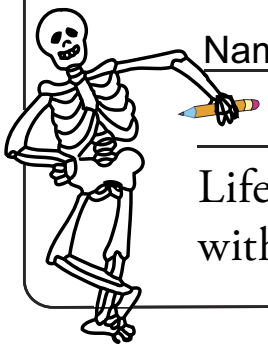
MY De-COMPOSITION BOOK



Name: _____

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Life and Death
with Decomposers

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California Education and the Environment Initiative

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California Natural Resources Agency

California State Board of Education

California Department of Education

Department of Resources Recycling and Recovery (CalRecycle)

Key Partners:

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Office of Education and the Environment

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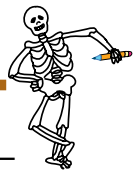


Name: _____

Agriculture: _____

_____

Bacteria: _____

_____

Compost: _____

_____

Decomposers: _____

_____

Decomposition: _____

_____

Ecosystem: _____

_____

Fungus: _____

_____

Humus: _____

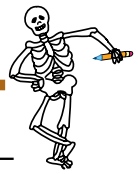
_____

Landfill: _____

_____

Matter: _____

_____



Name: _____

Microorganism: _____

_____

Nutrient: _____

_____

Scavenger: _____

_____

Topsoil: _____

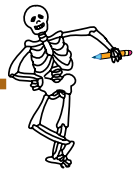
_____

Waste: _____

_____

Waste Management: _____

_____



Wonderful Compost

The warm days of summer turn cooler. Tree leaves shake and rustle in the wind. It is October, and crisp red apples ripen on the trees. In the fall, Juliana Kelly loves to pick apples. Her family goes to an apple orchard every year.

The orchard is in the foothills of the Sierra Nevada Mountains. Its name is Apple Hill. Juliana picks sweet, red apples and puts them in her basket. She will eat the apples in pies, as a snack, and in her school lunch.

At home, Juliana helps her parents make apple pies for the neighbors. She carefully takes the core out of each apple. All of these apple cores have to go somewhere. Juliana has some choices. She can put the apple cores in the trash. A garbage truck will pick up the trash and take it to a landfill. Juliana has another choice. She

Apple tree

Apple core

can save the apple cores for the family compost pile.

Juliana decides to add the apple cores to the compost pile in her backyard. She throws the apple cores on top of the compost pile with other vegetable, fruit, and food scraps. Then she adds some grass from the lawnmower bag. She sprinkles some rich, black soil on top.

Decomposers Do Their Job

The apple cores and the cut grass soon begin to rot. Scientists use the word "decompose" to explain what happens to the food scraps. Tiny organisms called bacteria and fungi live in the pile. These organisms are chemical decomposers. They change the chemistry of the food. They break it down into nutrients that enrich the soil. Chemical decomposers are tiny. People need a microscope to see them.

Mites, pill bugs, snails, and springtails live in Juliana's yard. So do beetles, ants, flies, and earthworms. They all find their way to the compost pile. These organisms are scavengers. Scavengers feed on dead plants and animals. They grind, bite, chew, and tear the food into tiny pieces. This helps the bacteria and fungi break down the food. Together, the decomposers and scavengers turn the food scraps into compost.

Juliana knows that the decomposers and scavengers need help. They must have water, air, and lots of food to make healthy compost. Juliana sprays her compost pile with water every few days. She uses a shovel to turn the compost pile. Turning the pile gives the decomposers a fresh supply of air. She also makes sure they have lots of fresh food scraps.

The compost is ready to use in a few months. It smells and looks like rich, healthy soil. Juliana puts the new compost in her garden. She mixes it with the soil. Then she plants pumpkin seeds and tomato seeds. She waters them well. Soon she will

Food scraps in compost pile

see tiny plants begin to sprout. Juliana will watch her pumpkins and tomatoes grow. Her family will begin to eat them when summer comes. Juliana will remember her compost each time she bites into a juicy tomato.

Worms at Work

Juliana's mother takes a fresh apple to work. After she eats her snack, she puts the apple core in a covered box. In the box are hundreds of wriggling red worms. Tiny decomposers also live in Mrs. Kelly's box.

The red worms begin to eat the apple core. Their intestines are rich with juices that break down the food. The worms leave behind droppings called "castings." Tiny decomposers break down the castings and release vitamins and minerals into the soil. These nutrients are good for plants. Mrs. Kelly will use the worm castings to help her garden grow.

