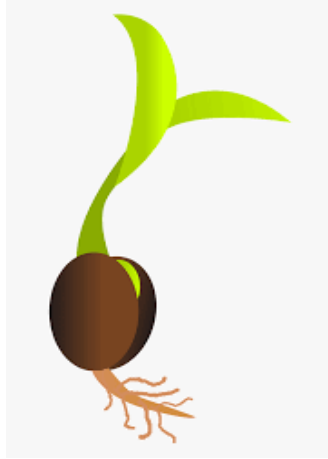


# SEEDS and more!



Lesson Plans for January and February 2022

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Growing is Knowing!



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## SEED BASICS:

A seed has four main parts: the seed coat, the endosperm, the embryo, and the cotyledon.

- The seed coat is the outer layer of the seed which protects what is inside.
- The endosperm is the inside of the seed which is the energy source.
- The embryo is the baby plant inside the seed.
- The cotyledon is the first leaf of the plant. They die off once the plant grows its true leaves.

Seeds are either a dicot (plant with two cotyledons) or monocot (plant with one cotyledon—corn and other grasses)

We eat some seeds like peas, beans, corn, nuts, and sunflower seeds. Seeds are usually found inside the fruit of the plant which grows from the plant's flower.

## LEARNING JOURNALS:

It is recommended that students use some sort of learning journal as they embark on their discovery of seeds. Learning journals can be simple and just consist of information, notes, and diagrams of various concepts. Learning journals can help kids stay organized as they learn science concepts using inquiry-based observations and investigations. A journal can be made by stapling pages together or using a folder. You can have students make a folder out of construction paper to hold their KWL charts, diagrams and other materials.

The journal is a great assessment tool which allows students to display their learning and understanding of the skills and concepts being taught.

## Seed Discovery

Objective: To develop understanding the role of seeds and the diversity of their shapes, sizes and colors

Materials: Seed mixture for student pairs

Vocabulary: Diversity  
Texture  
Diversity

Lesson:

Brainstorm with students what they already know about seeds. Guide discussion with questions such as: What is a seed? How can you tell something is a seed? Why are seeds important? What are some characteristics of seeds? What does diversity mean? What does diversity among seeds look like?

A K-W-L chart is a great way to record students' responses and may be used as a reference in future lessons.

Students can be given cups of mixed seeds either individually or in pairs. Students are to sort the seeds based on color. Students who finish their sorting quickly can count the seeds in each variety and record on a class board or chart for the class to observe. Then students sort again for shape. Once more for size. Then one final time for texture.

Afterward, students can share their sorting method with another student or pair. As a class, they can explain their reasoning, observations, and discoveries as they sorted the seeds. How did students sort seeds in their mixture? Were there any seeds that didn't fit into their sorting method? What wonderings/questions do students have about seeds? This can be recorded on the K-W-L chart.

MATH EXTENSION:

Have the students receive the same amount of seeds, sort them according to a parameter (size, shape, color, texture), count the seeds in each parameter grouping and record them all. The students can then compare the data and create a graph or a grid of the data. Or the data could be used as the basis for future math equations.

New Jersey Learning Standards Science: PreK: 5.1.1-4, 5.2.1, 5.3.1 K:LS1.C 1:LS1.A 2:LS2.A  
Math: PreK: 4.1-4 K.CC, K.G.A 1: 1:OA.A, C 2.MBT.2

## Mini-Greenhouses

Objective: To set up an on-going experiment in order to observe seed sprouting, growth and the parts of plants.

Vocabulary: seed coat, stem, sprout, greenhouse

Materials: a pre- soaked lima bean seed for each student  
Ziplock bags  
Cotton balls  
Water

Lesson:

What do students know about what seeds need to thrive? What compels a seed to move from a stage of dormancy to sprouting? Brainstorm with the students what they know about seeds and how they grow?

