

# FIRST GRADE GARDEN BASED CURRICULUM

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# UNIT 1: From Waste to Resource

## Unit Summary

In this unit, students will learn about various ways of dealing with waste, including landfills, recycling, and composting. Students will practice sorting waste items and learn the importance of recycling and composting. Students will have various opportunities to play games watch videos to learn about landfills, recycling, and composting, and to write about what they have learned.

*Note: All lessons in this unit could easily be adapted for use in 2<sup>nd</sup> and 3<sup>rd</sup> grade classrooms by using related Common Core standards at those grade levels. Common Core standards in writing are quite similar at these grade levels. Not only can the standards be adapted to these grade levels, but the activities in these lessons are also appropriate for students at the age of 2<sup>nd</sup> and 3<sup>rd</sup> grades.*

## Lesson Summaries:

### Lesson 1.1 ~ Biodegradable vs. Non-biodegradable

Students will learn the difference between biodegradable and non-biodegradable items. Students will play a card-sorting game in which they separate cards of waste items into the categories of biodegradable and non-biodegradable and explain why they chose that particular category. Lastly, students will write to describe the difference between biodegradable and non-biodegradable items.

### Lesson 1.2 ~ Cafeteria Waste Sorting

Students will learn how landfills are harmful to our environment. Students will then build upon their knowledge of biodegradable and non-biodegradable items to learn what items from the cafeteria are composted, recycled, or thrown in the trash. Students will play another card-sorting game to help them practice waste separation in the cafeteria. This lesson focusses on using speaking and listening skills so students can explain and understand each other's reasoning.

### Lesson 1.3 ~ How Does Composting Work?

Students will watch a video about composting. Students will listen to a brief lecture by the teacher about the compost food web, the role organisms (especially bacteria, fungi, and actinomycetes) play in the decomposition of organic residues, as well as the four ingredients compost needs. Students will then process what they learned by doing a writing, drawing, and matching activity.

### Lesson 1.4 ~ How Does Recycling Work?

Students will watch a video about recycling. Students will then select a particular recyclable item mentioned in the video that they are most interested in. Students will form groups based on their recyclable item of interest to watch another video that goes into more detail about their selected item. Students will then write a paper that describes the sequence of how their item is recycled.

### Lesson 1.5 ~ What's Your Opinion?

Students will synthesize the information they have learned over the previous four lessons to write an opinion piece on the topic: "Why should we compost and recycle instead of just throwing things in the trash?"

# From Waste to Resource

## Lesson 1.1 ~ Biodegradable vs. Non-biodegradable

Teacher:  
Author: Wes Oswald

Grade Level: 1

Date:

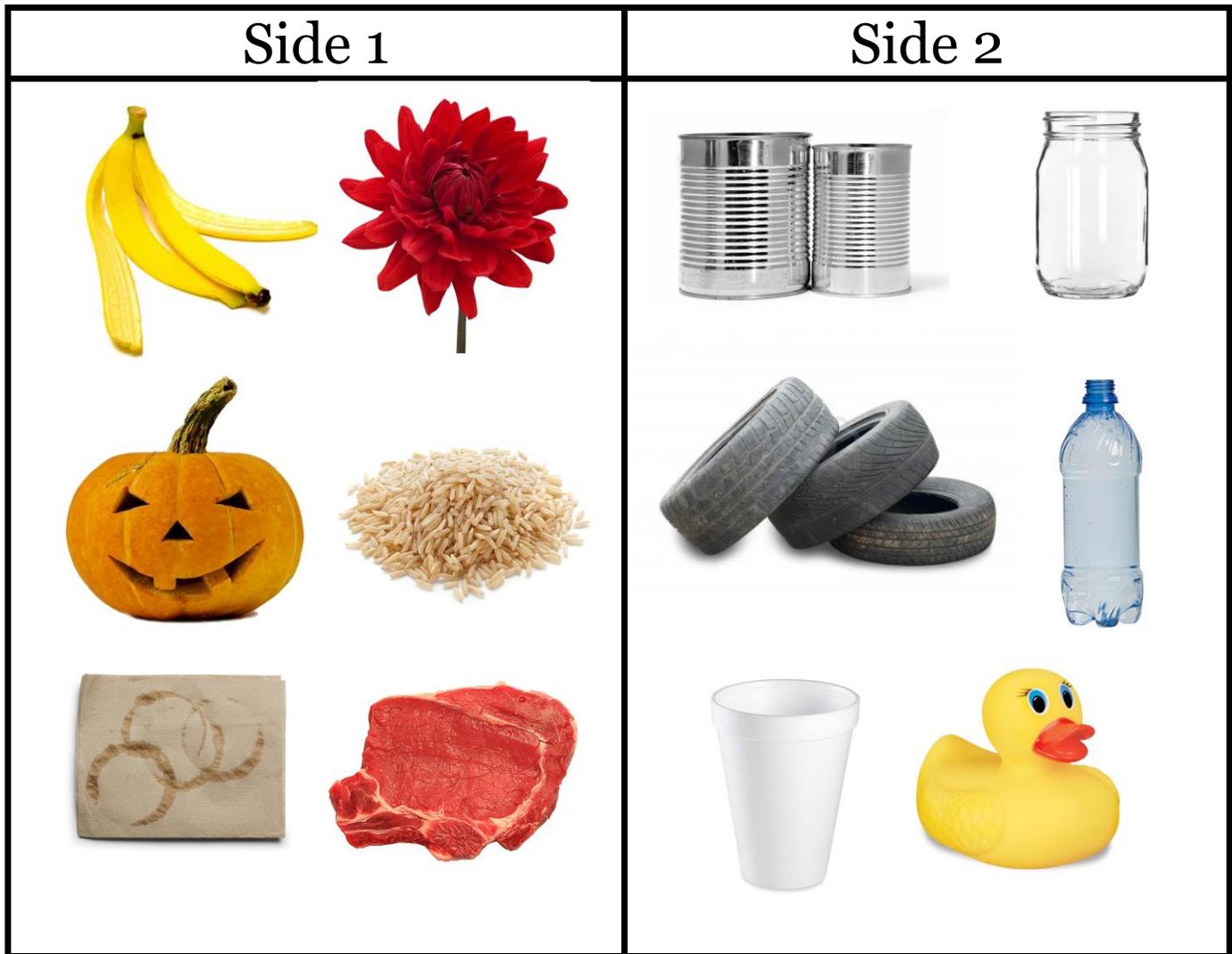
<b>Common Core Standard:</b>	<ul style="list-style-type: none"> <li>•CCSS.ELA-LITERACY.W.1.2</li> </ul> Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.
<b>Ecology Objective:</b>	<ul style="list-style-type: none"> <li>•Students will understand the difference between biodegradable and non-biodegradable items.</li> </ul>
<b>Enduring Understandings and Essential Questions</b>	Interconnectedness (being joined or related): Organisms and their environments are interconnected; changes in one part of the system will affect other parts of the system. <ul style="list-style-type: none"> <li>•Why does it matter to think about whether something is biodegradable or non-biodegradable?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <b>Writing</b> <i>Other:</i>	<ul style="list-style-type: none"> <li>•Students will write to explain the difference between biodegradable items and non-biodegradable items.</li> <li>•Students will name the topic, write some facts, and write a closing sentence.</li> </ul>
<b>Language Objective:</b>	

Vocabulary		Materials		
Biodegradable, non-biodegradable		<ul style="list-style-type: none"> <li>•(1 per table group) <i>Biodegradable Non-biodegradable Sorting Cards Game</i> (see accompanying documents)</li> <li>•(1 per student) <i>Biodegradable and Non-biodegradable sheet</i> (see accompanying documents)</li> <li>• Crayons</li> <li>•(1 per table group) Mini whiteboard and dry-erase marker</li> </ul>		
<b>Seasonality:</b> This lesson is not dependent on seasonality.				
<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June

### Anticipatory Set: (5 minutes)

Give each student a strip of paper that they can write a sentence or two on. Then project the chart and statement below. Read the statement to the students.

Here is a diagram of some common things people use and then “throw away.” Study the two sides. What is the difference between the two sides? Why are some things on one side and some on the other?



### Activity/Investigation:

#### Review and Discuss Anticipatory Set (5 minutes)

1. Have students share together what makes the two sides of objects different. Then have individuals share their idea to the whole class. As students share, create a t-chart on the board and write key differences between the items from both sides. Students will likely say things like, “Side 1 is mostly from plants,” or “Side one is stuff from nature,” and “Side 2 is not food,” or “Side 2 is stuff from stores.” Accept any responses that make sense.

### **Direct Instruction (10 minutes)**

2. Reveal to students that the items above are put into 2 different categories because some are biodegradable and some are non-biodegradable. Biodegradable means “able to be broken down by nature and turn into soil again.” Non-biodegradable means “NOT able to be broken down by nature and won’t turn into soil again.” Now label your t-chart headings as “biodegradable” and “non-biodegradable.” Have students repeat these words and definitions after you. Tell students that biodegradable things come from plants or animals. Point out examples from the anticipatory set and how they match the definitions. (Note: the napkin comes from paper, which is from a tree. The rice comes from a rice plant.)
3. Explain the word parts to students:
  - Bio means life. This is meaningful because biodegradable items are broken down by living organisms like bacteria and fungi (more on this in lesson 3)
  - Degrade means to break down into smaller pieces.
  - Non means not.
4. Tell students that things that are biodegradable break down back into soil in nature. Water, sunlight, bugs, and microscopic organisms like bacteria and fungus all work together to turn biodegradable things back into soil. This is important to think of because all the things we use are either biodegradable or non-biodegradable. (*Note: students will learn why this is important in the next lesson.*)
5. Tell students that they will play a sorting game to determine if some common objects are biodegradable or non-biodegradable. Tell students that each table group (3-5 kids or so) will get a deck of cards facedown. Each card will have a word and a picture on it. Your job is to take turns (one at a time) take the top card, read it out loud and shows the picture to the kids at your table. Then you will decide whether that object is biodegradable or non-biodegradable. Each group will also get a small whiteboard and a marker. Make a blank t-chart on the board writing the words biodegradable and non-biodegradable at the top as labels. Once you decide which category your object goes into, explain to your group why you made that decision. If your group agrees, place the card in the correct category. If not, your table group can try to change your mind. Once you have all agreed, place the card on matching side of your t-chart. Then it’s the next person’s turn. You will start with the person at your table that has the longest hair and continue playing in a clockwise fashion.
6. Provide an example to the students yourself by selecting a card, thinking aloud, and then explaining the choice you made. Ask the class if they agree or not. Then place the card on the matching side of the white board.