When a worm dies tiny bacteria go to work. They break down the carbon, nitrogen, and protein in the worm's body. Bacteria need carbon and nitrogen for energy. They need protein to grow and multiply. Decomposers, like bacteria, leave their own waste behind.

Red worms feeding

Green waste collection

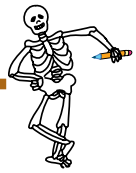
This waste is rich in nitrogen, phosphorus, and magnesium.

"Vermicomposting" (*"vermi" means worm*) is the term for what happens when worms decompose food waste. Vermicomposting is a good choice for people who want to compost but do not have a big backyard. A box of special red worms takes little space. People can buy the worms online or at a local nursery. The worms need bedding like shredded newspaper. They need a steady supply of food scraps. They need someone to make sure their home doesn't get too wet or too dry. Many classrooms have worm bins. Sometimes students put the castings in their school gardens. Other students take the castings home for their houseplants.

Composting at Home

Lucas Garcia is a young boy who lives in Alameda, a town near San Francisco. He does not have a garden. But he knows how to use his family's food scraps for compost. Lucas reminds his family to put their food waste in a special bucket by the sink. When it is full, he dumps it into a cart for green waste outside. Mrs. Garcia puts grass into the green waste cart after she mows the lawn.

Each week Lucas pushes the green cart to the street. A special green truck picks up the Garcias' green waste. The truck stops at every house in Alameda. It delivers the green waste to a big place for composting. There, decomposers and scavengers turn the waste into compost. Other cities send their green waste to the same place. California has so much green waste that it



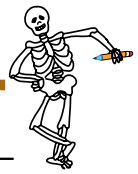
creates 4 million tons of compost each year.

Farms, vineyards, and orchards use the compost that Lucas helps the city make. Farmers in the Central Valley, Napa Valley, and Sonoma Valley add compost to their soil. They add compost to orange, avocado, and almond trees. Compost also helps grapes, tomatoes, and other crops. Farmers who use compost can water less. They can also cut back their use of chemical fertilizers, which can sometimes pollute the environment and make animals sick. Compost makes the soil and plants healthier. Using compost is good for farmers. It is also good for our land, food, and water.

Tractor turning compost pile

Making compost means putting less in the garbage can. Less trash means fewer garbage trucks. Fewer trucks on the highways means less traffic and pollution. Less traffic and pollution can mean cleaner air to breathe. Less trash also means that landfills will fill up more slowly. Many landfills are built on open space that once provided habitat for wild animals. When new landfills are built, habitat for animals is often destroyed. Finding new places to take our garbage is very difficult. Every person in California makes about 58 pounds of trash each month. You probably already recycle bottles, cans, and paper. How much less trash would you make if you made compost?

Juliana and Lucas feel good about composting their food waste. They reuse what some people call garbage to make soil healthier. They know that making compost with decomposers helps the environment. Their families and their friends can enjoy healthier food and safer water. Food grown in composted soil can improve the quality of life for all.



Name: _____

Part 1

Instructions: Read each question and provide a complete answer.

What do you think will happen to the banana slice in the bag with yeast? (2 points)

I predict that _____

_____

_____

What do you think will happen to the banana slice in the bag without yeast? (2 points)

I predict that _____

_____

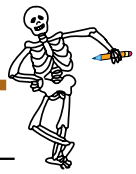
Part 2

Instructions: Observe the banana pieces carefully, then complete the following.

Use this space to draw what the banana slices look like. (2 points)

A. Beginning Date: _____

Bag with Yeast	Bag without Yeast



Name: _____

Draw what you see in each bag: (2 points)

B. Ending Date: _____

Bag with Yeast	Bag with No Yeast

Part 3

Instructions: Complete the following.

List the decomposers and the scavenger that you learned about in this lesson. (3 points)

_____

_____

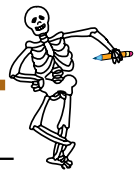
_____

How are decomposers and scavengers helpful? List at least three ways. (3 points)

_____

_____

_____



Name: _____

Instructions: Read and complete the following.

Decomposition takes a team effort! Making it happen requires two kinds of organisms. You are about to see photographs of both kinds of organisms.

Write the name of each organism you see next to the number found on the back of the information card: (1 point each)

1.	5.
2.	6.
3.	7.
4.	8.

