



Lesson 4

WHAT HAPPENS TO OUR TRASH & RECYCLABLES?

Lesson Focus

In this lesson students will learn which solid waste items can be recycled and which ones should be disposed of in the trash.

Lesson Objective

- Students will be able to correctly define single stream recycling.
- Students will learn how to correctly sort trash into landfill and recycle categories.

Grade Level	Duration	Subject Area	Vocabulary
3	45 Minutes	Science	material recovery facility, transfer station, curbside recycling programs, single-stream recycling program, drop off recycling programs

Louisiana Student Standards for Science

LSSS (2017) | K-ESS3-2

Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Louisiana Student Standards for Science

LSSS (2017) | 5-ESS3-1

Generate and compare multiple solutions about ways individual communities can use science to protect the Earth's resources and environments.

Materials List

Per Student

- 1 copy of **Activity Sheet #4**

Per Group

- 1 copy of **Activity Sheet #1** and **Activity Sheet #3**
- 1 set of waste cards - **Activity Sheet #2**, cut into individual cards and placed in an envelope
- 1 envelope

Activity Sheets

- Proper Waste Disposal Placemat
- Waste Cards
- Data Sheet: Can It Be Recycled?
- Check for Success

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Advance Preparation

1. Make a copy of **Activity Sheet #1** for each group of students.
2. Make copies of **Activity Sheet #2** and cut them into individual cards. Place each set of cards into an envelope.
3. Make a copy of **Activity Sheet #3** and **Activity Sheet #4**.

Background Information

According to the United States Environmental Protection Agency (EPA), the average American generates 4.9 pounds of trash every day or 1,788 pounds per year. That is almost a ton of trash per person, per year! Louisiana has a population of 4.574 million people (US Census Bureau, 2023). If each person in Louisiana generates 4.9 pounds of trash per day that totals 22.413 million pounds per day or 8.18 billion pounds per year! That is a lot of trash! Managing our trash with the goal of diverting as much as possible from the landfill is particularly important.

“Trash, or municipal solid waste (MSW), ...[is] various items consumers throw away after they are used” (EPA, 2023b). EPA reported that in 2018 (the most recent data available) “94 million tons of MSW were recycled and composted, equivalent to a 32.1% recycling and composting rate” (2023b). Other various waste management pathways accounted for 17.9% of the MSW, leaving “more than 146 million tons of MSW (50%)” to be landfilled (2023b).

EPA defines a landfill as a “discrete area of land or excavation that receives household waste” (2023a). When a landfill reaches capacity, the environmental engineers cap the landfill. All the trash that is collected must then be taken to a new landfill site. It is often difficult to find space for new landfill sites. We can extend the life of a landfill by reducing the amount of trash we produce and increasing recycling.

Recycling percentage rates since 2005 have hovered in the low- to mid-30’s range (Figure 1). By percentage, paper and paperboard are recycled the most (66.54%), with metal recycling running at 12.62% (Figure 2). With only 32.1% of recyclable and compostable MSW diverted from landfills, there is much room for improvement in increasing the amount of recycling we do. Given that landfills are finite in size and that over 50% of MSW is still destined for landfills, we need more communities to offer curbside and drop off recycling programs.

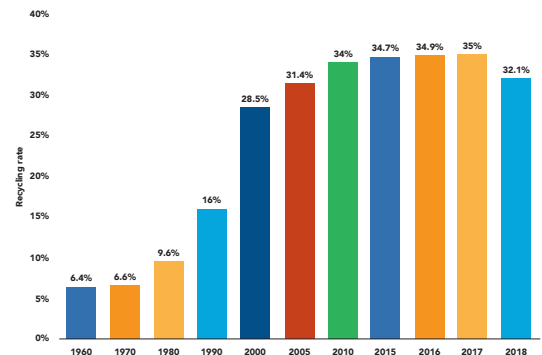


Figure 1. Municipal solid waste (MSW) recycling rate in the United States from 1960 to 2018. <https://www.statista.com/statistics/193928/percentage-of-us-municipal-solid-waste-recycled-since-1960/>

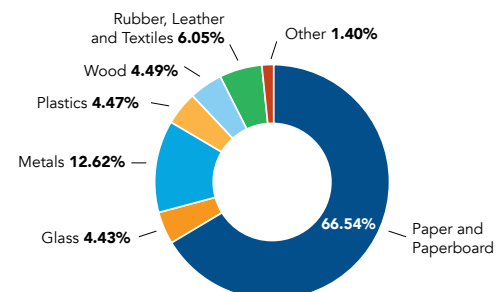


Figure 2. Municipal solid waste (MSW) recycling by material, 2018. 69.1 million tons. <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>

