OSU EXTENSION SERVICE

Klamath Basin Research & Extension

Grow It, Cook It, Like It

Farm to School and Nutrition Education Program

FoodCorps

Oregon State University

Hi, I'm Miss. Anna!

Q: If you were a vegetable, what type of vegetable would you be?

If I were a vegetable, I would be a pea! Special bacteria can live on the roots of peas (and other legumes). These bacteria make a nutrient called Nitrogen for the soil. Nitrogen is one of the three key nutrients that plants need to grow.

I am like a pea because I build a welcoming and nourishing foundation that allows others to thrive and grow. Plus peas are delicious – I especially enjoy snap peas!

To the right is a picture of me at Henley Elementary asking students what they think of our local ground beef taste test. My Shasta Scorpions and Henley Hornets will recognize me from the cafeteria and maybe even your classroom!

Questions or comments about this lesson? Get in touch!

anna.barlowe@foodcorps.org

Lesson #1: What is Dirt?

Today we're going to conduct a **science experiment** to explore what dirt is made of and understand why it is so important for all living things.

Q: What is dirt really made of?

Oregon State University
Extension Service

Hold up, let's get one thing straight...

We are scientists today, so we should use proper scientific vocabulary.

Agricultural scientists don't use the word "dirt", they actually call it **soil**. Soil is the material on the top surface of the Earth that supports plants.

Even though it may look boring and lifeless, soil is just the opposite. It is actually full of many small animals, plants, bacteria and fungi that are working hard to build the foundation of LIFE for you and me.

So remember:
Soil is for **s**uper **s**mart **s**cientists!

Q: So...what is soil really made of?

Let's set up our experiment to discover the four main components of soil are. A **component** is a part or piece of a larger whole.

Oregon State University
Extension Service

Here's what you will need to get started:

Gather these supplies and find a workspace where you can set up your experiment.

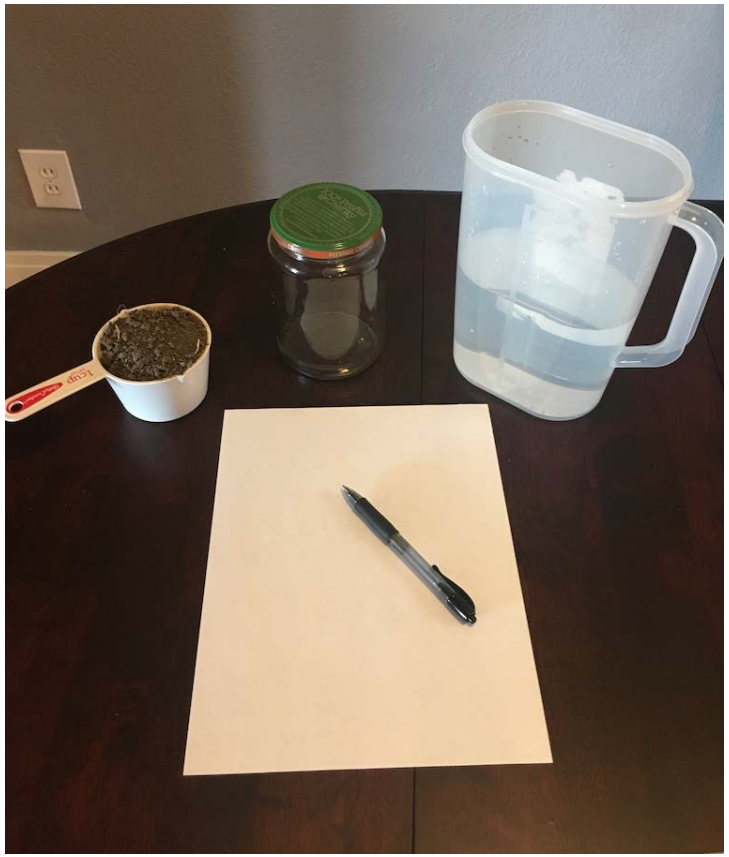
- ✓ **A medium to large glass jar, glass cup or clear plastic bottle**. Ideally, find something with a wide mouth and a lid. Remove labels so you can see into the container easily. Check with an adult at home to make sure whatever you find is ok to get dirty and use for an experiment.