Students will assemble “mini” greenhouses in class so they can watch seeds sprout and begin to grow. As a class, make predictions...how does a seed sprout? Tell students that they will learn about the parts of a seed during the growth process.

Students can work in groups of four. Each group gets a ziplock bag, 4 pre soaked lima bean seeds and 5-6 cotton balls. Wet the cotton balls and squeeze out the excess water, and drop them into a sandwich bag with your seeds. Ziplock bags can be sealed and labeled with groups' names and hung on the window with tape.

After greenhouses are assembled, the class can gather back together and discuss what they discovered about their seeds. Did they see the seed coat splitting or roots emerging from their pre soaked seeds? How long do they think it will take for the plants to grow?

Students should understand that not all seeds sprout and not to be disappointed or feel like they failed. Some seeds will grow quickly, others will take longer and some won't grow at all. This is an opportunity to think like a scientist and think about why and how seeds grow.

Over the next few weeks, students should be encouraged to observe their seeds sprouting every day and to open the bag for a short period of time to let their plants breathe and to remoisten the cotton balls. This is a great opportunity to encourage scientific thinking. A class chart can be made documenting seed sprouting and growth.

New Jersey Learning Standards

Science: K:LS1.C 1:LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS1.C

## Seed Survival with the Tiny Seed

Objective: To understand how soil, air, water, and sunlight play a role in the growth and cultivation from seed to plant.

Materials:

Book, The Tiny Seed by Eric Carle or here is a link: [The Tiny Seed | A Read Aloud - Bing video](#)

Lesson:

During the last lesson, students planted seeds in their mini-greenhouses. How will they keep those seeds growing and flourishing? What should students do to help the seeds survive? What do seeds grown indoors or outdoors in a garden need to thrive?

Students can create hypotheses about seeds and ideas can be recorded on the board or on a chart if desired. Why are soil, water, wind and sun so important to seeds and plants? What do they offer for the plant's survival? What environments do different seeds prefer?

Read the book, The Tiny Seed by Eric Carle. As you read, point out how many seeds there are and what happens to them. What events in the book could happen to a seed in the school garden? What was the right environment for the seed to grow? Why did the other seeds not survive?

Discuss with students what seeds need to grow (**water and air**) and what plants need to grow (**the correct amount of water, soil and sunlight**). Students should understand that too much sun and water can be harmful, but the right amount is necessary for them to live.

New Jersey Learning Standards Science: PreK: 5.1.1-5, 5.3.1,4 K:LS1.C 1:LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS1.C

## Sprouts

Objective: To understand the process of seed growth and identify the different parts of a sprout.

Vocabulary: cotyledon, photosynthesis

Material: Parts of a seed worksheet (optional)

Lesson:

Brainstorm with students about the changes they have noticed with the seeds in their mini-greenhouses. What parts of the seed do they see emerging? Using a student's sprout as an example, have the class explain the growth of the seed and how the plant is developing. Which part emerged first? Introduce the students to the term cotyledon. The cotyledon is the embryonic leaf or leaves or the "baby" leaves of the sprout. You can explain to the students that similar to "baby" teeth, these leaves will fall off when the adult leaves grow. These small leaves help the sprouted seed begin harvesting sunlight through photosynthesis, the process in which plants make food through sunlight.

Have students or pairs carefully handle their mini greenhouses and observe any changes their seeds have encountered. Students can sketch what they observe. Have them identify the cotyledon, roots, stem and seed coat. Recordings of how many seeds have sprouted and which have roots or cotyledon. After students have observed their greenhouses, they can water if needed and rehang.

Afterward, the students can share their findings. Were all of the seeds at the same stage of growth? How many seeds have sprouted? Were there any parts of the sprout that they didn't know or couldn't identify?

New Jersey Learning Standards

Science: K:LS1.C 1:LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS1.C

## Seed Dissection

Objective: The students will learn the three parts of seeds

Materials:

1 lima bean seeds soaked in water overnight for each student

Optional: Parts of a Seed worksheet

Lesson:

Tell students that they are going to examine some seeds. Give each student one soaked bean seed. Instruct students to carefully examine their seeds. What do they observe?

