22 minute observation time, a total of ~ 15% of the bear's time was budgeted to swimming. Each team can construct a pie chart to visually represent their data. In addition, each team should answer the following questions on the *Ursus maritimus* data sheet:

- Do you think that the 20 minutes that you observed the bear was long enough to get an accurate picture of the bear's normal time budget? Why or Why not? (Equate to human activity. Each student will have different activities in the morning [eating breakfast, getting dressed, etc.] than at mid day.)
- Based on your observations from the video and the observations that you made at the Zoo, do you think that the time budget for captive bears is different or the same as wild polar bears? Why or Why not?
- What are some ways that you might be able to alter the time budget of captive polar bears to more closely resemble wild polar bears? (Zoo staff are constantly trying to alter stereotypic pacing that is observed in many captive bears through better exhibit design and animal enrichment [hiding food instead of just plopping food into the exhibit, etc.]

Extension: Using appropriate computer software such as Microsoft Word or PowerPoint, have each team create a colorful presentation for the rest of the class.

Have students research the natural history of polar bears and design a zoo exhibit where captive polar bears would elicit a time budget that would more closely resemble that of wild polar bears.

Ursus maritimus Observation Sheet

Date:	Time Begin:
Air Temperature:	Time End:
Weather Conditions:	Subject ID (if known):

Observers:

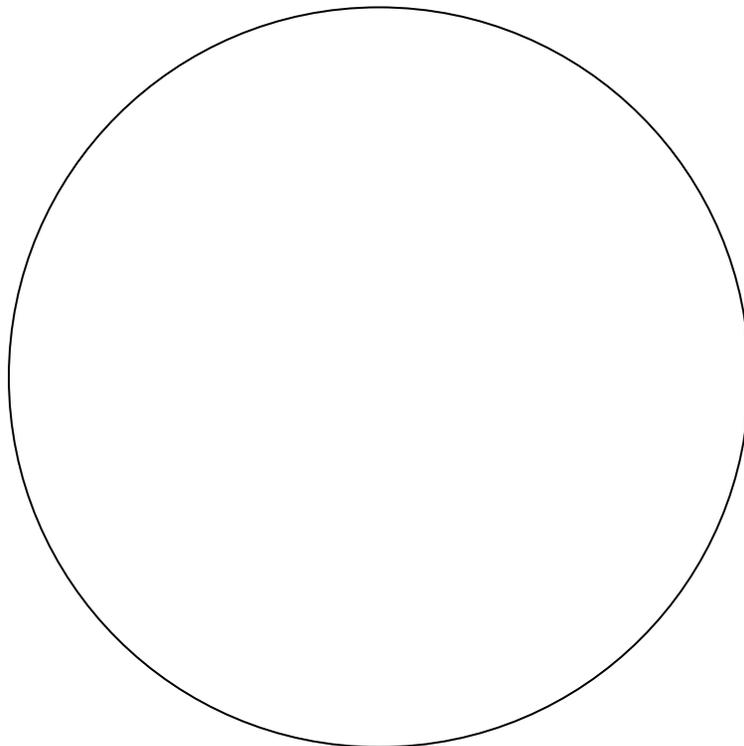
		1	2	3	4	5	6	7	8	9	10
Activity	Feed										
	Drink										
	Urinate										
	Defecate										
	Look Around										
	Smell										
	Groom										
	Scratch										
	Rub										
	Bite										
Dive											
Posture	Walk										
	Run										
	Pace										
	Swim										
	Lie										
	Sit										
	Stand										
	Erect										
	Climb										
Exploration	Throw										
	Lick										
	Bite										
	Chew										
	Nudge										
	Stalk										
	Retrieve										
	Hold-mouth/paw										

Ursus maritimus Data Sheet

Time Budget Report:

Total Observation Time:		
Behavior	Time in Behavior	% of Time in Behavior

Pie Chart:



Science Standards

National Standards	
	Polar Bear Aware
Science as Inquiry	
Abilities necessary to do scientific inquiry	
Ask a question about objects, organisms, and events in the environment.	✓
Plan and conduct a simple investigation.	✓
Employ simple equipment and tools to gather data and extend the senses.	✓
Use data to construct a reasonable explanation.	✓
Communicate investigations and explanations.	✓
Understanding about scientific inquiry	
Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.	
Scientists use different kinds of investigations depending on the questions they are trying to answer. Types of investigations include describing objects, events, and organisms; classifying them, and doing a fair test (experimenting).	✓
Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.	
Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). Good explanations are based on evidence from investigations.	✓
Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigations.	✓
Scientists review and ask questions about the results of other scientists' work.	
Life Science	
The characteristics of organisms	
Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met. The world has many different environments, and distinct environments support the life of different types of organisms.	✓
Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.	

Science Standards

National Standards	Polar Bear Aware
Life Science	
The behavior of individual organisms is influenced by internal cues (such as hunger) and by external cues (such as a change in environment). Humans and other organisms have senses that help them detect internal and external cues.	✓
Life cycles of organisms	
Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. The details of this life cycle are different for different organisms.	
Plants and animals closely resemble their parents.	
Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual's interaction with the environment. Inherited characteristics included the color of flowers and the number of limbs of an animal. Other features, such as the ability to ride a bicycle, are learned through interactions with the environment and cannot be passed on to the next generation.	
Organisms and environments	
All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.	
An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.	✓
All organisms cause changes in the environment where they live. Some of these changes are detrimental to the organisms or other organisms, whereas others are beneficial.	✓
Humans depend on their natural and constructed environments. Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms.	

Arctic Resources on the Internet

<http://www.pbs.org/wnet/nature/whitebear/>

<http://www.polarbearsalive.org/>

<http://www.allthingsarctic.com/default.aspx>

<http://www.defenders.org/wildlife/new/polarbears.html>

<http://arcticcircle.uconn.edu/>

<http://www.anwr.org/>

<http://geog.pdx.edu/oga/lessons/Canada/Inuit/InuitsoftheNunavut.pdf>

<http://www.kn.pacbell.com/wired/fil/pages/listtheinuinr.html>

<http://library.thinkquest.org/TQ0310225/arcticmenu.htm>

<http://www.mnh.si.edu/arctic/>

<http://www.museum.state.il.us/exhibits/changing/journey/hunters.html>

http://nsidc.org/arcticmet/basics/arctic_definition.html

http://www.siberiagym.com/siberia_pictures_nenets_oxana_kh.htm