

The Great Recycling Lesson: Tracking Energy and Tiny Particles

Materials Needed

- Index cards or small pieces of paper (10-15 per learner)
- Markers or colored pencils
- String, yarn, or tape (to connect the chain)
- Modeling clay or Play-Doh (at least two colors)
- Worksheet/Notebook for drawing
- A small amount of water (optional, for particle discussion)

Learning Objectives

By the end of this lesson, you will be able to:

1. Identify and sequence the four main parts of a food chain (Producer, Consumer, Decomposer).
2. Explain that all matter (living and non-living) is made up of tiny pieces called particles.
3. Create a model showing how energy flows and how materials (particles) are recycled from the end of the food chain back to the beginning.

Introduction (10 Minutes)

Hook: Everything is Recycled!

Educator Talking Points: Think about your lunch yesterday. Where did the energy go? Did it just disappear? We know we recycle plastic bottles and paper, but nature is the ultimate recycler! Today, we are going to trace not just the energy, but the actual tiny building blocks—the particles—that make up everything, as they move through the living world.

Success Criteria Checklist (Self-Check)

We will be successful if we can draw a complete circle (a cycle) that shows both where the energy goes *and* where the materials go.

Body: Content and Activities

Part 1: The Energy Road Map (I Do & We Do)

I Do: Modeling the Food Chain (10 Minutes)

Educator Talking Points: A food chain is just a path showing how energy moves from one living thing to the next. Let's define the four main roles:

1. **Producers:** These make their own food using the sun (like plants, grass, trees). They are the start!
2. **Primary Consumers:** They eat the Producers (like rabbits eating grass, or deer).
3. **Secondary Consumers:** They eat the Primary Consumers (like a fox eating a rabbit).
4. **Decomposers:** The recycling crew! These break down dead plants and animals and turn them back into rich soil (like mushrooms, mold, and tiny worms).

We Do: Building the Chain (15 Minutes)

Activity: String Chain

1. On separate index cards, write or draw the following: **Sun, Grass (Producer), Rabbit (Primary Consumer), Fox (Secondary Consumer), Mushroom (Decomposer).**
2. Learners arrange the cards in the correct sequence.
3. Use string or yarn to connect the cards in the direction the energy flows (Sun to Grass, Grass to Rabbit, etc.).
4. **Formative Check:** Ask learners to point to the card that represents the end of the energy transfer. (Answer: Decomposer, which transfers energy back to the soil.)

Part 2: The Tiny Building Blocks (I Do & We Do)

I Do: Introducing Particles (10 Minutes)

Educator Talking Points: Look at your hand. It feels solid. Look at the water in the glass—it flows. Look at the air—you can't see it! Everything you see or touch—the grass, the fox, the soil, and even the air—is made up of tiny, invisible building blocks called **particles**. Think of them like super tiny LEGO bricks! We can model them with clay.

- (Educator demonstration with Play-Doh) Take one color of clay (e.g., green) and pinch off many tiny pieces. Explain these are the particles that make up the grass.
- Take another color (e.g., brown) and show how the Fox is also just a big, organized pile of tiny particles.

We Do: Modeling Matter (10 Minutes)

Activity: Particle Piles

1. Learners use the clay to create small balls representing particles. Use Color A for 'Living Stuff' (like the rabbit) and Color B for 'Soil/Non-living stuff.'
2. Guide the learner to explain: "My rabbit is just a big arrangement of millions of these Color A particles."
3. Discuss: When the rabbit eats the grass, what is it taking in? (Answer: Energy AND the grass's particles, which the rabbit uses to build its own body.)

Part 3: Tracking the Material Cycle (You Do)

You Do: The Particle Trail Project (20 Minutes)

Application Activity: Connecting the Concepts

Learners will now track the particles through the food chain they built in Part 1.

1. **Setup:** Place the "String Chain" from Part 1 on the table.
2. **Tracing the Material:** Assign one particle color (e.g., Blue) to represent essential nutrients in the soil.
3. **Step 1: The Producer:** Discuss how the grass (Producer) takes in the Blue particles (nutrients) and uses the sun to make food. Place 5 Blue particle clay balls near the Grass card.
4. **Step 2: The Consumer:** When the Rabbit eats the Grass, those 5 Blue particles (now combined with energy) move into the Rabbit's body. Move the 5 Blue particles from the Grass card to the Rabbit card.
5. **Step 3: The Transfer:** When the Fox eats the Rabbit, the particles move again. Move the 5 Blue particles to the Fox card.
6. **Step 4: The Recycler:** When the Fox eventually dies, the Decomposer (Mushroom) breaks down its body. The Decomposer doesn't use the energy, but it sends the particles back. Move the 5 Blue particles from the Fox card back to the Soil/Beginning of the chain.
7. **Reflection:** Look at the path. The energy flowed out (from the sun, through the chain), but the essential material (the particles) went in a complete circle.

Scaffolding and Differentiation

For Struggling Learners (Scaffolding)

Provide pre-written labels for all index cards. Use only three steps in the food chain (Sun -> Plant -> Deer). Focus solely on the transfer of the clay particles in Part 3.

For Advanced Learners (Extension)

Introduce a secondary chain (e.g., adding a bird or insect). Research the difference between matter (particles) that stays solid and matter that changes state (e.g., exhaling carbon dioxide particles). Model *why* the energy leaves the system (heat) but the particles remain.

Conclusion (10 Minutes)

Closure and Recap

Educator Talking Points: We learned that the world isn't a straight line, it's a circle! Energy moves **through** the food chain, but the materials (the particles) are always **recycled** back to the soil so new life can begin.

Quick Recap Questions:

- What is the name for the tiny building blocks that make up the fox and the grass? (Particles/Matter)
- If a squirrel eats a nut, is the squirrel getting new particles or reused particles? (Reused)
- What is the most important job of the Decomposer? (To break down dead stuff and recycle particles back into the soil/system)

Summative Assessment: Cycle Drawing

Activity: Draw Your Cycle

Learners should take a clean piece of paper and draw their own food chain cycle. They must include:

1. Labels for Producer, Consumer, and Decomposer.
2. An arrow showing the flow of Energy.
3. A distinct path (maybe a dashed line or a different color) showing the cycle of Particles/Materials

back to the soil.

Feedback: Check the learner's drawing against the success criteria. Ensure the particle path returns to the soil and the energy path moves from the sun outward.