- ✓ **If your container does not have a lid or top, a fork.** You will need this for stirring.

- ✓ **About 1 cup of soil.** Head outside and dig some up from your yard or garden – ideally not potting soil. Again, ask an adult to make sure you can use some soil!

- ✓ **Water**.

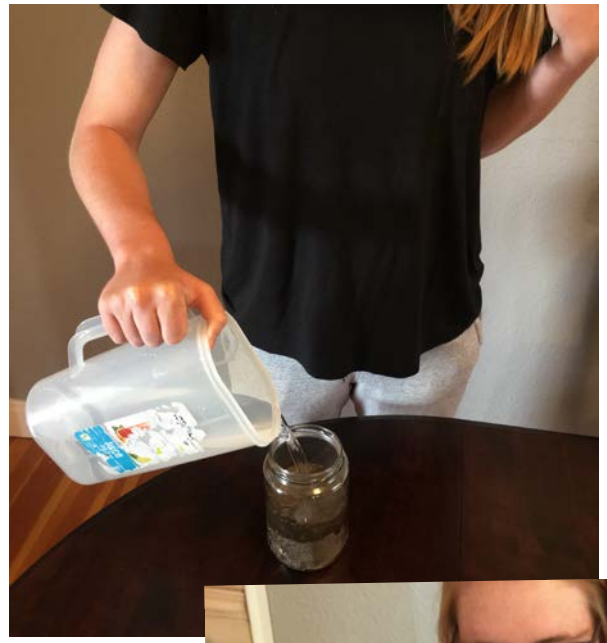
- ✓ **A piece of paper or notebook and something to write with.** To record your observations and predictions.



Here's what my supplies looked like!

Step 1: Mix Water and Soil

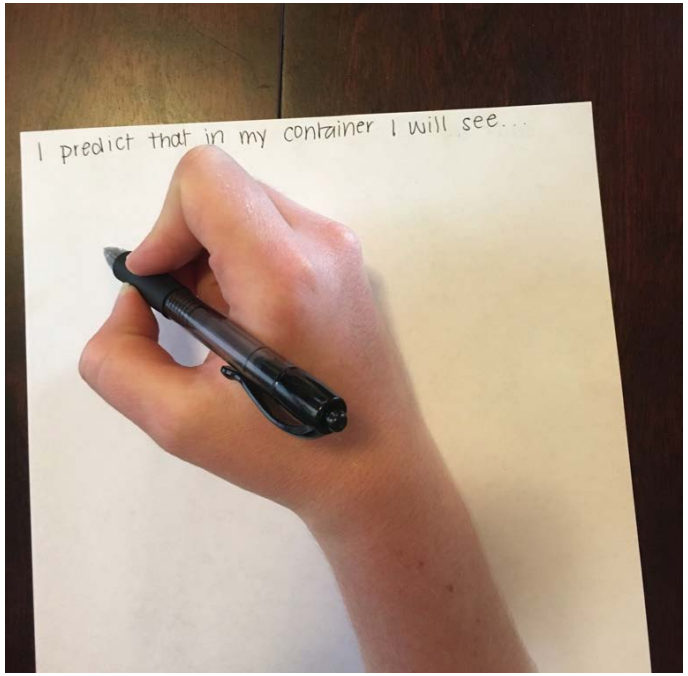
- ✓ Fill your glass or plastic container about half way with water.
- ✓ Carefully pour your soil into the container with water. Add enough so that your mixture is still a liquid – we are trying to make dirty water, not mud. *Note: If you're working with a container with a narrow top, you can create a funnel using a piece of paper to avoid making a mess while pouring in your dirt.*
- ✓ Tightly screw the top on if you have one and shake your container until well mixed. If you do not have a top, use the fork to stir. Get those arm muscles moving - shake and stir while this video plays (or, for about 3 minutes)!
- ✓ You should end up with some cloudy, brown water in your container.