How are scavengers and decomposers different? (2 points)

_____

_____

How do decomposers and scavengers work together? (2 points)

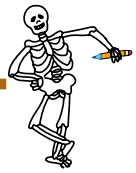
_____

_____

What do scavengers and decomposers get from eating dead things? (2 points)

_____

_____



Decomposition in the Forest

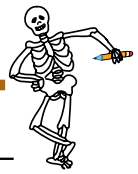
A warm wind blows gently through the trees. A leaf falls from a tree to the forest floor. Bacteria from the soil move onto the leaf. They begin to feed on the leaf, breaking it down. As the bacteria get energy and nutrients from the leaf, they reproduce and grow. More bacteria begin to feed on the fallen leaf.

The leaf begins to show signs of decomposing. An earthworm breaking through the top of the soil swallows a piece of the leaf. The earthworm also swallows some soil along with bacteria and fungus living in the soil. The worm's insides grind up the leaf matter. The bacteria living in the worm's intestines help the worm digest the leaf matter. The worm gives off waste called "castings." The castings become part of the soil on the forest floor. Other bacteria and fungi begin to feed on the worm's castings.

They decompose the castings and release the nutrients in them into the soil and air. The tree takes up some of these nutrients in its roots. Plants and animals in the forest breathe in nutrients in the air. The wind blows nutrients to other ecosystems.

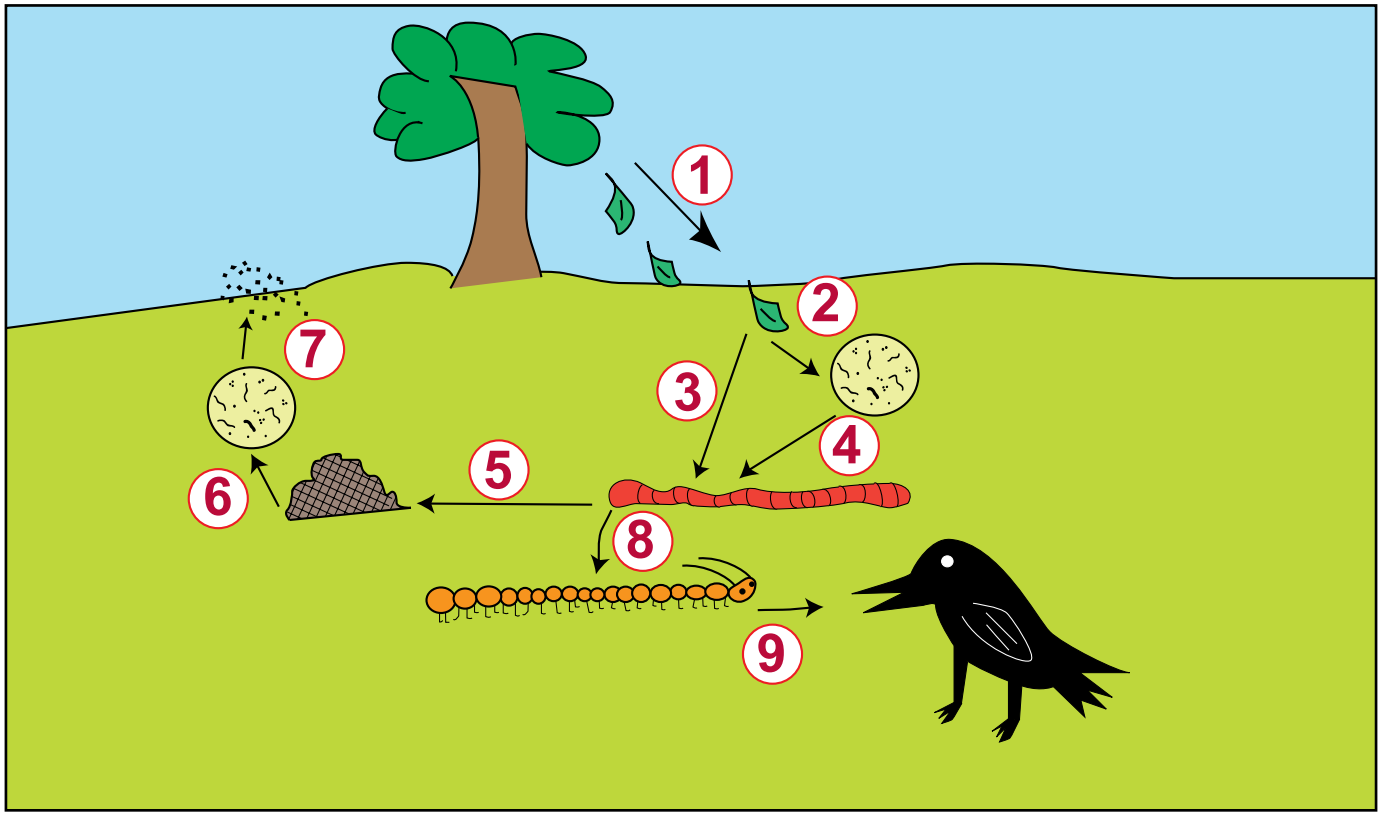
A centipede crawling over the fallen leaves sees the earthworm. It catches and eats the worm. Just as the centipede finishes its meal, a blackbird spies it from a tree branch above. The blackbird flies down and snatches the centipede in its beak. Then it flies back up to the branch to enjoy its meal in the warm wind blowing through the trees.

