



GUIDE Classroom Waste Investigation

What is a Classroom Waste Investigation?

Ever wonder how well your school is recycling? A waste investigation, also known as a waste audit, is a structured process used to quantify the amount and types of waste being generated in a defined building space. Information from waste audits help identify current recycling practices and how they can be improved. In schools, they serve as a tool to:

- Educate students about the importance of recycling.
- Measure effectiveness of existing waste management systems.
- Incorporate experiential learning into classroom subjects.
- Engage students in the science of data collection, data analysis and data presentation.
- Identify ways of reducing consumption and reusing classroom materials.

Believe it or not, waste audits are a fun activity for students to engage in. If you think about it, how often do you get to explore what's in your waste and why? Let the waste investigation begin!

Planning

- Form a group of 10-15 students.
- Obtain permission from your Principal to conduct the waste audit in the cafeteria, gym or an open outdoor space.
- Identify which classrooms' bins you'll be investigating. Depending on the number of students involved, choose how many classrooms you'll be collecting from. Inform teachers.
- Inform your custodial staff when and where you'll be conducting the waste audit so that they do not empty classroom bins prior to your activity. Determine with your custodial staff where to put materials following the completion of your audit.
- It would be helpful to borrow an empty dual-bin dolly from your custodian and label bags clearly.
- **SAFETY CONSIDERATIONS:** Do NOT sort waste from bathrooms or health-related areas. Remind students to wear closed shoes on the day of the audit.



TIP: Before waste audit day, meet with the student group to review instructions and data collection sheet. You may even conduct a smaller, sample audit from one classroom! Let students know that it may get messy.

Time Required: 1.5 hours approximately

Materials Needed: email schoolrecycling@grownyc.org to rent a Waste Audit kit for free.

3 data sheets	3 scales for weighing	3 large clear plastic trash bags
Plastic tarp(s)	3 clipboards	3 sets of waste category signs
Rubber gloves	Hand sanitizer	NYC's Recycling Signs for all 3 waste streams

Preparation

- Review NYC's recycling rules, so that students can sort items into proper categories.
- Review Data Collection procedure and Data Sheet.
- Divide participants into 3 teams (Green/Blue/Trash). All teams should designate members to set up, collect, sort, weigh, and record data.
- Inform students which classrooms the materials will be collected from. Note: If a classroom has more than 3 bins, assume unlabeled or extra bins are Trash.
- Ensure dual bin dolly is empty and the bags are correctly labeled.
- Distribute **Bin Team Directions** to each group.
- Hand out materials and protective gear to students and repeat safety considerations.

Data Collection

Collect Bin Materials

- Designate one member from each group to go and collect bin materials. Ensure that materials are going into the corresponding bag in the dual-bin dolly. **Collect materials as found from bins.**
Note: Green Bin Team member will collect items from green bins in each classroom, Blue Bin Team member will collect items from blue bins in each classroom, and Trash Bin Team member will collect items from trash bins in each classroom.
- The remaining members should lay down tarps, designate 3 separate areas for sorting, and read **Bin Team Directions**.
- Once all materials are collected, team members will bring the materials to their designated tarp area.



TIP: To minimize the mess, leave trash items in the bag and pick out recyclables to sort and weigh separately.

Collect and Analyze Data

Use **DATA SHEET Classroom Waste Investigation** form to collect and record data.

- Record all measurements in pounds (lbs.) to 1 decimal place (e.g. 2.1 lbs.)
- MGPC = Metal, Glass, Hard Plastic, Cartons

Use **DIRECTIONS Data Analysis** document to assist in analyzing the data.

Clean-up

- Put sorted recyclables and trash into 3 separate clear bags.
- Take bags to your schools waste storage or setout area designated by your custodial staff.
- Clean up any spillage on tarps and put away all tools safely.

Evaluation

A waste audit can be a very eye-opening experience. Use the momentum to share the results with the rest of your school and create a plan to reduce waste based on your findings.

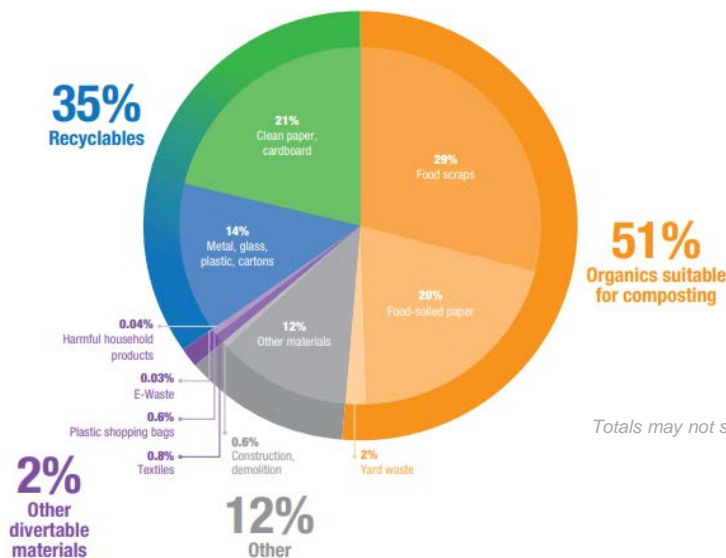
Inquiry and Critical Thinking Questions:

