Adapted from: http://www.nps.gov/olym/learn/education/upload/food-web-lab.pdf by Roque C. Indalecio

Grade level: 7th grade

Lesson overview:

Students will work individually and interactive with the whole class. Each student will be given a specific animal that could be found in the forests of the Mariana Islands. Students will see how energy is transferred from one species to another in a food chain.

Content Objective:

- Identify which organisms in the Mariana are considered to be primary consumers, secondary consumers, and tertiary consumers.
- Calculate the amount of energy gained or loss during each round of the activity.

Language Objective:

- Complete the activity worksheet using complete sentences.
- Participate in a class discussion about the different roles in the ecosystem.

Time/duration: 30-50 minutes

Materials needed:

- Energy calculation sheet
- Pencil
- Hat/container for slips
- Printable slips
- Activity worksheet

Background:

This lesson assumes that students have already covered roles in the ecosystem (primary, secondary, tertiary consumers and trophic levels).

Lesson Procedures:

1. Each student should already have their materials ready.
2. Each student must have an energy calculation sheet.
3. Each slip should be cut into strips with detailed information about each organism.
4. Each student will draw a slip from a container/hat.
5. Remind students to not share what organism they drew from the container/hat.
6. Once every student drew a slip, go over the energy calculation sheet with them.
7. Each animal has a specific role in the ecosystem and each of them has different energy points.

    a. Animals at the top of the trophic level will have more energy points than that of an animal in the lower trophic level.
8. There will be four rounds for this activity.
9. Have students stand up and walk around so everyone is dispersed.
10. The teacher will say "feed", once they hear that word, they will find a partner.
11. If the class is an odd number, the teacher may participate so everyone will have a partner.
12. Remind them again not to show their organism.
13. Once they find a partner, they will say to each other "I am a _____, can I eat you?" at the same time.
14. Based on the strips that were given, they should be able to calculate their energy points gained or loss on their energy calculation sheet.
    a. Ex. Pair 1: Bird and a brown tree snake, the student who is a bird will deduct the number of points that is mentioned on the strip, so that means the bird loses its energy while the snake gains energy points. Record it onto their energy calculation sheet.
15. Before starting each round, have them walk around and disperse themselves.
16. Then repeat steps 10-14 until all rounds have been completed.
17. Collect strips back.
18. Take your seats and complete any calculations that needs to be done.

Evaluation:

Once everyone has completed the calculation sheet, the class can have a short discussion on the different roles in an ecosystem. Class can discuss how this relates to an actual food chain and how energy is transferred. Finally, hand out activity worksheet and have students complete them individually and submit it in for grade.

Introduction:

In this activity, you will be simulating a small food chain of the Tropical Forests in the Marianas and Guam. Each species plays an essential role in the ecosystem. The premna, melano, and psychotria (plant) represents the lowest in the trophic level because they are producers. The birds represent primary consumers because they eat the producers. The rat fall into two places a primary consumer in which it eats the premna, melano, and psychotira and even a secondary consumer because it can eat smaller birds and eggs. The brown tree snakes are tertiary consumers because they eat both rats and birds.

This activity will help you identify how each organism play a crucial role in an ecosystem and how energy is gained or loss when an organism either eats another organism or is eaten by another organism.

 **<u>Premna obtusifolia</u>** **“False elder”**	 **<u>Premna obtusifolia</u>** **“False elder”**	 **<u>Premna obtusifolia</u>** **“False elder”**
You have 10 energy points	You have 10 energy points	You have 10 energy points
You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.
If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.
Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.

 **Rat**	 **Rat**	 **Rat**	 **Ptilinopus roseicapilla** **“Mariana Fruit-Dove or Totut”**	 **Ptilinopus roseicapilla** **“Mariana Fruit-Dove or Totut”**	 **Ptilinopus roseicapilla** **“Mariana Fruit-Dove or Totut”**
You have 12 energy points	You have 12 energy points	You have 12 energy points	You have 16 energy points	You have 16 energy points	You have 16 energy points
You can be eaten by a brown tree.	You can be eaten by a brown tree.	You can be eaten by a brown tree.	You can be eaten by a brown tree.	You can be eaten by a brown tree.	You can be eaten by a brown tree.
If you are eaten by a brown tree snake you **lose** 5 energy points.	If you are eaten by a brown tree snake you **lose** 5 energy points.	If you are eaten by a brown tree snake you **lose** 5 energy points.	If you are eaten by a brown tree snake you **lose** 5 energy points.	If you are eaten by a brown tree snake you **lose** 5 energy points.	If you are eaten by a brown tree snake you **lose** 5 energy points.
If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.
If you encounter another rat, you **lose** 1 point.	If you encounter another rat, you **lose** 1 point.	If you encounter another rat, you **lose** 1 point.	If you encounter another bird, you **lose** 1 point.	If you encounter another bird, you **lose** 1 point.	If you encounter another bird, you **lose** 1 point.
If you eat a Golden white-eye you gain 6 points	If you eat a Golden white-eye you gain 6 points	If you eat a Golden white-eye you gain 6 points	If you encounter a rat you lose 1 point.	If you encounter a rat you lose 1 point.	If you encounter a rat you lose 1 point.
If you encounter a Totut or Sali you lose 1 point.	If you encounter a Totut or Sali you lose 1 point.	If you encounter a Totut or Sali you lose 1 point.			

