# Decomposition Activity

**Investigative Question:** What is Decomposition? What organisms contribute to decomposition?

**Goal:** Students will investigate how organisms interact with one another in environments. Students will learn diversity within a system and ways that energy flows in an ecosystem. Students will classify organisms using decomposing logs (datasheet includes an illustrated log model).

**Objective:** Students will be able to describe organism interactions. They will accurately measure in centimeters and use measured values to calculate area.

**Knowledge:** Students will use vocabulary to explain/understand how organisms interact. Student will learn about native organisms and their interrelationships.

**Skills:** Students will investigate a native habitat through observation, data collection and analysis. Students will calculate the area of a cylinder and measure and record lengths using metric units.

**Values:** Students will recognize the importance and complexity of decomposers and their systems.

**Virginia SOLs:**

Science 3.1, 3.5, 3.6, 3.8, 4.1, 4.5
Math 3.9, 3.10, 3.17a, 3.20, 4.7

**Materials**

- Student handouts
  - Log Decomposition (Datasheet # 1)
  - Decomposition Log Classification Guide(Resource # 1)
  - Decomposers in the food chain (Datasheet # 2)
  - Organism ID Key (Resource # 2)
- PVC 1m $^2$ quadrats (or hula hoops)
- pencils
- metric rulers
- hand lenses
- clipboards
- Insect ID Books

**Special Safety:** This investigation may involve wildlife. Students need to be careful to preserve the wellbeing of themselves *and the organisms they encounter*.

**Procedure**

**a)** Inquiry discussion with students about decomposition:
  - *What do decomposers eat/do? Talk through how to break down the name to explain what a "decomposer" is and what does it do. What is a composer? What does the prefix "de" explain? (think of other "de" words like destroy, destabilize, decontaminate. "de" means take away or the opposite of) What does compose mean? (We think of composers as*

*people who write music, but what about if you compose yourself, or compose a collection of stories? NOTE – students may not know this term)*
    - *List some examples of decomposers in nature*
    - *Additional Inquiry*
        - *What would happen if we didn't have decomposers? Where do you think we can we find decomposers?*

**b)** Each group of students receives the following:
- Log Decomposition (Datasheet # 1)
- Decomposition Log Classification Guide(Resource # 1)
- Decomposers in the food chain (Datasheet # 2)
- Organism ID Key (Resource # 2)

**c)** Assign each group of students to a decomposing log.

**d)** Instruct students to classify their log (stage of decomposition) using the Decomposition Log Classification Guide (Resource # 1).

**e)** Using the Log Decomposition (Datasheet # 1)**,** instruct students to measure and record the length and width of the log.

**f)** Extension: The students will stand in the quadrat and look up through the forest layers and project the circle through the layers of forest to estimate the fraction of coverage provided by each layer within that circle. For example "the canopy layer covers ½ the ground within the quadrat)

**g)** Using the Organism ID Key (Resource # 2)*,* students will look on, around and under the log for organisms. REMIND STUDENTS: return the log and the organisms around the log back to the way in which it was found. Do not handle any of the animals, only observe them. You may gently push leaves and sticks around for a better look, but make sure you leave your rotting log the way you found it.

**h)** Using the*,* Decomposers in the food chain (Datasheet # 2) students will sketch, identify, and determine what kind of decomposers are found as well as determine if they can find the food source of the organism. This may be done on white boards as well.

**i)** Finally, students will draw a simple food chain using the organisms that they found in and around their log. This will be done on the bottom of the *Decomposers in the food chain (datasheet# 2)* page.
    - Extension idea: Have students draw a food web based on the organisms found and then, discuss why they made the web relationships that they did.

**j)** Wrap up your activity with an inquiry discussion about the organisms found under different decomposition log stages. Examples: Under which class of log (based on class/level of decomposition) did you find the most organisms? Why? Do all logs decompose at the same rate? Why? Do you think there would be different organisms under your log if you came back in a year to investigate it again? Why? How do you think decomposition can be influenced by the weather? How do you think logs can be influenced by human interactions? Gauge the knowledge of the class with these prompting questions and develop your questioning strategy. Make sure that students understand that without decomposition we would be underneath piles of debris.

