Rangeland Roots- Energy Lesson

Created by: IRRC	**Date:**
Subject: Math/ Science	**Grade Level:** 4th +
Time Required: 1 hour	**Standards:** Science- Standard 3: Biology Mathematics- Standard 2:Concepts and Principals of measurements

Overview	These two activities illustrate the flow of energy through an ecosystem. Students will first analyze what they eat, then what different types of organisms need to survive.
Goal(s) & Objective(s)	The students will differentiate between a producer, a primary consumer, and a secondary consumer. Students will be able to calculate why more organisms are at the lower levels of a food pyramid.
Prerequisites & Materials	(Optional) Range Science Lesson **Materials:** • Paper • Pencils • Overhead Energy Pyramid • Energy Worksheet • Math Worksheet
Teaching Activities: ***Instructional Approaches/Strategies***	**Procedures** **Introduction:** Have students write down anything they have eaten in the last day, skipping a line on their paper. Be sure they list food items separately. Give an example - a ham sandwich would be bread, ham, pickles, tomatoes, and cheese, all listed on separate lines. Have students keep their lists for activity #1. **Practice** **Activity #1:** 1. Show students the energy pyramid,(attached) and give them examples of producers, primary consumers, and secondary consumers. Ask them to come up with examples of their own. If students are working on note taking, this would be good information for their science notebook. 2. Divide students into groups. Have students tear or cut apart their list from the beginning of class. They can glue or tape each item from their food list to the food pyramid for their group. Demonstrate how to do

	this, and what types of food would go in each level. 3. Have students respond to the questions on the Energy on the Range Worksheet or discuss these questions as a class. **Activity #2:** 1. Use plants clipping instructions from the "Range Science" lesson (***session II).*** 2. Clip all the new vegetation in the plot frame and weigh it. This should take about 15-20 minutes, less if the location is close or students have done it before. As an option, the teacher could clip a plot and bring it inside for students to weigh. 3. Read through the first two questions on the "Energy Math" worksheet with your students. Have each student write a prediction for question 2 before they begin work. For high functioning students who are working on conversion factors, you may wish to white out the "fill in the blank" format. 4. Have students evaluate their responses based on what is reasonable - there should be less energy left at the end of the worksheet with the secondary consumer (Wolves). **Closure** Use the following four questions as a closing discussion: 1. Where does energy come from in the environment? (*sunlight)* 2. Why do people eat more producers than primary consumers? (*more energy is stored in plants than in animals, so it is easier to acquire calories from plants)* 3. Why do you think people still eat primary consumers, if less energy is present in that level? (*Answers will vary - this would be a good time to point out that most of the land that could be farmland is located in forests that many species need to survive. Livestock and other primary consumers such as deer can graze these areas, and rangeland areas not fit for farming, with little damage, while farming would diminish habitat)*
Assessment:	Evaluate students' completion and correct responses on the worksheet, based on what was covered in class.

Modifications: If you do not want or do not have the means to do a field trip for *Energy Lesson*, Skip activity II –Mathematics, and no prerequisite is required.

Attachments

Energy on the Range Worksheet
Energy Math Worksheet

Energy on the Range Worksheet

Name_____

1. Which level of the energy pyramid did most of the food items in your group come from?

2. Which level of the energy pyramid contains the greatest number of organisms?

3. What do you think would happen if there were more consumers than producers?

4. If mice eat grass seeds, and owls eat mice, sketch an energy pyramid containing grass, owls and mice.

5. In question 4, would there be more grass, owls, or mice?

6. If the grass didn't grow as well one year, what would happen to the numbers of mice? What would happen to the numbers of owls?

Energy Math

Name_____

1. Find the weight of all the Producers in your plot (in grams)

_____ grams

2. In this activity, you will find how much energy makes its way from producers to secondary consumers.
Based on this information, predict whether the amount of energy at the end will be greater than (>), less than (<), or equal to (=) the amount at the beginning.

The energy at the beginning will be_____ the energy at the end.

For questions 3-5, you will use your answer from the previous question to find a final answer.

3. The materials you clipped are all from Producers. Each 1000 grams of producers contains 300 calories of energy. How much energy is in **your** plot?

_____ grams x 300 calories ÷ 1000 grams = _____ calories

4. A mule deer (a primary consumer) can only use 10% of the energy from the plants it eats in your plot to grow! How much energy does the deer use from your plot to grow?