Pouring water and shaking up my mixture.

Step 2: Wait and Write Predictions

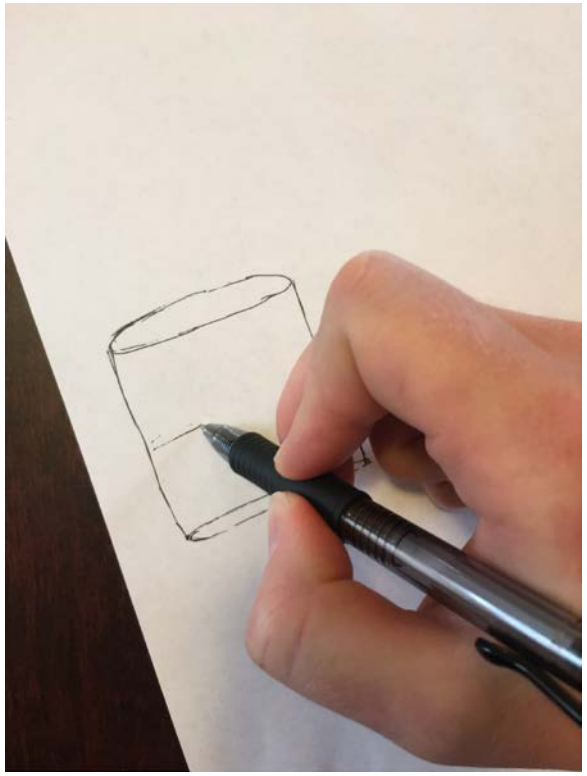
- ✓ Set your glass jar aside and do not move or mix it for at least 3 hours (longer is ok, too – I waited 24 hours).
- ✓ During your rest time, get out your piece of paper and write down two full sentences with a prediction for what your container will look like at the end of the experiment. Remember - a **prediction** is a guess for what will happen in the future. Scientists make these during experiments. Use these sentence starts, or think of your own:
  - I predict that in my container I will see...
  - I think that the soil and water will...



Don't skip out on making your predictions!!

Step 3: Record Results

- ✓ After the resting period, return to your container.
- ✓ **Q: What do you see?** Flip over your piece of paper and draw a sketch of what your container looks like. Use color if you'd like!
- ✓ Write one full sentence describing what you observe. Remember – an **observation** is something you notice about your experiment using your five senses (smell, taste, touch, hear, see). For this experiment, what we see is the most important. Use one of these sentence starts or think of your own to describe what you see:
  - In my container I see...
  - My container looks like...