Leaves on a forest floor



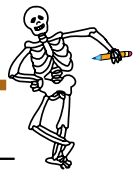
Name: _____

Instructions: Look at the diagram and complete the activity below.



Each arrow on this picture shows something from the decomposition story. Describe what is happening at each arrow. Write your answers on the lines below. (2 points each)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____



Name: _____

Decomposition at the Coast

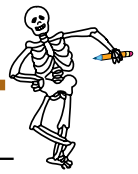
As the tide comes in, a crab scampers out from under a rock. It heads over to a pool of ocean water the Sun has warmed. Then the crab slips into the pool and hides in the slippery, green algae growing on the side.

All day long, the algae gather energy from the Sun. They also gather nutrients in the pool's water. Some of these nutrients come from the rocks around the pool. Other nutrients come from the wastes of animals and plants in the pool. Many animals, including the crab, eat the algae.

But the crab is not interested in the algae right now. It wants the little pieces of a fish that died in the pool earlier. Tiny plankton and barnacles in the pool have already started to feed on the fish matter. But the crab is larger and will use its claws to take some of the fish matter from them.

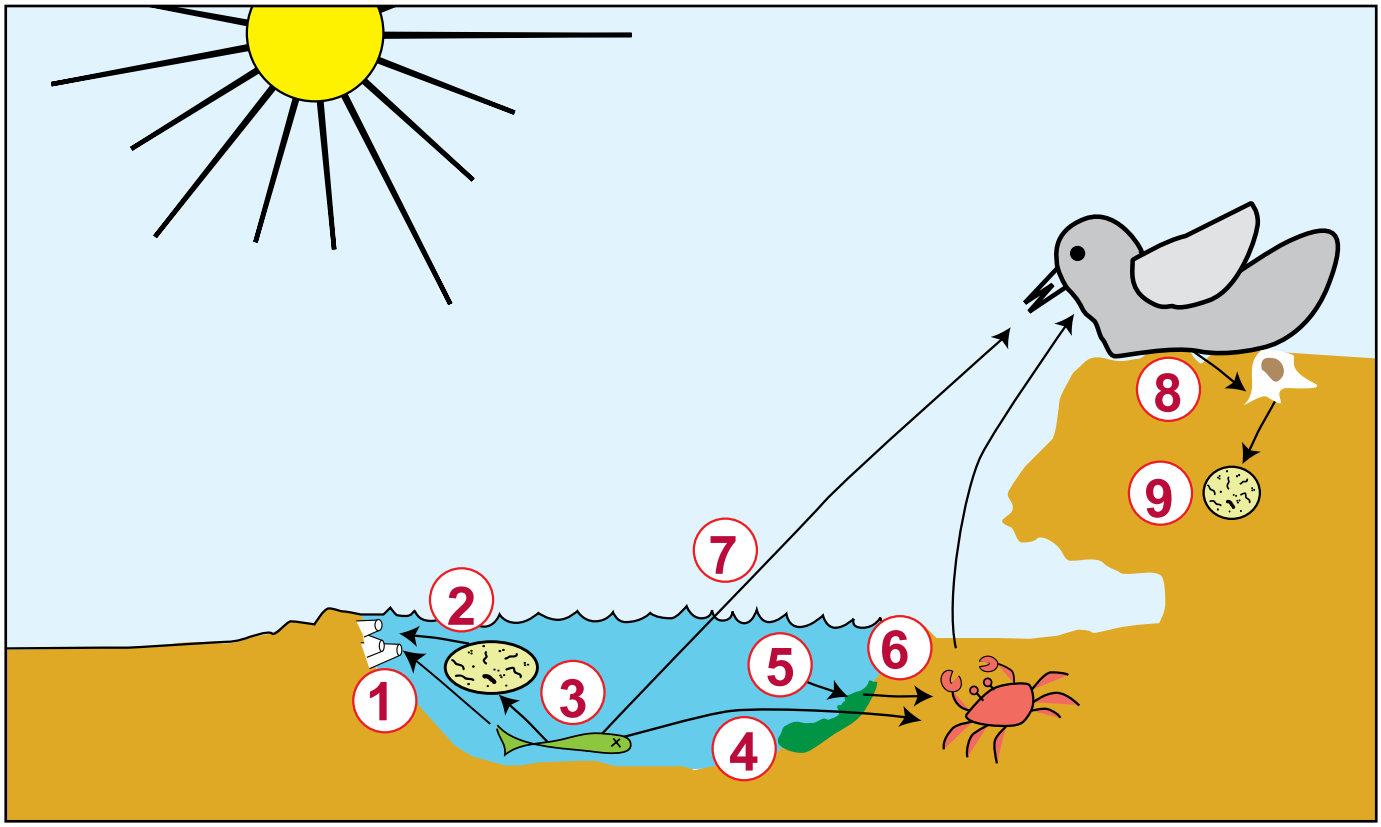
From the top of the nearby rock, a gull watches the action in the pool. The gull could eat the dead fish or the live crab, but chooses to eat the live crab. The gull steps over its waste on the rock, on which bacteria have already begun to feed. It then hops down to the pool. The crab does not see the gull's shadow until it is too late.