**Points to Include**

Horizontal Alignment

(how decomposition can be incorporated in other subject areas)

- History
    - What kind of land use changes surrounding the log may have contributed to current organism life (chimney, house burned down, in field- pesticides)

- English
    - Write a summary (one sentence about what you learned)
    - Write a poem, song, dance to what we found/learned
    - Create a story from the view of the log/organism
- Math
    - Graph number of organisms found
    - Estimate tree height or age based off log (if it was trunk or branch)

Vertical Alignment

(how decomposition can be connected to past and future grade levels)

**Possible Extension**

SOL 3.14

Compare and contrast characteristics of plane and solid geometric shapes. Include the number of angles, vertices and edges, and the number of shape of faces, using concrete models

Math

3.9

The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:

3.9c.

Estimate weight/mass of objects

How could students estimate the change in weight over time of the logs they studied?

Have students devise a plan to measure change in weight/time

3.9a.

Determine the actual measure of area or perimeter

Have students devise a method to measure perimeter of their logs.

# Log Decomposition
# Datasheet # 1



Refer to: “Classes and Characterizations of Log Decomposition” sheet to answer the following.

**Describe your log**.

Shape: Bark:

Texture: Organisms:

**Use the Log Classification sheet to determine your log’s decomposition class.** (circle)

Class 1 Class 2 Class 3 Class 4

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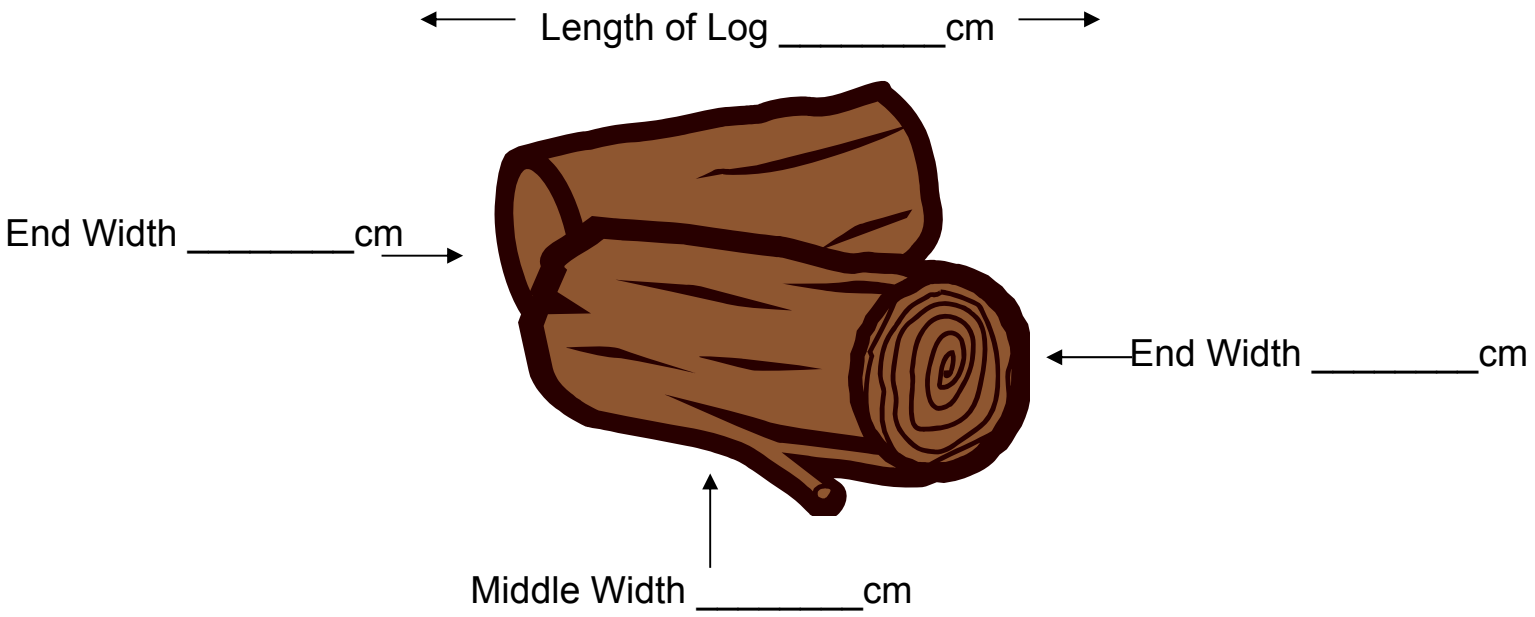