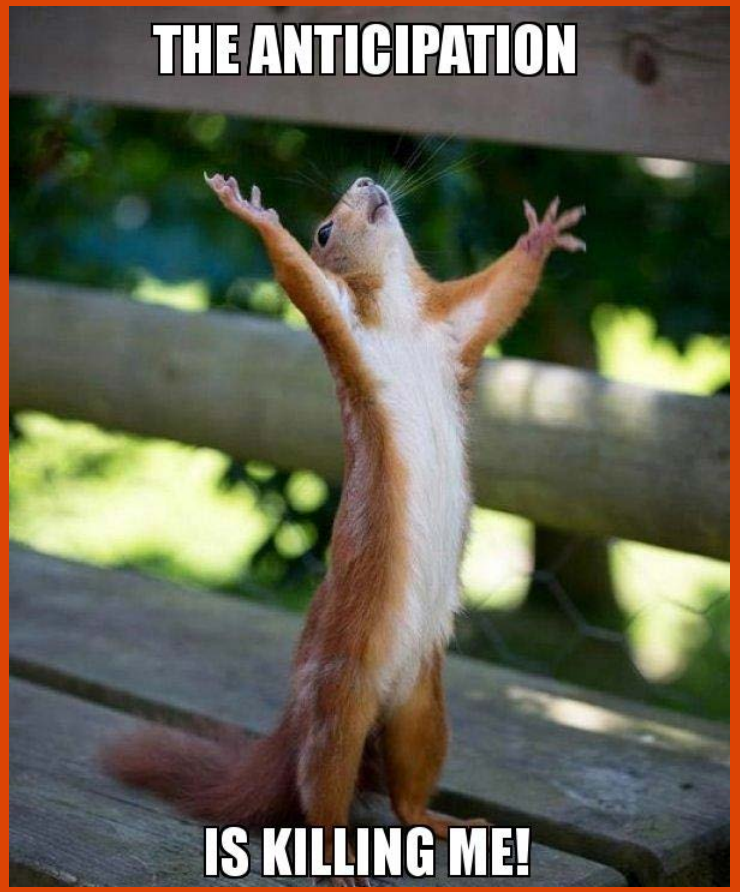


Sketching my experiment – Picasso would be proud!

Important note: Be sure to keep your container with the soil and piece of paper until the very end of our lesson!

Q: What does our experiment tell us about soil?

Let's take a look at our results!



Oregon State University
Extension Service

Layers...like a Chocolate Cake!

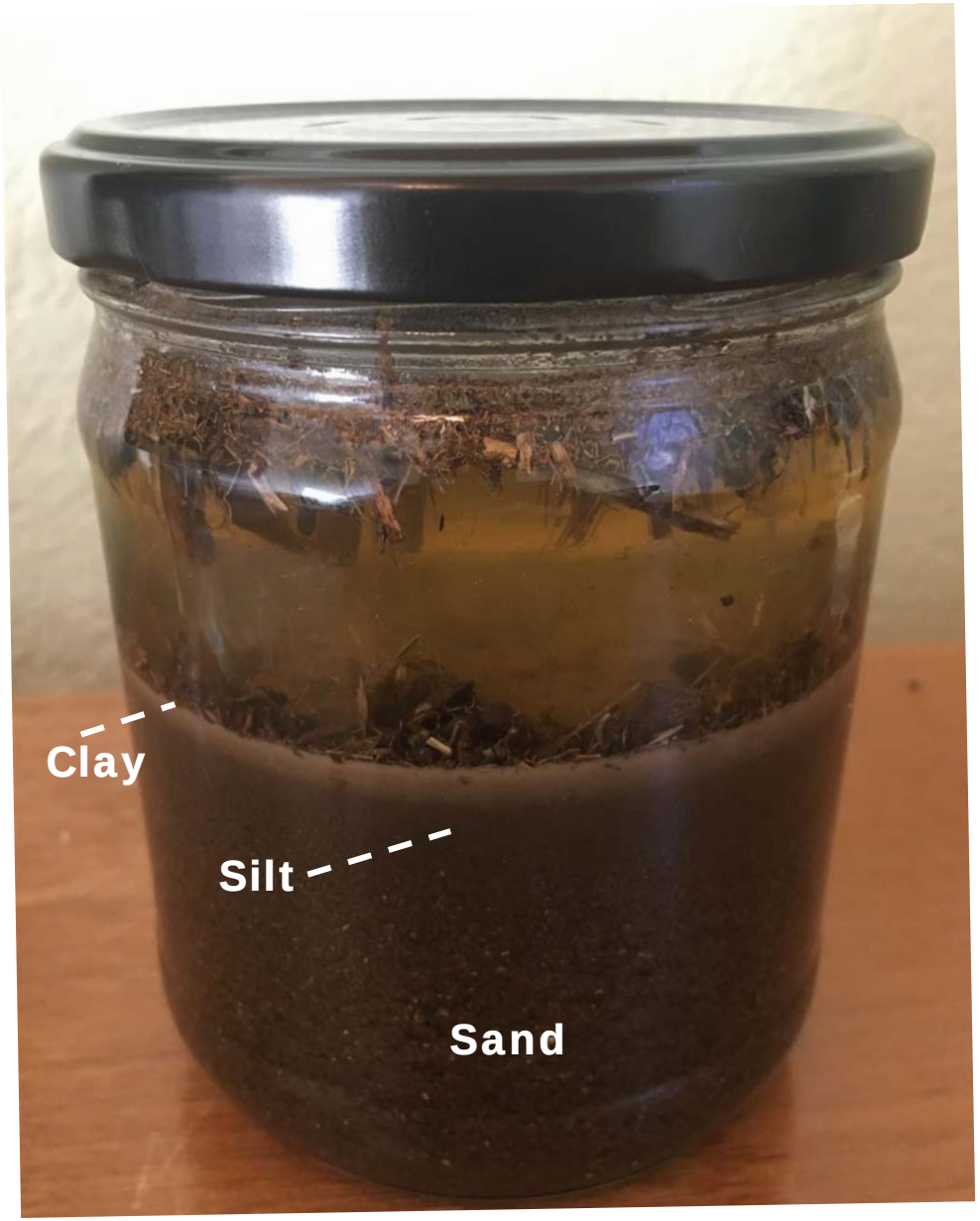
Here's what your container should look like after the resting period:

