I'm a Junior Biologist

Grade Level: K – 5

Standards:

Minnesota Academic Standards in Science Codes

1.1.1.1.1, 1.1.1.1.2 – Scientists work as individuals and in groups to investigate the natural world, emphasizing evidence and communicating with others

5.1.1.1.3 – Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument, and skeptical review

3.1.1.2.1, 3.1.1.2.2, 3.1.1.2.3, 3.1.1.2.4 – Scientific inquiry is a set of interrelated process incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena

3.1.3.4.1, 5.1.3.4.1 – Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish

1.4.1.1.1, 3.4.1.1.2, 5.4.1.1.1 – Living things are diverse with many different observable characteristics that enable them to grow, reproduce and survive

1.4.2.1.1, 1.4.2.1.2 – Natural systems have many components that interact to maintain the living system

1.4.3.1.1, 1.4.3.1.2 – Plants and animals undergo a series of orderly changes during their life cycles

3.4.3.2.1, 3.4.3.2.2 – Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment

Writing Benchmarks K-5 (Common Core Writing Standards K-5)

3.6.7.7 – 5.6.7.7, 3.6.8.8 – 5.6.8.8 Research to Build and Present Knowledge

Minnesota Academic Standards in Mathematics Codes

K.3.2.1 – Compare and order objects according to location and measurable attributes

1.3.2.1, 1.3.2.2 – Use basic concepts of measurement in real-world and mathematical situations involving length, time

2.3.2.1, 2.3.2.2 – Understand length as a measurable attribute; use tools to measure length

2.3.3.1 – Use time in real-world and mathematical situations

3.3.2.3 – Understand perimeter as a measurable attribute of real-world and mathematical objects. Use various tools to measure distances

3.3.3.1, 3.3.3.2, 3.3.3.4 – Use time, and temperature to solve real-world and mathematical problems

3.4.1.1 – Collect, organize, display, and interpret data.

Link Resources:

http://www.bear.org

http://www.bearstudy.org

Black Bear Basics:

http://www.bear.org/website/images/stories/Documents/Black_Bear_Basics.pdf

Den Visit Video:
http://www.bear.org/website/images/stories/education-outreach/resources/Lynn-Donna-Den-Visit-short.mp4
ABCs of Black Bears – book versions:
http://www.bear.org/website/images/stories/education-outreach/resources/ABCs_100dpi.pdf (low res)
http://www.bear.org/website/images/stories/education-outreach/resources/ABCs_300dpi.pdf

Goals:

Students role play biologists and use observation and recording skills to examine a 'tranquilized' black bear during a simulated den visit. Data collection and recording are emphasized.

Curriculum Focus:

Science, Language Arts, Mathematics, Art

Lesson:

Background: Wildlife Biologists involved in research must pay attention to detail, work independently, and possess strong written and oral communication skills. They must have physical stamina and general good health. To collect biological data on black bears, biologists visit dens of radio-collared bears. Depending on the requirements of their study, they may need to tranquilize the bear to collect data.

Advance Preparation: Construct a bear den in the classroom. The den could be an army blanket draped over a table or paper bags stuffed with newspapers and hot glued together. Students can use craft store leaves and raffia to rake in for bedding.

Review the ABCs of Black Bears (book or PowerPoint version) with special concentration on D—dens, H—hibernation, and R—radio-collar and researcher.

Place a bear in the den. Use a stuffed bear, or create a bear using art materials. Use a dog collar to create a replica of a radio-collar for the bear. Cubs can be small stuffed bears or can be made from socks filled with beans to weigh approximately 3 pounds—similar to a cub's weight in late February or early March.

Have students view a short 'Den Visit' video of researchers visiting the den of a radio-collared bear, tranquilizing the bear, taking measurements, and replacing the bear's radio-collar.

Materials:

pack	to hold the following gear
clipboard	to hold data sheet
data sheet	samples below
pencil	
dowel	for use as jabstick
syringe	needle-less, available at hardware stores for injecting glue into loose joints
pole	to hoist bear for weighing
ropes	long one for weighing adult bear, short one for weighing cubs
tape measure	cloth one works best
stethoscope	for measuring heart rate
scale	hanging scale works best

containers for collecting teeth, parasites, fur samples, etc.

Locate Den: Researchers sometimes use GPS signals to help locate bears, similar to GPS tracking in cars. GPS readings can lead researchers to the general area, but radio-telemetry is needed to locate the bear in the den. Students could follow written directions to navigate through the classroom to locate the general area where the den is located (for example: a specific section of desks). Writing and illustrating these directions could be a related Language Arts activity. Children might use a wire coat hanger fashioned to simulate a radio-telemetry antenna to locate the actual den.

