



Grade 6-8 Lesson: Waste Management

WASTE STREAMS: DIVERTIBLE WASTE, LANDFILL, RECYCLING, & ORGANICS

Let's talk about your waste. Outside of your school and home, likely you've seen three colours of carts; black, blue and green. Let's find out what the colours of the carts mean and where the Loraas red truck collects and takes their contents.



The “waste stream” is a term used to describe the entire life cycle of the garbage we produce – from putting out the trash until it gets to the landfill or recyclables being collected, sorted, then sent off to be made into new items like park benches. There are four waste streams to deal with all of the consumable products we purchase. These include: Divertible waste, Landfills, Recycling, and Organics. Let's find out what each one entails:

CHAPTER 1: DIVERTIBLE WASTE

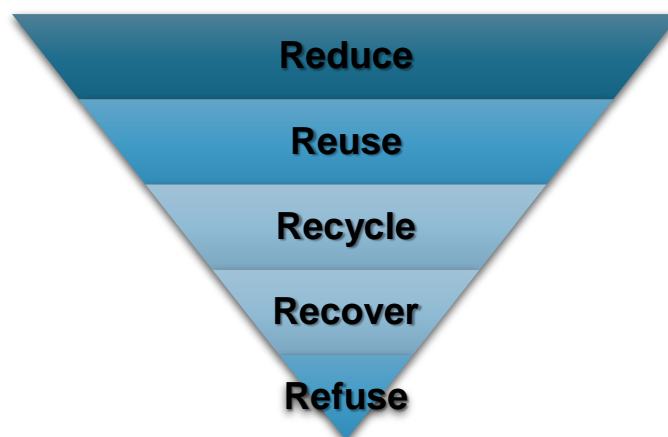
[Slide 1] Divertible waste is a term used for items that are recyclable, but cannot simply be placed into our blue residential Loraas recycling cart. This is because not everything with a recycling symbol can be recycled in the blue cart and has to be taken to a specialized recycler. Examples of divertible waste includes: Tires, metal hangers, used oil, paint cans, clothing, propane tanks, tools, toys, electronics, and more.



[Slide 2] The correct term for the recycling symbol or triangle ♻️ is “Mobius”. The recycling mobius was designed for the first Earth Day on April 22nd, 1970 and is now placed on some of the products we buy today. The mobius lets us know which products we purchase contain recycled materials, not that they can be recycled again.

[Slide 3] Knowing what can be recycled where can be confusing. Our recyclables have specific recycling programs and simply placing everything in the blue cart is dangerous. Why? This is because people physically sort out items from the carts after they are collected by the Loraas red recycling trucks. Items like needles could accidentally poke an employee when they are sorting recyclables. Needles should be taken back to a pharmacy for recycling after they are placed into a yellow and red poke-proof biohazardous container, not the recycling cart. “Know before you throw!” A great resource to find where to take items to get recycled is The Saskatchewan Waste Reduction recycling search engine at: www.swrc.ca. Try it out with items around your household or school.

Before we decide to place an item into the recycling cart, we should determine if that is the first and best choice for the environment. There are multiple steps we can do to reduce our waste. These steps are the 5 R’s Waste Hierarchy. We’ve all heard about the 3 R’s, “Reduce, Reuse, Recycle,” but did you know there are actually two more steps after recycle? Let’s find out what each involves:



1. [Slide 4] **Reduce** – The first step is to change our waste behaviour. Can we try to decrease the amount of items we purchase that have extra packaging? Can we refuse to use a straw at a restaurant? These are questions we should ask ourselves to reduce the amount of waste we create and are responsible for its proper disposal.
2. [Slide 5] **Reuse** – The second step is to reuse materials. Once we are finished with an item, we need to ask ourselves, “Can we reuse it for an alternative purpose?” For example, we reuse that sour cream plastic container to store dog treats before we recycle it.

If it can't be recycled, then it's time to get creative and turn it into something else! This action is called, “Upcycling”. For example, turning towels with holes in them into cleaning rags.

3. [Slide 6] **Recycle** – The third step is recycling and reprocessing materials for recovery. The Loraas Recycling program is designed for household food-packaging and paper or cardboard products. You can recycle: (1) Paper, (2) Cardboard, (3) Household Tin and Aluminum Packaging, (4) Plastics ♻️1 to ♻️7, and (5) Household Glass (For Saskatoon residents only). For helpful downloadable and printable guides and posters visit: <https://www.loraas.ca/facilities/recycle-facility/waste-widget/>.
4. [Slide 7] **Recover** – The fourth step has two meanings, either rot or recovering energy. If we can't follow the first three steps, then sometimes there are alternative options for our waste before landfilling them.

