Fernbank Science Center

Title:	The Mathematics of Climate Change (2407)	**Type:**	Outreach
Level:	4th Grade	**Length:**	60 minutes
Location:	Local School	**Limit:**	1 class

Program Description

This class focuses on the effects of climate change on living things in the Arctic ecosystem, with an emphasis on the polar bear. The polar bear's habitat and conditions necessary for its survival are described, with an emphasis on energy and nutritional needs. The polar bear's trophic level and predator-prey relationships are discussed. Polar bears primarily eat ringed seals, and students help characterize the factors affecting the survival of the seal population, with a focus on energy flow within the ecosystem. The impacts of human actions on the polar bear are discussed. Students play a game that teaches them how to imagine a polar bear's life in different climate change scenarios.

Please Note:
Classes cannot be combined.

Standards

S4L1 Students will describe the roles of organisms and the flow of energy within an ecosystem.

S4L2 Students will identify factors that affect the survival or extinction of organisms such as adaptation, variation of behaviors (hibernation), and external features (camouflage and protection).

S4E3 Students will differentiate between the states of water and how they relate to the water cycle and weather.

ELACC4RI3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

MCC4.MD.2 Use the four operations (addition) to solve word problems

Vocabulary

Polar bear	Climate	Arctic	Climate change
Predator	Global warming	Food web	Atmosphere
Prey	Food chain	Tundra	Properties of water
Ecosystem	Trophic level	Glaciers	Permafrost

Post-Visit Activity

Students can watch the short video below and describe the roles of organisms and the flow of energy within an ecosystem**.**

Video at http://idahoptv.org/dialogue4kids/archive/episodePage.cfm?versionID=199542.

produced by Dialogue for Kids through Idaho Public Television.

The Mathematics of Climate Change
2407 Post-Visit Activity

Biomass Pyramid

S4L1: Students will describe the roles of organisms and the flow of energy within an ecosystem

A biomass pyramid shows how body mass, or weight, is transferred up the food pyramid. Students already know that each trophic level receives about 10% of the mass of the level below it.

Animals get heavier as you go up the food chain. Use a pyramid with the appropriate number of levels for the ecosystem of your preference. The numbers at each level represent the mass available for the next level.

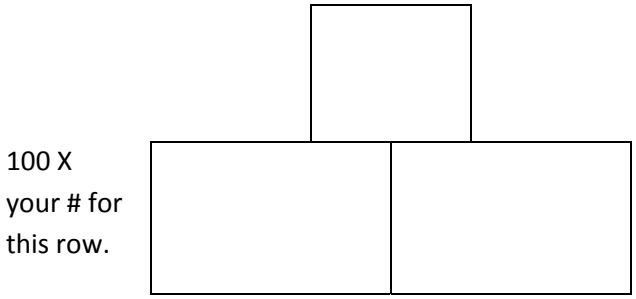
Begin at the bottom level. Students roll dice to determine how many kilograms are in the bottom level. This is the level of the producers.
In other words, a Create an "Energy Pyramid" that shows how energy is transferred up the food chain. Students roll the dice to calculate how many "NU"'s (Nutritional Units) each level provides to the next. Remember that only about 10% of each level's energy is transferred to the next level.

Use these:
http://www.globalchange.umich.edu/globalchange1/current/lectures/kling/energyflow/highertrophic/trophic2.html

http://earth.rice.edu/mtpe/bio/biosphere/topics/energy/40_biomass.html

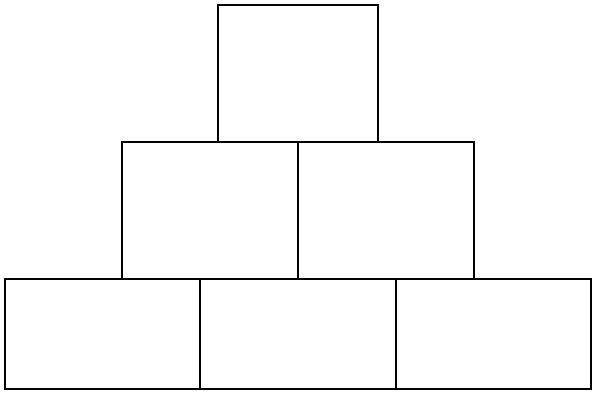
http://www.random.org/integers/ for random numbers

