**Eating at a Lower Trophic Level**

Background information

A trophic level, or feeding level, is made up of all of the organisms whose energy source is the same number of consumption steps from the sun in a given ecosystem. The trophic level of plants (producers) is 1, while that of herbivores (primary consumers) is 2 and that of carnivores (secondary or tertiary consumers) is 3. Higher trophic levels can exist for animals if they eat higher on the food chain. In this exercise, you will compute numeric values for human energy needs based on diets at different trophic levels.

Problem

You will be comparing the diets of 3 humans who eat at different trophic levels in order to determine how much ENERGY each diet requires. For simplicity, we will say that each of these 3 humans eats only one particular type of food:

* Human 1 eats only seaweed (a producer)
* Human 2 eats only shrimp (a primary consumer)
* Human 3 eats only tuna (a secondary consumer)

You will need to use *dimensional analysis* to determine the answers to the following questions. NO CALCULATORS ARE TO BE USED. Dimensional analysis is a mathematical system using conversion factors to move from one unit of measurement to a different unit of measurement.

**Conversion factors:**

1 shrimp = 0.1 pounds

1 tuna = 40 pounds

**Information needed to solve problems:**

Each human must consume 20 pounds of food per week

A shrimp consumes ½ pound of seaweed per week

A tuna consumes 100 pounds of shrimp per week

**Part I –** How many pounds of *seaweed* is needed to support each diet for a week?

1. Human 1 (eats only seaweed) = \_\_\_\_\_\_\_\_\_\_ lbs. seaweed
2. Human 2 (eats only shrimp)

lbs. seaweed

20 lbs shrimp

=

human

human

1. Human 3 (eats only tuna)

human

lbs. seaweed

=

**Part II –** How much seaweed would be required to support each diet for a YEAR? (Show work!)

1. Human 1 - \_\_\_\_\_\_\_\_\_\_
2. Human 2 - \_\_\_\_\_\_\_\_\_\_
3. Human 3 - \_\_\_\_\_\_\_\_\_\_

**Part III** – How many humans can 1000 pounds of seaweed support for one week (Show work!)

1. Human 1 - \_\_\_\_\_\_\_\_\_\_
2. Human 2 - \_\_\_\_\_\_\_\_\_\_
3. Human 3 - \_\_\_\_\_\_\_\_\_\_

Conclusion

USING DATA FROM THIS LAB and other information you have learned from the reading support the following statement:

*Eating at a lower trophic level requires less energy and thus reduces environmental impact.*

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