- You should see multiple separate layers in your container. These layers are formed by the different components of soil.
- **Q: Why does the soil and water mixture separate into layers?** Take a moment to think: when you throw a rock into a pond, what happens to the rock? When you throw a leaf into a pond, what happens to the leaf?
- The leaf will most likely float, because it is lighter than water. The rock will most likely sink because it weighs more than water.
- Something similar has happened to create the layers in our container. Our soil components have separated out by weight. Lucky us - now we have isolated them so we can figure out what they are!

Yum – looks delicious!

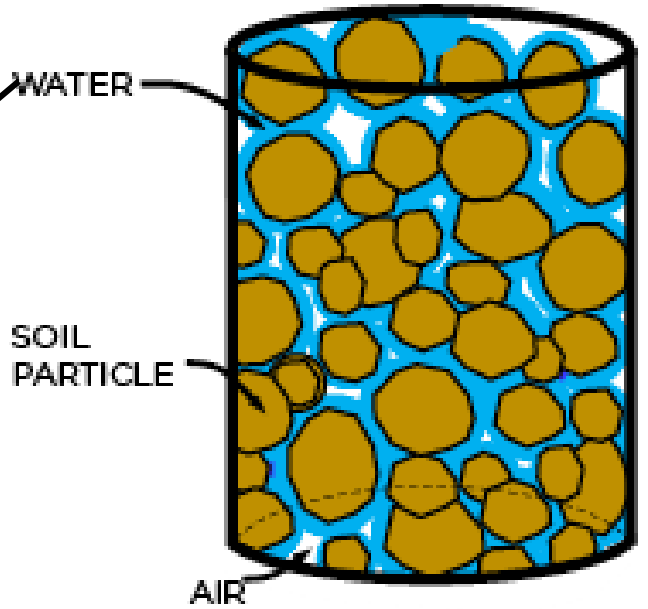
Bottom Layers = Minerals

- All the layers below the water are called minerals. Minerals are mostly made from rocks that have been broken down into much smaller pieces.
- You may see up to four layers of minerals in your container. The bottom would be any gravel or rocks you scooped up. The next layer is **sand**, then **silt**, and then **clay**. The bottom is the heaviest, while the top layer, clay, is the lightest.
- Record on your piece of paper after your observation sentence how many mineral layers you see, using a full sentence of course!



Middle Layer = Water (And Air)

- The next layer is **water**. Even though we added water to do this experiment, soil also naturally holds water in tiny pockets. When you have the hose on in a yard, that's why the water seems to disappear into the ground – the soil is absorbing water.
- This is a good time to mention another component of soil: **air**. We don't really see air as a layer (except maybe at the top, depending on how full your container is). However, just like water, air is in soil in tiny pockets.



