School Recycling Club SHIP

(Supporting Home Instruction Program)

Lesson Plan 8

Grade Level:	7-8
Lesson:	III.B.2.—How Can We Reduce Waste? - Recycling—Graphing Recyclables
Source:	*3 R's of the Common Core*
Activity/Craft:	How Much Money Can You Make Running a Garbage Company? (https://bizfluent.com/info-8723367-much-make-running-garbage-company.html)
Video Link:	What Happens to Your Recycling After It's Collected? (https://www.youtube.com/watch?v=s4LZwCDaoQM)
Video Link 2:	How Much Does It Cost To NOT Recycle? (https://www.youtube.com/watch?v=1V4Ygfw4TiU

Lesson Matrix Grades 7-8
3R's of the Common Core

Lesson	Leading Question	Objective	Common Core Alignments		Skills
7-8 **Throwing It All Away** **I.A.1**	What do you know about the solid waste we produce?	• Understand the sources, content and magnitude of the solid waste problem	**Grade 7** CCRI.7.1 CC.W.7.7 CC.SL.7.1 CC.7.RP.3	**Grade 8** CC.RI.8.1 CC.W.8.7 CC.SL.8.1	• Communicating • Comparing multiple solutions • Sharing research and writing • Applying mathematical concepts
7-8 **School Trash Analysis** **I.A.2**	What are all the things we throw away?	• Analyze waste producing habits in order to begin changing them	**Grade 7** CC.SL.7.4 CC.W.7.4 CC.7.SP.1	**Grade 8** CC.SL.8.4 CC.W.8.4 CC.8.SP.1	• Analyzing • Applying mathematical concepts • Investigating
7-8 **Potato Cakes** **I.A.3**	Could we save energy and other natural resources by choosing one product or packaging over another?	• Examine the complexities of food processing and packaging	**Grade 7** CC.RI.7.4 CC.SL.7.4 CC.W.7.4 CC.7.EE.3 CC.7.RP.1	**Grade 8** CC.RI.8.4 CC.SL.8.4 CC.W.8.4	• Applying ideas to solve problems • Collaborating • Researching • Using mathematical and computational thinking
7-8 **Resource Protection Game** **I.B.1**	How do our activities impact on our environment?	• Identify the ecological impacts of some of the solid waste management practices on natural resources	**Grade 7** CC.RI.7.4 CC.SL.7.1 CC.W.7.7	**Grade 8** CC.RI.8.4 CC.SL.8.1 CC.W.8.7	• Collaborating • Gathering information • Problem solving
7-8 **Trash Timeline** **I.C.1**	What can the waste we produce tell us about ourselves?	• Examine and classify various forms of evidence in the study of current trash and that of a past culture	**Grade 7** CC.RI.7.8 CC.SL.7.4 CC.W.7.6	**Grade 8** CC.RI.8.8 CC.SL.8.4 CC.W.8.6	• Analyzing • Collaborating • Sharing research and writing
7-8 **Art Reflecting the Environment** **I.C.2**	Why do people create art? What is the difference between "art" and "waste"?	• Understand the visual artist as a recorder of history and ideas • Identify society's impact on artistic expression • Identify potential ways artistic expression can impact society	**Grade 7** CC.RI.7.1 CC.SL.7.5 CC.W.7.6	**Grade 8** CC.RI.8.1 CC.SL.8.5 CC.W.8.6	• Analyzing • Applying ideas to solve problems • Questioning • Sharing research and writing
7-8 **Waste Walk** **II.A.1**	What is litter?	• Document and categorize litter in their neighborhood • Explore ways to get people to stop littering	**Grade 7** CC.RI.7.4 CC.W.7.2 CC.7.SP.1	**Grade 8** CC.RI.8.4 CC.W.8.2 CC.8.SP.1	• Applying mathematical concepts • Collecting data • Interviewing • Problem solving

