

# TURNING THE TIDE ON TRASH

**A LEARNING GUIDE ON MARINE DEBRIS**



## LESSON FOUR

# Marine Debris – Data Mining

**Grade Level:**  
Grades 6 – 8

**Subjects:**  
Language Arts, Mathematics, Science, Social Studies

**Overview:**  
This lesson is designed to increase students' awareness of different kinds of debris in water environments, and the impact it may have on animals, humans, and aquatic habitats. Students learn about different trash items and define “marine debris” through a discussion about these items. Students then categorize debris and use statistics and graphing to describe the types and amounts of marine debris that are found each year.

**Objectives:**

- Define “marine debris.”
- Learn how marine debris items are classified by activities that reflect how the debris found its way into water.
- Learn to create charts and graphs using raw data.
- Discuss results of charts and graphs.

**Vocabulary:**  
debris, foamed plastic, marine, marine debris, trash

**Materials:**

- Handouts with a table showing the “Top Ten” debris items found during the International Coastal Cleanup
- “Marine Debris: Raw Data 2001-2005”

handout of from the International Coastal Cleanup (ICC)—a summary of items collected during cleanups

**Learning Skills:**  
Analyzing, Calculating, Classifying, Graphing/Charting, Communicating, Percentages

**Duration:**  
40 minutes

## Activity

**1.** If the students have not learned about marine debris prior to this lesson, begin the lesson by reviewing the sources and impacts of marine debris. Highlight how most debris found in our oceans is preventable through proper handling and disposal of waste items.

**2.** Distribute the “Marine Debris: Raw Data 2001-05” handouts to the class, or make it available on classroom computers. Inform the students that the data are from The Ocean Conservancy, a U.S. marine conservation organization that sponsors annual beach cleanup events all over the country and the globe. Explain that hundreds of thousands of volunteers record the items they find when they clean up beaches each September and send this information to The Ocean Conservancy, which compiles, prepares, and analyzes the data each year.

**3.** Instruct the students to use the data from Ocean Conservancy to make a bar



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Beach cleanup data card

graph comparing the quantities of the debris in each of the categories shown on the chart of raw data. Show students how to make the bar graphs using Excel or a similar software program. Students will prepare a bar graph for each activity (“Shoreline and Recreation Activities,” “Ocean and Waterway Activities,” etc.). All the charts should be titled (e.g., “Marine Debris from Shoreline and Recreation Activities,” etc.), and the horizontal and vertical axis should be labeled.

**4.** Once the bar graphs are complete, have the students discuss the results.

- Ask if bar graphs are the best format to display the data.
- Were there any numbers on the data sheet that surprised the students?
- Looking at the data sheet, ask students to find the debris item with the lowest number of items found and the debris item with the largest number.
- Discuss alternative charting techniques that might be used for illustrating the relative quantities of marine debris types.

**5.** Have the students add up the number of items in each category. Students can use the

software program to add up these items, or you can have them do it without computer help. Then, have the students add all the categories together for a grand total. Have students derive the percentage each marine debris category represents by using the category totals and the grand total.

**6.** Using these percentages, have the students create pie charts, again using Excel or similar software.

**7.** Using all the charts and graphs, discuss with students which categories of marine debris are most common.

**8.** Students can create a three-dimensional bulletin board to display the bar graph or pie chart. Examples of the types of trash represented by the bar graph could be glued or taped onto the board around the graph.

**DIVE DEEPER:**

Other Resources on Marine Debris

- NOAA’s Marine Debris website:  
[www.marinedebris.noaa.gov](http://www.marinedebris.noaa.gov)
- EPA’s Marine Debris site:  
<http://water.epa.gov/type/oceb/marinedebris/index.cfm>

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## EXTENSIONS

## Trash Stats

Americans generate large amounts of household trash every year. In 2010, each person in the United States produced approximately 5 pounds of trash each day! See if you can work out these trash math problems to learn even more.

1. In 1990, Americans recycled and composted 34 million tons of trash. In 2005, approximately 79 million tons were recycled and composted. By how many tons did recycling and composting increase from 1990 to 2005? In the United States, a ton is a unit of weight equal to 2000 pounds or (907 kilograms). Recalculate the amount recycled and composted using pounds or kilograms instead of tons as the unit of measure.
2. Research the current population of your state or territory. How many aluminum cans or plastic bottles would be thrown away if everyone drinks two canned or bottled sodas a day for a week and for a year?
3. Of the 196 million tons of trash generated in the United States in 1990, about 16 million tons were plastic. What fraction of the total trash generated was plastic? Reduce this fraction. Of the nearly 246 million tons of trash generated in the United States in 2005, about 29 million tons were plastic. What fraction of the total trash generated was plastic? Reduce this fraction and compare to the 1990 number.
4. Americans produced 84 million tons of paper waste in 2005. In that same year, Americans produced a total

of nearly 246 million tons of trash.

What percentage of the total trash generated did paper make up?

5. Of the nearly 246 million tons of trash generated by Americans in 2005, about 54 percent was landfilled (the rest was recycled, composted or burned for energy). How much trash, by weight, was landfilled?

