



**Science Unit: *Fossils and the Changing Earth***

**Lesson 3: *The Earth Recycles***

School Year: 2016/2017

Developed for: Sir Sandford Fleming, Vancouver School District

Developed by: Kathryn Gregory Wodzicki (scientist); Gale Nyden and Monica Treanor (teachers)

Grade level: Presented to grade 6-7; appropriate for grades 4 - 7 with age appropriate modifications

Duration of lesson: 1 hour

**Objectives for Students**

1. Assess understanding of decomposition by thinking about what happens to forest litter
2. Practice making observations in order to answer questions by examining leaf litter.
3. Learn that earth is a closed system (to matter). Matter undergoes chemical changes (“is recycled”), but is not created or destroyed.
4. Practice analyzing and interpreting data by looking at the weight data from the “Seedlings in a Jar” experiment. The seedlings grew, but why didn’t the jar gain weight?

**Materials**

- *Earth’s mass assessment* (printable page included below)
- Science notebook, for recording observations
- 4 stations: 2 stations of leaf litter from local forests placed out in box lids or shoe boxes for students to examine, 1 station of fresh leaves, 1 station with animal bone or horn and seedlings in a jar experiment, which we started the first week.
- Magnifying glasses
- Popsicle sticks (for looking through litter)
- Seedlings in a Jar experiment (from lesson 1), weight measurements

**In the Classroom:**

**Earth Mass Assessment**

- Give students 5 minutes to complete the **Earth’s mass assessment (below)**.
- What do the students think? Does the earth get heavier?
- Introduce the activity - students will examine leaf litter, the seedlings in a jar experiment, and other material to get insight into the question of whether the earth gains mass and gets heavier.

**Activity**

- Give students 5-10 minutes at each station to make observations. (Alternatively, this activity could be completed outside, weather permitting).
- Discuss observations as a class



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### Explanation

- Using the [slide show](#), discuss conservation of matter, matter cycling, and the concept of elements vs. compounds.
- Discuss implications of the seedlings in a jar experiment

### Vocabulary

<u>Mass</u>	The amount of matter in an object
<u>Leaf litter</u>	Layer of debris on top of the soil, which includes decomposing leaves, twigs, bark, needles, etc
<u>Decomposition</u>	The process of decaying or rotting, which separates a substance into simpler substances or elements

### Extension of Lesson Plan

1. If students are interested in any bugs they find in the litter, they may want to “catch” and ID them.
2. If the weather permits, students could examine leaf litter outside
3. Another conservation of matter demonstration could be dissolving a piece of limestone, shell, chalk, or egg in vinegar in a closed container and seeing if the mass (weight) changes.
4. The ideas in this lesson can contribute to an interesting discussion about recycling. Students could also research how different materials are recycled in Vancouver.
5. Students could do a “Great Canadian Shoreline Cleanup” in the schoolyard or local park. How long would it take the different types of garbage they find to decompose?

### References

1. Acorn, J., and Sheldon, I. 2001. Bugs of British Columbia. Lone Pine Publishing.
2. Keeley, Page, Eberle, Francis, and Dorsey, Chad. 2008. “Earth’s Mass.” [Uncovering Student Ideas in Science v. 3](#). NSTA Press. pp. 147-154.
3. Konicek-Moran, Richard. 2013. Everyday Life Science Mysteries: Stories for Inquiry-based Science Teaching. NSTA press.
4. <<http://www.amnh.org/our-research/center-for-biodiversity-conservation/publications/general-interest/biodiversity-guides/life-in-the-leaf-litter>> Johnson, Elizabeth A., and Catley, Kefin M. 2002. Life in the Leaf Litter. American Museum of Natural History. Accessed November, 2015.
5. Winston, Robert. 2012. Life as we Know it. DK.



## Earth's Mass

Imagine walking through a forest in the fall. The ground is covered with dead leaves, needles, seeds, nuts, twigs, branches and other plant parts. This layer of debris is called the **leaf litter**.

Scientists have measured amounts of leaf litter, and found that a forest the size of the Fleming schoolyard can produce 1000 kg+ of leaf litter and animal/insect poo a year. That's a ton or more of material!



Given this observation, what do you think happens to the mass of the Earth over time (mass = the amount of matter in an object)?

Circle the best response below:

1. The mass of the earth increases.
2. The mass of the earth decreases.
3. The mass of the earth stays about the same.

Please explain your thinking. What reasoning did you use to select your answer?

KMG 1/2017. Modified from Keeley, P, and Eberly, F., and Dorsey, C., 2008, Uncovering student ideas in science, volume 3. NSTA press. Leaf Litter mass estimate from Johnson, EA and Katley, KM, Life in the Leaf Litter, AMNH website ([www.amnh.org](http://www.amnh.org)). Image: By James Petts from London, England leaf litter [CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0/>)], via Wikimedia Commons