



Environmental Lesson Plan



5E Learning Sequence: Grades 4-6

*Developed by K-12 Science Education Specialists in L.A. County and Aligned With:
California Common Core Standards,
Next Generation Science Standards (NGSS), and
California Environmental Principles and Concepts (CA EP&C)*

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LESSON PLAN

Objective

Students will gain a shared understanding of what a landfill is, how waste ends up there, and its effects on our environment. Students will be able to explain how the four R's (Reduce, Reuse, Recycle, Rethink) help to reduce the amount of waste being sent to the landfills. They will apply their understanding by producing a public service announcement (PSA) that teaches their community about how forming habits around the four R's can reduce waste in our landfills and help our environment.

Standards

Next Generation Science Standards (NGSS)

Elementary

- [5-ESS3-1](#) Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

California Environmental Principles and Concepts (CA EP&C)

- **Principle I** People Depend on Natural Systems
- **Principle II** People Influence Natural Systems
- **Principle III** Natural Systems Change in Ways that People Benefit from and an Influence

Common Core State Standards - Language Arts

Reading: Informational Text

Key Ideas and Details:

- [CCSS.ELA-LITERACY.RI.5.1](#) Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

Integration of Knowledge and Ideas:

- [CCSS.ELA-LITERACY.RI.5.7](#) Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- [CCSS.ELA-LITERACY.RI.5.9](#) Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Writing

Text Types and Purposes:

- [CCSS.ELA-LITERACY.W.5.8](#) Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

Research to Build and Present Knowledge:

- [CCSS.ELA-LITERACY.W.5.9](#) Draw evidence from literary or informational text to support analysis, reflection, and research.

Speaking and Listening

Comprehension and Collaboration:

- [CCSS.ELA-LITERACY.SL.5.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- [CCSS.ELA-LITERACY.SL.5.2](#) Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Presentation of Knowledge and Ideas:

- [CCSS.ELA-LITERACY.SL.5.4](#) Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
- [CCSS.ELA-LITERACY.SL.5.5](#) Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Teacher Background

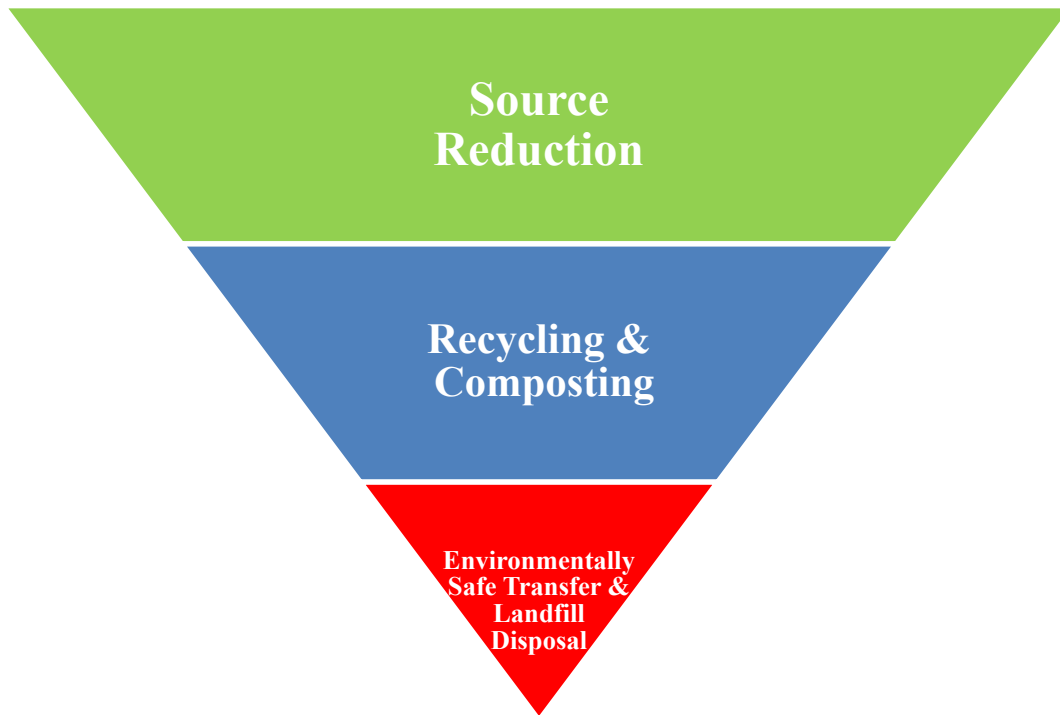
Landfills are the most common form of waste disposal throughout the world. Some landfills use burial or put the material into piles or even throw waste into pits as a form of waste treatment. However, other landfills process waste material by recycling, sorting and treating materials.