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Lesson	Leading Question	Objective	Common Core Alignments		Skills
7-8 **Recovering Recyclables** **II.A.2**	How can mixed trash be separated for recycling?	• Devise materials recovery systems for recovering recyclables from the waste stream	**Grade 7** CC.RI.7.1 CC.SL.7.4 CC.W.7.4	**Grade 8** CC.RI.8.1 CC.SL.8.4 CC.W.8.4	• Applying ideas to solve problems • Comparing multiple solutions • Developing models
7-8 **Trash Haulers** **II.A.3**	How much does waste disposal cost?	• Investigate the efficiency and costs of solid waste collection • Assess advantages/disadvantages of operating a recycling business and/or a curbside recycling program	**Grade 7** CC.SL.7.1 CC.W.7.4 CC.7.NS.3	**Grade 8** CC.SL.8.1 CC.W.8.4 CC.8.SP.1	• Gathering information • Interviewing • Sharing research and writing • Using mathematical and computational thinking
7-8 **Mini-Landfills** **II.B.1**	What are some of the possible hazards that might result from an improperly designed landfill?	• Learn how a sanitary landfill is made and operates • Understand some of the associated pollution problems	**Grade 7** CC.RST.6-8.3 CC.SL.7.4 CC.WHST.6-8.7 CC.7.G.6	**Grade 8** CC.RST.6-8.3 CC.SL.8.4 CC.WHST.6-8.7 CC.8.G.9	• Applying mathematical concepts • Developing models • Observing • Providing evidence
7-8 **Landfill Soil** **II.B.2**	Why is it important to test the soils of a potential landfill site?	• Determine the importance of soil studies prior to the siting of landfills	**Grade 7** CC.SL.7.1 CC.W.7.4 CC.W.7.7 CC.7.RP.3	**Grade 8** CC.SL.8.1 CC.W.8.4 CC.W.8.7 CC.8.F.5	• Carrying out investigations • Developing models • Observing • Sharing research and writing • Using mathematical and computational thinking
7-8 **Burning Waste: Then and Now** **II.B.3**	Why do we burn trash?	• Research the historical perspective of burning solid waste • Examine the reasons for these changes over the decades	**Grade 7** CC.RI.7.1 CC.SL.7.4 CC.W.7.4	**Grade 8** CC.RI.8.7 CC.SL.8.1 CC.W.8.6	• Sharing research and writing • Analyzing • Comparing multiple solutions • Collaborating
7-8 **Packaging Design** **III.A.1**	How could packaging be designed to waste less?	• Explore parameters of packaging design • Use guidelines in their own design project	**Grade 7** CC.RST.6-8.8 CC.SL.7.4 CC.WHST.6-8.7 CC.7.G.6	**Grade 8** CC.RST.6-8.8 CC.SL.8.5 CC.WHST.6-8.6 CC.8.G.9	• Applying ideas to solve problems • Designing • Researching • Using mathematics

Lesson Matrix Grade 7-8

3R's of the Common Core

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Lesson Matrix Grades 7-8
3R's of the Common Core

Lesson	Leading Question	Objective	Common Core Alignments		Skills
7-8 Source Separating III.B.1	What is the best way to sort and store our recyclables?	• Investigate current containers and make proposals • Design containers for the easy and efficient source separation of recyclables, as needed	**Grade 7** CC.RST.6-8.2 CC.SL.7.4 CC.WHST.6-8.4 CC.7.G.6	**Grade 8** CC.RST.6-8.2 CC.SL.8.4 CC.WHST.6-8.4 CC.8.G.9	• Applying mathematical concepts • Collaborating • Developing models • Problem solving
7-8 Graphing Recyclables III.B.2	Do recycling businesses pay us for the materials we collect?	• Examine how fluctuating markets and different offered prices affect the fate of recycling	**Grade 7** CC.SL.7.1 CC.WHST.6-8.4 CC.WHST.6-8.7 CC.7.SP.7	**Grade 8** CC.SL.8.1 CC.WHST.6-8.6 CC.WHST.6-8.7 CC.8.SP.4	• Communicating • Evaluating • Graphing data • Investigating
7-8 Destination Recycle III.B.3	When you recycle where does it all go? What does it become?	• Identify the destination and fate of their states recyclables	**Grade 7** CC.RST.6-8.2 CC.SL.7.1 CC.WHST.6-8.4	**Grade 8** CC.RST.6-8.2 CC.SL.8.4 CC.WHST.6-8.7	• Gathering information • Interviewing • Problem solving • Sharing research and writing
7-8 Making Good Compost III.C.1	What are the essential ingredients for a successful compost?	• Conduct experiments testing the effects of too little water, nutrients, air, and imbalance of material on producing successful compost • Learn the basic principles necessary to construct a good compost pile	**Grade 7** CC.RST.6-8.3 CC.SL.7.4 CC.WHST.6-8.4	**Grade 8** CC.RST.6-8.3 CC.SL.8.5 CC.WHST.6-8.6	• Collaborating • Collecting data • Communicating information • Synthesizing

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How Can We Recycle Resources to Reduce Waste?

Concept
Continuing and comparative studies may be done to find the most profitable place to take recyclables.

Objective
Students will see how fluctuating markets and different commodity prices affect the fate of recycling.

Method
Students will graph prices offered for recyclables.

Materials
Graph paper, transparencies, list of recycling businesses, computer and internet access,

Subjects
Mathematics, Business, Language Arts,

Skills
Communicating, evaluating, graphing data, investigating

Time
Several months

Vocabulary
Subsidize, recyclable

Resources
Local Recycling Businesses, Resource Recycling Magazine (Market Update Section); William D. Robinson, T*he Solid Waste Handbook*; your state's natural resources department or other environmental agencies

3R's of the Common Core
Parallel Activities
4-6, Where to Recycle
9-12, Cart Before the Horse
Information
Redesign and Reuse
Recycling
Resources
Solid Waste and Recycling
Waste Management Agencies by State

Background

Each community faces different challenges with recycling and waste management. Geography, populations and local legislation will affect a community's ability (or inability) to effectively manage its waste. Below is information regarding a rural area (Vermont) and an urban area (Chicago).