At this point children could tranquilize the bear using a jab stick (dowel) prepared with an empty syringe taped near to the end (available at hardware stores for injecting glue into loose joints in furniture).

After bear is tranquilized, students carefully remove it from the den and lay it in an open area to be measured.

Data Collection: Students may record the following information on data collections sheets, or orally give information for an adult to record, depending on the age of the students.

Date/Time	Stress the importance of recording the date and time whenever collecting biological data. Any data collected is worthless without a date and time attached.
Observer(s)	This could be an individual student, a team of students, or the whole class.
Bear	Record the bear's unique number or name.
Age of bear	Some bears are studied from birth so their age is known. Others have been aged in prior years by pulling and examining a tooth.
Location of den	Where is this bear? What town? What classroom?
Sex	Is the bear male or female?
Cubs present?	Yes/No. If yes, record number, sex, and weight of each. Cubs are removed from the den and kept warm inside the biologists' jacket (some of the students may wear jackets or sweaters for this purpose).
Weight	Record weight in pounds or kilos. Be sure to indicate unit of measure. To weigh the bear, loop a rope around one front foot and the opposite rear foot and hoist up with a pole.
Den Description	What kind of den is the bear in (dug, rock, brush pile, nest, etc.)?
Coat color	Black bears are not always black. Some are brown, blonde, or even white. What color fur does this bear have?
Coat condition	Is the bear's fur thick and fluffy or is it scruffy-looking? A healthy bear should have a thick, lush winter coat.
Parasites	Healthy bears seldom have parasites, but check to be sure. Does

	this bear have any ticks, fleas, or lice? Collect a sample of any parasites found.
Markings	Black bears sometimes have a white chest marking called a 'blaze.' Does this bear have a chest blaze? If so, measure it and draw a picture of it.
Injuries	Record and estimate the age of any injuries. Bears may have injuries from fights with other bears, being hit by vehicles, caught in traps, shot at by hunters or homeowners, etc.
Body length	Measure along the back of the bear from tip of its nose to tip of its tail.
Head circumference	Measure around the bear's head at the widest part. This measurement helps determine how tightly to adjust the collar so it can't be easily slipped off.
Neck circumference	Measure the circumference of the bear's neck.
Abdominal girth	Measure around the bear's belly at the widest part. Neck and girth measurements help determine the bear's overall condition—i.e. how fat it is. Fat is a good thing on bears!
Foot pad condition	Bears shed the calluses from their footpads over winter just like humans do. How much of each footpad has been shed?
Front foot pad width	Footpad width is a good measure of how large a bear's bone structure or 'frame' is. Measure at the widest part.
Missing/broken teeth	Has the bear lost or broken any teeth? If so, which ones?
Extracted tooth	If the age of a bear is not known, a small premolar can be extracted and sent to a lab where it can be examined and the bear's age determined. The tooth is sliced thin and dyed. Under a microscope the layers of cementum can be counted to determine the bear's age.
Blood drawn	Yes/No. If the bear is involved in a study requiring blood samples then blood may be drawn.
Heart rate	Record the bear's heart rate in beats per minute. A stethoscope is helpful.

The above scenario would take approximately 45 minutes. Then the students carefully replace the bear exactly as they found her in her den and place cubs against her chest.

Additional Activity: If fresh snow is available outside, tracks of animals can be observed and identified, and compared with black bear track replicas that are included in the black bear boxes and are also available for purchase from online sources.

Bear Observation Sheet

Date: _____ **Time:** _____ AM / PM

Observer(s): _____

Number/Name of bear: _____ **Age of bear, if known:** _____

Location of den: _____

Description of den: _____

Weight: _____ pounds / kilos

Cubs present?: Yes / No **Number of cubs:** _____

Sex and weights of cubs: M / F _____ M / F _____ M / F _____

Color of coat: _____ **Markings:** _____

Condition of coat: _____ **Parasites:** Yes / No **Sampled:** Yes / No

Injuries: _____

Body length: _____ **Head circ:** _____ **Neck circ:** _____

Abdominal girth: _____ **Front foot pad width:** _____

Foot pad condition (% shed): R front _____ L front _____ R rear _____ L rear _____

Teeth missing or broken (number = 42): _____

Tooth extracted: Yes / No **If yes, which?:** _____ **Blood drawn?:** Yes / No

Heart rate: _____ beats per minute

Additional Observations (movement of bear before tranquilizing, movement of cubs, sounds, breaths, weather conditions, etc.):

_____

_____

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