### **Sorting Game (10 minutes)**

7. Monitor game play and note any cards that are challenging. These are the cards you will discuss with the class after game play.

**Direct Instruction (5 minutes)**

8. Select and discuss a few cards that groups had trouble agreeing on, or that were commonly misplaced.
  
9. Tell students that they will now write and describe the difference between biodegradable and non-biodegradable. In their own words, students will: Introduce their topic
  - Explain what biodegradable is
  - Explain what non-biodegradable is
  - Give some examples for each using the words on the cards
  - Provide a sense of closure
  
10. Tell students they will leave the cards face-up at their tables still categorized on their white boards. Tell them to leave the cards there so they can use the printed words to help them with their spelling.

Make sure students understand what it means to introduce their topic as well as to provide a sense of closure. If appropriate, provide the following sentence starters:

<b>Introduce topic</b>	<b>Closing</b>
Today we learned....	I liked learning about...
We sorted some....	I can tell the difference between...
Today we played....	Biodegradable and non-biodegradable things are...

**Writing Activity (20 minutes)**

11. Students each get a copy of Biodegradable and Non-biodegradable sheet (see accompanying documents). Students write according to the writing prompt listed in step 7. Once you have checked that their writing is complete, invite them to draw a picture or diagram to accompany their writing.

**Closure: (5 minutes)**

12. Ask students to clean up. Then ask them to hold their paper they just completed and find a friend at a different table to share their writing with. Tell students that to share their writing, they need to put their paper on the table so that both partners can see and read it, then the writer will read the paper to their friend. Then they switch.

If time permits, ask the students, “What’s the most interesting thing you learned in this lesson today?”

**Teacher Reflection:**

# From Waste to Resource

## Lesson 1.2 ~ Cafeteria Waste Sorting

Teacher:  
Author: Wes Oswald

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<ul style="list-style-type: none"> <li>•CCSS.ELA-LITERACY.SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</li> <li>•CCSS.ELA-LITERACY.SL.1.1.A Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).</li> <li>•CCSS.ELA-LITERACY.SL.1.1.B Build on others' talk in conversations by responding to the comments of others through multiple exchanges.</li> <li>•CCSS.ELA-LITERACY.SL.1.1.C Ask questions to clear up any confusion about the topics and texts under discussion.</li> </ul>
<b>Ecology Objective:</b>	•Students will know how to sort waste materials into categories of landfill, recycling, and compost
<b>Enduring Understandings and Essential Questions</b>	<p>Interconnectedness (being joined or related): Organisms and their environments are interconnected; changes in one part of the system will affect other parts of the system.</p> <ul style="list-style-type: none"> <li>•Why should we sort our waste materials?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <b>Writing</b> <i>Other:</i>	<ul style="list-style-type: none"> <li>•Students will talk with their peers about which items go in the landfill, recycling or compost.</li> <li>•Students will listen to each other and speak one at a time.</li> <li>•Students will respond to each other and ask questions when needed.</li> </ul>
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>
Biodegradable, non-biodegradable	<ul style="list-style-type: none"> <li>•(1) Computer connected to internet, preferably with projector</li> <li>•(1) <i>Tucson Recycling Poster</i> (see accompanying documents)</li> <li>•(1 per table group) <i>Landfill Recycling Compost Sorting Game Cards</i> (see accompanying documents)</li> <li>•(1 per table group) Mini whiteboard and dry-erase marker</li> </ul>
<b>Seasonality:</b> This lesson is not dependent on seasonality.	
<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.
<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.
<i>Dry Summer</i> May-June	

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**Anticipatory Set: (2-3 minutes)**

Where do the things we “throw away” in the garbage can go? What happens to them there?

Give students a few moments to think about these questions. Then have them turn to a neighbor and discuss.

**Activity/Investigation:**

**Review and Discuss Anticipatory Set (2-3 minutes)**

1. Have students share their ideas from the above question.

**Direct Instruction (25 minutes)**

2. Explain to students that when we “throw things away” they don’t actually “go away.” They go to the landfill or the dump. Show students these pictures of Tucson’s Los Reales Landfill.





3. Show students a video of how a landfill works:

<https://www.youtube.com/watch?v=lsyg472MQp8>

4. After the video has been shown, have students discuss the following question:
  - What's something new you learned?
  - What do you think of landfills?
  - How are landfills a problem?
5. Tell students that there are other ways we can deal with our waste. Ask students what ways they can think of. Students may respond with recycling and composting. Tell students that when you recycle, the materials go to a factory to be sorted and turned into new things. When you compost, biodegradable things are separated and they break down into soil. Ask students if they remember what biodegradable means. Ask students if there are questions. Explain that we both recycle and compost at our school as a way for less garbage to be taken to the landfill.
6. Show students the Tucson Recycles poster:

[https://www.tucsonaz.gov/files/es/lwn\\_flyer\\_eng-span\\_web.pdf](https://www.tucsonaz.gov/files/es/lwn_flyer_eng-span_web.pdf)

Show how the following items are recyclable:

- Metal Cans
- Plastic Containers
- Glass Containers
- All Paper and Cardboard (not grease stained)
- Milk Cartons and Drink Boxes
- All items should be fairly clean
- Most non-biodegradable household waste except: Plastic bags, Styrofoam

Hang this poster or create a list on the board for students to reference.

7. Explain to students what is compostable. (*Note: Students will learn the process of composting in a later lesson.*) Tell students that anything that is biodegradable is also compostable. Tell students that everyone composts a little bit differently. Tell student that at our school, (as well as at the homes of many people who compost) we don't compost animal products like dairy or meat even though they are biodegradable. Ask students to give some examples of dairy (milk, ice cream, cheese, yogurt, etc.). Tell students that we don't compost meat or dairy because they break down more slowly, tend to smell, and can attract pests. Tell students that at our school, if there is a little bit of meat or dairy as a part of a food item, we will usually compost it though. For example some salad with a little bit of cheese or ranch dressing would be acceptable.
8. Take kids on a short walk to Manzo's compost piles. (You may even want to pre-arrange for a compost bucket filled with scraps be set aside for your class to empty into it.) Have them gather around a bin. Explain to them that our bins look like they've been filled with soil because the food waste that's been put into it is already decomposing/breaking down. Take a pitchfork and dig into one to show them that there is indeed food waste inside. Tell them that they will learn how composting works in a later lesson. Answer questions and walk students back to class.
9. Tell students that today they will do another sorting activity. Last time we sorted biodegradable and non-biodegradable things. Today we will sort common cafeteria items into the categories of landfill, recycling, or compost. Students will play like they played the previous sorting game in lesson 1. This time though, they will divide their white board into a chart with three sections and label each section as landfill, recycling, compost. Tell students that each table group (3-5 kids or so) will get a deck of cards facedown. Each card will have a word and a picture on it. Your job is to take turns (one at a time) to take the top card, read it out loud and show the picture to the kids at your table. Then you will decide whether that object goes to the landfill, recycling, or compost. Have the Tucson Recycles poster displayed for reference purposes. Once you decide which category your object goes into, explain to your group why you made that decision. If your group agrees, place the card. If not, they can try to change your mind using ideas or resources from today's lesson. Please ask each other questions so you can understand each other better. Once all have agreed, place the card on matching section of your chart. Then it's the next person's turn. You will start with the person at your table who has the name that starts with a

letter closest to A. If there is a tie, do rock paper scissors one time to see who wins. Continue playing in a clockwise fashion.

10. Provide an example to the students yourself by selecting a card, thinking aloud, and then explaining the choice you made. Ask the class if they agree or not. See if the class has any questions to ask you. Then place the card on the matching section on the chart on your white board.

### **Sorting Game (15 minutes)**

11. Monitor game play and note any cards that are challenging. These are the cards you will discuss with the class after game play. There are purposely some cards that are tricky. Some cards do not fit neatly into one category!

### **Direct Instruction (5 minutes)**

12. Discuss any cards that were troublesome to sort. Many cards are self-explanatory, but here are some trickier ones:
  - Fried Rice: Compost
  - Fruit Cup: Compost the fruit, recycle the cup, trash the lid
  - Ham and Cheese Sandwich: Ham and cheese go to the garbage (or to chickens), bread to the compost
  - Ketchup packet: Trash
  - Peanut Butter and Jelly Sandwich: Compost (all ingredients come from plants)
  - Plastic Container: Hard plastic gets recycled
  - Plastic Fork: Hard plastic gets recycled
  - Refried Beans: compost
  - French fries: compost (made from potatoes)
  - Pizza: either throw the whole thing in garbage or scrape cheese and meat into trash and compost bread and sauce
  - Salad in container: Compost the salad, container in recycling

### **Closure: (5 minutes)**

13. Ask students to clean up their cards. Pose the following question: “Why do we sort our waste into compost and recycling instead of just throwing everything in the trash here at Manzo?” Students discuss with a neighbor. Then teacher asks volunteers to share their ideas.