A diagram of what soil looks like on a microscopic level. You can't see the air and water with your eye, but it's there, I promise!

Top Layer = Organic Material

- The material floating on top of the water is what we call **organic material**. Organic material is made up of plants, animals and their by-products.
- Organic material can be plants and animals that are alive, like fungi. It also includes plants and animals that are dead, like wood chip or leaf.
- There's a chance your jar has barely no organic material at all (or A LOT if you used potting soil). We'll talk about this in Lesson #2 on decomposition and organic material. Join me next week if you're curious to learn more!

We finally can answer our initial question!

Yipee! That took some time, but it was #worthit

Soil is made up of **four** main components:

1. **Minerals** - including sand, silt and clay
2. **Water** – in tiny pockets
3. **Air** – you can't see it, but it is also in tiny pockets
4. **Organic Material** – plants, animals and their by-products, both living and dead.

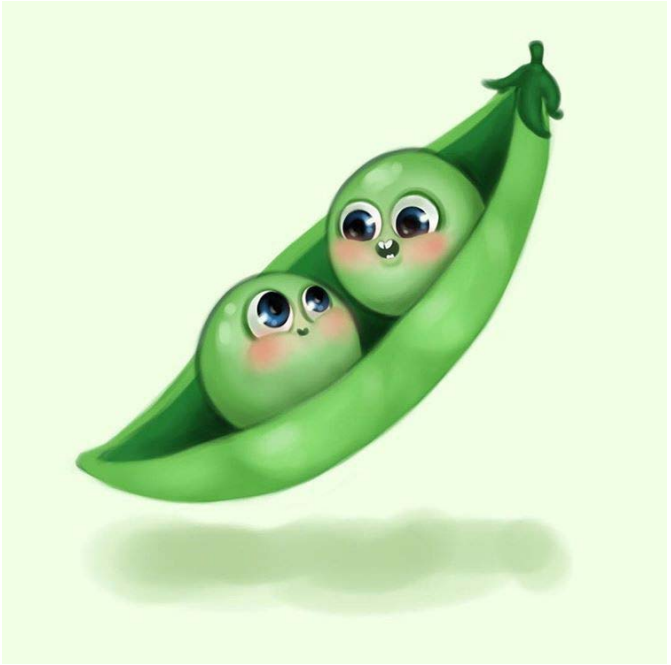
Q: Can you think of a mnemonic (sounds like: NEW-MON-ICK) device to help you remember these four pieces? A **mnemonic device** is a trick you use to help memorize something, like a rhyme, song, phrase or word. An example is: "i before e, except after c". Send me an email if you come up with a good trick for remembering the soil components!

Miss. Anna, why should I care about soil?

Now that we know what soil is made of, let's think about plants and why this all matters.

Q: What are some things a plant needs to grow? Water, sunlight, air, nutrients and time are all great examples. (If you said soil, you're one step ahead of me!)

- Based on the components of soil - minerals and organic material (which we sometimes group together as nutrients), air and water - and what a plant needs, it turns out that plants and soil are a perfect match!
- **Plants can get most of what they need to grow from soil**. That's why most plants, and especially plants that we grow on a farm, are grown in soil.
- So anytime you eat a plant like **potatoes**, or an animal that eats plants like a **tri-tip steak**, or wear a plant like **cotton**, or bite into a **juicy apple**, or smell a sweet flower like a **cherry blossom** you can be sure to thank...



Plants and soil are like two peas in a pod!