There are approximately 1,738 active municipal solid waste landfills in the United States (source: <https://www.statista.com/statistics/186346/number-of-landfills-in-us-municipal-solid-waste/>). Americans generate at least five pounds of waste per person per day, more than half of which ends up in landfills (source: <http://www.learner.org/series/essential-lens-analyzing-photographs-across-the-curriculum/garbage-the-science-and-problem-of-what-we-throw-away/>).

Not only do landfills take up living space that can be used for plants and animals, they also produce greenhouse gases. As organic material is compacted down and covered, it undergoes a process that releases methane gas which is 21 times more harmful than carbon dioxide.

Inorganic materials take a long time to decompose versus organic material. For example, a plastic bag can take 10-1,000 years to decompose and a plastic water bottle can take up to 450 years compared to a banana peel which takes 2-5 weeks.

In order to limit the waste that goes into landfills we reduce, reuse, and recycle materials, with disposal in a landfill as the very last option.



Time Needed

2-3 hours collectively, as it can be broken down into three smaller lessons (Introduction: Engage, Procedure: Explore and Explain, Conclusion: Elaborate and Extend).

Materials Needed

- Landfills and the Four R's PowerPoint
- White board or chart paper, marker
- Card sort sheet, one per group - attached below
- Informational text

Informational Text

- Trash Facts: <http://www.thelivingcoast.org/wp-content/uploads/2012/05/TrashFacts.pdf>
- Recycling Facts and Stats: <https://pw.lacounty.gov/epd/rethinkla/recycle/recycle-what-is.aspx>
- Fact Sheet - Landfill Impacts: https://fighttheplasticbagban.files.wordpress.com/2013/04/fact-sheet-landfill-impacts_revision_3.pdf

Vocabulary

Organic - Material that is made from living organisms such as from plants or animals which contain carbon compounds.

Inorganic - Material that is not made from living organisms, usually man-made synthetic material.

Decomposition - The process of decaying or rotting. Organic material decomposes at a quicker rate than inorganic material.

Conservation - Anything we do to protect our planet's natural resources.

Reduce - Using less of something and not wasting.

Reuse - Using an item over and over again.

Recycle - Using materials from old items to make something new.

Rethink - Using mindfulness to think about how to conserve resources by forming habits to reduce, reuse and recycle.

Directions

(S1) Lesson Title - Landfills and the Four R's

Introduction (Engage) - Essential Questions: Where does the waste in landfills come from? How does it get there?

1. (S2) Show students the slide with a picture of the landfill and questions.
 - Have students share with an elbow partner what they see in the picture and any questions they may have. Once students have had a chance to share with a partner, have a class discussion. As students share their observations and questions, record their responses within a 'T' chart on a whiteboard or chart paper.



Observations	Questions

Heavy equipment operators use machinery to compact and shape mountains of trash at L.A. County's Puente Hills Landfill. (Luis Sinco / Los Angeles Times)
<http://www.latimes.com/world/global-development/la-fg-global-trash-20160422-20160421-snap-htmlstory.html>

- Ask students to make a prediction as to where this picture was taken.
2. (S3) Show students slide of Google Map.



- Explain to students that the waste we discard ends up in landfills like the one in S2 which is the Sunshine Canyon landfill. The landfill handles about one-third of the daily waste of all of Los Angeles County and receives roughly 8,300 tons of waste per day (source: www.sunshinecanyonlandfill.com/about).
 - Students may not realize that there are landfills near where they live. Ask for volunteers to come up to the image and point to the area where they think they live, provide guidance if necessary.
 - Ask students if they have any additional questions to add to the “T” chart now that they have a better understanding that landfills are in an area near where they live.
3. (S4) Ask students: Where does all the waste in landfills come from? How does it get to the landfill? *The waste comes from the things that we throw away. Waste collection trucks take it to the landfill.*
- (S5) Explain to students that the waste that goes to the landfill comes from a variety of sources. Here we see waste bins lined up for collection. Have a class discussion around these questions: Which day of the week does waste collection happen on your street? Who has more than one waste bin at their home? Are they different colors? What do the colors mean?



