Oak Woodlands Energy Transfer

Practice: Set 1 Answers

Acorns are a traditional staple food and energy source for the Native people of Northern California. Oak trees take energy from the sun and convert that energy into nutritional organic compounds that other animals eat. Acorns are highly nutritious! Native peoples have used acorns to cook traditional foods for thousands of years. Humans do not consume raw acorns. In addition to cooked acorns, humans also consume other animals that eat acorns such as grasshoppers and quails.

1. Based on the information above, to which trophic level do acorns belong? How do you know?

Primary producers; oak trees and acorns are autotrophs meaning they make their own food using solar energy.

2. Based on the information above, to which trophic level do humans belong? How do you know?

Apex consumers; humans are heterotrophs meaning they consume other organisms to obtain energy. They are apex consumers specifically because there are no trophic levels above them.

3. If **10%** of energy is transferred between trophic levels and **1 ounce (oz)** of acorns contains **1000 calories (kcals)** of energy, how many calories does a person obtain by eating **1oz** of acorns? **2ozs**? Illustrate your work using simple drawings.

1000 kcals x .1 percent = **100 kcals**
2000 kcals x .1 percent = **200 kcals**

4. How much **energy (in kcals)** is lost when a human eats **1oz** of acorns? List at least one way energy is lost between trophic levels. Illustrate your work using simple drawings.

1000 kcals x .9 percent = **900 kcals**
Energy can be lost between trophic levels through heat, waste, or other cellular processes.

Practice: Set 2 Answers

1. **1 pound (lb)** of grass contains **40,000 kcal**. If only **10% of kcals** are transferred from a lower trophic level to a higher trophic level, how many **kcals** does a deer receive from eating **1lb of grass**? Illustrate your work using simple drawings.

40,000 kcal x .1 percent = **4,000 kcals per pound**

2. Based on your answer above, if the same deer needs **160,000 kcals per week**, how many **lbs** of grass does it eat per week?

160,000 kcals per week / 4,000 kcals per lb = **40 lbs of grass per week**

3. There is a massive drought that knocks out half of the grass population! Only **1,000lbs** of grass remain. For how long would **10** deer live off of **1,000lbs of grass**?

40 lbs of grass per week x 10 deer = **400 lbs of grass per week**

1,000 lbs of grass / 400 lbs of grass per week = **2.5 weeks**

Practice: Set 3 Answers

1. If the deer weighs **150lbs** and its meat contains a total of **750,000 kcals**, how much energy (in kcals) does **each pound** of deer meat contain?

750,000 kcals / 150 lbs = **5,000 kcals per lb**

2. If a human requires **17,500 kcals per week**, how many **lbs** of deer would a human have to eat **per week** to get their required calories? (Remember the 10% Energy rule!)

5,000 kcals per lb x .1 percent = **500 kcals per lb**
17,500 kcals per week / 500 kcals per lb = **35 lbs of deer meat per week**

3. If the average deer weighs **150lbs**, how many people could live off of one deer for one week? Round up or down to the nearest *whole* number.

150 lbs / 35 lbs per week per person = **~4 people**

4. How many **150-pound** deer would be needed to feed a group of **ten** people for **one month**?

35 lbs per week per person x 10 people = **350 lbs of deer meat per week**
350 lbs per week x 4 weeks = **1,400 lbs of deer meat per month**
1,400 lbs / 150 lbs = **~10 deer per month**

Practice Reflection: Answers

1. The energy transfer questions in Set 3 have humans consuming *only* deer meat in their diet. Do humans only eat one kind of food? How do you think the human diet should be designed instead?

No. It is best to eat a diverse diet containing many different food types. Humans eat fruits, berries, birds, acorns, and many other foods from their environment.

2. The questions in Set 3 have humans eating all the deer meat available in the food web. Is this responsible? Why or why not?

No. It is irresponsible to eat all the deer meat because you must leave behind enough deer to reproduce so there will still be deer in the future.

3. If humans were to consume all the possible deer in their food web, what would happen to the deer population? What about the grass population?

If the humans ate all the deer there would be no deer left to eat in the future and there would be fewer animals to eat the grass so grass populations would increase.

4. Why is it important that humans only take what they need from their food web?

It is important to only take what you need from the food web to maintain balance between consumers and producers and to ensure there is enough food for the future.