Crab in a tidepool



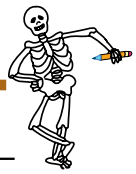
Name: _____

Instructions: Look at the diagram and complete the activity below.



Each arrow on this picture shows something from the decomposition story. Describe what is happening at each arrow. Write your answers on the lines below. (2 points each

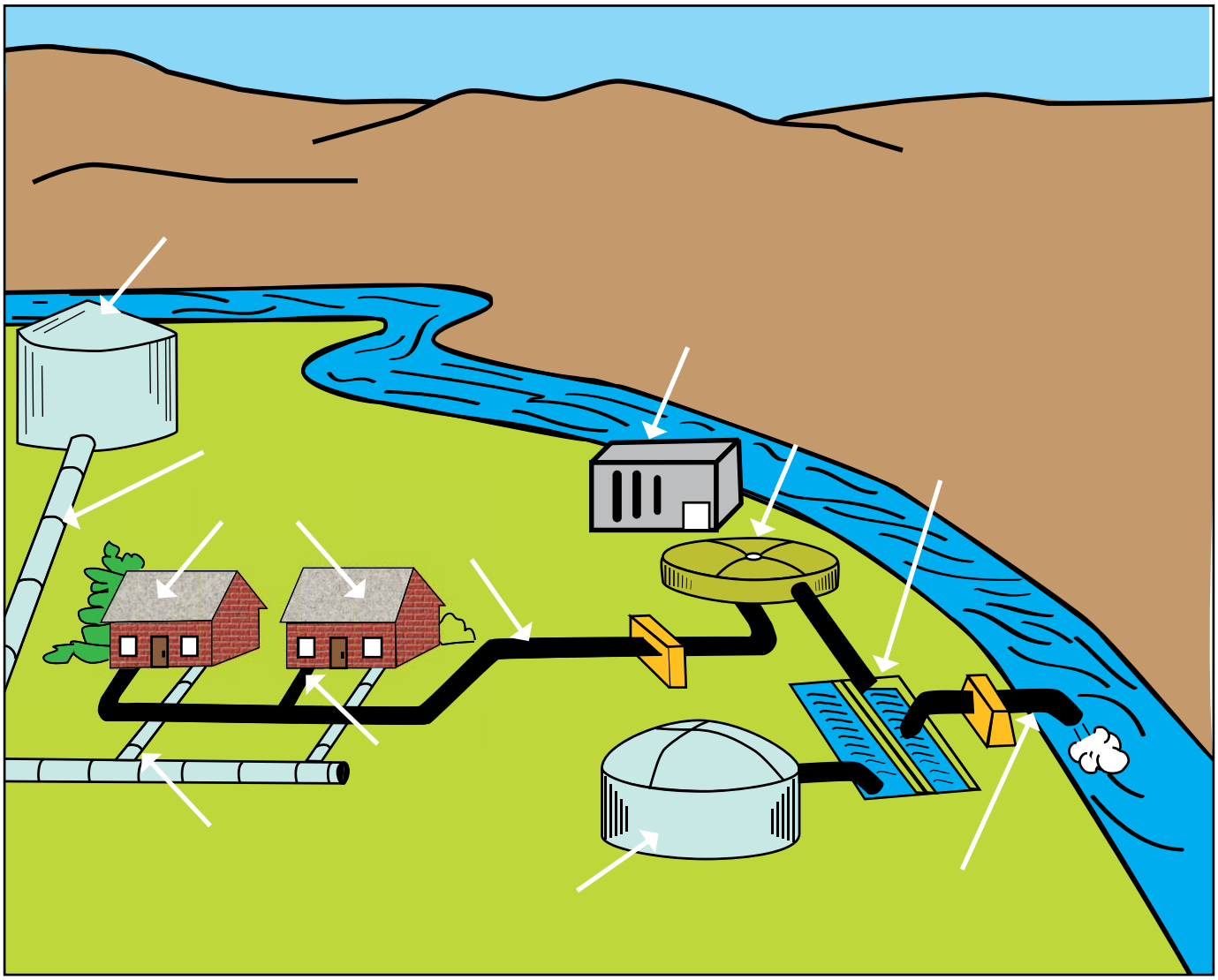
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