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Recycling programs for MSW divert recyclable materials away from landfills. Some communities offer curbside recycling programs and community drop off programs. **Curbside recycling programs** pick up recyclable materials that are placed in designated bins at the curb of households in a neighborhood. Many communities offer curbside recycling as a **single-stream recycling program**. This type of recycling program allows residents to put all recyclable items into a single recycling bin. The contents of the recycling bins are transported to a recycling sorting facility, called a **Materials Recovery Facility (MRF)**, where items are sorted, bailed, and sent to the proper handling facility. Another recycling management strategy is to have **drop off recycling programs** set up at sites around the city requiring residents to bring their recyclable materials to that central location. This recycling program also may be single-stream recycling.

The trash we throw away into our garbage cans is picked up by a garbage truck. When the garbage truck is full it needs to be emptied to make room for more trash. Instead of the garbage truck traveling long distances to the landfill to empty their load, they will instead drive to a nearby **transfer station**. At the transfer station, they empty their load of trash and can quickly return to their route to finish picking up trash. Larger trucks come to the transfer station to pick up loads of trash to take to the landfill. Only 32% of MSW is recycled, which means the loads of trash contain large quantities of materials that could have been recycled and kept out of the landfill.

Knowing what can be recycled and what needs to be thrown away is an important step in how to manage our waste properly. Below is a table of what can be recycled and what should be tossed into the trash. Note that some items can be recycled (electronics, batteries, etc.) through specific recycling efforts of retailers. This is called Specialty Recycling.

What can be Recycled and What Goes in the Trash Can

Check your local listing to see what can be recycled in your area.

Paper		
Recycle		Trash / Landfill
Junk mail	Paperboard boxes - cereal, tissue, frozen food boxes	Photos
White or colored paper	Gift catalogs, magazines	Hardcover books
Gift wrap	Newspaper	Cardboard greasy pizza boxes
Paper bags	Cartons - milk, juice, broth, soup and others	Paper plates with food remnants
Flattened cardboard boxes		Paper towels
Paperback books		Tissue paper
File folders, office paper, envelopes		Waxed paper

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Plastic			
Recycle		Trash / Landfill	
Plastics #1-5 & #7	Tops and lids from plastic containers	Plastics #6	Plastic wrap and film
Plastic bottles	Water bottles	Plastic coat hangers	Clamshell take out packaging
Rinsed out plastic food containers	Milk jugs	Plastic toys	Hard plastics like chairs and toys
Detergent bottles	Soda bottles	Plastic grocery bags**	Plastic solo cups
Shampoo bottles		Six-pack rings	Plastic silverware
Rinsed household cleaner bottles		Packing bubble wrap	Large yard/garbage bags
Rinsed bleach bottles		Styrofoam	Snack bags and packaging
			Straws

** Plastic grocery bags can be recycled at some Albertsons, Hi-Nabor, Matherne's, and Walmart stores. Ask your local grocery store if they accept recycled plastic bags. You can always request paper bags for your groceries!

Metal / Aluminum	
Recycle	Trash / Landfill
Aluminum cans	Aerosol cans
Tin cans	Wire Hangers
Rinsed food and pet cans	Non-food metal items
Metal Cans	

Specialty Recycling - Glass	
Recycle	Trash / Landfill
Glass food jars (remove lids)	Light bulbs
Glass containers	Mirrors
Glass beverage bottles	Window glass
	Drinking glasses
	Dishes

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Specialty Recycling	
Recycle	Trash / Landfill
Printer ink and toner cartridges	
Electronics and computer hardware	
DVDs	
Mobile phones	
Telephone and computer cables	
Computer monitors	
Laptops	
Computers	
Xboxes and PlayStations	
Printers	
Batteries	
Paint	
Plastic shopping bags in some areas**	

References

- Baton Rouge Parish of Department of Environmental Services Recycling Division. (2018). The Red Stick Green Guide. Available at <https://www.brla.gov/DocumentCenter/View/4621/2018-Green-Guide-first-edits-made>
- Louisiana Department of Environmental Quality. (no date). Recycling Resources and Recyclers. <https://deq.louisiana.gov/page/recycling-resources-and-recyclers>
- Republic Services, Baton Rouge. (2023). Acceptable Recycling Materials. <https://www.republicservices.com/residents/recycling/basics>
- US Census Bureau (2023). QuickFacts. Louisiana. <https://www.census.gov/quickfacts/fact/table/LA/PST045222>