Draw a large bean on the board and ask students to help you make it accurate with their observations. Students can make their own drawings for their learning journals. Identify the seed coat (it should be loose due to the overnight soaking). Be sure students understand the purpose of the seed coat; this can be compared to the coats we wear. Have students carefully remove the seed coat. Identify the food storage within the seed. This is the largest part of the seed in which the embryo plant grows. The scientific word for this is endosperm. Carefully open the seed and locate the embryo plant. Label each of these structures (seed coat, endosperm (stored food), embryo) on a diagram. Students can either draw their own or the teacher can provide one for students to label.

Optional follow-up:

Compare a dry bean with a soaked bean. Now look at a dry bean. This bean will have the same structures, but they may be visibly different. Record your comparisons in your journal. What are the similarities? What are the differences?

New Jersey Learning Standards: Science: K:LS1.C 1:LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS1.C

## The Traveling Seed

Objective: To identify different ways that seeds travel.

Materials:

The Seed is Sleepy by Dianna Aston or here is a link : [A Seed Is Sleepy by Dianna Hutts Aston \(Read Aloud\) Storytime - Bing video](#)  
seed samples

Lesson:

Read the book, The Seed is Sleepy and discuss the lessons of the story, paying attention to the different traveling patterns of seeds. The book has excellent examples of how seeds travel and how their parent plant develops mechanisms to help them fly, float or explode from a seed pod. As these travel styles are identified, they can be added to learning journals as a resource for future activities.

The class can explore seed samples and can make predictions on how it travels...hairs for flying, hooks for sticking, etc.

EXIT SLIP:

What are different ways seeds can travel? Why do seeds travel?

New Jersey Learning Standards Science: PreK: 5.1.1-5, 5.3.1,4 K:LS1.C 1:LS1.A 2:LS2.A 3:LS1.B 4:LS1.A 5:LS1.

Make your own flying seed!



Objective: Students will understand the mechanics of seeds that fly in the air, like a dandelion: what features and characteristics do these seeds have that help them fly or float.

Materials: paper  
sample origami and spinning seeds

Lesson:

Working individually or with a partner, students will make seeds using one of the two methods below. The teacher may want to provide a demonstration of each for students. Students will need to follow directions and use good craftsmanship if they want to create a seed that flies. If there is enough time, students can make both designs and compare the success of each.

Students fly their seeds in class off a high point to test the success of their seeds, troubleshoot problems, and celebrate their creations. When all the students have finished their projects, all can be tested and observations can be made.

This is a great opportunity to discuss the ideas of success and failure. Students should understand that when things don't go the way they expect they are given a chance to learn something new.

Here is a link to make an origami maple seed: [Simple Origami Maple Seed - YouTube](#)

New Jersey Learning Standards: Science: 2: LS2.A,D 3: LS1.B, LS3.B 4:LS1.A 5:LS1.C, LS2.A

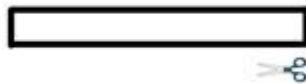


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This is a seed from a sycamore tree. You can throw them into the air and watch them spin!

You can make your own spinning seed.

1. Cut out a strip of paper.



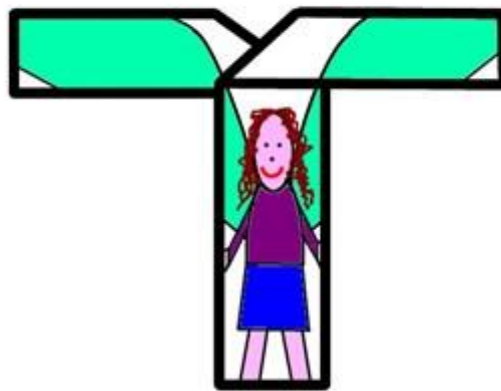
2. Fold the strip of paper in half.