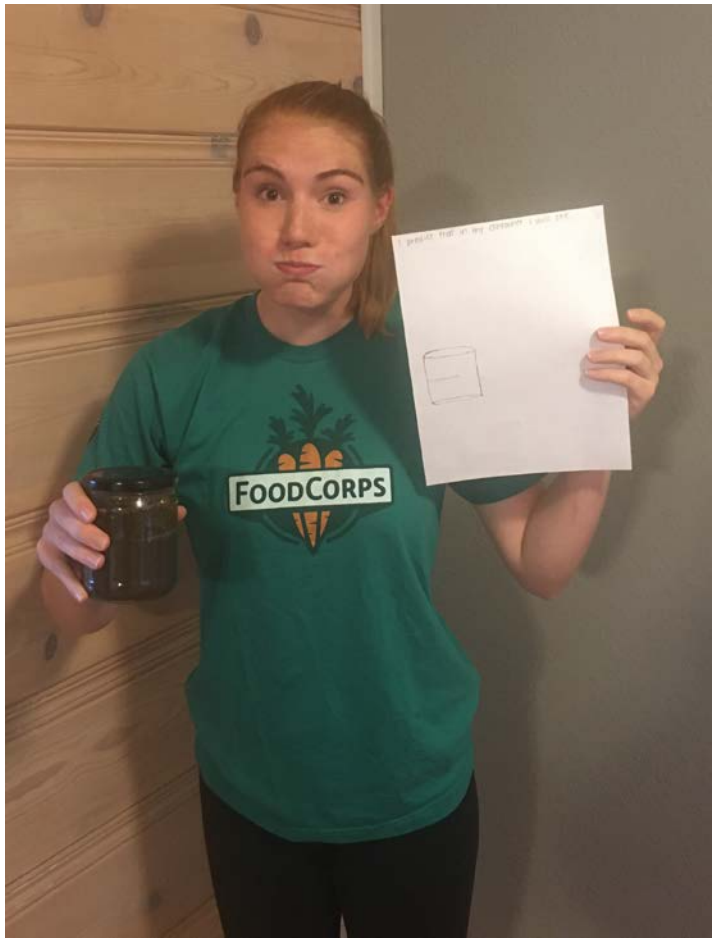
SOIL!

Check out this song to help you say thank you to soil!*

*even though they call it dirt :(

Knowledge Check!

- ✓ Snap a photo using your webcam, tablet, a cellphone, or other digital camera of your soil container experiment and piece of paper with your predictions and reflections. Try to fit it in one photo if possible. **Feel free to include yourself making a silly face if you have parent permission!**
- ✓ Email the photo to anna.barlowe@foodcorps.org. I will respond and let you know if can check off the "What is Soil?" activity on your Bingo Board.



My knowledge check and silly face!

Knowledge Check!

- ✓ Be sure to also share with someone else what you learned in this experiment including the four components of soil, so can check off another activity on your bingo board!
- ✓ Congratulations - you are one step closing to earning prizes and have some new knowledge about soil!

Thanks for joining me!

Want more fun farm to school and wellness activities? Want to earn awesome prizes? Visit our website to learn more!

FoodCorps

Oregon State University
Klamath Basin Research and Extension Center

What some more?

Check out these additional videos and resources to extend the fun!

- ✓ Video: What's the Dirt on…Dirt?
- ✓ Video: The Importance of Top Soil & Earth as an Apple
- ✓ For the advanced scientist (and mathematician): https://hgic.clemson.edu/factsheet/soil-texture-analysis-the-jar-test/
- ✓ A whole website of fun with soil: https://www.soils4kids.org/experiments

Learning Objectives & Science Standards

Overall Program Learning Objectives:

1. Label the life cycle of plants/animals and describe the role humans have
2. Safely prepare a recipe with ingredients from food grown in Oregon
3. Describe what a plant needs to grow and how humans can assist
4. Identify where and how food is grown in Klamath/Oregon
5. Identify an Oregon grown food and taste it.

NGSS Standards Used in Garden Education 3rd Grade:

3-LS1-1 From molecules to Organisms: Structures and Processes
Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3-1 Heredity: Inheritance and Variation of Traits
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS4-3 Biological Evolution: Unity and Diversity
Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4 Biological Evolution: Unity and Diversity
Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-ESS2-1 Earth's Systems
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Engineering Design 3-5

3-5-ETS1-1 Engineering Design
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Engineering Design
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.