6. Create pie charts and bar graphs using the following data from the International Coastal Cleanup.

#### “Top Ten” Most Frequently Collected Marine Debris Items

Data collected by volunteers worldwide during the International Coastal Cleanup (1986 – 2010)

Item	25 Year Totals
Cigarettes/Cigarette Filters	52,907,756
Food Wrappers/Containers	14,766,533
Caps, Lids	13,585,425
Cups/Plates/Utensils	10,112,038
Beverage Bottles (Plastic)	9,549,156
Bags (Plastic)	7,825,319
Beverage Bottles (Glass)	7,062,199
Beverage Cans	6,753,260
Straws/Stirrers	6,263,453
Rope	3,251,948
<b>Total</b>	<b>132,077,087</b>

The International Coastal Cleanup is organized annually by the Ocean Conservancy.

[www.oceanconservancy.org/our-work/marine-debris/](http://www.oceanconservancy.org/our-work/marine-debris/)

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HANDOUT

## Marine Debris: Raw Data 2001-2005

	2001	2002	2003	2004	2005	TOTALS
<b>Shoreline and Recreational Activities</b>						
Bags	221,647	190,477	170,053	158,037	131,758	3,346,666
Balloons	46,177	57,387	45,996	43,136	40,435	475,863
Beverage Bottles (Glass)	205,772	226,251	211,359	199,804	159,941	2,329,142
Beverage Bottles (Plastic) 2 liters	189,591	223,029	227,260	209,075	187,724	1,965,210
Beverage Cans	202,983	238,826	207,225	189,132	148,000	2,293,559
Caps, Lids	306,428	363,857	356,523	339,841	306,498	4,186,593
Clothing, Shoes	50,836	50,205	48,807	48,293	43,311	661,794
Cups, Plates, and Utensils	196,018	250,511	205,301	188,262	192,636	3,575,209
Food Wrappers & Containers	295,109	444,447	418,795	390,995	356,447	3,318,729
Pull Tabs	39,094	49,277	50,971	43,904	39,521	458,765
Shotgun Shells/Wadding	17,824	16,792	20,689	14,247	14,497	63,360
Six-Pack Holders	14,919	20,987	18,244	18,897	16,365	298,075
Straws, Stirrers	151,660	182,794	180,091	158,984	134,538	1,960,122
Toys	32,510	37,365	37,956	38,154	33,332	314,091
<b>Ocean and Waterway Activities</b>						
Bait Containers/Packaging	19,855	21,511	21,126	18,529	15,154	75,049
Bleach/Cleaner Bottles	10,842	14,263	11,743	11,290	8,220	195,111
Buoys/Floats	17,457	19,494	18,737	12,110	11,212	245,496
Crab/Lobster/Fish Traps	5,463	6,035	7,860	3,685	4,713	62,755
Crates	2,640	2,580	2,782	2,140	2,264	28,929
Fishing Line	27,828	32,741	32,862	25,981	27,741	416,456
Fishing Lures/Light Sticks	10,593	14,082	12,593	11,955	10,693	234,619
Fishing Nets	6,281	6,278	7,737	5,359	5,377	111,502
Light Bulbs/Tubes	4,980	5,520	4,854	4,614	3,389	114,174
Oil/Lube Bottles	11,582	14,120	10,838	10,331	8,605	203,465
Pallets	2,190	2,433	2,839	2,051	1,895	45,021
Plastic Sheeting/Tarps	41,268	44,163	47,247	40,436	40,567	316,170
Rope	57,591	57,099	61,379	47,871	41,970	925,301
Strapping Bands	20,367	18,829	22,730	16,858	13,833	249,521
<b>Smoking-Related Activities</b>						
Cigar Tips	57,792	67,649	72,078	56,551	54,433	236,425
Cigarette Lighters	22,856	21,369	21,362	17,845	22,903	344,411
Cigarettes/Cigarette Filters	1,286,116	1,345,833	1,426,613	880,807	1,008,288	12,848,255
Tobacco Packaging/Wrappers	48,786	51,090	49,564	39,353	35,859	175,088
<b>Dumping Activities</b>						
55-Gallon Drums	890	769	833	864	559	32,257
Appliances	1,234	1,606	2,061	1,788	1,510	6,138
Batteries	5,241	6,304	6,135	5,836	5,107	22,488
Building Materials	49,579	55,388	54,935	59,255	49,224	847,816
Cars/Car Parts	10,217	10,447	9,891	10,206	8,216	39,086
Tires	7,196	6,828	6,916	8,031	5,739	104,539
<b>Medical and Personal Hygiene</b>						
Condoms	7,339	8,209	7,576	7,329	6,818	83,694
Diapers	7,565	7,776	5,897	5,863	5,022	112,213
Syringes	2,245	2,529	2,910	2,937	2,837	48,405
Tampons/Tampon Applicators	10,261	11,435	10,155	11,874	8,617	179,555
<b>TOTALS</b>	<b>3,726,822</b>	<b>4,208,585</b>	<b>4,141,523</b>	<b>3,362,510</b>	<b>3,215,768</b>	<b>43,551,117</b>

Source: Ocean Conservancy, ICC Data Reports (2001-2005). [www.oceanconservancy.org/our-work/marine-debris/](http://www.oceanconservancy.org/our-work/marine-debris/)