

3.1 Trash Timeline

Exploring the Biodegradability of Trash

Overview Students will use common household objects to create a visual timeline depicting the rate of biodegradation of different materials.

Lesson Use the table below for lesson planning purposes.

Characteristics

Time Required	15-30 minutes
Key Concepts/Terms	Decompose; Biodegrade; Nutrient Cycling; 4 R's: Rethink, Reduce, Reuse, and Recycle
Prerequisites	None
Setting	Indoors or Outside; Small Groups

Learning Objectives After completing this lesson, students will...

- Understand that some materials biodegrade much more quickly than others; and
- Recognize trash items that can be recycled, reused or composted as alternatives to sending them to the landfill.

Materials Needed The table below lists the materials needed to conduct this activity.

Items Needed for the Whole Class	Items Needed for Each Group
Trash Timeline Display Board (to make a Trash Timeline Display board, attach one of each of the items you choose to put in student kits in the order in which they decompose, from fastest to slowest. Draw a line to connect these items in your "timeline.")	One Trash Timeline Kit composed of up to 10 items from the Biodegradation Rate Table below in a large, zip closure plastic bag.
Tape/Glue (hot glue works well)	
String/Twine	

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3.1 Trash Timeline, Continued

Background Information

Decomposition vs. Biodegradation

We generally use the words decompose and biodegrade interchangeably to mean “rot” in our society. Decomposition can also be used as the following: to break down into smaller pieces (physically). This is VERY different from rotting, and any claims of decomposition times by various industries should be researched carefully to understand how the word is being used.

Why Do We Care?

Nature recycles by breaking down organic (once living) material into nutrients to be used again by new plants. Humans interrupt this cycle when they use and discard non-biodegradable materials. This activity helps students make more “environmentally-friendly” choices in their daily lives.

Trash Timeline Kits

For the Trash Timeline Kits, choose 10 items from the list below and put them in a large, zip-closure plastic bag (one for each group of students).

BIODEGRADATION RATES	
Material	Time Required to Biodegrade
Paper Towels	2-4 weeks
Apple Core /Orange Peel (Add this in at the last minute. Do not store these in the plastic bag.)	2-4 weeks
Newspaper	2-4 weeks
Plain Cardboard (unwaxed)	3 months
Cotton cloth	3-6 months
Rope	1 year
Waxed Milk Carton	5 years
Cigarette	1-5 years
Disposable Diaper	10-20 years
Steel Can	80-100 years
Aluminum Can	200-400 years
Ziploc™ Bag	300 years
6-pack Ring	400 years
Plastic Bottle	450 years
Monofilament Fishing Line	600 years
Glass Bottle	Thousands to millions of years
Styrofoam™	?????

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3.1 Trash Timeline, Continued

Procedure

Follow the steps in the table below to conduct the activity. *Items in italics are possible student answers to questions.*

Phase	Step	Action
Engage	1	Prepare one completed Trash Timeline display, mounting the same materials that the students receive in their kits on the display board. Use the string as your “timeline” to show the order in which materials decompose, from fastest to slowest. Hide this “answer key” until students have completed their own Trash Timelines.
	2	Break a Styrofoam cup into pieces. Then cut an apple into pieces. Ask students to explain what will happen to these items over time. <i>The Styrofoam can break into small pieces, but will never biodegrade/rot, like the apple.</i>
	3	Ask students if they have ever heard the terms BIODEGRADE or DECOMPOSE . Discuss what they think these might mean and lead them to understand that these terms are synonymous with ROT .
	4	Explain that students will be completing an activity to learn about how different materials BIODEGRADE/DECOMPOSE/ROT .
	5	Pass out one Trash Timeline Kit (that you have prepared ahead of time) per group of 4-6 students.

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3.1 Trash Timeline, Continued

Procedure (continued)

Phase	Step	Action
Explore	6	Give students 10 minutes to sort the items in their Trash Timeline Kit (including the large, re-sealable plastic bag) into a “timeline,” from the item that they think will take the shortest amount of time to biodegrade to the item that they think will take the longest.
Explain	7	Once all groups are ready, have each group present their predictions/hypotheses to the class.
	8	Show your prepared Trash Timeline Display Board. Allow students to compare and rearrange their items to match the real timeline.
	9	Discuss the actual times that each material takes to biodegrade. For each item, discuss what natural resource was used to make it. Have students classify items are renewable/non-renewable.
	10	Ask students if they can think of items that are composites – items made of more than one material. What happens to these? <i>Examples could include diapers with plastic linings, milk cartons/juice boxes with wax/foil linings, etc.</i>
	11	Discuss which materials are reusable (plastic bags, rope), recyclable (plastic bottles, aluminum or steel cans, glass), or compostable (orange/apple, cotton, rope, paper). Compost is most likely a new concept for students and may need further explanation before they can identify which items can be composted.
12	Discuss why we buy and use non-biodegradable products. <i>Answers include convenience, low cost, etc.</i> Explain that we all make choices and we need to consider the consequences of our actions.	

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3.1 Trash Timeline, Continued

Procedure (continued)

Phase	Step	Action
Elaborate	13	<p>Use any of the following suggestions to elaborate on this activity:</p> <ul style="list-style-type: none"> • Have students research different materials to understand why they decompose at certain rates. • Have students create a “trash time capsule” where they collect different items and bury them. Later, dig up the capsule and examine the decomposition/biodegradation process. • Students can create different experiments to test the rate of decomposition/biodegradation by varying the materials, or the experimental setting (moist vs. dry; exposed to light/dark, etc.). • Visit a local landfill and discuss the rate at which it is filling with the manager. • Visit a local recycling center or start a recycling project at school or home.