- What were the main components of our school's waste?
- What were the most commonly missorted items?
- Are there any things we found that we found that didn't belong in any of the 3 piles? Why?
- What were some of the items that could have been reused instead of thrown away?
- Would the results be different if the audit was done at a different time in the school year?
- Based on our findings, what could students do today to reduce waste going to landfills?
- How can we help raise awareness and affect change through announcements, monitors, signage or education?

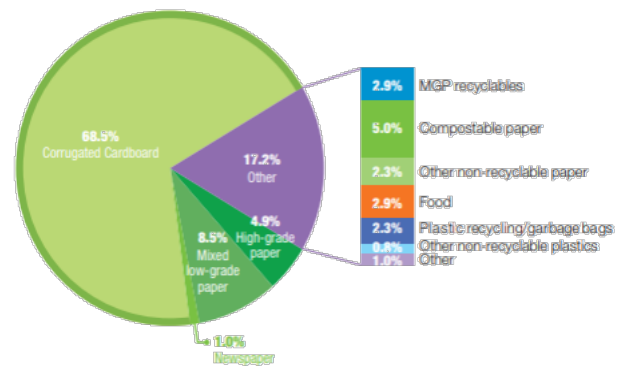
Opportunities:

- Compare your *actual* waste diversion rates to your *potential* waste diversion rates and identify opportunities for change.
- Create your own bar graphs or pie charts to display in your school community.
- Use DSNY's Schools Composition pie charts below as examples.
- Repeat Waste Audit again throughout the year to chart progress.

2017 Composition of Schools Aggregate Discards



2017 Composition of School Paper Recycling



Totals may not sum exactly due to rounding

Note: The term "Aggregate Discards" is used to mean overall waste, or the sum total of all material streams.

For more resources and downloadable Green Team materials, check out the Recycling Champions website www.grownyc.org/RCP

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DIRECTIONS Bin Teams

Cut along line and give to each team.

Green Bin Team

Note: All of the data your team collects will be filled into Row 1

1. Sort all materials found in the Green Bins. Put Paper & Cardboard in one pile, MGPC in another pile and Trash in another pile.
 2. Weigh Paper & Cardboard. Record total in Row 1, Column 1.
 3. Weigh MGPC. Record total in Row 1, Column 2.
 4. Weigh Trash. Record total in Row 1, Column 3.
 5. Across Row 1, add Column 1, Column 2 and Column 3 together. Record in Row 1, Column 4 as “**Bin Total**”.
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Blue Bin Team

Note: All of the data your team collects will be filled into Row 2

1. Sort all materials found in the Blue Bins. Put Paper & Cardboard in one pile, MGPC in another pile and Trash in another pile.
 2. Weigh Paper & Cardboard. Record total in Row 2, Column 1.
 3. Weigh MGPC. Record total in Row 2, Column 2.
 4. Weigh Trash. Record total in Row 2, Column 3.
 5. Across Row 2, add Column 1, Column 2 and Column 3. Record in Row 2, Column 4 as “**Bin Total**”.
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Trash Bin Team

Note: All of the data your team collects will be filled into Row 3

1. Sort all materials found in the Trash Bins. Put Paper & Cardboard in one pile, MGPC in another pile and Trash in another pile.
2. Weigh Paper & Cardboard. Record total in Row 3, Column 1.
3. Weigh MGPC. Record total in Row 3, Column 2.
4. Weigh Trash. Record total in Row 3, Column 3.

Across Row 3, add Column 1, Column 2 and Column 3. Record in Row 3, in Column 4 as “**Bin Total**”.

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DIRECTIONS Data Analysis

Data Analysis

After all 3 teams have measured their materials, it's time to make sense of all these numbers!

Share & Add Data

- Teacher may ask each team member to say their three data points out loud so rest of the class can fill in the entire table.
- Add all measurements in Column 1 to find the “**Stream Total**” for Paper & Cardboard. Record total in Row 4, Column 1. Repeat for Column 2 and Column 3 to measure Stream totals for MGPC and Trash.
- Add all measurements in Row 1 to find the “**Bin Total**” for all items found in all the Green Bins. Record total in Row 1, Column 4. Repeat for Row 2 and Row 3 to find bin totals for Blue Bins and Trash Bins
- Adding all Stream totals and all Bin Totals should indicate a grand total.