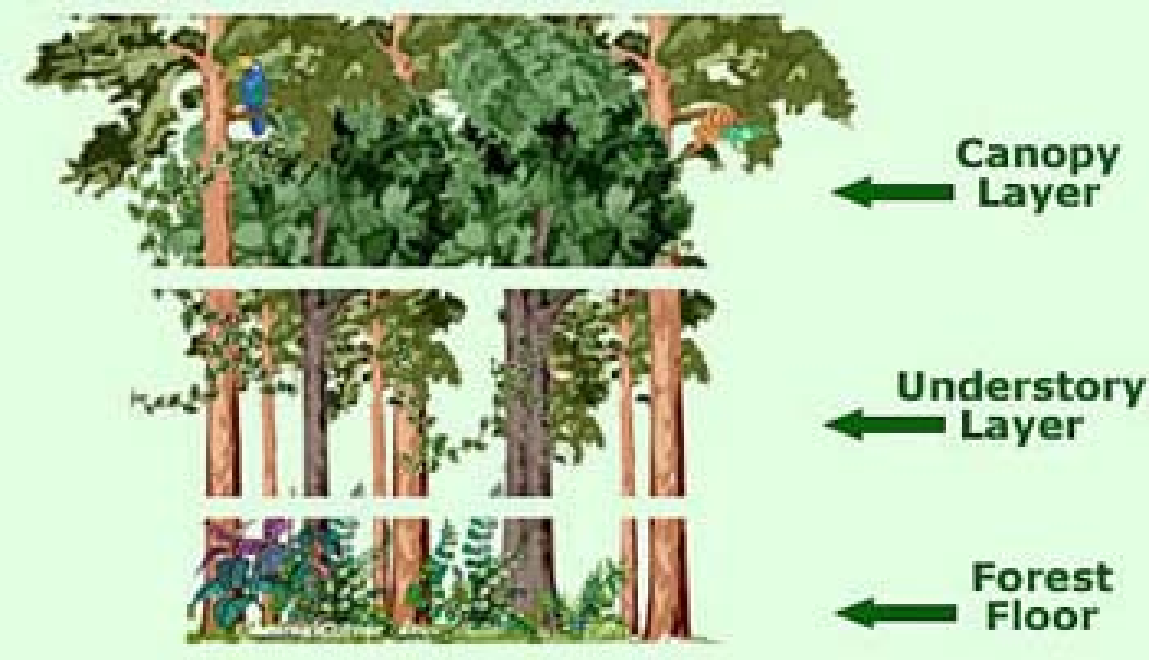


# Datasheet # 1


**Describe the habitat within your log's square meter quadrat:**

The **ground cover** is what fraction of your whole square meter?

Ground Cover: None $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ All _____

The **understory** is what fraction of your whole square meter?

Understory: None $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ All _____

The **canopy** is what fraction of your whole square meter?

Canopy: None $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ All _____

Write the symbol that correctly explains your findings

**<, >, =**

Ground Cover_____ Understory

Understory _____Canopy

Canopy _____Ground Cover

# Decomposition Log Classification Guide

**Resource # 1**

(Adapted from the Smithsonian Biodiversity Science in the Classroom)

| | Class 1 | Class 2 | Class 3 | Class 4 |
|---|---|---|---|---|
| |  |  |  |  |
| **Shape** | Log has just fallen to the ground with branches attached. | Log is round and the branches have decomposed. | Log is not round; it breaks into pieces like a puzzle. | Log is shapeless and breaking down into small soil-like pieces. |
| **Bark** | Bark is attached to the log. | Bark is starting to peel off the log. | Bark has completely fallen off the log. | Bark has broken into very small pieces of soil. |
| **Texture** | Very hard and can't break the bark off the branches. | Can pull off the bark and break it into small pieces of wood from the side of the log. | Can break off large pieces of wood from the log. | The bits and pieces are soft to touch and break apart very easily with your fingers. |

