Lesson #10 Energy Pyramid Activity (Teacher Resource)

Adapted from
http://www.cfep.uci.edu/cspi/docs/lessons_secondary/energy%20biomass%20pyramids.pdf

Objectives: Students will participate in an activity to role-play how energy if transferred from one organism to the next within an ecosystem

Materials:

- Role cards with organisms (30 players + the teacher)
  - 16 diatoms (primary producers)
  - 8 copepods (primary consumers)
  - 4 herring (secondary consumers)
  - 2 chum salmon (tertiary consumers)
  - 1 killer whale (the teacher!)
- Plastic or paper chips or markers, to represent "energy" (48 green)

Procedure:

a. Show and discuss the following oceanic food chain to the class:

Diatom→ Copepod →Herring →Salmon →Killer Whale

b. Place all of the role cards into a bag/hat, and ask students to randomly draw a card with an organism.

c. Students who draw the diatoms and copepods enter the play area first.
   - Each diatom is given 3 green energy circles.
   - At 'GO' the copepods attempt to "eat" the diatoms by tagging them.
   - When a diatom is tagged, it must give up one of its energy circles.

d. After 30 seconds, the herring enter the area.
   - When a herring tags a copepod, it receives two energy circles.

e. After another 30 seconds, the salmon enter the area.
   - They receive four circles when they tag a herring.

f. Finally, the killer whale enters.
   - It receives eight circles per salmon tag.

g. Once complete, have students record the number of energy circles accumulated by each level on a chart on the board (see results table below).

Results:

Organism	Energy Circles Accumulated
Diatom	
Copepod	
Herring	
Salmon	
Killer Whale	

Class Discussion Questions:

1. In looking at the results, what do you notice in where the green energy circles are?
2. Does energy transfer completely from one level to the next?
3. Place your organisms and number of green energy circles on the pyramid
4. Where should the Sun be added to the pyramid? (the source of all energy)
5. What are some possible explanations for why all of the energy does not transfer to the next level?
6. Why are there only a limited number of top predators (i.e. killer whales) in the ocean?
7. On the pyramid sketch, add trophic levels (primary, secondary, tertiary), consumers, and producers.
8. As a class, create a pyramid that would represent the local aquatic ecosystem where data was collected in the previous lessons. Discuss the cycling of matter and energy in the ecosystem.