### **Teacher Reflection:**

# From Waste to Resource

## Lesson 1.3 ~ How does Composting Work?

Teacher:  
Author: Wes Oswald

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<ul style="list-style-type: none"> <li>•CCSS.ELA-LITERACY.RI.1.7 Use the illustrations and details in a text to describe its key ideas.</li> <li>•CCSS.ELA-LITERACY.W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.</li> </ul>
<b>Ecology Objective:</b>	•Students will describe the four ingredients compost requires and describe the roles of primary consumers in a compost pile.
<b>Enduring Understandings and Essential Questions</b>	<p>Interconnectedness (being joined or related): Organisms and their environments are interconnected; changes in one part of the system will affect other parts of the system.</p> <ul style="list-style-type: none"> <li>•How does composting benefit our environment?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <b>Writing</b> <i>Other:</i>	<ul style="list-style-type: none"> <li>•Students will use a picture of a compost food web to describe how the process of composting works.</li> <li>•Students will summarize how composting works in a short text.</li> </ul>
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>			
Water, Oxygen, Browns, Greens, fungi, molds, actinomycetes, bacteria, organisms	<ul style="list-style-type: none"> <li>•(1) Computer connected to the Internet, preferably with a projector</li> <li>•(1) <i>Compost Wood Web</i> (see accompanying documents)</li> <li>•(1) <i>Four Ingredients of Compost</i> (see accompanying documents)</li> <li>•(1) <i>First Level Consumers</i> (see accompanying documents)</li> <li>• (1 per student) Student worksheet: <i>What Does a Compost Pile Need?</i> (see accompanying documents)</li> <li>•Scissors and glue for students to share</li> </ul>			
<b>Seasonality:</b> This lesson is not dependent on seasonality.				
<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June

### **Anticipatory Set: (5 minutes)**

Today we will learn how composting works. Here is a video that will review some things about landfills and teach us some new things about composting. Think about these questions as you watch the video:

<https://www.youtube.com/watch?v=dRXNo7Ieky8>

1. How does the school in the video compost similarly to our school?
2. How does the school compost differently?
3. What's something new you learned about composting?

### **Activity/Investigation:**

#### **Review and Discuss Anticipatory Set (5 minutes)**

1. Have students share their ideas from the above questions with a neighbor. Then share as a whole class. Potential responses:
  - They use buckets. They compost many of the same things we do.
  - Their compost leaves the school. Ours is composted in bins at our school. They compost meat and dairy (remember they are biodegradable!) but we don't. They don't compost napkins or paper plates. We can (they're made from trees and are considered "browns") as long as we don't put in a bucket that the chickens will eat.
  - The video does a great job of showing the food cycle. Remove the stickers off fruit!

#### **Direct Instruction (20 minutes)**

2. Tell students that the video we just watched mentioned that billions of tiny creatures help to break down the organic materials in compost. Project the compost food web (see accompanying documents) for students to see. Point out that the arrows show the flow of energy or what gives energy to what. Explain as follows:

- A. *Organic Residues*: Project "*Four Ingredients of Compost*" (see accompanying documents). The compost pile needs four basic materials: Water, Oxygen, Dead, dried up organic materials (Browns) and fresh, colorful organic materials (Greens). Once these four materials are present, composting can begin!
  - Ask students for some examples of browns: straw, shredded paper, dried up leaves, dead, dry branches, etc.
  - Ask students for some examples of greens: any kind of recently discarded food, green leaves, fresh fruit and vegetable peels, any organic material that is not dried up. ("Greens" are not at all necessarily green in color. This is the stuff we collect in the cafeteria for our compost piles.)
- B. *First Level Consumers*: Project "*First Level Consumers*" (see accompanying documents). *These are the organisms that get energy by eating the organic residues. Molds, bacteria, and actinomycetes are all microscopic organisms that live by eating and breaking down the organic residues. These are the most important organisms for creating compost. Have students repeat the names of these first level consumers after you: molds, bacteria,*

actinomycetes. Show students pictures of these three first level consumers. Show students that first level consumers also include worms, sow bugs, flies and snails. However, if we add the right combination of organic residues along with oxygen and water, then the compost pile gets too hot for these bugs to live in it. We make sure the compost pile has oxygen by mixing lots of “browns” into it to give it loft (or to make it fluffy and light) and by turning the compost (essentially fluffing it up). The bacteria, molds, and actinomycetes create heat as they come to the compost bin and grow. The heat that the bacteria, actinomycetes, and molds create is beneficial because it speeds up the composting process. If we don't give the compost pile the right amount of water, these organisms dry up and die. If we don't give the compost pile oxygen by turning it and adding browns, they lose oxygen and die. When they die, the compost pile loses its heat and composts much more slowly.

C. *Second Level Consumers*: Mites, roundworms, springtails, and some beetles (Note: this can be simplified/summarized by calling them “bugs.”) can come to the compost pile to get energy by eating the first level consumers. However, if conditions in the compost pile are just right, the compost pile will be too hot for many of these second level consumers to survive. Then the bacteria, actinomycetes, and molds will continue to break down the compost very fast.

D. *Second and Third Level Consumers*: Centipedes, ground beetles, ants, and other organisms (Note: These too can be simplified/summarized by calling them bugs.) get energy by eating the second and first level consumers. But again, if conditions in the compost pile are just right, the compost pile will be too hot for many of these second level consumers to survive. Then the bacteria, actinomycetes, and molds will continue to break down the compost very fast.

3. Intermittent closure: Have students walk to at least 2 different classmates to say in their own words how the compost food web works. Then have some students share their summaries with the class.
4. Check for understanding: Ask the class these questions:
  - What are the most important organisms for a compost pile? (molds, actinomycetes, bacteria)
  - What are the four ingredients a compost pile needs? (greens, browns, oxygen, water)
  - How do we give a compost pile oxygen? (turning it and adding browns, which add loft/fluffiness)

### **Writing Activity (25 minutes)**

5. Distribute *What Does a Compost Pile Need?* worksheet. Make sure references are projected, posted, or distributed for students to reference and use as spelling guides as they write. (*You may wish to extend time into another class session if your students don't write very fast, or if you'd like students to go through the editing process and write final drafts.*)

**Closure: (5 minutes)**

6. Ask students to read to themselves to review what they've already written on their papers. Students will stand and share their ideas with at least 2 other students wearing different colored shirts: Students in white uniform shirts will describe the 4 ingredients of compost and describe what they do for compost. Students in blue uniform shirts will name the 3 first level consumers and what they do to help a compost pile turn into soil. Once students have had time to share with each other, ask volunteers to share ideas with the whole class.

**Teacher Reflection:**

# From Waste to Resource

## Lesson 1.4 ~ How does Recycling Work?

Teacher:  
Author: Wes Oswald

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<ul style="list-style-type: none"> <li>•CCSS.ELA-LITERACY.W.1.3 Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure.</li> <li>•CCSS.ELA-LITERACY.W.1.2 •Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.</li> </ul>
<b>Ecology Objective:</b>	•Students will describe how items are recycled and why recycling is important.
<b>Enduring Understandings and Essential Questions</b>	<ul style="list-style-type: none"> <li>•Interconnectedness (being joined or related): Organisms and their environments are interconnected; changes in one part of the system will affect other parts of the system.</li> <li>•How does recycling benefit our environment?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <b>Writing</b> <i>Other:</i>	•Students will write to describe how a material of their choice is recycled.
<b>Language Objective:</b>	

<b>Vocabulary</b>		<b>Materials</b>		
Recycling, glass, plastic, paper, carton, cans		<ul style="list-style-type: none"> <li>•(5 or more) Computers connected to the Internet, preferably with 1 connected to a projector</li> <li>• (1 per student) <i>How Does Recycling Work?</i> (see accompanying documents)</li> <li>•Crayons or other coloring supplies</li> </ul>		
<b>Seasonality:</b> This lesson is not dependent on seasonality.				
<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June

### **Anticipatory Set: (2-3 minutes)**

Today we will learn how recycling works. Please talk with a neighbor to review the following:

1. What materials are recyclable?
2. Why should people recycle?

## **Activity/Investigation:**

### **Review and Discuss Anticipatory Set (2-3 minutes)**

1. Then share ideas from the Anticipatory Set as a whole class. Potential responses:
  - metal containers, paper, cardboard, hard plastic (most inorganic materials except plastic bags, plastic film, or Styrofoam)
  - Reduce waste being brought to landfill, keep landfill from expanding, save land as habitat for animals, prevent more leachate from polluting our land and water, prevent the need for excess mining and drilling for new materials, etc.

### **Direct Instruction (5 minutes)**

2. Tell student that today they will watch a series of videos created by MRF (Materials Recovery Facility). MRF is the company that collects recyclables from Tucsonans, sorts it, and prepares the materials to be sent to other factories to be made into new products again. Tell students that they will first watch a video that shows how ALL things are recycled. Then each student will select a recyclable material they are most interested in and watch another video about just that material. This second video will provide additional details about how that singular material is recycled. Project this video *Materials Recovery Facility* found on the website below for the class to view:

<http://www.recommunity.com/education/>

3. Ask students to select one of the following 5 recyclable materials that they would like to learn even more about: cans, plastic, cartons, paper, or glass. Groups do not need to be equal size, but each material should have at least a couple students in it. Tell students that the next video they watch will help them become “experts” on the material of their choice so that they can write to describe the process of how that material is recycled.

### **Research (10 minutes)**

4. At the computer lab, or using computers in your classroom, separate your students by the material they are most interested in learning more about. Return to the following website:

<http://www.recommunity.com/education/>

Set up groups of students at computers to watch the video that features their selected material:

- *Recycling Cans*
- *Recycling Plastic*
- *Recycling Cartons*
- *Recycling Glass*
- *Recycling Paper*

Tell students that they should watch the video twice so they can really remember the details of how each material is recycled.

5. After students have viewed the video that represents their group's choice twice, ask students to turn to a partner in their own group and summarize how that material is recycled.