_____ calories x 0.10 = _____ calories

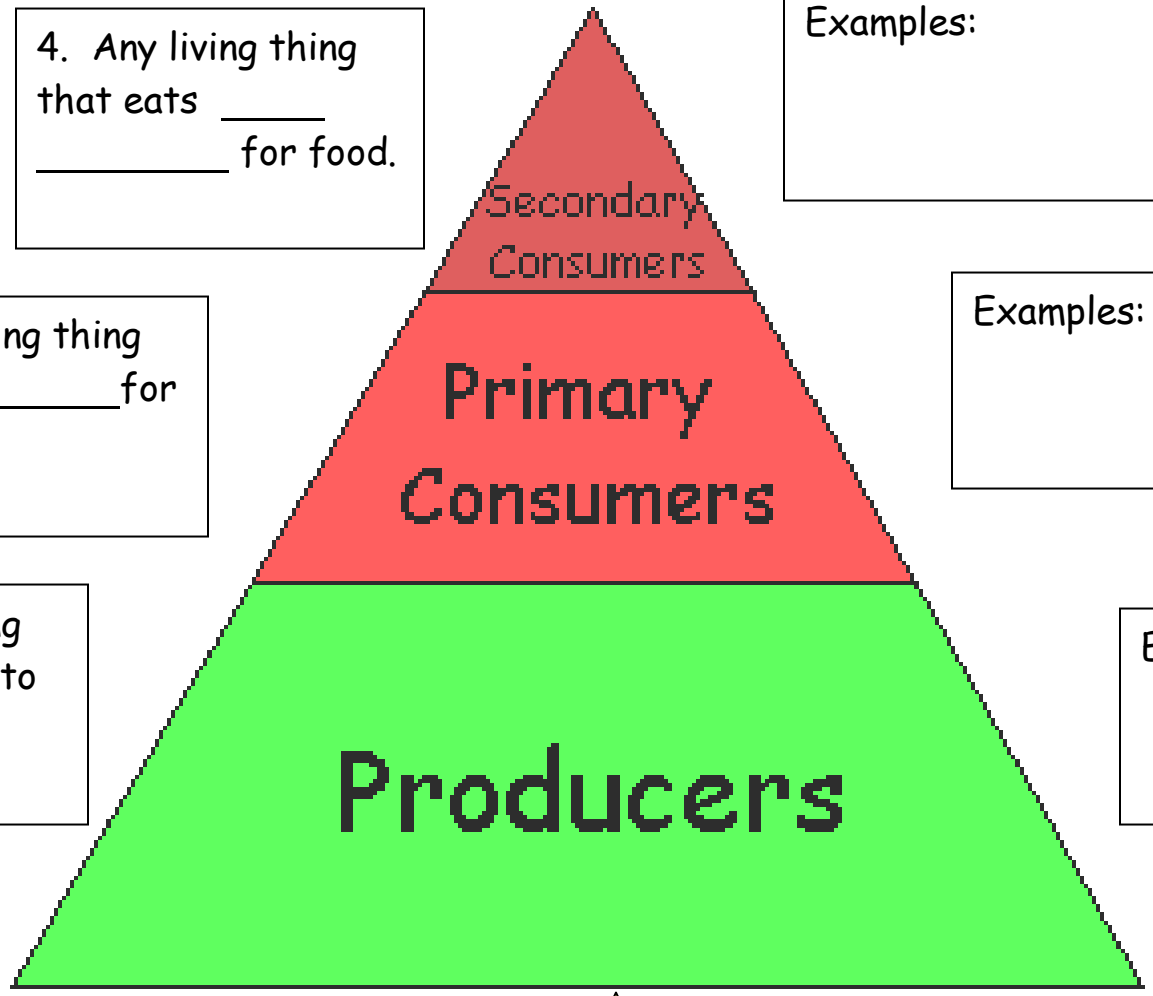
5. Finally, a predator (like a wolf, bear, or person) will eat the deer. Only 20% of the calories the deer used to grow are available as food for secondary consumers. The rest of the energy is stored in indigestible materials (bone, tendons, or hair). How much energy from the original plants could be transferred from the deer to a predator?

_____ calories x 0.20 = _____ calories

6. How did your prediction in question #2 compare to your final answer?

4. Any living thing that eats _____ _____ for food.

Examples:



3. Any living thing that eats _____for food.

Examples:

2. Any living thing that uses _____ to make food.

Examples:

1. All energy for plants and animals comes from the _____.