Lesson 2

ROADSIDE LITTER SURVEY

Lesson Focus

In this lesson, students will become scientists conducting a litter survey on Louisiana's roadways. This activity is a simulation of a roadside litter survey conducted by researchers in 2023.

Lesson Objective

- Students will collect data from the litter cards during the simulation, sort them into categories on the data sheet, and record it on the data sheet with 100% accuracy.
- Students will correctly express data collected from the simulation graphically using a bar graph.
- Students will draw appropriate conclusions based on the data collected by writing at least one or two sentences that correctly summarize the litter data found on Louisiana roads.

Grade Level	Duration	Subject Area	Vocabulary
3	45 Minutes	Math, Science	litter, trash

Louisiana Student Standards for Math

3.MD.B.3

Draw a scaled bar graph to represent a data set with several categories.

Louisiana Student Standards for Science

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 Sheets #2***
- 1 copy of ***Activity Sheets #3*** *(optional)*

Per Group

- 1 copy of ***Activity Sheet #1*** - see Advance Preparation, Step 1
- Envelopes or paper bags

Lesson 2
ROADSIDE LITTER SURVEY

Activity Sheets

- Visible Litter Simulation Cards
- Simulated Visible Litter Survey
- Check for Success

Advance Preparation

1. Print one set of ***Activity Sheet #1*** per pair of students. Cut the 20 litter cards apart and place them in an envelope or paper bag.
2. Make a copy of ***Activity Sheet #2*** for each student.
3. Make sure you can view the Engage video on your classroom projection system.
4. Make a copy of ***Activity Sheet #3*** for each student. *(optional)*

Background Information

Trash is waste that is disposed of properly. Paper, fast-food wrappers, beverage cans, Styrofoam, cardboard, plastic bottles, cigarette butts, tire and car parts, plastic bags, clothing, plastic wrapping, and even biodegradable items are examples of trash items, but if they are improperly discarded, they become **litter**. Unfortunately, many of these items are common sights along Louisiana roadways.

In 2023, Keep Louisiana Beautiful conducted a comprehensive litter study comprised of a roadside litter survey, a cost of litter survey, and a public attitude survey. The roadway litter survey documented an astounding 143 million pieces of litter on interstates, LA highways, and U.S. highways in Louisiana. The survey team sampled 137 sites that represented rural, suburban, and urban locales. Litter at each site was counted in an area 300 feet long by 15 feet in depth. Litter items found in this rectangular area were classified by category, item, and material type. Below are the descriptors for each of the 11 litter categories. The complete report can be found on the KLB website at https://keeplouisianabeautiful.org/litter-study.

Litter Summary Categories, Items, and Packaging Material
(from KLB Roadway Litter Study, Table 2-1, p. 3-4)

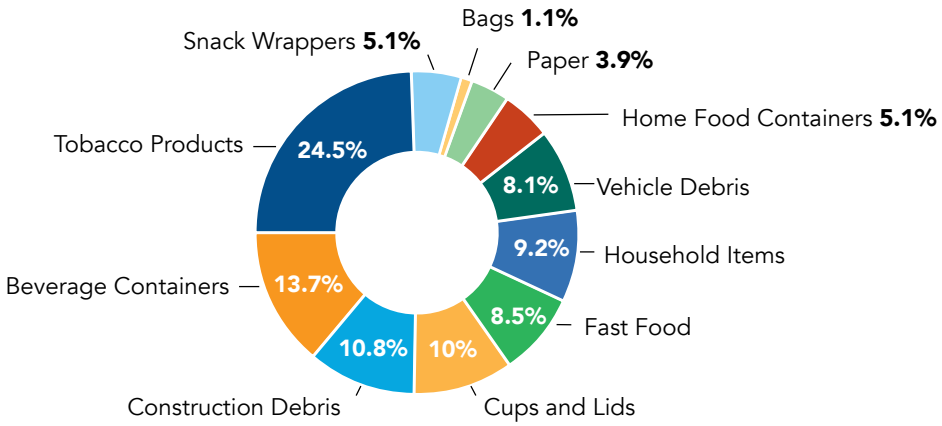
Category	Item	Material
Bags	Fast food, retail, trash, leaf bags	paper, plastic, cloth
Beverage Containers	Beer, soda, sports, energy, water, wine/liquor, juice, tea	metal, plastic, glass, composite
Construction Debris	Shingles, lumber/wood, electrical, drywall, foam, insulation, industrial rags, tarps	metal, plastic, polystyrene foam, composite, wood
Cups and Lids	Cups for hot or cold drinks, lids, straws, wrappers	paper, plastic, polystyrene foam
Fast Food	Boxes, clamshells, trays, plates, utensils, napkins	composite, paper, foil, plastic, polystyrene