*Writing Activity (35 minutes)*

5. Away from the computers, or back at class, students will draw a picture and write about how their material is recycled using the template "How Materials Are Recycled" (see accompanying documents). Review expectations for writing:

- Introduce the topic
- Provide some details about the steps to recycle your chosen material.
  - Use words like "First, Next, Later, Last."
- End with a sense of closure

Provide students with the following sentence starters:

- For their introduction: \_\_\_\_\_ *can be recycled.*
- For their closure: *Recycling is important because* \_\_\_\_\_.

6. Allow students to write their sentences and draw an accompanying image once their writing is complete.

*Closure: (5 minutes)*

Students will do a gallery walk. Students display their completed papers at their tables. Allow students time to view and read a variety of papers about the recycling of different materials. Then ask students to share with the class something new they learned about recycling.

**Teacher Reflection:**

# From Waste to Resource

## Lesson 1.5 ~ What's your opinion?

Teacher:  
Author: Wes Oswald

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<ul style="list-style-type: none"> <li>•CCSS.ELA-LITERACY.W.1.1</li> </ul> Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.
<b>Ecology Objective:</b>	<ul style="list-style-type: none"> <li>•Students will state their opinion of what to do with their own waste in the cafeteria and supply a reason why.</li> </ul>
<b>Enduring Understandings and Essential Questions</b>	Interconnectedness (being joined or related): Organisms and their environments are interconnected; changes in one part of the system will affect other parts of the system. <ul style="list-style-type: none"> <li>•How can we deal with our waste materials in ways that benefit our environment?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <b>Writing</b> <i>Other:</i>	<ul style="list-style-type: none"> <li>•Students will write to state their opinion about how to deal with waste in the cafeteria and supply at least one reason for their opinion.</li> </ul>
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>			
Landfill, compost, recycling, leachate, biodegradable, non-biodegradable, organism, glass, plastic, paper, carton, cans	<ul style="list-style-type: none"> <li>•(1 per student) <i>My Opinion about Waste Materials</i> (see accompanying documents)</li> <li>•Crayons or other coloring supplies</li> <li>•Resources/posters regarding recycling and compost from previous lessons.</li> </ul>			
<b>Seasonality:</b> This lesson is not dependent on seasonality.				
<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June

### **Anticipatory Set: (2-3 minutes)**

We have learned about 3 ways that our waste in the cafeteria is dealt with. Discuss these questions with your table group:

- a. What are those three ways?
- b. Which is the best for our planet? Why?
- c. Which is the worst for our planet? Why

## **Activity/Investigation:**

### **Review and Discuss Anticipatory Set (2-3 minutes)**

1. Ask students to share ideas for each question. Questions b and c don't necessarily have correct answers.

### **Direct Instruction (5 minutes)**

2. Tell students that they will be writing their opinions about why we should recycle and compost rather than just throw everything in the trash. Tell students that an opinion is something you believe.

Writing prompt: Why should we compost and recycle instead of just throwing things in the trash?

3. Direct students to resources. Show students the word bank you have written on the board (word bank should include relevant words students should use in their writing. See vocabulary list above.). You may want to set a required number of words (perhaps 3 or 4) from the word bank that students should use in their writing. Show students the posters you have displayed on the wall or elsewhere accessible for them to reference (Include compost food web, Tucson Recycles poster, Primary Consumers document, and other references from previous lessons.).
4. Tell students their guidelines for the opinion piece they will write:
  - a. Introduce the topic.
  - b. Tell your opinion.
  - c. Describe at least one reason for your opinion.
  - d. End with closure.
5. Provide some sentence starters.
  - For introductions:  
“We \_\_\_\_\_ in the cafeteria.”  
“In our cafeteria, we \_\_\_\_\_.”
  - To state opinions:  
“I think we should \_\_\_\_\_.”  
“It is important to \_\_\_\_\_.”
  - For closures:  
“It is very \_\_\_\_\_ to compost and recycle.”  
“Composting and recycling help \_\_\_\_\_.”

### **Writing Activity (35 minutes)**

6. Allow students to write their sentences on their own. Conversely, you may wish to guide the writing with the whole class or with a group of students who will need more help. To guide the writing, you can dictate/project sentence starters one at a time while students copy and complete sentence starters. Once writing is complete and has been checked, students may draw a picture to accompany their writing.

**Closure (5 minutes)**

7. Students will select a partner to read and show their writing to. After reading and showing, the partner should tell him a specific compliment. I.e.: “My favorite part of your writing was....” or “I agree with you that.....” Then partners switch roles.

Consider displaying finished writing in the cafeteria near waste sorting area or on a wall where students line up so students can read the opinion pieces while they wait in line.

**Teacher Reflection:**

## UNIT 2: Composting

### **Unit Summary:**

In this unit, students will learn about different ways of dealing with waste, including recycling and composting. Students will learn and gain the experience of waste and composting within landfills through various videos of local landfills in Tucson. Students will have various opportunities to engage with hands-on building projects and gathering data from their observations. Students will be able to write down their thoughts and share them amongst other students.

### **Lesson Summaries:**

#### **Lesson 2.1 ~ What is a Landfill?**

In this lesson, students will go on a Landfill 'Fieldtrip'. By watching YouTube videos, they will gain some insights as to what is a Landfill, what are some ways in which trash is buried, how some communities are educating young children in the importance of recycling and they will discuss as a class what they can do to help reduce the amount of waste taken from their house every week. Table teams will create an informative (advertisement) poster about what type of trash we put in cities' landfills. With teacher support and guidance and through sharing the pen, a Class Opinion Piece of writing will be co-created.

#### **Lesson 2.2 ~ Building a Mini-Landfill**

In lesson 1, students learned what a landfill is. Today the class will make a mini-landfill in the backyard. The area will be marked and labeled so that it is undisturbed as students will visit the site periodically to conduct and record observation about the decomposition of the materials used to create a 'landfill'. After creating the mini-landfill, students will write about how the landfill was created. Students will then check their work against the Checklists to determine whether their work is complete or needs more details.

#### **Lesson 2.3 ~ Learning about Leachate**

In this lesson the students will watch a short video to learn how the contaminate leachate forms in landfills. They will take notes and add quick drawings that capture important information. Students will also draw a diagram of a landfill and add labels. Then they will use their notes and labeled diagrams to teach each other what they learn in today's lesson. This is a great way to assess the learning and see if students are capturing the right ideas: Leachate is a byproduct of chemical reaction by all that trash. They will consider this question: If those things interacting with each other cause Leachate what do you think need to happen for less leachate to form? How about for zero leachate to form at all?

#### **Lesson 2.3 ~ Learning about Leachate (Part 2)**

Last time the class made a mini-landfill they will periodically observe to record decomposing changes that may happen. In this 2 part investigation, they will experiment with various materials placed in a plastic bottle to make a model of the layers of trash and repellant materials in a landfill to answer this question: Which combination of material is better at preventing leachate pollution? This is a 2-part investigation. Today: Part I, the students will watch the videos to learn about Leachate. Tomorrow Part II, they will construct the mini-landfills listed below.

# Composting

## Lesson 2.1 ~ What is a Landfill?

Teacher:  
Author: Aide Silva

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<p><b>1.W.7</b> Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p><b>1.W.8</b> With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>
<b>Ecology Objective:</b>	Students will graph historical yearly precipitation for Tucson and note trends.
<b>Enduring Understandings and Essential Questions</b>	<p><b>Biodiversity (the variety of life on Earth):</b> All ecosystems contain a variety of organisms that are interdependent.</p> <p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• How is biodiversity affected by human behavior?</li> <li>• How does decreased or increased biodiversity affect life on Earth?</li> <li>• How are humans dependent on biodiversity?</li> </ul>
<b>Content Objective:</b> <i>Math Reading Writing Other:</i>	<p>Students will be able to describe what a landfill is.</p> <p>Students will contribute ideas for a Class Opinion piece of writing.</p>
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>
Landfill, waste, garbage, toxic gases (e.g. methane), recycling	<p><b>Teacher:</b> Journal Anchor chart Markers PowerPoint about Landfills Opinion Writing Checklist for teacher and class to reference</p> <p><b>Student:</b> Journals Pencils Crayons Vocabulary chart Magnifying lenses</p> <p><b>For each Table Team:</b></p> <p>*A variety of plastic items such as milk jugs, plastic bottle caps, grocery plastic bags, six-pack rings, metal cans, etc.</p>
<b>Seasonality:</b> This lesson/unit would work during any season, as it is not reliant on any natural phenomenon.	
<i>Monsoon</i>	<i>Autumn</i>   <i>Winter</i>   <i>Spring</i>   <i>Dry Summer</i>

July-Sept.	Oct.-Nov.	Dec- Feb.	Mar.-Apr.	May-June
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**Guiding Questions:** What is a landfill? Why is it important we recycle and reuse?  
How do our actions impact our environment/the place we live in?

**Anticipatory Set:**

Display this picture and have students discuss this question at their tables: What do you think happens to all the garbage that is collected from you house every week?



**Activity/Investigation:**

1. Explain the Anticipatory Set task, set timer for 2 minutes and provides talking/processing time for students to discuss their ideas about what happens to the garbage the city collects from their house every week.
2. **Anchor Chart:** When time is up:  
Call on students from each table team and have them share their responses. Record their ideas on a chart. Allow some time for whole group discussions about the ideas being shared. Tell class “Today we are going on a Virtual Fieldtrip to a Landfill.” We will learn where the garbage truck takes all of our trash.”
3. Create a Vocabulary Anchor Chart and go over terms with class.
  - Landfill: A place where our trash is buried
  - Waste: Food and trash we put in our garbage cans
  - Plastic liner: The special plastic used to cover the hole on the ground and to cover the

- piles of trash that are buried at the landfill
  - Contaminate: to fill out the air or the land with waste or harmful (bad) gases all living things breath
  - Organic waste: The food we throw away or anything from nature such as dray leaves, grass, dead animals, etc.. that breaks down or decomposes
  - Decompose: To break down, to rot
  - Generates: to make/ to create
  - Gases: bad air which can harm humans and animals.
  - Recycle: To use things in same or different ways
4. State the Learning Targets on the slide. Have students repeat the Learning Goal to each other.
  5. Landfill Video: Notebooks and pencils should be ready at teach table for students to take notes as they watch the video. After the video is over, have the class recall some important informational details and add them to the Anchor Chart titled. **What we learned about Landfills.**
  6. **Shared Writing Experience:** Write a Class Opinion Piece

Tell students as a class you will write about **why we should recycle more and create less trash.**

Tell them today you will guide them in writing an Opinion Piece, and that later on they will write their own opinion pieces and that they will have to include all these parts.

