TAKE CARE OF TEXAS: EDUCATOR MATERIALS

LESSON PLAN

Introduction to Landfills

Objectives:

To understand the importance of landfills and demonstrate how reducing waste, recycling, and composting can extend the lifetime of landfills

Prerequisites:

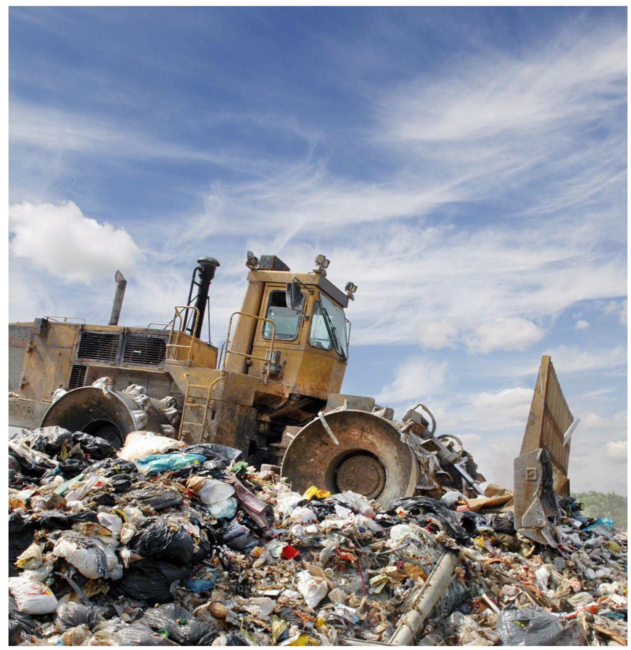
A general understanding of landfills and their purpose, and the ability to perform basic multiplication and division

Duration:

45 minutes

Materials:

- Inside Look at a Landfill poster
- Inside Look at a Landfill handout
- Introduction to Landfills handout



Introduction:

TEACHER BACKGROUND INFORMATION:

Whenever we have an item that we cannot reuse, donate, compost, or recycle, we throw it into the garbage. However, when you throw something into your trash can, it does not just disappear. It is picked up by a garbage truck and taken to a landfill—an area where trash is buried in a unit designed for that trash. It is important that waste ends up in a facility designed to receive it. Waste that is not properly disposed of can damage soil and groundwater.

In Texas we use several different types of landfills, depending on types of waste. **Type I landfills** are standard landfills for municipal solid waste, which comes from places like your house or your favorite restaurant. Type IV landfills only take in brush and yard waste, while also accepting waste from construction or demolition activities. **Type IV landfills** do not take in **putrescible waste**, which is waste that decomposes quickly, causing odors and attracting pests.

LP20 (Revised 3/26)

Much of the material we send to landfills can be recycled or composted. Recycling and composting can greatly extend the lifetime of a landfill. Also, expanding existing landfills or finding appropriate locations for new landfills is a challenge for communities.

It is unlikely that every Texan will start recycling and composting overnight, but we can each take individual steps to reduce our waste and dispose of it properly. To learn more, visit the Take Care of Texas website to discover easy ways to reduce your waste.

Using the **Inside Look at a Landfill poster**, explain the different parts of a landfill. Students can follow along with the **Inside Look at a Landfill handout**. To check for vocabulary understanding students can complete the crossword and word search.

Procedure:

In this activity, students will (1) estimate how many years of landfill space we have left in Texas and (2) estimate how much waste, on average, each of us generates. **NOTE:** *While it is likely that the Texas population will continue to grow and individual waste generation rates may change, we will assume in this exercise that the annual waste generation rate for 2024 will not change. We'll also ignore possible new landfills that would add waste space until they are authorized.*

This is the formula students will use to determine how many years we have left before we run out of landfill space. Ensure students are using the correct numbers to calculate.

$$\textit{years left (years)} = \frac{\textit{space left (millions of tons)}}{\textit{rate of disposal}\left(\frac{\textit{millions of tons}}{\textit{years}}\right)}$$

Assessment:

After students solve the equations and determine how many years we have left of landfill space, have students come together in small groups and discuss their findings. Pose the following questions to small groups and have them provide responses to discuss.

1. How does the amount of landfill space left affect future generations?
2. How could recycling, composting, or reusing items change the number of years of landfill space we have left?
3. How does learning about landfill space change the way you think about throwing things away?

Glossary:

- **Putrescible Waste** – waste that decomposes and might cause odors and attract pests.
- **Type I Landfills** – the standard type of landfill used in Texas. These landfills receive putrescible and other waste from homes and businesses.
- **Type IV Landfills** – landfills that only accept brush, construction or demolition waste, and similar, non-putrescible waste.

Texas Essential Knowledge & Skills (TEKS):

Science TEKS

- **6th Grade** – Section 112.18.b. 2A-D; 3A-C; 11A.
- **7th Grade** – Section 112.19.b. 2A-D; 3A-C; 12b.
- **8th Grade** – Section 112.20.b. 2A-D; 3A-C; 11b.

Mathematics TEKS

- **6th Grade** – Section 111.26.b. 1A-G; 9A,C; 10A,B.
- **7th Grade** – Section 111.27.b. 1A-G; 10A,C; 11A-C.
- **8th Grade** – Section 111.28.b. 1A-G; 10A,C; 11A-C.

References:

- Texas Commission on Environmental Quality: **Study on the Economic Impacts of Recycling** www.tceq.texas.gov/p2/recycle/study-on-the-economic-impacts-of-recycling
- Texas Commission on Environmental Quality: **Municipal Solid Waste in Texas: A Year in Review – 2024 Data Summary and Analysis** https://www.tceq.texas.gov/downloads/permitting/waste-permits/publications/as-187-25-english.pdf

Answer Key:

1. $\dfrac{2126 \text{ million tons}}{4132 \ \underline{\text{million tons}}\ \text{year}}$ = 51 years

2. 2026 + 51 = 2077

3. $\dfrac{41.32 \text{ million tons}}{32 \text{ million Texans}}$ = 1.29 tons per Texans

4. 1.29 tons x $\dfrac{2000 \text{ lbs}}{1 \text{ ton}}$ = 2,580 lbs. per Texan

5. 41.32 million tons x 0.44 = 18.2 million tons

6. a. $\dfrac{2126 \text{ million tons}}{18.2\left(\dfrac{\text{million tons}}{\text{Year}}\right)}$ = 117 years

   b. 2026 + 117 = 2143

7. 41.32 million tons × 0.28 = 11.6 million

8. a. $\dfrac{2126 \text{ million tons}}{11.6\left(\dfrac{\text{million tons}}{\text{Year}}\right)}$ = 185 years

   b. 2026 + 185 = 2211