 **<u>Aplonis opaca</u>** **“Micronesian Starling or Sali”**	 **<u>Aplonis opaca</u>** **“Micronesian Starling or Sali”**	 **<u>Aplonis opaca</u>** **“Micronesian Starling or Sali”**	 **<u>Cleptornis marchei</u>** **“Golden White-eye or Canario”**	 **<u>Cleptornis marchei</u>** **“Golden White-eye or Canario”**	 **<u>Cleptornis marchei</u>** **“Golden White-eye or Canario”**
You have 16 energy points	You have 16 energy points	You have 16 energy points	You have 16 energy points	You have 16 energy points	You have 16 energy points
You can be eaten by a brown tree snake.	You can be eaten by a brown tree snake.	You can be eaten by a brown tree snake.	You can be eaten by a brown tree snake.	You can be eaten by a brown tree snake.	You can be eaten by a brown tree snake.
If you are eaten by a brown tree snake you **lose** 4 energy points.	If you are eaten by a brown tree snake you **lose** 4 energy points	If you are eaten by a brown tree snake you **lose** 4 energy points	If you are eaten by a brown tree snake or a rat you **lose** 4 energy points.	If you are eaten by a brown tree snake or a rat you **lose** 4 energy points.	If you are eaten by a brown tree snake or a rat you **lose** 4 energy points.
If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.	If you eat a premna, melano, or psychotria you **gain** 2 points.
If you encounter another bird or rat you **lose** 1 point.	If you encounter another bird or rat you **lose** 1 point.	If you encounter another bird or rat you **lose** 1 point.	If you encounter another bird, you **lose** 1 point.	If you encounter another bird, you **lose** 1 point.	If you encounter another bird, you **lose** 1 point.

 **<u>Boiga irregularis</u>** **“Brown tree snake”**	 **<u>Boiga irregularis</u>** **“Brown tree snake”**	 **<u>Boiga irregularis</u>** **“Brown tree snake”**	 **<u>Premna obtusifolia</u>** **“False elder”**	 **<u>Premna obtusifolia</u>** **“False elder”**	 **<u>Premna obtusifolia</u>** **“False elder”**
You cannot be eaten.	You cannot be eaten.	You cannot be eaten.	You have 10 energy points	You have 10 energy points	You have 10 energy points
You start with 35 energy points	You start with 35 energy points	You start with 35 energy points	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.
If you eat a bird you gain 10 energy points	If you eat a bird you gain 10 energy points	If you eat a bird you gain 10 energy points	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.
If you eat a rat you gain 4 energy points	If you eat a rat you gain 4 energy points	If you eat a rat you gain 4 energy points	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.
If you try to eat a plant, you lose 8 energy points	If you try to eat a plant, you lose 8 energy points	If you try to eat a plant, you lose 8 energy points			
If you encounter another snake you lose 1 point.	If you encounter another snake you lose 1 point.	If you encounter another snake you lose 1 point.			

 **<u>Melanolepis multiglandulosa</u>** **"Melano"**	 **<u>Melanolepis multiglandulosa</u>** **"Melano"**	 **<u>Melanolepis multiglandulosa</u>** **"Melano"**	 **<u>Psychotria mariana</u>**	 **<u>Psychotria mariana</u>**	 **<u>Psychotria mariana</u>**
You have 10 energy points	You have 10 energy points	You have 10 energy points	You have 10 energy points	You have 10 energy points	You have 10 energy points
You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.	You can be eaten by a rat or any birds.
If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.	If you are eaten, you lose 2 energy points.
Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.	Every round you gain 1 energy point from the sun through photosynthesis.

Energy Points Sheet

Name: Date: Period:

Animals	Total Energy Start	Total Energy Round 1	Total Energy Round 2	Total Energy Round 3	Total Energy Round 4
Brown Tree Snake	44 points				
Mariana Fruit Dove	16 points				
Micronesian Starling	16 points				
Golden White-Eye	16 points				
Premna	10 points				
Melanolepis	10 points				
Psychotria	10 points				
Rat	12 points				
Energy gained by photosynthesis (1 point per round, only if you're a plant)					

Total energy points_____

Name: Date: Period:

Direction: Read each question and answer question in complete sentences.

Activity Worksheet

1. What are the frugivores?

2. What are the primary consumers?

3. What are the producers?

4. What animal is considered to be a carnivore?

5. What are process does the premna undergo in order to produce its food?

6. Why do you think the brown tree snake is common on Guam?

7. What animal is the highest in the trophic level? Why do you think it's the highest?

8. Why are frugivores or birds important in a tropical forest?