Share with class that a good opinion piece will:

- Introduce the topic you are writing about.
- Clearly answer the question.
- Give lots of reasons and explanations.
- "Wrap up" the piece with a concluding sentence.
- Use capitals, periods and question marks, and spell words correctly.

NOTE: Make an Anchor Chart title: Opinion Pieces of Writing Must Have: and add the bulleted items above.

7. Display this piece of writing, as it will be revisited several times during this unit.

### **Closure (5 minutes)**

Have class look at the Anchor charts and their notes and have them list three important reasons we must recycle and put less trash in our cities' landfills.

### **Teacher Reflection:**

# Composting

## Lesson 2.2 ~ Building a Mini-Landfill

Teacher:  
Author: Aide Silva

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<p><b>1. W.7</b> Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p><b>1. W.8</b> With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>
<b>Ecology Objective:</b>	
<b>Enduring Understandings and Essential Questions</b>	<p><b>Biodiversity (the variety of life on Earth):</b> All ecosystems contain a variety of organisms that are interdependent.</p> <p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• How is biodiversity affected by human behavior?</li> <li>• How does decreased or increased biodiversity affect life on Earth?</li> <li>• How are humans dependent on biodiversity?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <i>Writing</i> <i>Other:</i>	Students will create a mini-landfill to investigate this question: How long does it take for biodegradable waste to decompose?
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>
landfill, waste, garbage, toxic gases (e.g. methane), leaching, recycling, plastic liner, soil, biodegradable	<p><b>Teacher:</b> Journal Anchor chart Markers Video Camera</p> <p><b>Student:</b> Journals Pencils Crayons</p> <p><b>Mini-Landfill materials:</b></p> <p>A toy truck Some plastic containers, plastic bottle caps, paper, aluminum, newspaper, grass clippings, twigs, clippings from the vegetable garden, orange peel, lettuce leaves.</p> <p>A small garden shovel to dig a small, shallow hole</p> <p>A piece of study, black plastic liner</p>
<b>Seasonality:</b> This lesson/unit would work during any season as it is not reliant on any natural phenomenon.	
<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.
<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.
	<i>Dry Summer</i> May-June

**Guiding Questions:** How is a landfill built?  
How do our actions impact our environment/the place we live in?

**Anticipatory Set:**

Think about what our learning about landfills from yesterday and the opinion piece we wrote together. Today we will build a mini-landfill. What are some materials you think we should use?

**Activity/Investigation:**

1. Short Term vs. Long Term Biodegradable: A Discovery Lesson
  - o **How:** 1 set of the pictures per table team. (See Supporting Teacher Resources for Investigation #2)
  - o Label Headings: *Short term Biodegradable, Long Term Biodegradable*
  - o Tell students to put them in to piles: **Short Term and Long Term Biodegradable**
2. Tell students to look carefully at the pictures and to notice how they are different, and share their ideas.
3. Discovery lesson.

Give table teams time to look through their pictures and sort them by what they think makes them similar.

Once they have the correct sort, give them labels that read: *Short Term Biodegradable* and *Long Term Biodegradable*

Tell students the **Short Term label** goes with the food scraps and grass clippings sort.

**Ask:** Why do you think we labeled those pictures **Short-Term Biodegradable**, what do you think that means? Which do you think break downs or decompose and becomes part of the soil faster?

They should reason or you guide them into reasoning **those items breakdown or decompose very quickly. Those are also things made by nature. Say:** tomatoes and lettuce are grown from a seed. You can grow them and eat them and they are nutritious for you. **Ask:** Can you grow baby diapers or water bottles from nature? “No, they are man-made!” Students might say.

Lead the students to deduce short –term Biodegradable items that are made from nature and long term that are man- made.

**Ask:** What can we do with the bottle we drank the water from? What can we do with the orange peel, the lettuce leaves that we can’t eat anymore?

**Through this questioning line, you have leaded them to discover 3 important ideas:**

- Biodegradable means that something breaks down or decomposes.
- That nature-made matter has a short term decomposition rate.
- That man-made material has a long- term decomposition rate and that we must find sensitive ways to our environment (and all living things in it), of getting rid of those items when they cannot be reused or recycled. Praise them for their great reasoning.

4. Building a Mini-Landfill. (**Tip:** Take pictures/video of this process! Those can be used for reference later on.)
- In advance identify the area where the mini-landfill will be dug.
  - Gather class and show them the materials they will use.
  - The dump toy truck is to simulate how it is done in a real landfill.

Procedure:

1. Dug a shallow hole, deep enough to accommodate all material to be buried.
2. Line it with thick black plastic – a piece from a Hefty garbage bag will do.
3. Have students take turn placing layers of similar items.
4. Do layers of soil between layers of trash.
5. Cover with another layer of thick dark plastic.
6. Cover with soil and have some students stand on the pile to compress it.

5. Routine Writing: Make a sign.

Two options:

- A. This sign can be created as a class through a sharing the pen writing experience.

- OR -

- B. Teacher assigns a small group of students to be in charge:
- Teacher: “Class, we need a sign to post by our mini-landfill. What should it read if we don’t want others to disturb it?”
  - Question students to lead them to realize the poster needs to INFROM others about what the class is investigating and why they need other’s assistance in not disturbing the investigation site. It needs to be short, concise and convincing.
  - \*\*The goal is to use this as another important opportunity to teach first graders how we use writing in the real world to communicate needs or ideas. Once it is created, it needs to be re-read by the entire class. This gives them an opportunity to engage in collaborated editing.

Have the class re-read it though this lens:

- Is our message clear and convincing?
- Is the spelling correct?
- Did we include drawings or illustrations to support our written message?
- Is the writing neat and legible?
- Does the message inform/convince our audience about why it is/how important it is for our mini-landfill not to be disturbed?

6. Journal Writing:

Students will spend some quiet time reflecting about today’s learning. They will write about how we built the mini-landfill and **will make predictions about what they might see when we go check it out.** Assist as needed.

**Closure Question:**

What did we learn today about garbage and about being good stewards of the Earth? Why does learning about all of this should matter to us?

**Teacher Reflection:**

# Composting

## Lesson 2.3 ~ Learning about Leachate

Teacher:  
Author: Aide Silva

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<p><b>1.W.7</b> Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p><b>1.W.8</b> With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>
<b>Ecology Objective:</b>	
<b>Enduring Understandings and Essential Questions</b>	<p><b>Biodiversity (the variety of life on Earth):</b> All ecosystems contain a variety of organisms that are interdependent.</p> <p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• How is biodiversity affected by human behavior?</li> <li>• How does decreased or increased biodiversity affect life on Earth?</li> <li>• How are humans dependent on biodiversity?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <i>Writing</i> <i>Other:</i>	<p>Students will be able to describe what Leachate is.</p> <p>Students will conduct an investigation to answer this question: Given a variety of materials, which is better at preventing leachate pollution to underground water?</p>
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>
landfill, waste, garbage, toxic gases (e.g. methane), leachate contaminate, plastic liner, clay, soil, biodegradable	<p><b>Teacher:</b> Journal Anchor chart Markers PowerPoint with teaching notes Video Camera</p> <p><b>Student:</b> Journals Pencils Crayons</p> <p><b>Mini-Landfill Materials for each Table Team (will be used in Part II of this Investigation)</b></p> <ul style="list-style-type: none"> <li>• transparent 2-liter soda bottles cut in half with cap</li> <li>• 1 bag each of sand, gravel, topsoil, clay dirt</li> <li>• plastic wrap</li> <li>• food coloring - red or blue or green</li> <li>• jug of water</li> </ul>
<b>Seasonality:</b> This lesson/unit would work during any season, as it is not reliant on any natural phenomenon.	

<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June
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**Guiding Questions:** What is leachate?  
 How is a landfill built? What materials are better at stopping toxic liquid from getting to clean underground water?  
 How do our actions impact our environment/the place we live in?

**Anticipatory Set:**

As they look at this image, say: Think about all that garbage we know goes into a landfill. Have you ever wondered what happens when lots of food waste mixes with other trash in the landfill?



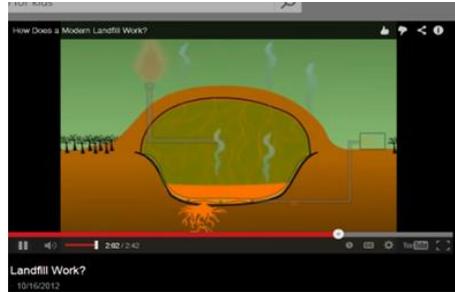
**In advance:** Create a chart with a definition of leachate to be displayed in the classroom. Once students have watched the videos and completed the mini-landfill investigation, recruit a small group of artists who brainstorm and come up with a good drawing to illustrate the definition of leachate above.

**Activity/Investigation:**

1. Record on chart paper their ideas to the question above.
2. Tell class today we will construct another model of a landfill. This model will help learn about leachate. A contaminant that can leek down from landfill craters into the ground water. Tell them that at they will see on a video, landfill workers work very hard to make sure this doesn't happen, but it is possible it can happen in the landfills built in other countries where there may be less resources to have the technology necessary to run landfill facilities as successful as it happens in our country.
3. Tell them they are going to watch a video that will teach them how landfills are made and how a contaminate called leachate is created when trash and water mix underground in all that buried garbage.
4. Have students write notes and draw pictures of some details they find interesting as they watch

the videos.