<http://www.newstribune.com/news/news/story/2015/jan/23/businesses-seek-open-market-trash-services/501050/>

- (S6) This is a picture of the back of a truck owned by a professional hauling business. Sometimes people pay a business for the service of hauling waste away to a landfill.



<http://www.inlandempirejunkremoval.net/make-home-free-garbage-hiring-junk-free-service/>

- (S7) Some waste in landfills comes from the waste people leave in our environment. Here we see pictures of people cleaning litter from the beach and along the highway.



<http://yourcoastnews.com/grover-beach/34th-annual-california-coastal-cleanup-day/>



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

Procedure (Explore) - Essential Questions: What are the different types of waste that end up in our landfill? What are the effects of landfill waste on our environment? How long will waste stay in our landfills and how is it affected by the decomposition rates?

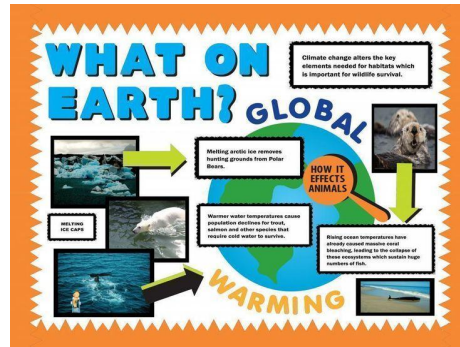
4. (S8) Ask students: What are the different types of waste that end up in our landfills? Listen to student responses. They may share examples such as: paper, food scraps, plastic, old clothes, leaves and other items. In the next activity students will sort such items into two general categories.
5. (S9) Have students form small groups. Cut a set of cards for each group (attached below). Have the groups sort the cards into two categories. Have them discuss the reasons why they grouped them the way they did. Have one representative from each group share out. Let students know that many different categories are possible.
6. (S10) Show students the list of items. Ask: What do these have in common? Have students share a prediction with a partner. After, ask a few students to share their predictions with the class. Explain to students that all the items on the list come from plants or animals; scientists describe these items as being **organic**. Write the word 'organic' on chart paper or on the whiteboard. Ask students if they have ever heard this word before and in what context.
7. (S11) Display the definition for organic. Point out to students that organic materials contain carbon compounds.
8. (S12) When carbon compounds break down from organic materials and bond with other compounds a harmful gas called methane is formed. Large amounts of methane are produced from the decomposition of organic materials in landfills. Methane gas in Earth's atmosphere contributes to the greenhouse effect and global warming which has harmful effects on our environment.



<http://www.omegaenergy.com.au/waste-streams/waste-trends/>

"Methane released from Landfills has 21 times the Greenhouse impact as the same amount of CO2!"

9. (S13) Review the poster. As a result of global warming, Earth's ice caps are melting, which causes melting of arctic ice causing Polar Bears to have less area to hunt. Global warming heats up the temperature of the ocean waters making it hard for trout, salmon and other fish to survive since they live in cold water.



<http://www.artskills.com/gallery/poster-categories/science-health/what-on-earth>

10. (S14) Show students the list of items. Ask: What do these have in common? Have students share a prediction with a partner, after ask a few students to share their predictions with the class. Explain to students that these items do not come from plants or animals, scientist describe these items as being **inorganic**. Write the word 'inorganic' on chart paper or on the whiteboard. Ask students if they have ever heard this word before and in what context.
11. (S15) Display the definition for inorganic. Review the prefix "in-."
12. (S16) Ask students: How long will waste stay in our landfills? Discuss question with students.



<http://www.naturalnews.com/2017-05-01-the-end-of-plastic-landfill-researchers-discover-caterpillar-that-eats-plastic-its-called-a-wax-worm.html>

13. (S17) Show students the definition of decomposition. Explain that as organic things go through the process of decomposition they decay or rot which causes them to break down into into smaller and smaller substances until the point of complete destruction.