Analyze Data

The 4 primary data points to analyze during a waste audit are Capture Rates, Contamination Rates, Actual Diversion Rates and Potential Diversion Rates.

A. Capture Rate: the percentage of materials that are properly sorted (placed in the correct bin). The goal is high Capture Rates.

B. Contamination Rate: the percentage of waste materials that are improperly sorted (placed in the wrong bin). The goal is low Contamination Rates.

C. Actual Diversion Rate: the percentage of all waste materials measured (Grand Total) that are actually sorted correctly, recycled and diverted from (not sent to) landfills. All Trash and incorrectly sorted materials are sent to landfills. The goal is high Diversion Rates.

D. Potential Diversion Rate: the percentage of all waste materials measured (Grand Total) that could be recycled and diverted from (not sent to) landfills. This data will highlight the room for improvement.

A. CAPTURE RATES

Paper & Cardboard

$$\text{Paper \& Cardboard Capture Rate (\%)} = \left(\frac{\text{Paper \& Cardboard found in Green Bins}}{\text{Paper \& Cardboard Stream Total}} \right) \times 100$$

Take the measurement in Row 1, Column 1 (the amount of Paper & Cardboard properly sorted and placed in Green Bins) and divide by the measurement in Row 4, Column 1 ("Stream Total"). Multiply by 100 to get percentage.

MGPC

$$\text{MGPC Capture Rate (\%)} = \left(\frac{\text{MGPC found in Blue Bins}}{\text{MGPC Stream Total}} \right) \times 100$$

Take the measurement in Row 2, Column 2 (the amount of MGPC properly sorted and placed in Blue Bins) and divide by the measurement in Row 4, Column 2 ("Stream Total"). Multiply by 100 to get percentage.

Trash

$$\text{Trash Capture Rate (\%)} = \left(\frac{\text{Trash found in Black Bins}}{\text{Trash Stream Total}} \right) \times 100$$

Take the measurement in Row 3, Column 3 (the amount of Trash properly sorted and placed in Trash Bins) and divide by the measurement in Row 4, Column 3 ("Stream Total"). Multiply by 100 to get percentage.

B. CONTAMINATION RATES

Green Bin

$$\text{Green Bin Contamination Rate (\%)} = \left(\frac{\text{MGPC + Trash found in Green Bins}}{\text{Green Bin Total Weight}} \right) \times 100$$

Add the measurements in Row 1, Column 2 + Row 1, Column 3 (the amount of MGPC and Trash in Green Bins). Take total and divide by the measurement in Row 1, Column 4 ("Bin Total"). Multiply by 100 to get percentage.

Blue Bin

$$\text{Blue Bin Contamination Rate (\%)} = \left(\frac{\text{Paper \& Cardboard + Trash found in Blue Bins}}{\text{Blue Bin Total Weight}} \right) \times 100$$

Add the measurements in Row 2, Column 1 + Row 2, Column 3 (the amount of Paper & Cardboard and Trash in Blue Bins). Take total and divide by the measurement in Row 2, Column 4 ("Bin Total"). Multiply by 100 to get percentage.

Trash Bin

$$\text{Trash Bin Contamination Rate (\%)} = \left(\frac{\text{Paper \& Cardboard + MGPC found in Trash Bins}}{\text{Trash Bin Total Weight}} \right) \times 100$$

Add the measurements in Row 3, Column 1 + Row 3, Column 2 (the amount of Paper & Cardboard and MGPC in Trash Bins) Take total and divide by the measurement in Row 3, Column 4 ("Bin Total"). Multiply by 100 to get percentage.

C. ACTUAL DIVERSION RATE

$$\text{Actual Diversion Rate (\%)} = \left(\frac{\text{Paper \& Cardboard found in Green Bins} + \text{MGPC found in Blue Bins}}{\text{Grand Total of Weight Measured}} \right) \times 100$$

Add the measurements in Row 1, Column 1 (the amount of Paper & Cardboard in Green Bins) and Row 2, Column 2 (the amount of MGPC in Blue Bins). Take total and divide by the measurement in Row 4, Column 4 (Grand Total). Multiply by 100 to get percentage.

D. POTENTIAL DIVERSION RATE

$$\text{Potential Diversion Rate (\%)} = \left(\frac{\text{Paper \& Cardboard Stream Total} + \text{MGPC Stream Total}}{\text{Grand Total of Weight Measured}} \right) \times 100$$

Add the measurements in Row 4, Column 1 (the amount of Paper & Cardboard in all Bins) and Row 4, Column 2 (the amount of MGPC in all Bins). Take total and divide by the measurement in Row 4, Column 4 (Grand Total). Multiply by 100 to get percentage.

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