

# Lesson #6: Down to Earth

## Soil as a Solution!



# 06

### Big Idea

As we learn more about the complexities of the soil beneath our feet, we're discovering its huge role in storing nutrients, including carbon. We also know the importance of healthy soils to support plant and ecosystem life above and below the earth. Discover some ways to support our soil by creating seed bombs to protect soil from erosion, and learn more about the roots of plants in the soil below you!



### Suggested Steps:

1. Start with the video or the first activity.
2. Afterwards, do the second activity.
3. Close the lesson with a journal reflection prompt or My Climate Story handout.

### Guiding Questions:

- How do soil and plants work together?
- How is soil affected by climate change?
- How can we be good stewards of soil?

### Learning Objectives

*I know (knowledge), I can (skills), I understand (conceptual understanding)*



#### I KNOW

- ↳ The soil beneath us is complex and comprises living and non-living things.
- ↳ Soil has an important role to play in storing carbon.



#### I CAN

- ↳ Differentiate between the different key components of soil.
- ↳ Compare different soils needed by plants and the role of their roots.



#### I UNDERSTAND

- ↳ That soil is a major climate change solution that I can help steward.
- ↳ There are many ways we can protect the soil on Earth and leave it undisturbed.

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# Activity 1: Bombs Away! (Making Seed Bombs)

Time: 40 mins

Process: 10 steps



### Materials Needed:

- Powdered Clay
- Water
- A tray or location for drying
- Compost
- A mixing bowl (one to make the recipe, more for small groups)
- Small bags or containers (for distribution and storage)
- Wildflower seeds (depending on location for planting)
- Spoons (optional, or use your hands!)
- Measuring Cup

## Process

1. This activity involves dirt and water. It might be messy, so choose the best location for your class.
2. Ask your students what kinds of wildflowers they have seen around them. What colour were they? What shape? Were they actually 'wild', or were they in a garden? Did they look like they belonged where they were?
3. Today you are going to make seed bombs together. Seed bombs are balls of seeds, clay, and soil that you can throw out into woods, ditches, or other spaces to help add some extra plants to areas.
4. Have your students think about important rules about seed bombs. What flowers would be appropriate to put in what places? How can we make sure we are choosing the right flowers for our environment? Where are good and bad places to throw them?
5. Extension: If time allows, you might want to research the best seeds for your location with your students. You also might want to bring in a local gardener or knowledge keeper who could introduce some wildflowers first.
6. Either divide the class into groups with their own bowls and spoons, or do all together. Just like a cooking show, you'll use your different ingredients to make the seed bombs.
7. Here's your recipe! Use a ratio of 1 cup of seeds to 5 cups of compost to 3-4 cups of clay, though you can be flexible with this. Start by mixing together the dirt and seeds. Then add in some of the powdered clay and slowly add a bit of water until you are able to roll the mixture into small, firm balls.
8. Set the bombs somewhere to dry out, and then distribute to your students.
9. Decide if you need to write out any instructions for someone using them. Are they meant for pollinators, or wildflower gardens, or the wild?
10. Remind your students about good and bad places to throw your bombs. Seed bombs also make a great present for the spring or summer months for someone in your community.

### Tip!

Native plant seeds can be difficult to find. If you have trouble finding the right seed, switch to a different blend of more common seeds and make it for backyard pollinators, or a wildflower garden - just ensure none of the plants are invasive and you are planting in the right spot!

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# Activity 2: Roots & Storage

Time: 20 mins

Process: 13 steps



### Materials Needed:

- Root Depth image printed, with root depth of plants portion folded behind.
- Root Depth Worksheet printed, with copies for small groups or each student (*optional*)
- Root Depth image without image of plants

above ground, and then entire image showing above ground and roots (*if displaying on a computer or projector*).

- Potted plant or plant that is showing its roots to introduce the activity (*optional*)

## Process

1. With your students, look at a potted plant in the room or outside - what do you notice about the pot? How deep is it? Do you think the roots are sticking out at the bottom?
2. Explain that plants sometimes can surprise you. A lot of their growth is happening in their roots, as they extend out into the ground collecting water and nutrients for the plant.
3. Explain to your students that today you are going to try and guess how deep some common plant roots grow.
4. While we can see how high a plant gets and how wide it is above ground, how can we guess how deep their roots go? What would be some clues that might help us decide? (if needed, prompt about size of plant, soil, water, and nutrients in their location, etc.)
5. Introduce the Root Depth sheet. You can choose to work on this together, in small groups, or individually.
6. For each of the plants, estimate how deep you think the plants' roots might grow. Draw them to the measurement you think would be best (for younger students, you may need to demonstrate measurements using a student or adult to measure by meters).
7. Alternative: for younger students, you may want to simply have the students number the plants from shallowest to deepest roots.
8. Review as a class and see how well everyone did by unveiling the answers (the complete root system image below the plants). Review with your students: were the plants that you thought had the deepest roots correct? Did any surprise you?
9. Looking at the grasses in particular, ask your students why they think the one grass had such deep roots? Provide hints to consider where some of these plants might live (windy or dry areas with lots of soil erosion), or how they might reproduce (if they do not have flowers). Can they think of any other good reasons?
10. Use a common lawn grass as a comparison, usually only with roots 3-6 inches deep. When thinking about soil, how might deeper roots help make healthier soil (more nutrients and water storage in the plant's roots, transforming nutrients and providing space and organic matter for organisms to break down matter into nutrients).
11. Why do you think some plants had much deeper roots than you may have thought?
12. Recalling the soil health video, how is this soil (and the plants) a solution to climate change (stores lots of carbon and prevents soil/land erosion for increased biodiversity).
12. To close the conversation, ask your students to think of solutions to treat the soil below us properly, and to protect plant roots. What can we do together?

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# My Climate Story Reflection



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As part of planting seeds for climate stories, your students are developing their own story to help them walk through their role in climate change. You can use this assignment in place of -or to support- a journal reflection.

The worksheet for developing My Climate Story for this lesson asks your students to explore the stories of climate action heroes who are stewarding and protecting soil. Using their head, heart, hands and feet, students will learn about the climate story of another person, familiarizing them with a template to create their own climate story at the end of the unit.

For further guidelines on helping your students develop their own Climate Story, check out the explanation in the Teacher's Guide.

### Reflection/Journal Prompts

- Pretend the soil is a creature. How would you describe a day in its life?
- Share a story of digging for buried treasure. What did you find instead below the soil?
- Write a poem about the roots of a plant.



### Assessment/Evaluation

### Extension Activities:

- ↳ Try filtering water through different soils to explore how a balanced soil retains moisture. Use different weights and types of mineral/soil blends to demonstrate this, such as rocks, bone meal or sand, heavy clay, and outside soil.
- ↳ Use the example of an apple to demonstrate the amount of arable land on the planet [[link to video](#)]
- ↳ Soil painting.
- ↳ Shake up a jar of soil with water and you'll be able to see the separation of sand, silt, and clay in the jar as it settles.