Litter Summary Categories, Items, and Packaging Material *Continued*
(from KLB Roadway Litter Study, Table 2-1, p. 3-4)

Category	Item	Material
Home Food Containers	Food jars, cans, bottles, lids	composite, glass, metal, plastic, polystyrene foam
Household Items	Clothing, hygiene items, appliances, packaging of items used at home	composite, cloth, metal, plastic, polystyrene foam
Paper	Non-food/beverage paper, e.g., newspapers, magazines, flyers, lottery tickets, business, school, receipts, packaging, paperboard, corrugated boxes	paper
Snack Wrappers	Sweet snacks (candy, cakes), salty snacks (chips, crackers), gum	paper, plastic, composite
Tobacco	Cigarette or cigar butts, lighters, matches, boxes, wrapping, pouches and other packaging. Each was separately classified.	tobacco, plastic, metal, composite
Vehicle Debris	Automobile parts from accidents, car maintenance debris, tires, tire debris	tire, rubber, metal

Aggregate Litter by Category (Figure 2-3)

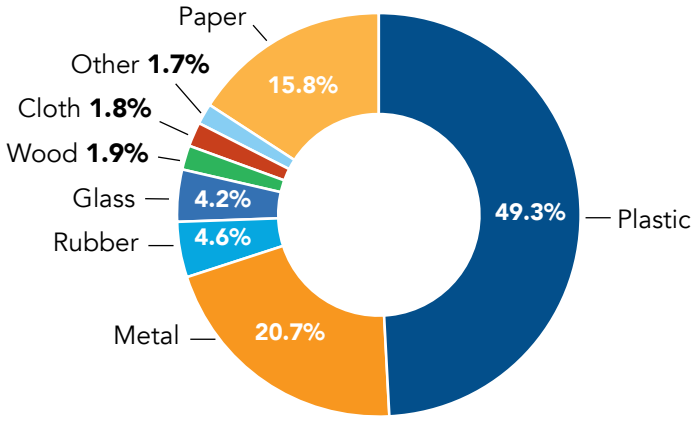
The graph below shows the percentages of aggregate (visible and micro) litter by category. Tobacco products were the most prevalent type of aggregate litter (24.5%), followed by beverage containers (13.7%), and construction debris (10.8%).



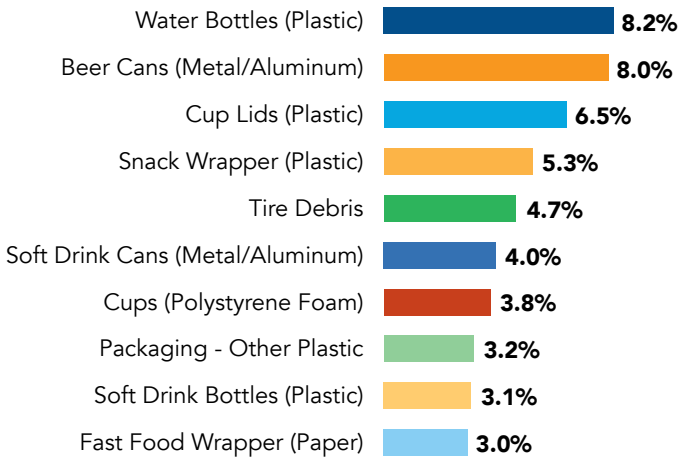
Note: Since this lesson has been created for children, the aggregate category of tobacco has been removed from the activity. The remaining 10 aggregate categories are all used in the simulation.