<http://www.bing.com/videos/search?q=landfill+video+for+kids&FORM=VIRE13#view=detail&mid=3334F8DB492650CoE46F3334F8DB492650CoE46F>



5. After watching the short videos, give students a few minute to discuss at their tables what important information they just learned. Ask them to use their notes and drawings in the conversations.

**Whole Group processing:**

**Say:** Class, so what information did we just learned to helps us grow in our understanding of landfills and how our actions have a negative impact in our environment?

6. Have students **draw a diagram** of a landfill that illustrate how leachate is created. Replay and pause video as necessary. Individual final products should **include at least 5 elements in the video, color and some labels**. Students will use their finish diagram to in their explanations to each and the teacher how leachate forms. This is a great way to assess the learning and to see if students are capturing the right ideas: Leachate is a byproduct of chemical reaction by all that trash.  
**They will consider this question:** If those things interacting with each other cause Leachate what do you think need to happen for less leachate to form? How about for NO leachate to from?

This experience will build some good background knowledge they will tap into on the second part of this investigation: Building a Mini-Landfill to find out which material combination of materials more effective at preventing leaking leachate.

NOTE: The diagram the class made be will used tomorrow as the Anticipatory Set in Part II of this investigation.

**Closure Question:**

What did we learn today about garbage and about being good stewards of the Earth? Why does learning about all of this should matter to us?

**Teacher Reflection:**

# Composting

## Lesson 2.4 ~ Learning about Leachate (Part 2)

Teacher:  
Author: Aide Silva

Grade Level: 1

Date:

<b>Common Core Standard:</b>	<p><b>1. W.7</b> Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p><b>1. W.8</b> With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>
<b>Ecology Objective:</b>	
<b>Enduring Understandings and Essential Questions</b>	<p><b>Biodiversity (the variety of life on Earth):</b> All ecosystems contain a variety of organisms that are interdependent.</p> <p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• How is biodiversity affected by human behavior?</li> <li>• How does decreased or increased biodiversity affect life on Earth?</li> <li>• How are humans dependent on biodiversity?</li> </ul>
<b>Content Objective:</b> <i>Math Reading</i> <i>Writing</i> <i>Other:</i>	<p>Students will be able to describe what Leachate is.</p> <p>Students will conduct an investigation to answer this question: Given a variety of materials, which is better at preventing leachate pollution to underground water?</p>
<b>Language Objective:</b>	

<b>Vocabulary</b>	<b>Materials</b>
landfill, waste, garbage, toxic gases (e.g. methane), leachate contaminate, plastic liner, clay, soil, biodegradable	<p><b>Teacher:</b> Journal Anchor chart Markers PowerPoint with teaching notes Video Camera</p> <p><b>Student:</b> Journals Pencils Crayons</p> <p><b>Mini-Landfill Materials for each Table Team (will be used in Part II of this Investigation)</b></p> <ul style="list-style-type: none"> <li>• transparent 2-liter soda bottles cut in half with cap</li> <li>• 1 bag each of sand, gravel, topsoil, clay dirt</li> <li>• plastic wrap</li> <li>• food coloring - red or blue or green</li> <li>• jug of water</li> </ul>
<b>Seasonality:</b> This lesson/unit would work during any season, as it is not reliant on any natural phenomenon.	

<i>Monsoon</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June
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**Guiding Questions:** How does leachate form?  
 How is a landfill built? What materials are better at stopping toxic liquid from getting to clean underground water?  
 How do our actions impact our environment/the place we live in?

**Anticipatory Set:**

Tell students yesterday they learned what Leachate (‘trash juice’) is and that today in their groups they will look at those diagrams and talk about how leachate forms. Tell them understanding about leachate and how is made in landfills will help them make some good decisions in our experiment for today’s investigation.

**Activity/Investigation:**

1. Investigation #3 lesson review:
  - o After students discussed with their groups the Anticipatory Set task, Have them look at their notebook and reference their notes from the Leachate lesson. OR as a class go over the anchor charts created.

Students should mention the process or parts of the process of how leachate forms in landfills and why people taking care of landfills make sure it does not reach underground water.

2. Next: Teacher guided investigation is done before table teams get to investigate with their materials.
  - o Students sit in in circle on the rug.
  - o **Say:** Today we are going to build a different kind of mini-landfill. This one will helps us find out which combination of materials is better a preventing leachate to leak down underground.
  - o I want you to watch me first trying out the mixt # 1 on the slide. **Let’s find out together** if these materials make a good barrier that would stop leachate from leaking.
3. TIP: Make a poster with materials and instructions to follow as you construct the first mini-landfill.

Follow directions and construct the model with material of your choice.

**Instructions:**

- 1) Place your liner at the bottom of prepared bottle.
- 2) If plastic - lay it on the bottom and press flat.
- 3) If using clay, pack it down with your fingers.
- 4) Randomly select any or all three of the soils - sand, gravel, topsoil and begin layering the soils.

- 5) Be sure to pack them with your fingers.
  - 6) Or use the materials recommended on the cards.
  - 7) You can layer your soils as thick as you want and as few or many layers as you want.
  - 8) As a class, decide if this liner mixture makes a safe, permeable liner to use in a landfill.
4. Table teams ready to try out their own mixes.
- In ADVANCE decide which mixes teams will experiment with. Make sure there is plenty of material for each teams.
  - **Teams RECORD** their findings by drawing their mini-landfills.
  - After teams experiment, whole class discusses which landfill was more permeable and which was less.
  - Ask: Class, what do you all think we should do with all this great information we just learned?
  - *You want them to reason that we can share our finding with our local landfill people.*
  - Ask: Any ideas how we can do that?
  - You want them to reason that the class can write a 'report' that will include illustrations and diagrams.

**IMPORTANT TO KEEP IN MIND:**

As researchers, students need to use the information they are learning in ways scientist use it in the real world.

**SHARING OUR FINDINGS:**

Write with a specific audience in mind. Write an informational piece of text.

The writing of the report should happen during the ELA block as a natural extension of this ecology investigation

**Closure Question:**

Have students think about these questions. Have them discuss with an elbow partner.

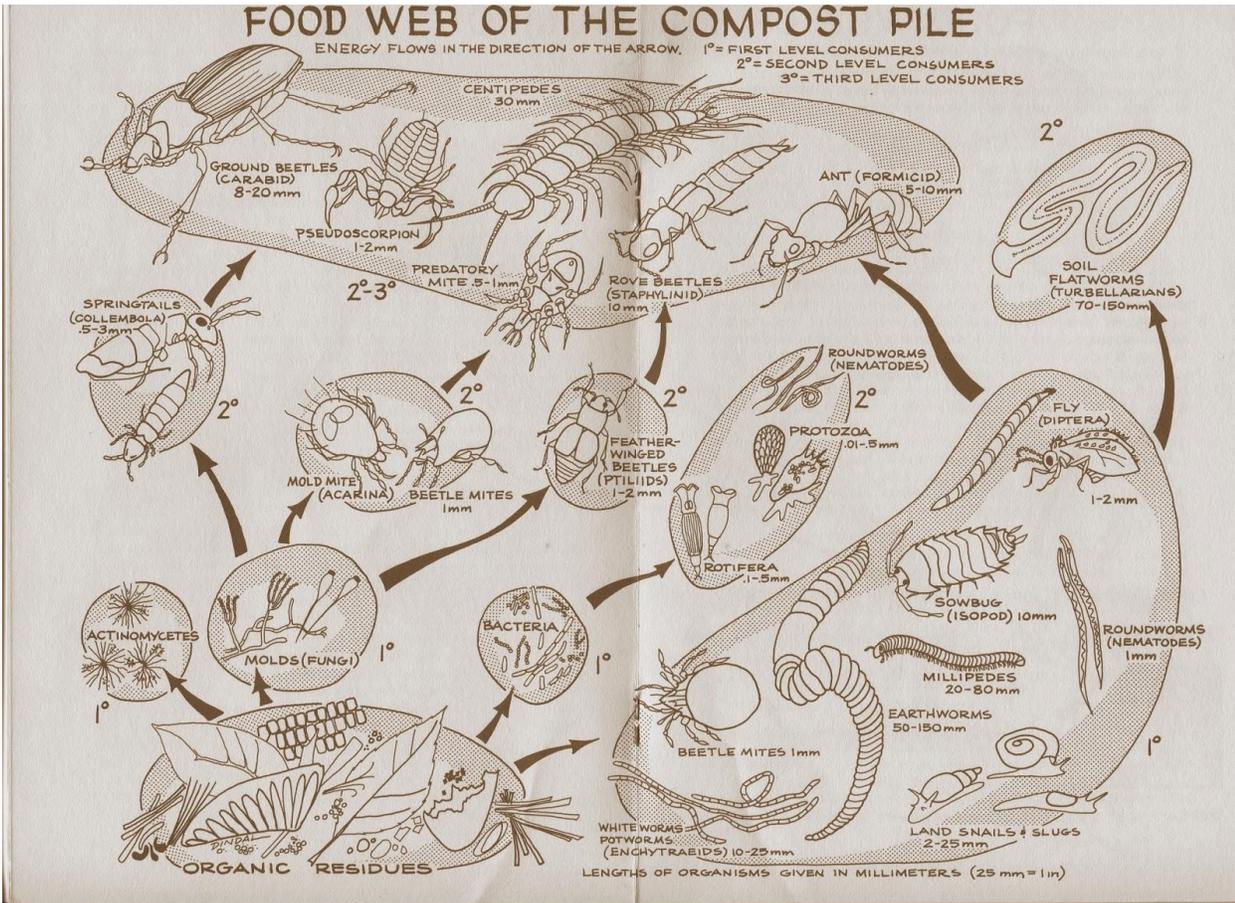
Call on a few to share out with the class.