14. (S18) Show the image of the two pumpkins. Ask students: What is the difference between the two pumpkins? How would you describe the pumpkin on the right versus the one on the left? What is the one on the right starting to do? *It's starting to go through decomposition.*



<https://www.thegreenhead.com/2011/09/dr-frybrains-pumpkin-embalmer.php>

15. (S19) Go over the Estimated Decomposition Rates with students. Point out that the organic items decompose faster than the inorganic ones. In fact, some inorganic materials can take hundreds of years to decompose! Revisit (S16) and ask: How long will waste stay in our landfills? *Organic waste will stay in our landfills from a few weeks to months. Inorganic waste will be in our landfills for hundreds of years or forever.* Ask students why the milk carton will take so long to decompose if it is made out of a paper like substance. *It will take a long time because the paper-like material is covered with wax or a thin layer of plastic.*

Estimated Decomposition Rates				
Paper	Leaves	Orange Peel	Milk Carton	Plastic Bag
				
2-4 Weeks	1-3 Months	3-6 Months	5 Years	10-20 Years
Aluminum Can	Plastic 6 Pk Ring	Plastic Bottle	Glass Bottle	Styrofoam
				
200-400 Years	400-500 Years	400-500 Years	500 Years-Forever?	Never?

Source: Penn State University, U.S. Bureau of Land Management

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<http://www.earthlyissues.com/recycling.htm>

16. (S20) Facilitate a class discussion around the question: How do we keep our landfills from filling up?

17. (S21) Show the students the meaning of conservation. Ask if they practice conservation at home with their family. How does their family try to protect the planet?
18. (S22) Ask students: What can you do to conserve and protect our planet so that less waste ends up in landfills? *We can stop throwing away so much waste and recycle things.*
19. (S23) Introduce the concepts of Reduce, Reuse and Recycle - three of the four R's that help us build habits around conserving our planet. Recycle means using materials from old items to make something new, Reuse means to use items over and over again, and Reduce means to use less of something and not waste it.



http://www.foza.com/post_reduce-reuse-recycle-poster_262248/

20. (S24) Introduce the fourth R, Rethink. "Rethink" refers to thinking about our habits when dealing with items you would normally throw away or use too much of in order to make better choices that will help to conserve and reduce waste. Ask students: What do people throw away that can be recycled or reused? Are there natural resources that people can reduce their use of? When they are about to add to the waste in landfills how might you be able to get them to rethink their choices?

Conclusion (Elaborate and Extend) - Essential Question: How can we best teach our community about how forming habits around the four R's can reduce waste in our landfills and help our environment?

21. Revisit the student observations and questions that were recorded on the 'T' chart at the beginning of this lesson. Review the questions with the students. Check off any questions that may have been answered during the lesson. Ask students to explain their answers to you; discuss as a class. If there are questions that still didn't get answered you can have students do some research at home and report back to the class the next day.

22. (S25) In conclusion, place students into groups. Tell them that they will be creating a public service announcement (PSA) that will teach their community how forming habits around the four R's can reduce waste in our landfills and help our environment. PSAs build awareness of public issues in order to change people's behaviors and attitudes. According the the article, "How to Create the Perfect Public Service Announcement" by Jaclyn Bell* follow these steps:

- i. Choose your topic.
 - ii. Time for some research - you need to know your stuff!
 - iii. Consider your audience.
 - iv. Grab your audience's attention.
 - v. Create a script and keep your script to a few simple statements.
 - vi. Storyboard your script.
 - vii. Film your footage and your PSA.
 - viii. Find your audience and get their reaction. (Note - Instead of filming their PSA, students can act it out.) <http://www.centerdigitaled.com/artsandhumanities/How-to-Create-the-Perfect-Public-Service-Announcement.html>
- Give each group one copy of each information text to use as research for their PSA:
 - i. Trash Facts: <http://www.thelivingcoast.org/wp-content/uploads/2012/05/TrashFacts.pdf>
 - ii. Recycling Facts and Stats: <https://pw.lacounty.gov/epd/rethinkla/recycle/recycle-what-is.aspx>
 - iii. Fact Sheet - Landfill Impacts: https://fighttheplasticbagban.files.wordpress.com/2013/04/fact-sheet-landfill-impacts_revision_3.pdf
 - Have students present their PSAs to the principal, parents, younger students and other stakeholders.

Resources

S9 Card Sort

Tree Trunk	Spoiled Food
Plastic Bottle	Old leather jacket
Glass	Cardboard
Aluminum Can	Polystyrene Foam Cup
Cut Grass	Toothbrush
Old Magazines	Soup Can
Car Tire	Banana Peel