Packaging Materials for Visible Litter (Figure 2-11)

Plastic (49.3%) was the most significant and pervasive visible litter packaging material. Metal (20.7%), predominantly aluminum beverage cans, was the second most common packaging material found at the survey sites, followed by paper (15.8%). Figure 2-11 shows the breakdown of visible litter by packaging material type.



Top 10 Visible Litter Items (Figure 2-9)



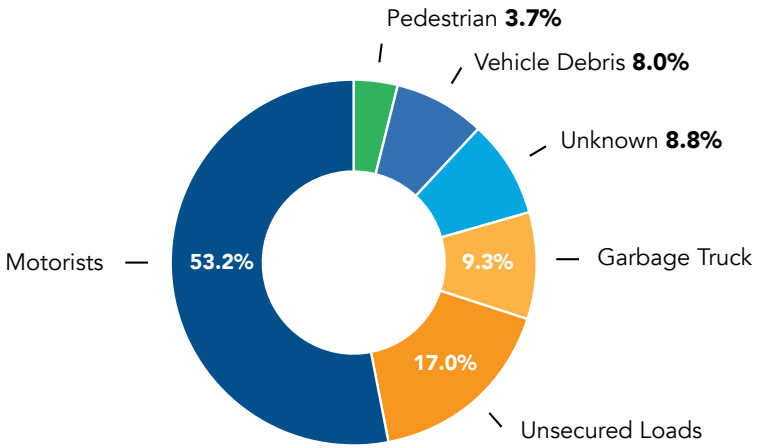
Litter Source Estimates

Determining the exact sources of litter without witnessing it, can be difficult. However, based on site conditions and guidelines developed and refined over time, identifying the likely sources of litter is possible. The litter source may be determined based on context clues such as:

- types, amounts, conditions, and locations of littered items
- proximity to specific land uses, e.g., solid waste facilities, convenience stores, construction sites, and fast-food establishments
- roadway type, e.g., accessibility by pedestrians

Lesson 2
ROADSIDE LITTER SURVEY

Top Sources of Litter (figure 2-14)



References

- Carson, C. (2023a). Louisiana Litter Research: Executive Summary. Keep Louisiana Beautiful. Available at https://keeplouisianabeautiful.org/litter-study

Procedure

Engage – 8 Minutes

1. Watch a short video of the introduction to the movie, WALL-E, https://www.youtube.com/watch?v=QHH3iSeDBLo (1:18; note: a bra appears as an item of trash at 0:29-0:35)
   - **What's going on when we are introduced to WALL-E?** *WALL-E, a robot, spends every day doing what he was made for… which is pickup and compacting litter left behind on Earth.*
   - **What does WALL-E do with the litter he picks up?** *WALL-E compacts it and builds structures out of the trash cubes. He also saves some of the trash he finds interesting by keeping it in a red cooler.*
   - **Where did all this trash come from?** *People left it behind. There was so much litter and trash that they had robots like WALL-E picking it up to get it out of the way. There was more trash than there was space in city's landfills, so litter began building up in the cities.*
2. To introduce the lesson, explain to students that they are going to be science researchers who will be going out to the field to determine what types of litter are found on Louisiana roadways. To prepare for this fieldwork, ask students the following questions:
   - **What kind of litter have you noticed on the roads leading to your school? What kind of litter have you noticed around your neighborhood?**
   - **How might litter on the sides of our roads in our cities, neighborhoods and rural areas be a problem?** *Litter is unsightly, sometimes dangerous to humans, often dangerous to wildlife, etc.*

Explore – 30 Minutes

1. Distribute the litter card envelopes or bags to each pair of students and one ***Activity Sheet #2*** to each student. Explain that in this activity students will simulate being scientists investigating the types of litter categories found on Louisiana roadways. To simulate the fieldwork, students draw litter cards from the envelope or bag and record the data on ***Activity Sheet #2***.