Biomass Pyramid with 2 levels

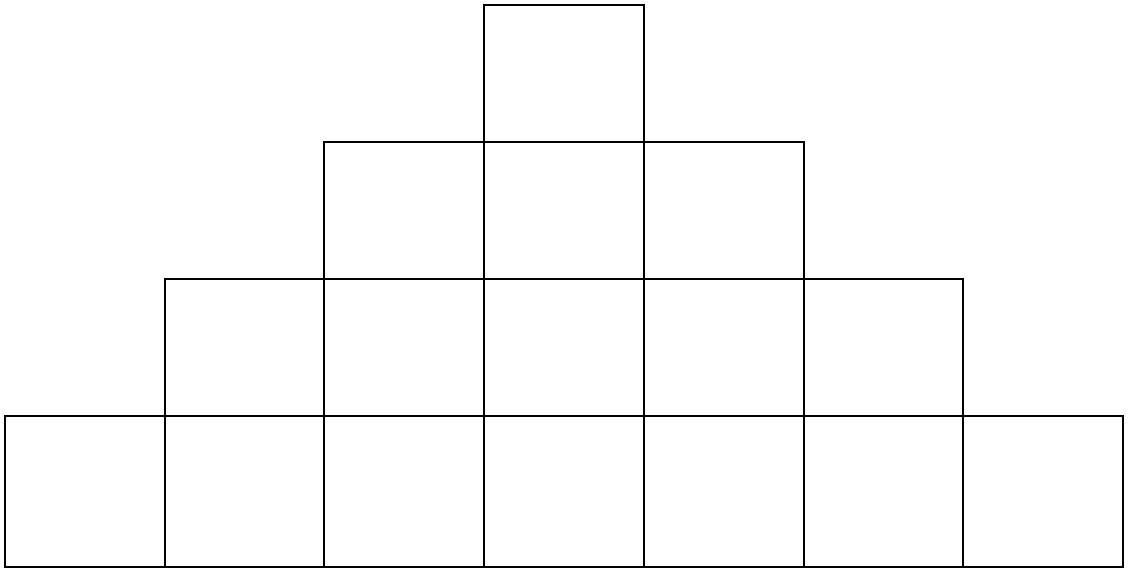


Biomass Pyramid with 3 levels

200 # your #
for this row

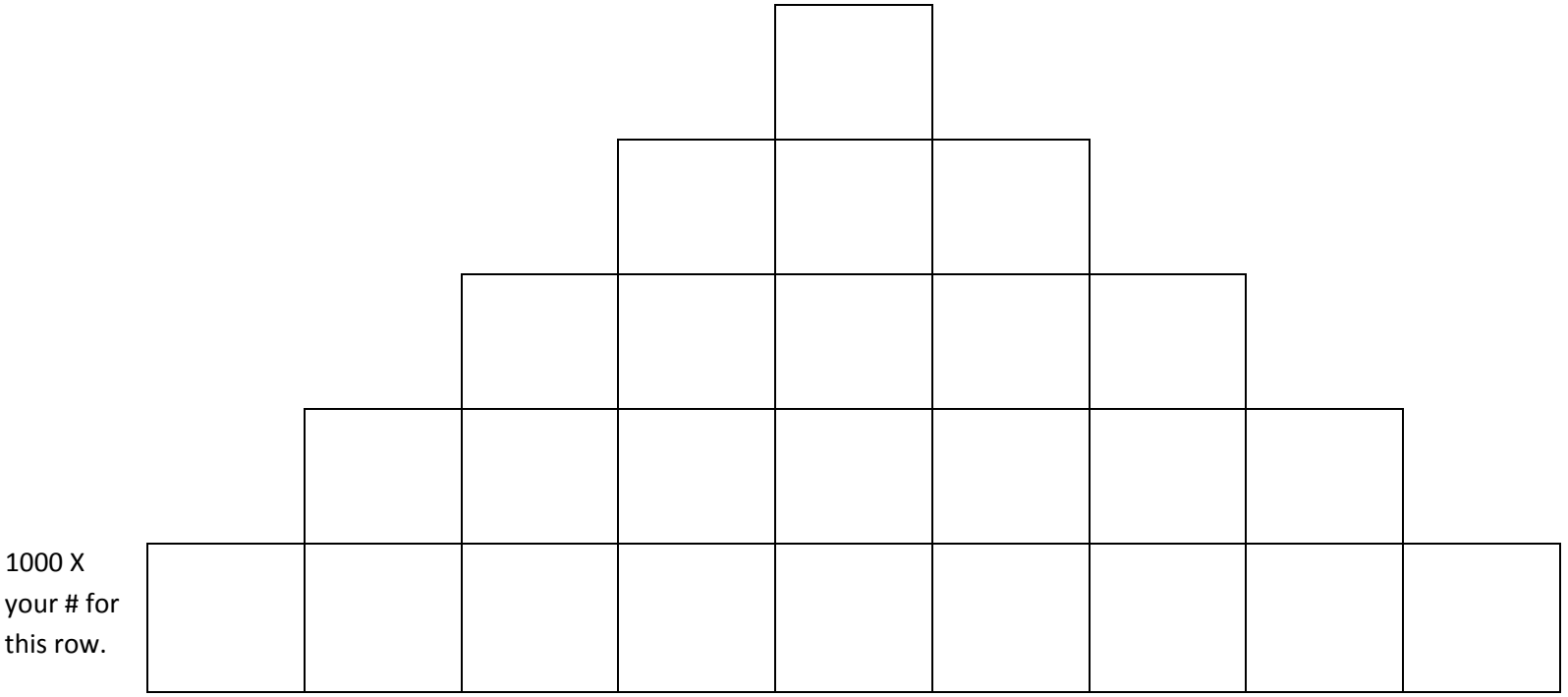


Biomass Pyramid with 4 levels



500 X your # for this row

Biomass Pyramid with 5 levels



1000 X your # for this row.

TF 10/2015