- How did this investigation help us grow in our understanding of landfills?
- Why should learning about leachate and ground water matter?

**Teacher Reflection:**



# Lesson 1.3



# 4 Ingredients of Compost

## Greens

- Colorful
- Fresh



## Browns

- dead
- dry
- crispy





Water



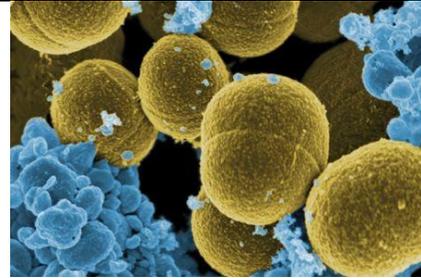
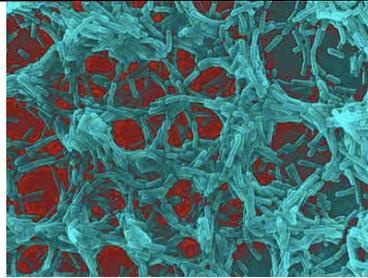
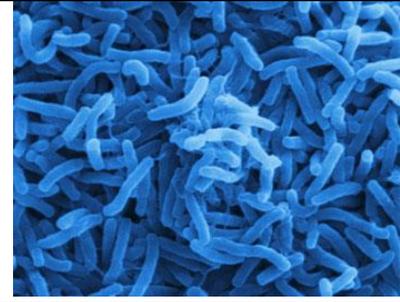
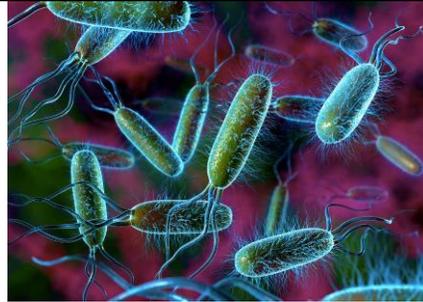
# Oxygen



# First Level Consumers

## Bacteria

- You can see them only with a microscope
- Most common organism in compost pile
- are everywhere in nature (even in the air)



## Actinomycetes

- A type of bacteria
- Looks like white dust or webs
- Make the compost smell earthy



## Molds

- a type of fungus
- break down tough, woody items







Browns	<hr/>
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What Breaks Things Down in a Compost Pile?

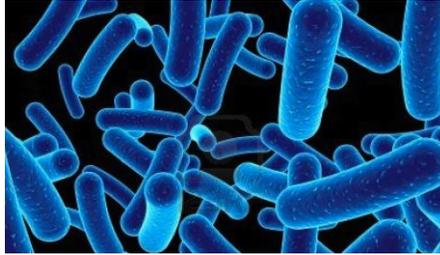
Molds	Bacteria	Actinomycetes



Teacher : Cut along dotted lines. Give one set of images to each student to use on previous page.

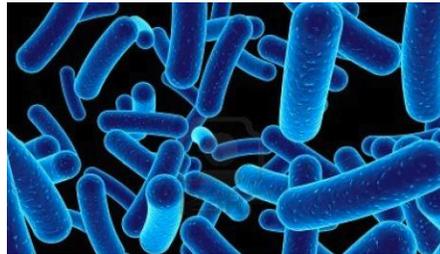
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Directions: Cut out these pictures. Glue them in the correct box where it says, "What breaks things down in a compost pile?"



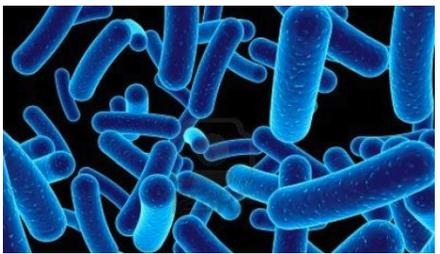
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Directions: Cut out these pictures. Glue them in the correct box where it says, "What breaks things down in a compost pile?"



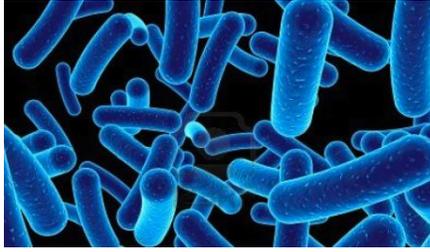
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Directions: Cut out these pictures. Glue them in the correct box where it says, "What breaks things down in a compost pile?"



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Directions: Cut out these pictures. Glue them in the correct box where it says, "What breaks things down in a compost pile?"



Lesson1.4

# How Does Recycling Work?

Handwriting practice lines consisting of multiple sets of solid top and bottom lines with a dashed midline.

Lesson1.5

# **My Opinion about Waste Materials**

Handwriting practice lines consisting of solid top and bottom lines with a dashed midline, repeated ten times.

## Lesson 2.1

### Web Resources:

- YouTube Video :Where does the trash go?

<https://www.youtube.com/watch?v=iPz5bJa9eOI>

- Landfill from England: In this video, we will see how we can build a mini-landfill in a container in the courtyard. Throughout this unit, students will check periodically to see what is decomposing.

<http://www.bing.com/videos/search?q=virtual+trip+to+a+landfill+for+kids&FORM=VIRE3#view=detail&mid=8A02EB3593AD23DEEA3E8A02EB3593AD23DEEA3E>

## Lesson 2.2

### Our Writing Has Conventions When:

- We capitalize the beginning of our sentences.
- We use the correct punctuation:
  - , ! ?
- We leave spaces between words.

### First Grade Process Writing Checklist:

- ✓ Think about the steps we followed to create our Mini-Landfill.
  - ✓ List the materials used.
  - ✓ List the steps we followed to make our landfill.
- Use words like:**
- ✓ First, then, next, after that, finally.
  - ✓ Use complete sentences.
  - ✓ Use Conventions
  - ✓ Re-read to make sure your story makes sense.

**Routine Writing:** Make a sign.

Two options:

- A) This sign can be created as a class through a sharing the pen writing experience.
- B) Teacher assigns a small group of students to be in charge:

**Teacher:** “Class, we need a sign to post by our mini-landfill. What should it read if we don’t want others to disturb it?”

Question students to lead them to realize the poster needs to **INFORM** others about what the class is investigating and why they need other’s assistance in not disturbing the investigation site. It needs to be **short, concise and convincing**.

\*\*The **goal is** to use this as another important opportunity to **teach first graders how we use writing in the real world to communicate needs or ideas**. Once it is created, it needs to be re-read by the entire class. This gives them an opportunity to **engage in collaborated editing**.

Have the class re-read it though this lens:

- Is our message clear and convincing?
- Is the spelling correct?
- Did we include drawings or illustrations to support our written message?
- Is the writing neat and legible?
- Does the message **inform/convince** our audience about why it is/how important it is for our mini-landfill not to be disturbed?

### **Journal Writing:**

Students will spend some quiet time reflecting today’s learning. They will write about how we built the mini-landfill and will make predictions about what they might see when we go check it out.

**Headings for picture sort. Each table team will need one.**

Short-term biodegradable

Long term biodegradable

At each table, students decide which pictures go together and through careful analysis and group discussions, they decide why the pictures belong in the two groups.

Short-Term Biodegradable	Long-Term Biodegradable

**In advance: Printed pictures to be sorted out will need to be cut out by teacher.**





The information below came from the link listed. This information can be charted out. It is strongly suggested that as many items as possible represented on the list be displayed in the classroom next to the chart. **This display serves as a good reminder of the awareness we are trying to develop in our young learners.**

[http://www.greengood.com/terms\\_to\\_know/biodegradable\\_definitions.htm](http://www.greengood.com/terms_to_know/biodegradable_definitions.htm)

Cotton rags	1-5 months
<b>Paper</b>	<b>2-5 months</b>
Rope	3-14 months
<b>Orange peels</b>	<b>6 months</b>
Wool socks	1 to 5 years
<b>Cigarette butts</b>	<b>1 to 12 years</b>
Plastic coated paper milk cartons	5 years
<b>Leather shoes</b>	<b>25 to 40 years</b>
Nylon fabric	30 to 40 years
<b>Plastic 6-pack holder Rings</b>	<b>450 years</b>
Glass bottles	1 million years
<b>Plastic bottles</b>	<b>Forever</b>

## Lesson 2.3

### Technology Resources:

YouTube Videos

<https://www.youtube.com/watch?v=uP9TcfoCaVo>

How a landfill is built. This short video is used to illustrate how a landfill cell is lined.



This video explains through animation, how leachate forms in a landfill.



Video link: In Advance: Teacher needs to watch these videos to gain some background knowledge. Both videos provide information which supports today's investigation. It is important teacher pauses video when appropriate to make sure students understand this simple but complex process for this age group.

This video demonstrates how landfill facilities capture Leachate and Methane gas generated by the buried trash. From trash we can get a renewable resource: methane gas.

<https://www.youtube.com/watch?v=uP9TcfoCaVo>

### Leachate

[From Wikipedia, the free encyclopedia]

**Leachate** is any liquid that in passing through matter, extracts solutes, suspended solids or any other component of the material through which it has passed.



