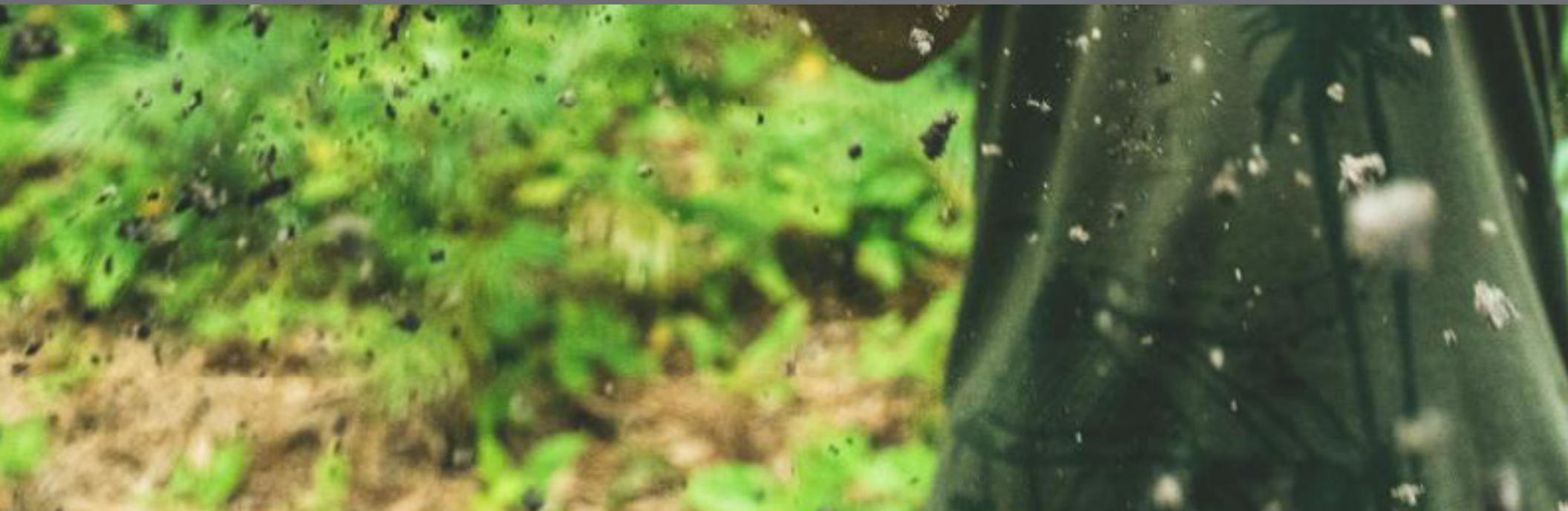




7<sup>TH</sup> GRADE  
STEAM & SOCIAL STUDIES





# ROT ON!

## Driving Question:

How do different composting methods affect how quickly substances decompose?

## Materials Needed:

Example of previously composted materials, science notebook, food scraps, other biodegradable trash (e.g., grass clippings and paper), dirt, earthworms, containers for compost (e.g., large buckets with lids), outdoor areas for compost (if students want to test outdoors), soil test kit, supplemental reading resources such as this [blog](#)

## In this lesson, students will:

- recognize that different ratios of organic compounds in soil aid in the breakdown and change of materials in compost.

## National Learning Standards:

Science: MS-LS2-3; MS-LS2-5;  
MS-ESS2-1; MS-ESS3-3  
Social Studies: III,h



## SPINNING THE COCOON

As a class, create a list of things that are commonly thrown away such as paper, food scraps, plastic bottles and baby diapers. The student list may be quite extensive. As a class, sort all of the items into these three categories: can be easily broken down, can't be easily broken down and unsure.

Look at all of the items that can be broken down and talk about what they have in common. Tell students we label them biodegradable and define biodegradable as the ability to quickly break down into more basic compounds such as carbon, hydrogen (water) and oxygen. Explain that, when thrown away, these items end up in the landfill where they can take even longer to break down and be exposed to volatile chemicals thus contaminating them. A more efficient and sustainable way to aid household waste in breaking down to more basic compounds is composting.

Show students the compost sample and explain that the soil they see was once food scraps, grass clippings and leaves. The breakdown of these materials leads to a soil rich in nutrients that are important for plant growth. In order to create compost, they need equal amounts of nitrogen sources such as veggie and fruit scraps or grass trimmings as well as carbon sources such as dried leaves or straw. Keeping the compost moist and aerating it frequently will allow the substances within to break down fairly rapidly.

### KERNEL OF KNOWLEDGE

It takes 500 to 1,000 years to create an inch of soil! Why so long? Soil is generally derived from rock, which has to be broken down by weathering and physical processes over time.