# Organism Identification Key

## Resource # 2

| | | | |
|---|---|---|---|
|  Beetles chew up wood |  Insect larvae eat rotten wood and dead leaves |  Termites eat wood |  Spiders eat insects |
|  Sow bugs eat dead plants and animals |  Snails eat rotten wood |  Slugs eat dead plant matter |  Centipedes eat insects, spiders and worms |
|  Fungi break down organic matter |  Millipedes eat dead plants and animals |  Ants eat fruit, plants, dead and live organisms |  Red backed salamanders eat insects |
|  Camel Crickets eat fungi and decaying plants. |  Worms eat dead plant and animal matter |  Pillbugs eat dead or decaying plants and animals |  Wooly Bear Caterpillars eat plants like clover. One place they seek shelter is in dead or decaying logs. |

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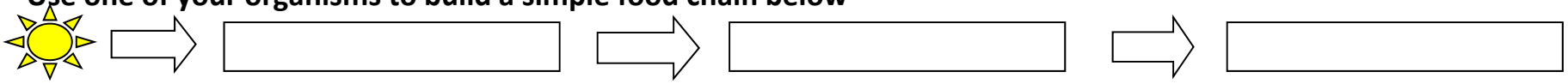
# Decomposers in the Food Chain

**Datasheet # 2**

| Identify an organism. Estimate how many you saw. | Measure the longest and widest part of each organism in centimeters. | Sketch the organism | Diet: Does the organism eat plants, animals or both? | Is it an omnivore, carnivore, herbivore, or decomposer. | Can you find the food it eats near your log? (circle your answer) |
|---|---|---|---|---|---|
| **1.** | **Length _____ cm**<br>**Width _____ cm** | | | | **Yes No** |
| **2.** | **Length _____ cm**<br>**Width _____ cm** | | | | **Yes No** |
| **3.** | **Length _____ cm**<br>**Width _____ cm** | | | | **Yes No** |
| **4.** | **Length _____ cm**<br>**Width _____ cm** | | | | **Yes No** |

**Use one of your organisms to build a simple food chain below**



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# LAB DIRECTOR INSTRUCTIONS:

Your primary job is to keep your scientists on task and focused. Listen as the instructor gives directions, and use the following experimental procedure as a reference. Student tasks are bolded.

*Throughout the experiment, please help them to explain their thoughts, but resist the urge to give "answers"!*

## EXPERIMENTAL PROCEDURE:

1. Students will be grouped and assigned to a decomposing log.
2. Students will classify their log (stage of decomposition) using the Decomposition Log Classification Guide (Resource # 1).
3. Using the Log Decomposition (Datasheet # 1)**,** students will measure and record the length and width of the log.
4. Using the Organism ID Key (Resource # 2)*,* students will look on, around and under the log for organisms. **REMIND STUDENTS:** return the log and the organisms around the log back to the way it was found. Do not handle any of the animals, only observe them. You may gently push leaves and sticks around for a better look, but make sure you leave your rotting log the way you found it.
5. Using the*,* Decomposers in the food chain (Datasheet # 2) students will sketch, identify, and determine what kind of decomposers are found as well as determine if they can find the food source of the organism. This may be done on white boards as well.
6. Finally, students will draw a simple food chain using the organisms that they found in and around their log. This will be done on the bottom of the *Decomposers in the food chain (datasheet# 2)* page.

**Extension: For students who finish early**

-This is located on the back side of Log Decomposition Datasheet # 1

- The students will stand in the quadrat and look up through the forest layers and project the circle through the layers of forest to estimate the fraction of coverage provided by each layer within that circle. For example "the canopy layer covers ½ the ground within the quadrat)
- Based off the forest layer fractions that the students just identified. The student will compare two of the forest layers to see which forest layer took up a greater amount of space in your quadrat.
    - For instance: Canopy layer (1/4) < Understory (1/2)

Thank you so much for your help at this Field Station! – The Blandy Education Team