Systems Thinking Mapping Activity
Grouping: Pairs or small groups (3–4)
Time: 25-30 minutes

Materials:
- Printed worksheet with doughnut diagram
- Colored pencils or markers
- Access to prior lesson notes/slides on food systems, circularity, and systems thinking

Objective:
To introduce systems thinking as a framework for analyzing food systems using nature's circular models. Students will identify components of systems and explore how feedback loops can be broken or repaired.

Instructions:
1. Answer the questions below before continuing to the diagram activity. This will help you create it.
2. Place a dot on the doughnut diagram:
    - Inside the hole = social shortfall
    - Outside the ring = ecological overshoot
3. Explain your reasoning.
4. Suggest how natural circularity (e.g., composting, nutrient loops) could improve the system.
5. Reflect on how systems thinking helped you understand your food's impact.

Your Task:
In this activity, you will apply systems thinking to explore two systems: a natural ecosystem and a school-based food system (e.g., cafeteria). For each system, identify the key components:
- Inputs
- Processes
- Outputs
- Feedback loops

Then compare how these systems close or break loops.

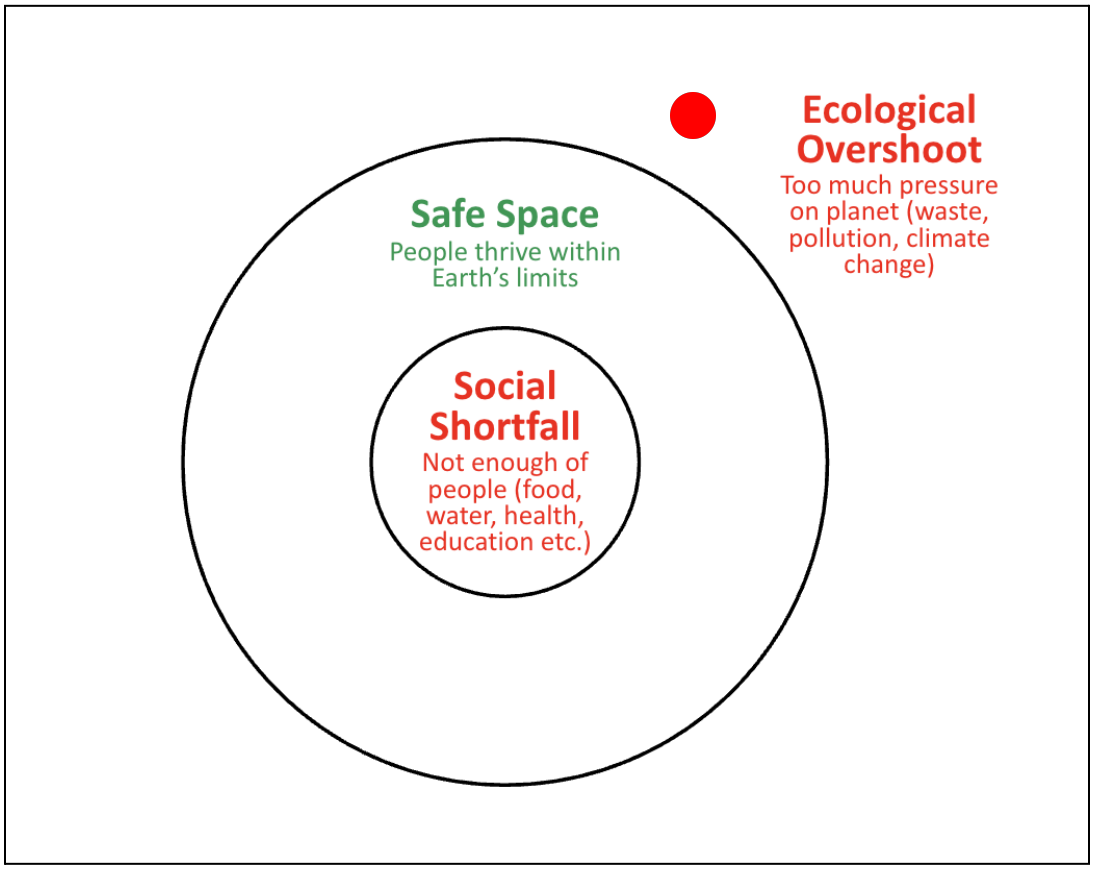
Step 1: What is Systems Thinking? Systems thinking is a way of seeing the whole picture—how the parts of a system connect, influence one another, and change over time. It focuses on relationships rather than isolated parts, helping us understand the ripple effects of our actions. The goal is to recognize these connections so we can create lasting solutions without causing new problems. For example, your lunch is part of a larger food system involving farmers, transporters, water, soil, energy, and waste. In your own words, how would you describe systems thinking?	**Step 2: Nature as a Circular System** In nature, nothing is wasted. A forest recycles sunlight, water, and nutrients into new life. Your cafeteria: What could be recycled instead of wasted? ● Example: food scraps → compost → soil for gardens. One idea for making your cafeteria more circular:

Step 3: Doughnut Thinking - Finding the Safe Space
Look at the doughnut diagram on your worksheet. It shows three zones:

- Hole = people don't get enough (food, nutrition, access).
- Ring = safe space (needs met, environment protected).
- Outside = too much harm to the planet (pollution, waste, overshoot).