"While progress has been made in reducing and diverting solid waste since the passage of Vermont's first robust solid waste management law (Act 78 in 1987), the amount of waste that Vermonters generate is significant at 5.18 pounds per person per day which leaves much room to improve upon waste reduction efforts. At the same time the diversion rate, amount of material kept out of landfills or incinerators, has stagnated in the mid 30% range for the last ten years....This sustainable materials management strategy focuses on using materials throughout the entire lifecycle of a product or material with the intent of preventing overall waste, increasing reusability, and increasing recycling and organics diversion.... managing materials sustainably transforms the waste management industry into an industry that has even greater influence on local economic development, ability for communities to build a working landscape, and decrease Vermont's greenhouse gas (GHG) emissions that contribute to climate change"

– State of Vermont, Materials Management Plan (2014)

"The Illinois per capita waste generation rate was significantly higher than the national average in 2007...Illinois is relatively urban with 87.3% of its residents living in cities, urban areas ...and produce on average 25% more trash than rural areas.....Although the state imposes some mandates concerning recycling, the actual business of managing the solid waste stream falls on the shoulders of local and municipal government... Many municipalities do not provide waste removal directly but allow several companies to compete in garbage removal service market....Volatile commodity prices make it difficult for recycling companies to plan ahead and unexpected downturns in commodity prices may leave companies without the liquidity they need to finance day to day operations. Recycling companies may be unwilling or unable to take on the risk that volatile commodity prices pose."

– Institute of Government and Public Affairs,
Waste and Recycling in Illinois (2010)

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Common Core Alignments

GRADE 7

CC.SL.7.1
Speaking & Listening:
Comprehension & Collaboration

CC.WHST.6-8.4
Writing in History/Social Studies,
Science & Technical Subjects:
Production & Distribution of Writing

CC.WHST.6-8.7
Writing in History/Social Studies,
Science & Technical Subjects:
Research to Build & Present Knowledge

CC.7.SP.7
Mathematics:
Statistics & Probability

GRADE 8

CC.SL.8.1
Speaking & Listening:
Comprehension & Collaboration

CC.WHST.6-8.6
Writing in History/Social Studies,
Science & Technical Subjects:
Production & Distribution of Writing

CC.WHST.6-8.7
Writing in History/Social Studies,
Science & Technical Subjects:
Research to Build & Present Knowledge

CC.8.SP.4
Mathematics
Statistics & Probability

Leading Question

Do recycling businesses pay us for the materials we collect?

Procedure

1. Students will investigate what materials are recycled in their area. They will write a letter and/or an email to their local waste management operation to ask for the information. They will compile a list of items recycled. They will create a second list of other items they feel should be recycled. Is the second list of materials technically possible to recycle, but are not recycled in the area? What is the difference in the lists? Why are some items recycled and others not?
2. Look at the list of recycling businesses serving your area. Call, write and/or email several recyclers. Ask them what price they are receiving for each ton of material they deliver to market. Ask them what factors influence the price they are paid for recyclables. Do they pay citizens for recyclables collected? Students will compile a report on their findings.
3. Graph the information by both (a) and (b):

   (a) Type of material

   - glass (green, brown, clear or mixed)
   - paper (newsprint, corrugated cardboard, white ledger or mixed)
   - metals (steel cans, bimetal cans, aluminum cans, other metals)
   - plastics (HDPE, PET, others)

   (b) Prices being offered by recyclers.
4. Study price changes on a monthly basis.
5. Using the graphed information, which recyclers pay the most? If the prices are the same, discuss why this is so. Why might the price vary from month to month?
6. Students will consider and include in their findings summary the following: If the payoff is not monetarily profitable, how else might it be profitable? How can increased recycling be promoted to citizens?

Evaluation

Each student will complete a written summary and evaluation of recycling and their findings. They will consider the following questions, as well as others they have considered in their findings. Do some recyclers pay more than others for material? Do prices change from month to month? What factors might influence prices paid for recyclables? (Some recyclers may include transportation, storage containers, etc., in the price offered.) They will discuss and share their reports in class.

Classroom Activities

A. Compare transportation costs with the value of the materials being recycled.

B. Discuss the questions on the following worksheet

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Name:_____ **Date:** _____

The Business of Recycling

1. Why is the recycling center located where it is?

2. If there is not a recycling center in your town, where would be the best place for one?

3. How might location affect the price recycling center operators pay and/or receive for their recyclables?

4. What kinds of equipment are used at the recycling center? Who pays for their costs?

5. What kinds of transportation might be used to deliver recyclables to a manufacturer?

6. How might the cost of transportation of any one recyclable affect the profit of the recycling center operator?

7. What might affect the price a manufacturer pays a recycling center for its recyclable material?

8. Should resources be recycled at a financial loss? If so, who should subsidize the recycling center operators so they will do it?

9. Can you think of any subsidies that government provides the wood and plastics industries that make it difficult for recyclable materials to compete?

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