

Lesson Plan: Waste Management

Objective	<p>Main Goal: Students will understand the options for sorting waste and their impacts on the community and environment (recycling, composting, landfills, and littering).</p> <p>Subsidiary Goals:</p> <ul style="list-style-type: none"> • Students will understand that waste is transported to nature through wind, water, and littering. • Students will understand that the better waste sorting options are more challenging (recycling costs money and composting is very time consuming), but they benefit the environment and community more.
Assumed Knowledge	<p>This lesson and activity assumes that students</p> <ul style="list-style-type: none"> • Have a general awareness of what materials their trash is made of • Are aware that trash ends up in the environment from human activities • Understand that after trash is disposed of in trash bins, it is generally collected and delivered to dumps or landfills
Materials	<ul style="list-style-type: none"> • Game Rules • Waste Management slides • A large supply of beads in three different colors or shapes • 12 containers • Container labels (see Game Rules)
Background	<p>Waste management is an essential part of our community organized by the government or private organizations (US EPA, 2016b). Without waste management, community members would be responsible for their waste on their own; deciding how to take care of it hopefully in a responsible way.</p> <p>Waste can be disposed of in landfills, recycling facilities, compost piles, or not disposed of at all. Trash that is not contained and responsibly managed is transported by wind and waterways throughout our ecosystems. Trash is a threat to ecosystems when it is consumed by wildlife, blankets important habitat, and breaks down sometimes releasing harmful chemicals (US EPA, 2016b). Plastics are example of a waste product with an extremely long lifespan. A plastic water bottle takes about 450 years to decompose and releases toxic chemicals into waterways throughout that process (KariO, 2011).</p> <p>Landfills are used to contain all mainstream trash not recycled, composted, or sorted another way. Disposing of trash to landfills contains trash in one area which contains the smell, appearance, and sometimes toxic nature of trash to one space (US EPA, 2016a). For example, batteries leak acid that smells and should not be consumed. Also, many metals rust when exposed to weather over time, which could give someone tetanus if it cut them and creates an orange-colored runoff. Landfills that have fences, walls, or covers to contain trash also reduce the transport of trash within ecosystems. While landfills are necessary, they are not the ideal management choice for all waste. Landfills require land</p>

	<p>space which could otherwise be used for other purposes. Trash in landfills that do not have liners between the land and the waste let the waste breakdown into the soil (US EPA, 2016a). Organic materials break down into soil with no negative effects, however metals, batteries, electronics, plastics, and other materials take a very long time to break down and leach chemicals into the soil which can affect local water quality (<i>Municipal Solid Waste Factsheet, 2020</i>). Landfills near neighborhoods smell bad and are unsightly, which often lowers property values and homeowners cannot get as much money for their land as they would have hoped when they sell it.</p> <p>Some communities use trash incinerators to burn some trash to reduce the amount of space needed in landfills. These incinerators are great for reducing the amount of space required to store trash, however they cause alternate pollution problems (<i>Municipal Solid Waste Factsheet, 2020</i>). When trash is burned, it is no longer leaching contaminants into the soil beneath, but trash is released into the air in the form of very small particles. Particulate matter pollution is known to be increased around trash incinerators</p> <p>While every recycling program is different, recycling facilities typically accept plastic, paper, and glass materials (US EPA, 2013a). The materials are sorted by type and then cut, shredded, melted, mixed and/or molded so they can make a new product. Recycling can sometimes be more costly than landfill disposal, however it reduces the new materials needed to produce the products we rely on. Recycling also reduces the total waste that needs to be stored in a landfill, which could reduce the number of landfills needed in a community. Therefore, recycling produces fewer negative environmental impacts than landfill disposal and incinerators.</p> <p>Waste that was once a living organism is considered “organic waste” that can be composted, including food scraps, garden scraps, and landscaping waste (US EPA, 2013b). Composting reduces the amount of space needed for landfills and makes great use of organic waste. By mixing compostable materials and giving them time to decompose, the nutrients in the organic waste can be returned to the soil, maybe in someone’s home garden. In this case, waste is recycled into something that improves environmental quality by increasing the nutrient levels and health of soil. Compost also has positive impacts on our communities by increasing the nutrient levels of the food we grow for our families. A regional composting facility is located in Antioquia which can process 450 tons of compostable waste per month to produce 40 grams of kilograms to be used in the community (Barbarán, 2020). This facility can serve approximately 127,000 people.</p>
<p>Discussion Questions</p>	<p>After the Game:</p> <p>What was the key difference in between Round 1 and Round 2? Which round best represents the waste management system for our community?</p> <p>Answer: In Round 2, multiple waste disposal locations were available, while in Round 1 there was only one place to put the waste, the landfill. If students are</p>

	<p>not aware, let them know if there are recycling and compost programs available in their community.</p> <p>In Round 2 where you had three waste sorting options, what was the easiest, laziest way you could have played this game? What would have been the results? Would you have won or lost? Answer: Students could have left all the beads in the trash can or only sorted into the landfill, but they would lose the game. Environmental and community impacts of our trash would be greater if trash was only sorted to the landfill, and even worse if trash was not sorted and disposed of at all. More trash would likely end up in the environment in this case. While recycling and composting take more effort, they would earn many more points and you would likely win the game.</p> <p>What would have happened if I gave you one million more trash beads? Answer: It would have taken more time and energy to sort the trash, and the landfill would have overflowed. Trash would have overflowed into nature, and you would need to make another landfill. Where would you want to make another landfill in your community?</p> <p>Can you think of any ways to reduce the amount of trash you produce? Answer: Bring snacks and lunch to school in containers that you can reuse like glass jars. Bring whole foods to school that don't have packaging, including fruits like apples, pears, peaches, etc. If you buy water, you can large jugs of water instead of smaller bottles, because large containers are made of less plastic than the plastic making up many small bottles added together.</p> <p>Why do you think you could get more points for composting and recycling? Answer: Because recycling and composting allow us to make new useful products from our waste instead of putting them in a landfill where they will take up space for a very long time and potentially cause pollution in nature.</p> <p>What would have made it easier to earn more points? Answer: Making it easier to recycle or compost by having the bins closer.</p>
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References

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