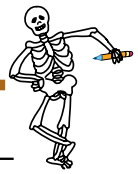


Name: _____

Instructions: Read and complete the following. (12 points)

This drawing shows a wastewater management system. Go through each part with your teacher. Then mark where decomposers work in the system.





Name: _____

Instructions: Think about what you have learned about decomposers and decomposition. Then answer the questions below.

1. What role do decomposers play in waste management in natural communities? (2 points)

_____

_____

_____

_____

2. Why is this important? (3 points)

_____

_____

_____

_____

_____

3. What role do decomposers play in waste management in human communities? (2 points)

_____

_____

_____

_____

4. Why is this important? (3 points)

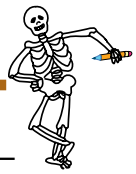
_____

_____

_____

_____

_____



Name: _____

Part 1

Instructions: Read and complete the following.

There are many types of soils. You and your partner will look at two samples of soil and decide which soil would be best for farming. As you look at the two soils, answer these questions:

Sample A: (1 point each)

What color is the soil? _____

What does the soil feel like in your hand? _____

What does the soil look like under the magnifying glass? _____

_____

What does the soil smell like? (Breathe gently.) _____

Sample B: (1 point each)

What color is the soil? _____

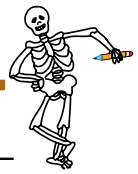
What does the soil feel like in your hand? _____

What does the soil look like under the magnifying glass? _____

_____

What does the soil smell like? (Breathe gently.) _____

_____



Name: _____

Part 2

Instructions: Circle an answer for each. (1 point each)

Which soil has more humus? **Sample A** **Sample B**

Which soil would be best for growing crops? **Sample A** **Sample B**

In which soil would you expect to find an earthworm? **Sample A** **Sample B**

Part 3

Instructions: Read the question and write a complete answer in the space below. (4 points)

How do we depend on decomposers in growing our food?

_____

_____

_____

_____

_____

_____

_____

_____

_____

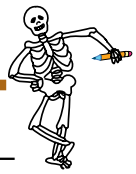
_____

_____

_____

_____

_____



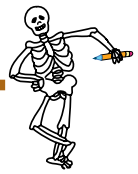
Name: _____

Instructions: Read and complete the following. (10 points)

You have learned many things about decomposers. In the space below, write about how decomposers and scavengers help you and your community.
Use the following words in your writing:

Word Bank

compost	crops	decomposition	food
garbage	grow	humus	landfill
matter	nutrients	soil	scavenger



Unit Title: **Life and Death with Decomposers**
Grade: **4**

Science Standard Number: 4.2.c.

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