2. Students record data over five simulated days. Students draw a litter card and record the type of litter on their data table. After recording the data, they return the litter card to the envelope or bag, mix up the litter cards within the envelope or bag and then draw another litter card. They will repeat this process until they have recorded 10 pieces of litter data in the table for each of the five days. Have the students follow the directions on the ***Activity Sheet #2***.
3. When students have completed recording their data for the five days, they should begin to graph their data as a bar graph. Students will need to scale and name the vertical axis. The x-axis categories are already provided. Students should provide a title for their graph.
4. Students should write a one or two sentence conclusion based on the data they collected and graphed.

Explain – 15 Minutes

1. Have students share their graphs with the class and orally describe the types and numbers of litter that were found on their five days of litter observations.
2. Some questions you might ask students include:
   - **Show us your graph and tell us what you learned from your data.**
   - **Did anything surprise you about the types of litter that are found on Louisiana roadways?** *Some students might report that they are surprised at how many beverage bottles and cans end up on Louisiana roadways.*
   - **What items were most commonly found on Louisiana roadways?** *Beverage containers, drinking cups, and fast-food packaging.*
   - **What items were less common on Louisiana roadways?** *Home food containers, plastic bags and household items.*
   - **How does all this litter end up on Louisiana roadways?** *Motorists are the source of most roadside litter. Littering can be unintentional and intentional. An example of unintentional littering is when plastic covering a box on a truck bed shreds in the wind as the vehicle moves down the roadway and lands on the side of the road. Intentional littering is when people toss their trash out the window of a car or deliberately drop it on the ground without finding a trash can.*
   - **Look at the categories on your graph. What are some unintentional ways that trash can end up as litter on the roadways of Louisiana? Can you think of ways that intentional litter happens for each of your survey categories?**
   - **What do you think is the source of the litter on the roadways?**
   - **How might you be able to prevent or reduce the litter in your graph?**

Expand – 15 Minutes *(Optional)*

1. Now let's look at a real research study to see what type of visible litter is found on Louisiana's roadsides. Have students look at the graph of the Keep Louisiana Beautiful Roadside Litter Survey of August 2023 (Step 4 of ***Activity Sheet #2***). Ask students to look at their graphs and compare their data to the graphed 2023 data.
   - **What are some similarities between your data and the 2023 Roadside Survey data?**
   - **What are some differences?**
   - **Why might your data look different from the 2023 Roadside Survey data?**

Take Action

1. Make litter prevention signs and hang around school.
2. Write and make a pledge not to litter.
3. Identify items being thrown away in the classroom and/or the cafeteria. Identify what is recyclable and what can be reused.

Evaluate

1. Hand out copies of ***Activity Sheet #3*** *(optional).*
2. Graphs and completed ***Activity Sheets #2*** can be graded based on whether the student correctly grouped and counted the different types of litter that were collected during their simulation.

Online Resources

Carson Consulting. (2023). **2023 Keep Louisiana Beautiful Litter Study.**
Available at https://keeplouisianabeautiful.org/litter-study

Burns-McConnell Research Team (2021). **2020 National Litter Study: Summary Report, May 2021.**
Keep America Beautiful. 47 p.
Available at https://kab.org/wp-content/uploads/2021/05/Litter-Study-Summary-Report-May-2021_final_05172021.pdf

Karimi, K., & Faghri, A. (2021) **The issues of roadside litter: A Review Paper.**
Current Urban Studies, 9, 779-803.
Available at https://www.scirp.org/journal/paperinformation.aspx?paperid=113864

Children's Books

Dejito, R. (2023). **Poly's Woeful Adventures.**
Rachel Dejito Publishing. ISBN-13: 9786210607475
Readers follow the journey of a discarded piece of trash. Ages 9 - 12 years.

Parker, T. (2022). **Talking Trash on the Bayou.**
Amazon Digital Services. ISBN-13: 9798351142371
Readers learn the effects of litter on humans, animals, and the environment. Ages 9 - 12 years.