



Product Life Cycles

Grades 4-8

Everything we consume comes from nature and returns to nature. What is its complete journey, and how is it connected to other systems? As students trace the resources and stages involved in producing some common products, they build an understanding of the systems involved in enjoying products they use everyday. In this lesson, students will construct an explanatory model to identify the stages and processes of a product.

Big Ideas of Sustainability: **Cycles** (every organism and system goes through a cycle), **Systems** (parts are connected through larger patterns), **Limits** (every system has a carrying capacity) and **Long-term Effects** (actions have effects beyond immediate reactions)

Standards
Next Generation Science Standards (NGSS)
MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
MS-ESS3-1 Construct a scientific explanation based on evidence for how uneven distribution of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.

NYS Social Studies Standards
Grade 4 Civic Participation: Identify situations in which social actions are required and suggest solutions.
Grade 6. Economics and Economic Systems: Examine the role that various types of resources (human capital, physical capital, and natural resources) have in providing goods and services.



Lesson Overview

Materials: Any available classroom materials, or students can brainstorm a list and bring materials from home. Here are some suggestions.

- Newspaper
- Sneakers
- Soda Can
- Desk
- Paper
- Calculator
- Scotch Tape
- Water Bottle
- Chewing Gum
- Laptop / tablet
- Pencil
- iPhone
- Granola Bar
- Post it
- Markers

Essential Questions:

- How do you affect and make changes in a system?
- In what ways do we impact cycles?
- What role does economics play in shaping our world?

Enduring Understandings:

- Students articulate the difference between their wants and needs while considering how culture, marketing and advertising play a role in what they determine to be a “need.”
- Students identify the raw materials and energy required to manufacture a product and consider whether future generations will have an opportunity to access these resources
- Students practice discovering the interconnections in a system, and use systems thinking as a tool for developing a sustainable worldview

Performance Indicators:

- Students create a “product life cycle” model and use it to describe the flow of energy through living and non-living systems
- Students conduct research to determine that synthetic materials:
 - Come from natural resources and are changed through chemical processes
 - Come from limited resources
- Students list resources and then identify which are non-renewable and how these resources take long amounts of time to form in the environment.
- Using evidence, students explain how the extraction of limited resources not only decreases the amount of this resource but changes the distribution of this resource on Earth.
- Students reinforce their ability to draw connections between the environmental, economic, and societal components of the system and think about ways their actions and choices affect others.



The Lesson

Activity:

1. Introduction: Everything we use comes from nature and will eventually return to nature. Provide the class with the choice to select objects from the suggested list of materials above. (They can also select other objects that are accessible in your classroom.)
2. Students will work in pairs for this activity.
3. Each pair selects an item to research.
4. Students conduct research and answer the following questions:
 - *Where did the materials that make up these products come from?* (If a product contains a lot of materials, have the students focus on one material in the product, i.e. oats in a granola bar; not every ingredient; cadmium in a cell phone)
 - First identify the parts of the process that make up the product on individual index cards working backwards (ie. plastic- where does that material come from - where does that come from - etc.)
 - Sort the cards in a logical order
 - Consider energy inputs and outputs
 - *What happens to the product after you use it?*
 - Waste (not used again) vs. Recycle vs. Upcycle
 - Renewable vs. Non-renewable
5. Students draw a model of the “life cycle of the product” on the paper provided and label key stages as identified in step 4.
6. Pairs circulate around the room (Gallery Style) to see the work of others.
 - Using post-its students make note indicating: one feature they really liked about the cycle and one question they might have about the cycle

Debrief:

- What questions came up as you did this activity?
- What surprised you about the product life cycle?
- What resources were necessary for your product to complete its journey?
- Where else do you see cycles in our daily lives?
- What are the long term effects of your product on the environment?

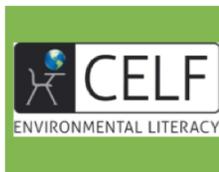
Follow-up

Reflection:

- What do I know now that I didn't know before the Product Life Cycle Activity?
- What can I do with my students to help them become more effective in their resource use as consumers?

Extensions:

- Have students choose an object at home and repeat the process creating a product life cycle on paper for homework.



Additional Resources:

[The Story of Stuff](#)

Reeske, Mike, and Shirley Watt. Ireton. *The Life Cycle of Everyday Stuff*. NSTA Press, 2001.

Ryan, John C., and Alan Thein Durning. *Stuff the Secret Lives of Everyday Things*. Northwest Environment Watch, 1997.