

▲ Energy Pyramid Lab

Mission: The preserve has lots of grass but only two hawks. Pass energy up the food chain level by level and discover why there are so few top predators.

Big question: Why are there fewer organisms at the top of a food chain?

★ Warm-up: Estimation station

Estimate and explain your thinking.

A field has 1,000 grasshoppers. About how many frogs could it support: 1,000, 100, or 5,000? ✓ **About 100: much less energy moves up.**

Why can't a hawk live on just one mouse a year? ✓ **It uses lots of energy to fly, hunt, and stay warm.**

Key vocabulary

Energy pyramid	A model showing how much energy is at each level of a food chain.
Trophic level	A feeding level (producer, primary consumer, ...).
10% rule	About one-tenth of energy passes to the next level.
Heat	Energy released as organisms live and move.

1 Box 1

Where did it go?

Where did most of the grasshoppers' energy go?

- ☐ Used for moving, growing, and living, then lost as heat
 ☐ Destroyed
 ☐ Stored in the soil
☐ Sent back to the Sun

✓ **Used for moving, growing, and living, then lost as heat**

2 Box 2

Energy table

In the simulator: Pass energy all the way to the **hawks**.

Record the energy at each level (10%, 10,000 start).

Level	Energy (units)
Grass	from simulator
Grasshoppers	from simulator
Frogs	from simulator
Snakes	from simulator
Hawks	from simulator

3 Box 3

The pattern

Each level has what fraction of the energy of the level below?

- ☐ 1/10
 ☐ 1/2
 ☐ The same
 ☐ 10 times more

✓ **1/10**

Why so few hawks?

Why does the preserve have lots of grass but only two hawks?

- ☐ There is very little energy left by the top of the chain ☐ Hawks don't like grass ☐ Hawks eat the grass
☐ Hawks are faster

✓ **There is very little energy left by the top of the chain**

4 Box 4

More sunlight

In the simulator: Change the grass energy to **20,000** and pass energy to the hawks.

How much energy reaches the hawks now?

Answer: _____ units ✓ **2**

5 Box 5

Legend: shorter chain Legend only

Why do people say eating plants uses energy more efficiently than eating meat?

- ☐ Eating lower on the chain loses fewer steps of energy ☐ Plants have no energy
☐ Meat has more energy than the Sun

✓ **Eating lower on the chain loses fewer steps of energy**

6 Box 6

Explain it

Explain why there are fewer organisms at the top of a food chain. Use a number from your table.

Look for: Talks about energy; Uses the 10% idea; Explains where energy is lost; a number from the simulator



Exit ticket: answer the big question in your own words

Why are there fewer organisms at the top of a food chain?

Look for: At each level, organisms use most of the energy they get (about 90%) to move, grow, and stay warm; it is lost as heat. Only about 10% is passed to the next level, so there is much less energy at the top, which can only support a few predators.



Completion codes

Students see a code like **ABC-I3** when they finish. The first part must match below. The letter is the level (E = Explorer, I = Investigator, L = Legend), and the number at the end is how many stars they earned.

Level	Code starts with
 Explorer	1RW-E
 Investigator	J90-I
 Legend	1FS-L

 Watch for these misconceptions

- "Arrows point to what an animal eats." Arrows show energy flow, pointing toward the eater.
- "Decomposers are not important." Without them, nutrients would stay locked in dead matter.
- "Plants get their food from the soil." Plants make food from sunlight, air (carbon dioxide), and water; soil gives nutrients.