The first meaning is rot or compost. If the waste is organic, then we can use different types of composting systems to decompose the waste and turn it into a usable product; a soil-like organic matter. We will discuss composting further in Chapter 3.

The second meaning is incineration. Incineration is a waste treatment process that involves the combustion (burning) of organic waste materials. This system converts the waste into ash, gas, and heat. In this process we can recover the gas or heat and turn it into energy; like power for our homes.

Waste to energy recovery methods, like incineration, are not always the best solution to our waste. This is because incinerations do not pass environmental pollution tests or they are very costly to build; therefore many communities discard of their waste in landfills instead. For example, burning plastics creates two harmful chemicals called dioxins and furans. These chemicals eat away at our ozone layer which protects us from the sun's harmful UV rays. Also, “What goes up, must come down,” and these chemicals build up in our soils where we plant our food. Yuck!

Find out more about waste to energy and why certain countries allow it, while others do not: <https://www.youtube.com/watch?v=z8q0yQJyB4Q>.

5. [Slide 8] **Refuse** – The last step is landfilling garbage materials. The term refuse is another word for garbage or waste. Reducing the amount of waste we send to landfill is key. We want to make sure what we throw in the landfill doesn't have an alternative home where it can be reused or recycled first. Some of the products we purchase simply are created for one use, then must be tossed in the garbage.

CHAPTER 2: LANDFILLS

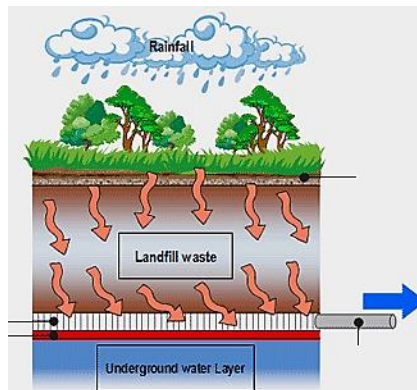
[Slide 9] A landfill site, also known as a garbage dump, is a designated place used for the disposal of waste materials. Landfills are the oldest and most common form of waste disposal. Historic landfills simply placed garbage in piles or into holes in the ground. In present times, we still continue to dispose of garbage into pits in the ground called Cells, but in a much safer way.

[Slide 10 & 11] After garbage is collected from your school or household in the black/grey cart or red bin, it is taken by a Loraas red garbage truck to our landfill just outside of Saskatoon, SK. Garbage is dumped out of the truck onto the ground. From there, a large piece of equipment will push the garbage down into the cell. At the end of each day, daily cover is applied and compacted by the equipment. The garbage will remain in the cell for eternity.



Incorrect disposal of items like divertible waste, recycling, and organics, take up valuable space at a landfill, emit GHG emissions, and sometimes do not decompose at all. Let's find out what would happen if we stopping all of our waste recycling programs and threw everything away at a landfill. Click the link to find out: <https://www.youtube.com/watch?v=8fFJOzXxB54>.

[Slide 12] Landfills are designed so they don't have adverse environmental effects to the surrounding soils and underground water reservoirs. All operating landfills are fully engineered with a non-permeable (liquids cannot pass through) layer at the bottom. The garbage in the cell is covered daily with soil and/or a thin layer of plastic. This cover helps prevent the interaction between the garbage and the air; reducing odors and enabling a firm base which equipment can drive on to compact the garbage down. It also restricts the amount of water able to percolate (pass through) to the bottom of the cell. The liquid at the bottom of a landfill is called leachate; similar to a chemical soup.



Let's get hands on to learn more about our own waste habits. Complete Activity 1 or Activity 2 before moving onto the next chapter.

Activity 1 – Complete a recycling audit

A waste audit can provide measurements of each classroom or home's daily waste habits. The data collected during the waste audit will help determine the effectiveness of the school or household's general waste reduction and recycling behaviors, and will highlight areas to take action and educate on. Do you need new signage? Do you have a dedicated green team? Do you need more recycling receptacles? An audit can help answer these questions.