A leachate evaporation pond in a landfill site located in [Cancún, Mexico](#)

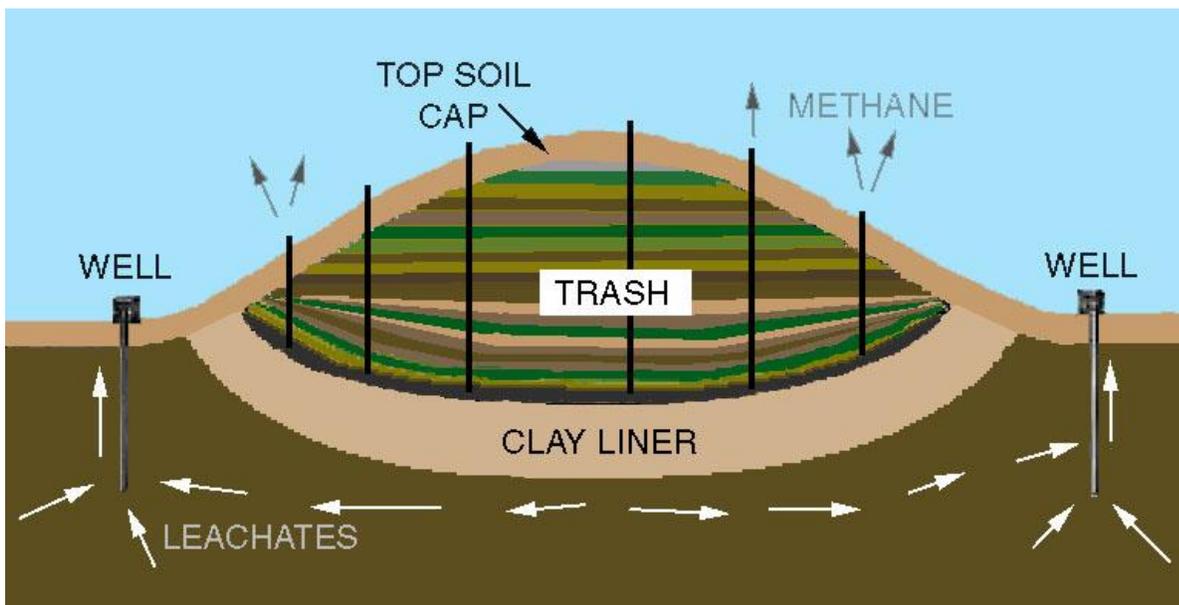
Leachate is a widely used term in the [environmental sciences](#) where it has the specific meaning of a liquid that has dissolved or entrained environmentally harmful substances which may then enter the environment. It is most commonly used in the context of land-filling of putrescible or industrial waste.

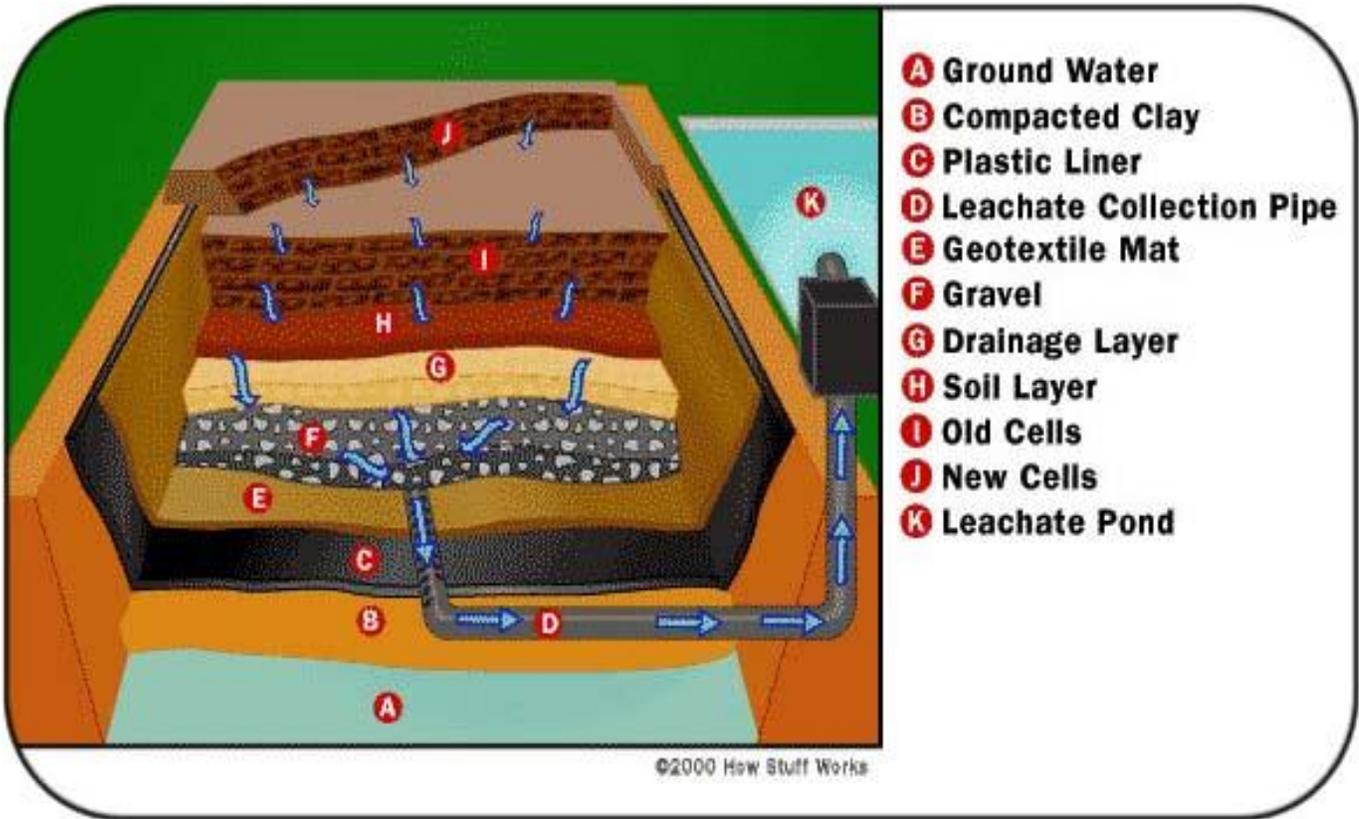
In the narrow environmental context leachate is therefore any liquid material that drains from land or stockpiled material and contains significantly elevated concentrations of undesirable material derived from the material that it has passed through.

**In advance: Crate a chart** with a definition of leachate to be displayed in the classroom. Once students have watched the videos and completed the mini-landfill investigation, recruit a small group of artists who brainstorm and come up with a good drawing to illustrate the definition of leachate above.

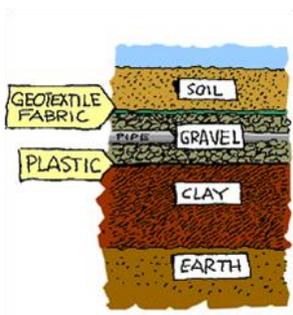
**Routine Writings:** Lists, Process Writing, and a Science Investigation in Progress ‘Anatomy’ of a Landfill Crater.

[http://www.svswwa.org/images/landfill\\_diagram.jpg](http://www.svswwa.org/images/landfill_diagram.jpg)





Here is how a typical landfill is constructed.



So, a landfill must not let the liquid contaminants seep into the ground water or soil. *Therefore, all landfills must be lined with either plastic or clay to prevent leachate pollution.*

***But which landfill liner is better? Which will successfully prevent leachate pollution? clay or plastic?***

Here's an activity you could do at home or with your youth group.

**Supply List:**

- transparent 2-liter soda bottles cut in half with cap
- 1 bag each of sand, gravel, topsoil, clay dirt
- plastic wrap
- food coloring - red or blue or green
- jug of water

- **Instructions:**

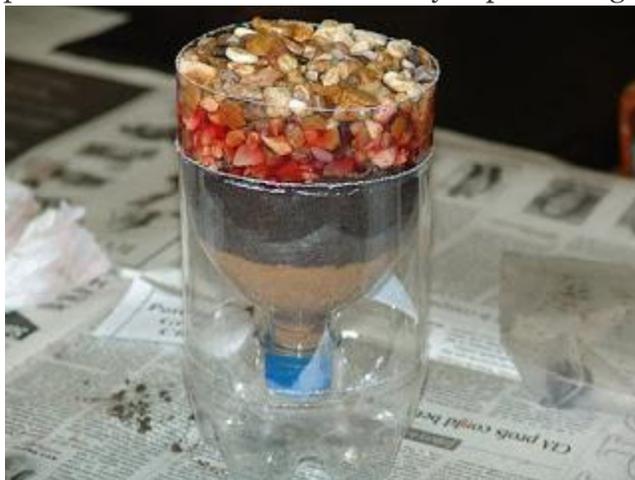
- Tap 3 holes in the bottle cap.
- Replace the bottle cap on the bottle.
- After cutting the bottle in half place the top half of the bottle, cap-side-down, inside of the bottom half of the bottle.
- Place your liner at the bottom. If plastic - lay it on the bottom and press flat. If clay, pack it down with your fingers.
- Randomly select any or all three of the soils - sand, gravel, topsoil and begin layering the soils. Be sure to pack them with your fingers. Or use the materials recommended on the cards.
- You can layer your soils as thick as you want and as few or many layers as you want.
- When you're down constructing your land fill, add a few drops of food coloring to your jugs of water. The colored water represents leachate.
- Pour the colored water into your landfill and watch how fast the water drains.

*What happened? Did the leachate leak through?*



Repeat the exercise and change your materials .What did others find? How do different landfills compare?

Was using clay or a plastic liner the most effective way of preventing leachate pollution?



These are some variations for construction a mini-landfill. Groups of students can try out different mixes.

Questions to answer after construction/investigations:

Which one leaks more, less, not at all? What do you think this is so?

Potting soil Sand Clay	Potting Soil Sand Plastic	Potting Soil Sand Clay Plastic
Potting soil gravel Clay	Potting soil gravel Plastic	Potting soil Gravel Clay Plastic
Gravel Sand Clay	Gravel Sand Plastic	Gravel Sand Clay Plastic
Potting Soil Sand Gravel Clay	Potting Soil Sand Gravel Plastic	Potting Soil Sand Gravel Clay Plastic