Identify the feeding position

A trophic level describes how an organism obtains energy in a feeding pathway. Identify its food source, not its size, strength or position in the habitat.

1. FOLLOW ONE SIMPLIFIED FOOD CHAIN



Producer

Captures sunlight by photosynthesis.

Primary consumer

Eats the producer.

Secondary consumer

Eats the primary consumer.

Tertiary consumer

Eats the secondary consumer.

Arrows point from food to eater: they show transfer of energy and matter. The Sun supplies energy but is not an organism or a trophic level.

2. COUNT FROM THE PRODUCER

Producers occupy trophic level 1. Primary consumers occupy level 2, secondary consumers level 3, and tertiary consumers level 4. "Primary consumer" does not mean first trophic level.

3. DIET CAN CHANGE THE POSITION

In a simplified example, a bird eating seeds acts as a primary consumer. Eating a plant-eating caterpillar makes it a secondary consumer in that pathway. Omnivores can feed at more than one level; a species does not always fit one fixed rung.

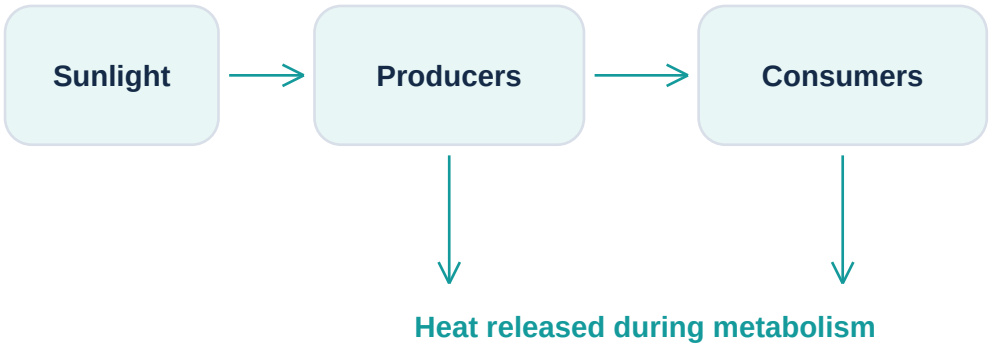
Feeding levels, arrows and multiple pathways: OpenStax, Biology 2e 46.1.
Sun-to-producer-to-consumer flow: College Board, ENG-1.B.3.

Scope: College Board AP Environmental Science CED (2025), Topic 1.9, p. 44.

Energy flows; it does not cycle

Terrestrial and near-surface marine food webs usually begin with sunlight captured by producers. Chemical energy then passes through feeding relationships.

1. TRACE INPUT, TRANSFER AND HEAT



Producers and consumers both respire. Decomposers also release heat as they use chemical energy in dead organic matter.

2. CONTINUOUS ENERGY INPUT IS NECESSARY

Organisms transform energy to power cellular work. Some becomes dispersed heat, which cannot be recaptured by the food web to replace the original energy supply. Ongoing input maintains ecosystem activity.

3. CONSERVATION IS NOT THE SAME AS RECYCLING

Energy is not destroyed when organisms use it. It changes form and becomes less available for biological work. Saying energy is "lost" from a food chain means it is no longer available to the next feeding level in that pathway.

Link to Topic 1.8: producers retain NPP as new organic matter that can support consumers and decomposers. The approximate 10% transfer model is developed in Topic 1.10.

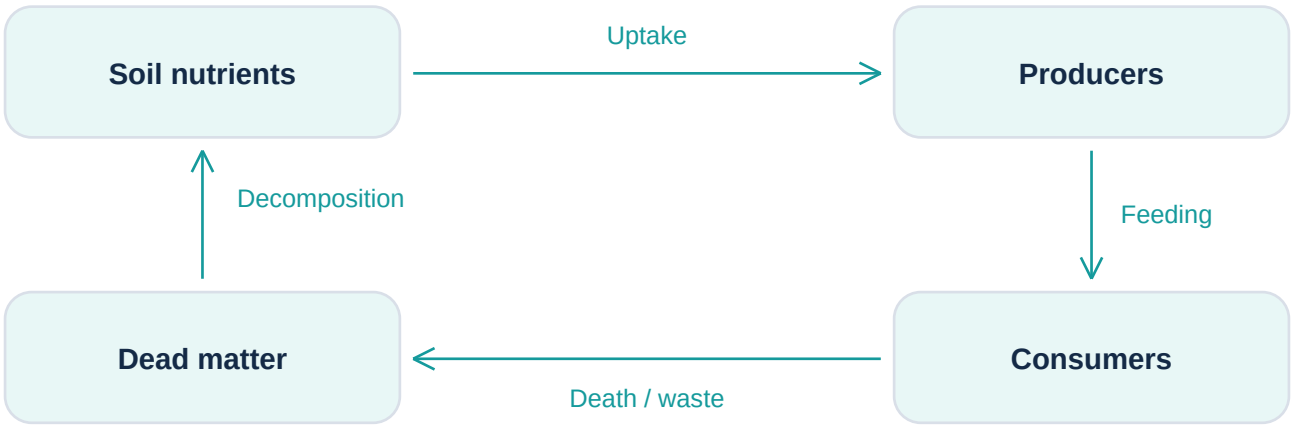
Continuous high-quality energy input: College Board, ENG-1.B.1 and B.3.
Energy transformations and trophic transfer: OpenStax, Biology 2e 46.2.

Scope: College Board AP Environmental Science CED (2025), Topic 1.9, p. 44.

Matter cycles between life and land

Biogeochemical cycles move elements between organisms and their surroundings. Atoms are rearranged and transferred; feeding and decomposition do not make them disappear.

1. A SIMPLIFIED SOIL-NUTRIENT LOOP



Dead matter also comes directly from producers. The loop shows one nutrient pathway, not every route or a closed local ecosystem.

2. DECOMPOSERS CONNECT MANY LEVELS

Fungi and bacteria chemically break down organic remains; detritivores ingest detritus. Dead matter and waste originate throughout the food web, so decomposers are not simply the final predator at the top.

3. FOLLOW AN ATOM, NOT A PACKET OF ENERGY

A carbon atom can enter a leaf from carbon dioxide, move to a herbivore in food, and return as carbon dioxide through respiration. It can later enter another producer. Energy disperses as heat along these processes rather than completing the same loop.

Conservation does not mean an unchanged local amount: nutrients can enter or leave an ecosystem in water, air or moving organisms.

Cycling and conservation of matter: College Board, ENG-1.B.1-2.
Detrital pathways: OpenStax, Biology 2e 46.1.
Element cycling: OpenStax, Biology 2e 46.3.

Scope: College Board AP Environmental Science CED (2025), Topic 1.9, p. 44.