How Many Black Bears Will Reproduce?

Grade Level: 3 – 5

Standards:

Minnesota Academic Standards in Science Codes

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

Minnesota Academic Standards in Mathematics Codes

3.1.2.1, 3.1.2.2, 3.1.2.4, 3.1.2.5 – Add and subtract multi-digit whole numbers; represent multiplication and division in various ways; solve real-world and mathematical problems using arithmetic.

3.4.1.1, 4.4.1.1 – Collect, organize, display, and interpret data. Use labels and a variety of scales and units in displays.

4.1.1.3, 5.1.1.3, 5.1.1.4, 4.1.1.5 – Demonstrate mastery of multiplication and division basic facts; multiply multi-digit numbers; solve real-world and mathematical problems using arithmetic.

Link Resources:

www.bear.org

www.bearstudy.org

Black Bear Basics:

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

Goal:

Student will understand the limiting factors of an environment's carrying capacity, competition within a species to survive and basic needs for survival.

Curriculum Focus:

Science, Mathematics

Lesson:

Overview: Students role play in this game as black bears. Their ultimate goal is to forage enough food to fatten for hibernation and be able to reproduce. The catch is students are not told how much food or what kinds of food they should forage, so they just forage what they can during the time limit set by the teacher. Of course there are a few twists. One poor black bear has had a run in with a porcupine and can no longer see (this student will use a blind fold). Another student and friend are a mother and cub. The mother will be the one to forage food, the cub will just follow sampling the foods the mother eats. In the end the mother will have to forage more food in order to produce milk for the cub. The last twist is an unfortunate bear that stepped in a trap and hurt its paw (this student must hop on one foot through the game). These twists will show that the circumstances of the bears also weigh heavily on the ability of the females to gain enough weight to successfully reproduce, or for the males to grow big and strong enough to defend a mating range.

Getting Started: Food tokens need to be made and color-coded. Each type of food is run off on different color paper. The color coding will make it easier for students to tell if they have foraged enough food at the end of the game to survive and be able to reproduce.   Below there are 5 sheets of Food Tokens. Print off one complete set (all 5 sheets) of Food Tokens for every 10 students. The numbers on the tokens correspond to pounds and also relate to the proportion that food item is in a bear's diet. The lower values for meat indicate that meat is a small part of the diet. Animal protein consumed by bears includes insects and meat; however, in this game, insects is a separate category because bears eat a much higher percentage of insects (especially ant pupae) than actual meat. Scatter the food tokens within your game area. For older kids, hide the tokens to make their food search more difficult. For younger students, spread tokens on the floor of the game area. You will need to have one blindfold for the blind bear and a timing device to keep time during the game.

Playing the Game: The black bears (students) all start in a line on the edge of the game area. When the teacher gives the signal, the bears begin to walk and find food. They cannot run because bears walk when they are foraging. Students are given one warning about running, then, if they continue, they will receive a penalty—at the end of the game they will have to have foraged double the amount of food because they used double the energy. When the teacher calls time, the bears will determine if they have gained enough weight and are able to reproduce.   Students will use the numbers on the food tokens to fill in the calculation chart. Two possible calculation charts are provided below. Students will have to have 80 pounds of food in order to survive and reproduce. Calculations based on the types of food foraged will determine how much food should have been consumed.   The mother must have 120 pounds to produce milk for her cub.

After students have played the game and learned about factors that contribute to a female's ability to successfully reproduce, or, if male, to maintain enough weight coming out of hibernation to successfully defend a mating range, they can complete the reflection page. Note: It is important to let students reflect when playing an education game or they may not make the connections you want them to make.

Results: Usually the blind bear and injured bear have a harder time surviving the game.   If they are females, they may not gain enough weight to successfully reproduce, if males, they may not gain enough weight to successfully defend their mating ranges.   The mother bear may not have the extra pounds needed to produce enough milk for the cub to survive. This is such a powerful role-play experience. It helps students realize the balance of resources as well as the huge impact of injury or having a dependent.   Once students realize the value of each type of food, the game will become very competitive in terms of food consumption. Children will strive to get high point value foods. This is where the competitiveness of a species for food and territory can be taught.

Students should be encouraged to research common sources of berries, insects, nuts, plant vegetation, as well as meat, note seasonal variations, and the effects weather plays on food availability.

Created by: Michelle Sedberry
                 District Level Instructional Coach for Science
                 MSedberry@LubbockISD.org

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Classroom Calculation Form

Student	Nuts N-25	Nuts N-15	Berries B-20	Berries B-10	Insects I-20	Insects 1-10	Plants P-20	Plants P-10	Meat M-8	Meat M-4	Total

Student Calculation Form

NAME OF FOOD	CALCULATIONS									TOTAL
NUTS										
BERRIES										
INSECTS										
PLANTS										
MEAT										

FOOD TOKENS – Nuts (orange)

N-25	**N-25**	**N-25**
N-15	**N-15**	**N-15**
N-15	**N-15**	**N-15**
N-15	**N-15**	**N-15**

FOOD TOKENS – Berries (blue)

B-20	**B-20**	**B-20**
B-10	**B-10**	**B-10**
B-10	**B-10**	**B-10**
B-10	**B-10**	**B-10**

FOOD TOKENS – Insects (yellow)

I-20	**I-20**	**I-20**
I-10	**I-10**	**I-10**
I-10	**I-10**	**I-10**
I-10	**I-10**	**I-10**

FOOD TOKENS – Plants (green)

P-20	**P-20**	**P-20**
P-10	**P-10**	**P-10**
P-10	**P-10**	**P-10**
P-10	**P-10**	**P-10**

FOOD TOKENS – Meat (red)

M-8	**M-8**	**M-8**
M-4	**M-4**	**M-4**
M-4	**M-4**	**M-4**
M-4	**M-4**	**M-4**