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- US EPA. (2023a). Municipal Solid Waste Landfills. Available at <https://www.epa.gov/landfills/municipal-solid-waste-landfills>
- US EPA. (2023b). National Overview: Facts and figures about materials, waste, and recycling. Available at <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>
- US EPA. (2023c). Reduce, Reuse, Recycle Resources for Students and Educators. Available at <https://www.epa.gov/recycle/reduce-reuse-recycle-resources-students-and-educators>

Procedure

Engage – 8 Minutes

1. Watch: Homewood Disposal. **Sorting and Recycling Facility – Follow the Process.**
Accessed at <https://www.youtube.com/watch?v=3Lzsu8SXaWY> (4:01)
 - **What is a MRF (pronounced 'merf')?** *It is an acronym for Materials Recycling Facility, a place where recyclables are brought and sorted.*
 - **What materials are sorted on the conveyor belt?** *Items that cannot be recycled are removed first. Then items that can be recycled such as cardboard, paper, plastic containers, tin cans, and aluminum cans are separated.*
 - **The last stop at the recycling center is a baler. What does this machine do?** *It puts each type of recyclable material into large bunches called bales. It prepares it to be transported to a processor.*
 - **Why is it important to recycle as much material as possible?** *Recycling diverts trash from the landfill, which extends the life of the landfill. Recycling also conserves natural resources when virgin materials are not required to make new products.*
 - **What happens when items that cannot be recycled are put in the recycle bin?** *Items that are placed in the recycling bin that cannot be recycled contaminate the entire load. This sometimes can result in the load going to the landfill instead of being recycled as it is often too hard to separate the trash items from the recyclables.*

Explore – 30 Minutes

1. In this activity students will learn what should be disposed of in the trash, destined for the landfill, and what can be recycled. Students will work with a partner to do this activity. Each student pair should be given a data sheet (**Activity Sheet #3**), a proper waste disposal placemat page (**Activity Sheet #1**) and an envelope filled with cards. Students are to decide whether the item on the card is something that can be recycled or if it should be put in the trash can destined for a landfill.
2. Allocate 20 minutes for students to pull the cards, place each card in the appropriate waste disposal section on **Activity Sheet #1** and complete the data sheet.
3. Students should discuss each item with their partners when deciding if the item can be recycled or if it should go in the trash.

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Explain – 10 Minutes

During this section, discuss which items should be thrown away and which items can be recycled.

1. **What are some plastic items that can be recycled?** *plastic water bottles, rinsed out plastic food containers (no clamshells), detergent bottles, shampoo bottles, rinsed household cleaner bottles, rinsed bleach bottles, tops and lids from plastic containers*
2. **What are some plastic items that cannot be recycled?** *plastic bags, plastic coat hangers, plastic toys, six-pack rings, packing bubble wrap, Styrofoam, dirty plastic items, plastic furniture*
3. **What are some glass items that can be recycled?** *clear glass, green glass, brown glass, glass bottles and jars*
4. **What are some glass items that cannot be recycled?** *light bulbs, mirrors, window glass, drinking glasses, dishes*
5. **What are some electronic items that can be recycled at special locations?** *printer ink and toner cartridges, electronics and computer hardware, cell phones, telephone and computer cables, computer monitors, laptops, computers, Xboxes and PlayStations, printers*
6. **What are some metal items that can be recycled?** *aluminum cans, rinsed food cans, metal lids, tin cans, metal cans*
7. **What are some metal items that cannot be recycled?** *aerosol cans, wire hangers, non-food metal items*
8. **What are some paper items that can be recycled?** *junk mail, newspaper, white or colored paper, paper gift wrap (no foil), paper bags, cardboard, paperback books, gift boxes, cereal boxes, gift catalogs, magazines*
9. **What are some paper items that cannot be recycled?** *photos, hardcover books, greasy pizza boxes, dirty paper items*
10. **Why is recycling materials so important?** *It diverts materials from the landfill, extending the life of the landfill. It reduces the use of natural resources needed to create new items.*

Expand – 10 Minutes (Optional)