Download and print the following PDF documents:

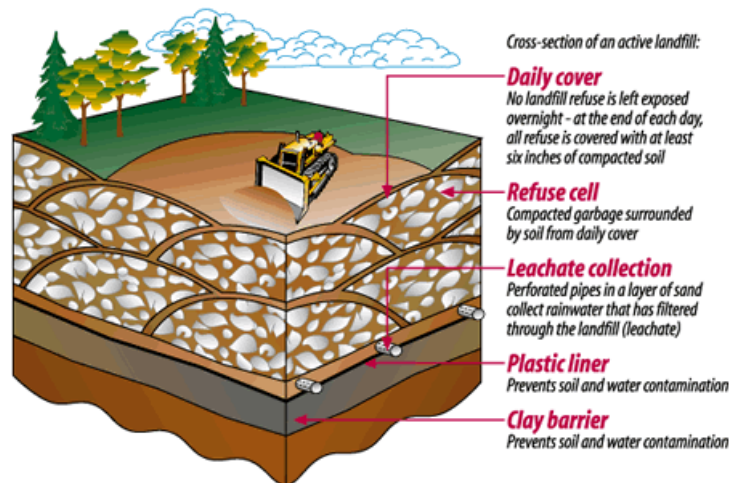
- Activity – Grade 6 to 8 – Recycling Audit *and* Activity – Grade 6 to 8 – Recycling Checklist

OR

Activity 2 – Design your own landfill

Teach Engineering has created an instructional video for this task. Have students work alone or in groups to create a small-size landfill and test their designs against the natural elements. The goal is to create landfills that hold the most garbage and keeps trash and landfill-juices (leachate) inside the cell to prevent it from causing environmental damages. Click the link for instructions and to complete this task:

https://www.teachengineering.org/activities/view/cub_enveng_lesson05_activity2.



CHAPTER 3: RECYCLING

[Slide 13 & 14] Recycling is a great solution to reduce usable materials going to landfill and save our natural resources. Recycling saves trees, fossil fuels, and sand by using recyclable material to make new consumable products like our paper and clothing rather than using natural resources. Once our natural resources are used up, they are gone forever!

[Slide 15] Did you know that recycling 1 tonne of paper saves 17 fully grown trees! For reference, a single bale of paper weighs 1200lbs or the same weight as a dairy cow. Technically, we could just replant trees once we cut them down, but in Saskatchewan it would take about 50 years for a single tree to grow big enough to cut down and send to a pulp mill.



[Slide 16 to 19] After recyclables are collected from your school or household from the blue cart or bin, they are taken by a red Loraas recycling truck to our Materials Recovery Facility (MRF) in Saskatoon, SK. A MRF is a sorting facility where recyclables are separated using people and machines back into alike categories. Test out your sorting skills by pretending to be a Loraas pre-sort employee. Use our interactive game by going to: <https://www.loraas.ca/facilities/recycle-facility/recycle-game/>.

[Slide 20 & 21] Once sorted, recyclables will be compacted (squished) into a 1 tonne bale (1x1x1 meter cube). Recycling bales are shipped within North America to be made into new products. For example, after your pop bottle leaves our facility it is turned into tiny pieces of plastic then reformed into new products, such as fibers for jacket insulation.

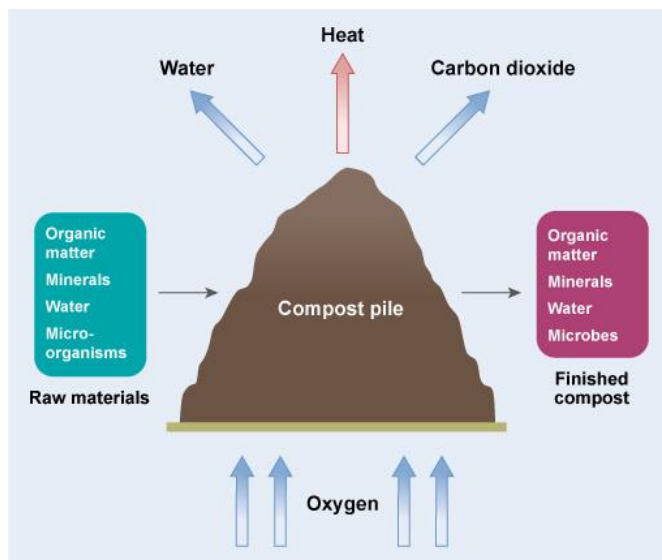


See our MRF in action by visiting the following website: <https://www.loraas.ca/facilities/recycle-facility/>.