Your task:

1. Place a dot where you think your cafeteria system belongs.
2. Write 2–3 sentences explaining why you placed it there.
3. Suggest one change that could move the dot closer to the green safe space.



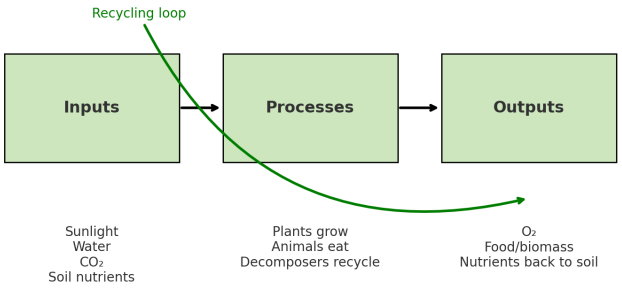
Explanation:

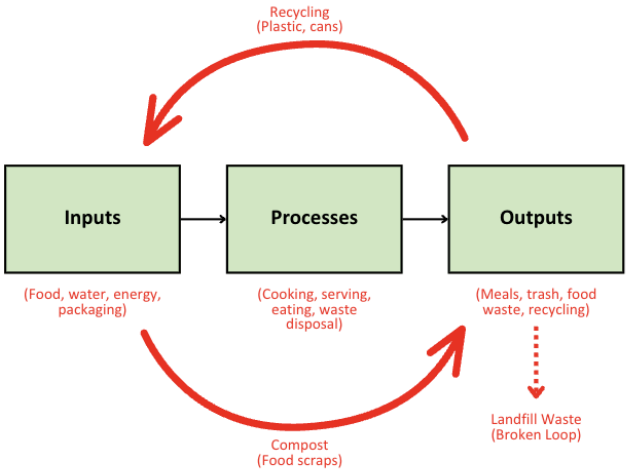
Suggest One Change:

Step 4: Side-by-Side Systems Mapping

Natural System: Forest (Example) Inputs (What goes into the forest?): Sunlight, rainfall, nutrients in soil, atmospheric carbon	**School-Based System: Cafeteria** Inputs (What goes into the cafeteria?):

dioxide, seeds / organisms Processes (What happens in the forest to use these inputs?): ● Photosynthesis by plants converts sunlight, water, and CO_2 into energy (sugars). ● Nutrient uptake by roots supports plant growth. ● Animals eat plants and one another, transferring energy through food chains. ● Decomposition by fungi, bacteria, and detritivores breaks down dead matter into nutrients. ● Respiration by plants, animals, and microbes releases CO_2 and cycles energy. Outputs (What comes out of the forest system?): ● Oxygen (O_2) from photosynthesis ● Biomass (trees, plants, animals, fungi) ● Organic matter (leaf litter, fallen trees, dead organisms) ● Nutrients returned to soil via decomposition ● Heat and CO_2 from respiration Feedback Loops (How do resources cycle back? Mark ✓ if loop is closed, ✗ if open): ✓ Nutrient cycle: decomposed matter enriches soil, supporting new growth. ✓ Water cycle: transpiration returns water vapor to atmosphere → rainfall. ✓ Carbon cycle: CO_2 absorbed in photosynthesis, released in respiration. ✓ Seed dispersal: animals/insects spread seeds, ensuring regeneration. ✗ Occasional disruptions: deforestation, fires, or invasive species can break loops.	Processes (What happens to the food and materials?): Outputs (What comes out of the cafeteria system?): Feedback Loops (How do resources cycle back? Mark ✓ if loop is closed, ✗ if open):
Draw Arrows: Step 1, Use arrows to show how inputs move through processes to become outputs, Step 2, marking any cycles that return to the start as closed loops and any losses as broken loops. A template is given below.	





Step 5: Compare Systems and Improvements

1. What is the biggest difference between forest and cafeteria systems?

2. Propose a policy or innovation that could improve the cafeteria system:

3. Given your idea, how would it strengthen or close a loop?

Reflection Prompt:

What is one lesson nature teaches us about designing better food systems?

Skills You'll Use:

- Systems thinking
- Analyzing real-world sustainability challenges
- Visual reasoning and communication
- Reflection and solution design