

SEEDS

FRAMEWORK
I. Scientific and Engineering Practices
II. Cross-Cutting Concepts
III. Physical Sciences

SKILLS/OBJECTIVES
- o Learn the function and the basic structure of seeds through hands-on exploration and observation. - o Explore what kinds of objects contain seeds and use this knowledge to predict the function of seeds. - o Learn the three parts of a seed and observe them in a living seed. - o Observe the process of seed germination over time.

MATERIALS
- o 1 Apple (or other fruit with easily visible seeds) - o 1 Granola bar - o 1 Old tennis ball - o 1 Sharp knife - o Pre-soaked lima beans - o Magnifying glasses - o Toothpicks - o Grass seed - o Clear containers (such as plastic cups) - o Clear gel medium/water-based spheres

NOTES
Lima beans must be presoaked.

BACKGROUND

- Seeds can be many different sizes and come in lots of different shapes.
- Seeds are found in many fruits we eat every day.
- Seeds are responsible for the spread of life in plants.

Activity # 1	Where Are Seeds Found
Materials	- o 1 Apple (or other fruit with easily visible seeds) - o 1 Granola bar - o 1 Old tennis ball - o 1 Sharp knife
Worksheet	N

- Place apple, granola bar, and tennis ball on the table. Ask for some similarities and differences between the three objects (some possible comparisons: edible vs. inedible, human-made vs. natural, round vs. not, apple peel "packaging" vs. granola bar packaging, etc.).
- Now ask: *what about the insides of the objects? Any predicted similarities or differences?*
- Cut the apple down the middle and hold up or pass around the pieces so that everyone can see the seeds. *What do the seeds do?*
- *Does the granola bar have seeds inside?* Cut it open or peel open the wrapper and hold up or pass around. *It does! Is there a difference between the seeds in the apple and the seeds in the granola bar?* (Hint: what would happen if we planted them?)
- *Does the tennis ball have seeds inside?* Cut it open and hold up/pass around. *Why do you think it doesn't?*

Activity # 2	What is a Seed Made of
Materials	- o Pre-soaked lima beans - o Magnifying glasses - o Toothpicks
Worksheet	Y

- Part I: Build a Seed (game from Kayam Farm in Reisterstown, MD)
 - o Explain that we are now going to take a trip inside of a seed to find out what else is in there! Split the students into groups of 3 (if any have more than 3, people can double up on a part).
 - o Explain that each group is one seed, and each group member makes up a different part of that seed. Optionally, you can have the groups decide what kind of seed they are and present it with an accompanying physical movement.
 - o *There is actually a tiny baby plant inside each seed! We call that baby plant an **embryo**. Embryo just means a baby before it's born. Animals and even people are embryos before they are born. The embryo is asleep inside of its seed until it starts to grow.* Each group selects one member to be the embryo. Embryos should crouch down into a ball (so they can fit inside the seed) and hold out either one or two hands, palm up. These

hands are the first leaves of the plant, and every plant has either one or two. If they want they can pretend to be asleep.

- o *Who is usually hungry when they wake up in the morning? Well, the embryo will be hungry too when it wakes up. Luckily, its mom packed it breakfast! There is a big chunk of food sitting inside the seed, ready to feed the embryo all kinds of delicious nutrients when it wakes up.* Each group selects a second person to be the food. That person stands next to the embryo and does something to represent food (example: rub your belly and repeat "yummy" or "mmm" or the name of your favorite food).
- o *The last part of the seed is called the **seed coat**. What do you think it does? (Hint: it is kind of like a coat that you wear). The seed coat keeps the embryo safe until it is ready to start growing.* Each group selects a third person to be the seed coat. That person marches in a circle around the other two and chants, "De-fense! De-fense! De-fense!"
- o Once all three parts of the seed are going at once, ask or tell the students what we need to wake up the seed...water! If any students do not yet have a part, they can pretend to water all the seeds (otherwise you can do it). Once they've been watered, the embryo wakes up, slowly starts to stand up, and extends its arms upward toward the sunlight until it is fully outstretched. Congratulations! You've sprouted!

- **Part II: Dissect a Seed**

- o Pass out toothpicks, magnifying glasses, and soaked lima beans. Have students explore the three parts of the seed. Explain that because these seeds were soaked in water overnight, they have started to wake up. The seed coat has become a very thin, wrinkly layer that they can gently peel off with a toothpick. The two large halves are the nutrients of the seed. Gently pry the two halves open along the seam. Inside should be a tiny embryo! Observe with magnifying glass—can you see any plant parts? (The root, stem, and leaves should actually be visible, though tiny.) Draw what you observe.

Activity # 3	Observe Seed Germination in Action
Materials	- o Grass seed - o Clear containers (such as plastic cups) - o Clear gel medium/water-based spheres
Worksheet	N

- Each student gets a clear container filled with some of the clear gel medium (this can be supplemented with water, but not too much because the seeds should be able to rest on top of the medium). Students sprinkle a pinch of grass seed into

their cups. They can take the cups home, put them in a sunny place, and watch the seeds germinate and grow into grass. They should be able to see the roots growing down into the medium through the sides of the cup.

CONCLUSIONS

- Seeds have several layers to them, even though they may appear to be very small.
- Be sure to put the cups of grass seed in a very sunny place, such as by a window where there is a lot of sunlight.

WHAT'S INSIDE A SEED?

Draw what you observe through the magnifying glass. Can you find the seed coat, the food, and the embryo?

Draw the whole seed here:

Draw the embryo here:

Which part of the seed is on the outside? _____

Which part of the seed is the biggest? _____

Which part of the seed looks like a little plant? _____