1. Watch: **Where Does My Trash Go After It Is Picked Up?** Homewood Disposal Systems. Accessed at <https://www.youtube.com/watch?v=jQCBvG7s58c>. (2:26)
 - **When the garbage truck picks up your trash at your curb, where does it go?** *A garbage truck picks up household trash in neighborhoods usually on a weekly basis. When the garbage truck fills up it needs to be emptied to make room for more trash. Instead of the garbage truck traveling, sometimes long distances to the landfill to empty the load, they will drive to a transfer station. At the transfer station, they empty their load of trash and can quickly return to their route to finish picking up trash.*
 - **What happens at the transfer station?** *At the transfer station, all the trash is loaded onto much larger trucks and taken to the landfill.*
 - **Can landfills be hazardous to the environment?** *Modern landfills are designed to keep toxic trash contained but unfortunately leaks do happen. Landfills can also emit harmful gases like methane and carbon dioxide, which contribute to climate warming. However, monitoring, regulations, and*

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technology to capture gas and leachate (contaminated liquid at the bottom of the landfill) have improved the environmental impacts.

- **Why can't we just let the CO₂ and CH₄ (methane) gas escape into the atmosphere?** Methane is a potent greenhouse gas that traps heat and contributes to global climate warming.
- **How does recycling help landfills?** Recycling extends the life of a landfill because it reduces the amount of waste taking up space in a landfill.
- **What do you think happens when a landfill is full?** When a landfill is full, the environmental engineers cap the landfill. All the trash that is collected must be taken to a new site. It is often difficult to find space for new landfill sites. We can extend the life of a landfill by reducing the amount of trash we produce and increasing recycling.

Take Action

1. Students can make posters to demonstrate how they can reduce the trash that goes to the landfill. *Using reusable water bottles instead of single-use ones, packing their lunch in reusable containers instead of disposable plastic baggies, refusing plastic straws and extra napkins are a few ways to reduce trash.*
2. Students can take a tour of a Material Recovery Facility (MRF) or landfill. After the tour, they can write a letter to the mayor or community leaders explaining what they learned and the importance of recycling.

Evaluate

1. Hand out copies of **Activity Sheet #4**.

Online Resources

GreenWaste Material Recovery Facility (MRF Tour)

<https://www.youtube.com/watch?v=zmMAIYMfw9k> (4:57)

Shows what goes on at the GreenWaste Material Recovery Facility.

Homewood Disposal. **Sorting and Recycling Facility - Follow the Process.**

Accessed at <https://www.youtube.com/watch?v=3Lzsu8SxaWY> (4:01)

Follows the recycling and sorting process from curbside to finished sorted materials ready to be reused.

KCAL (2020). **What happens to the trash when it is taken away? The Landfill Supervisor Knows.**

Accessed at <https://www.youtube.com/watch?v=vQZorKBOCsg> (3:01)

Meet Amanda, an environmental geologist, who manages a landfill. Learn more about landfills in her talk about methane collection and leachate (trash juice).

Mystery Science. (2020). **What do garbage trucks do with garbage?**

https://www.youtube.com/watch?v=1ZtlC_pog-E (7:27)

A comprehensive look at landfills and how they are created. The video covers composting, incinerators, and recycling.

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NowThis Originals. (2018). **What happens to your recycling after it is collected?**

Accessed at <https://www.youtube.com/watch?v=s4LZwCDaoQM> (5:46)

An excellent video that tells the story of how recyclables are moved through a material recovery facility. The video explains the value of recyclable materials.

Republic Services. **Welcome to Recycling 101.**

<https://www.republicservices.com/residents/recycling-and-solid-waste/recycling-education>

This website provides a variety of information including virtual field trips to a landfill and a recycling facility, information on improving how you recycle, and a variety of activity sheets.

Children's Books

Disney, R.H. (2014). **Smash Trash!** (Disney/Pixar WALL-E).

Random House Children's Books. ISBN-13: 9780385389792 [e-book]

Readers are introduced to WALL-E, a trash-compacting robot. Ages 5 - 8 years.

Flynn, S.W. (2017). **This Book Stinks! Gross Garbage, Rotten Rubbish, and the Science of Trash.**

Disney Publishing Group. ISBN-13: 9781426327308.

This book is filled with infographics, photos, statistics, facts, quizzes and activities to inspire kids to act. Ages 8 - 12 years.

Showers, P. (2015). **Where Does the Garbage Go?**

HarperCollins Children's Books. ISBN-13: 978-0062382009

This book explains how people create too much waste, how waste can be recycled and what happens to waste in a landfill. Ages 4 - 8 years. Read aloud at <https://www.youtube.com/watch?v=1lbM727ISQA>