# METAMORPHOSIS

Students will experiment with how quickly they can get waste materials to break down in compost. Students should have at least two compost buckets or piles. They should keep detailed records of how they manipulate the two compost samples that include the mass of carbon and nitrogen sources added, how often they turn the compost, the volume of water added, and whether or not they incorporated organisms such as earthworms. Ideally students should only change one variable such as the amount of water or how often they turn the compost. Students should check regularly to see if their compost is fully broken down. When it is, students can take an additional step and use a soil test kit to test nitrogen, phosphorus, potassium, and the Ph balance of their sample to check how fertile the is, in addition to the speed at which it broke down.

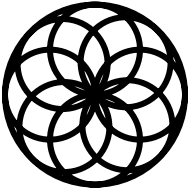
## THROUGH THE LENS



Have students create a short video using Flipgrid either individually or in a small group that answers the following question: How can composting reduce toxic runoff in waterways and improve life for Texans? The video should incorporate the ideas generated from the science lesson above. Remind them that the video should be clear and concise.

## UPCYCLE

Most food will ideally rot eventually or be consumed by decomposers. But are all foods created equal? Students will use compost and vermiculture to test how quickly organic versus processed food waste is broken down. Students should use two vermiculture bins with the same amount of soil and worms. In one they will place organic food such as potatoes, fruits, vegetables, and organic pastas and oatmeal. In the other bin, students can put items such as processed chips and other pre-packaged, non-organic foods. Prior to officially beginning the exploration, students should write a hypothesis regarding what will happen to the food products and worms in each bin. Students should weigh all food before adding it and “feed” their worms with regularity. After adequate time has passed, students should use a screen to separate worm castings from leftover food byproducts and weight the mass of the remaining food products as well as count the number of worms in each bin. Students should use this data to determine if worms consume and break down organic foods or processed foods at faster rates and if the different food sources impacted the worms’ health.



# KALEIDOSCOPE

Explain to students that the Texas economy is largely based on agriculture. Have students identify ways Texans have modified the environment, specifically related to the waterways and pollution from farming practices, and have them research and analyze the results using their electronic device. Use the answers students find to promote a discussion. This can be done in partner talks or as a class.





## eARTH

Worms are hard workers when it comes to creating a compost pile, but did you know that they can also be artists? Borrow a few of the worms that were used in creating the compost pile for the science lesson and introduce your students to worm art! Give each student 1-3 worms to work with\*, a medium sized sheet of white watercolor or mixed media paper, and some water-based paints. Be sure avoid oil-based or other forms of paint as they may harm the worms.

Once the students have their paper laid out and their paint ready (which should be in small bowls), have the student dip their worm in their chosen paint color and place it on the white paper. The worm will start to wiggle and move around create a beautiful line as it glides across the paper. If the student has multiple worms, have them dip them in different colors and place them on the paper at the same time. When finished, the worms should be rinsed with water and placed back in the dirt or compost pile.

Once all of the worm paintings are dry, hang them up and let the students see all of them. Form a discussion about line and color. Ask students, “Do the lines vary? Are there different thicknesses?” This can be a great kick start project for a more concentrated work based on line, or the students can take their worm’s art and add to it to make it a collaborative effort.

*\*If any of the students are just too grossed out to paint with the worm, have some gummy worms handy that they can dip in paint and drag across the paper themselves.*

### Community Garden

- As a class, create a compost heap and distribute samples of it throughout the community. Offer to sell larger amounts to prospective customers and use the money to plant a garden at your school.
- Or, work with a local organization to supply a community garden with compost for one semester and record via photos or video on a regular basis how sections of the garden grow with composted fertilizer and without.
- Use time-lapse techniques to create a brief video report on the impact of using properly composted materials in a garden. To supplement your video, interview a representative from an organization such as [Bonton Farms](#) on the impact of composting and gardening in areas without access to grocery stores.



## CAREER CONNECTION

**Organic Composting Specialist** - Organic composting specialists work for waste departments to discover ways to more effectively break down waste materials into usable products. In addition to hands-on research, they manage other scientists and interns within composting programs. This career requires a bachelor's degree in science, as well as personnel management skills.

**Soil Scientist** - Soil scientists examine and research the chemical and physical properties of soil from around the world. Not only do they determine soils viability for agricultural purposes, they also provide vital information about soil quality as it pertains to human health and biodiversity. A soil scientist requires a bachelor's degree, but most have a master's degree.



## CAREER HIGHLIGHT

Joel Salatin, a self-proclaimed “lunatic farmer,” is famous for making nature work for him to create sustainable farms. One of his most intriguing projects uses animal rotation to compost various areas of the farm, thus preventing the need for fertilizer. By rotating different animals from pasture to pasture, manure is spread and composted to fertilize the fields with minimal interference from humans.