CHAPTER 4: ORGANICS

[Slide 22 & 23] Buried organic waste not only occupies valuable landfill space, it also produces methane gas when it decomposes—one of the Greenhouse Gas emissions causing global warming. This is because landfills lack the two important elements needed to break down organic waste: (1) UV rays/Sunlight and (2) Oxygen. Composting is a great way for you to divert materials from the landfill, while creating nutrient-rich, soil-like organic matter for gardening. When you compost, the items are broken down and turned into carbon dioxide and organic matter. These are important elements for our trees and plants that provide oxygen for us to breathe.

[Slide 24] In order to create good-quality compost, you require a mixture of Brown and Green materials. Browns are carbon-rich and act as a bulking agent allowing oxygen pockets within your compost. Browns include: Dry leaves, hay, and food-soiled cardboard. Greens are nitrogen-rich and have water content. Greens include: apple cores, coffee grounds, and fresh flower clippings. How can you tell the difference? Let them sit for 3-days, if they begin to smell they are a Green.



[Slide 25 & 26] After organic waste is collected from your school or household from the green cart or bin, it is taken by a Loraas truck to an Organics Processing Facility just outside of Saskatoon, SK. Loraas uses aerated static pile composting technology. It's basically like a fully sealed container with adjustable controls allowing Loraas to break down difficult compostable materials like grain, cheese, bones, and meat! Without high temperatures these materials will ferment, give off putrid odors, or potentially pass along harmful bacteria to our plants as they do not fully decompose in at-home or industrial windrow composting systems.

To see our facility in action visit: <https://www.youtube.com/watch?v=fImcrZ1CoAE>.

Want to start composting on your own? Find out which composting system is right for your classroom or home by taking The Saskatchewan Waste Reduction composting quiz at:

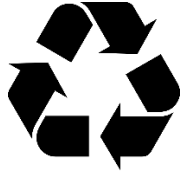
<http://www.saskwastereduction.ca/quiz/>.

STUDENT QUIZ - GRADE 6-8: WASTE MANAGEMENT

For a passing grade, students must achieve a grade of 50% (6 out of 12 correct).

Please circle the most correct answer by circling the letter:

1. **What is the correct name/term for the following symbol?**



- a. Recycling Symbol
 - b. Recycling Mobius
 - c. Recycling Triangle
2. **What is the correct order for the Waste Hierarchy?**
- a. Reduce, Reuse, Recycle, Recover, Landfill
 - b. Reduce, Recover, Recycle, Landfill, Reuse
 - c. Recover, Reuse, Landfill, Recycle, Reduce
3. **What is the “chemical soup” called at the bottom of a landfill?**
- a. Dioxin
 - b. Methane
 - c. Leachate
4. **What two elements are needed in order for organic waste to break down properly?**
- a. Methane and fire
 - b. UV sunlight rays and oxygen
 - c. Carbon and water
5. **What Greenhouse Gas emission is created when organics break down at landfills?**
- a. Methane
 - b. Carbon Dioxide
 - c. Oxygen
6. **What is the importance of recycling?**
- a. To reduce Greenhouse Gas emissions
 - b. To stop/prevent litter
 - c. To save our natural resources (i.e. Trees, fossil fuels)
7. **The term “upcycling” mean taking something and repurposing/making it into something new.**
- a. True
 - b. False

8. **What waste stream does the “black cart or red bin” represent?**
- a. Organics
 - b. Recycling
 - c. Garbage
9. **An example of “Brown organic material” that is carbon-rich includes which of the following:**
- a. Dry leaves, hay, and food-soiled cardboard
 - b. Grains, cheese, bones, and meat
 - c. Apple cores, coffee grounds, and fresh flower clippings
10. **“Think smart, 5 in the cart!” Loraas’ recycling program accepts five categories of recyclables including: (1) Cardboard, (2) Paper, (3) Plastics, (4) Household Glass (Saskatoon only), and (5) _____. Fill in the blank:**
- a. Household Aluminum
 - b. Household Tin
 - c. Both a and b
11. **The “waste cycle” is a term to describe the entire life cycle of the garbage we produce.**
- a. True
 - b. False
12. **Recycling 1 tonne of paper, would save how many fully grown trees?**
- a. 7
 - b. 17
 - c. 27
13. **BONUS Question: In one of the videos, how many years did they mention it take for landfills to fill up and close down?**

QUIZ ANSWER KEY - GRADE 6-8: WASTE MANAGEMENT

For a passing grade, students must achieve a grade of 50% (6 out of 12 correct).

1. B
2. A
3. C
4. B
5. A
6. C
7. A
8. C
9. A
10. C
11. B
12. B
13. 30 to 50 years