3. Fold the top piece to the right. Flip the strip of paper over and repeat on the other side.



4. Draw a picture on each side of the paper. I drew me with wings! You could draw a bird, an insect or a seed.



5. Attach a paper clip at the bottom end of the spinning seed, where the first fold is - this is where my legs are in the picture. Throw it in the air! Watch what happens to the spinning seed as it flies.

### **What's happening?**

When the spinning seed falls, air pushes upwards against it. Air also pushes sideways on the arms of the spinning seed. The two arms are getting a push in opposite directions, which makes the seed spin.

This helps sycamore seeds to fall far from the tree so they have plenty of space to grow.

More books about Seeds:

The Bad Seed by Jory John

This is a book about a *bad seed*. A *baaaaaaaaaaad seed*. How bad? Do you **really** want to know? He has a bad temper, bad manners, and a bad attitude. He's been bad since he can remember! This seed cuts in line every time, stares at everybody and never listens. But what happens when one mischievous little seed changes his mind about himself, and decides that he wants to be—happy?

The Carrot Seed by Ruth Kraus and Crockett Johnson

When a little boy plants a carrot seed, everyone tells him it won't grow. But when you are very young, there are some things that you just know, and the little boy *knows* that one day a carrot will come up. So he waters his seed, and pulls the weeds, and he waits...

The Empty Pot by Demi

A long time ago in China there was a boy named Ping who loved flowers. Anything he planted burst into bloom. The Emperor loved flowers too. When it was time to choose an heir, he gave a flower seed to each child in the kingdom. "Whoever can show me their best in a year's time," he proclaimed, "shall succeed me to the throne!" Ping plants his seed and tends it every day. But month after month passes, and nothing grows. When spring comes, Ping must go to the Emperor with nothing but an empty pot.

Flip, Fly, Float, Seeds on the Move by JoAnn Early Macken

Spinning like a shiny green helicopter, a maple seed floats on the wind. Where will it land? Seeds splash away in raindrops, slide across the snow, and hitch rides on birds and animals—and even people's clothing.

Miss Rumphius by Barbara Clooney

The story of Alice Rumphius, who longed to travel the world, live in a house by the sea, and do something to make the world more beautiful. The countless lupines that bloom along the coast of Maine are the legacy of the real Miss Rumphius, the Lupine Lady, who scattered lupine seeds everywhere she went.

Seeds by Ken Robbins

In this fascinating chronicle, young readers will learn how seeds grow, and how they vary in shape, size, and dispersal patterns. From cherry pits to exploding pods, to sticktight seeds that cling to your shoes.

A Place to Grow by Stephanie Bloom

No matter where it lands or how desperately it hopes, the tiny seed can't find a place to grow. Will the tiny seed ever find a home, or will it keep searching and floating forever?

A Seed in Need by Sam Godwin

An inquisitive ladybug and snail follow the growth of a plant from seed to full flowering.

One Little Seed by Elaine Greenstein

Simple language and endearing illustrations follow a seed from the time it is planted until it grows into a beautiful flower.

Seeds: A Book About How Living Things Grow by Joanna Cole

Ms. Frizzle's class is growing a beautiful garden, but Phoebe's plot is empty. Her flowers are at her old school! So, the kids climb aboard the Magic School Bus. They go to Phoebe's old school to get some of her old flowers, but they end up actually going inside the flowers. Follow the kids' colourful adventure as they learn how living things grow.



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# Tomatosphere!

## Experiment Description

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### RESEARCH OVERVIEW

- Tomatosphere-US provides teachers and students with a blind study involving two sets of seeds: a control group that has been Earth-based, and a treated (or “tortured”) group of seeds that has been in space or has been subjected to simulated space conditions.
- When teachers have germinated their seeds with students, their results are submitted and recorded.
- Teachers are then informed of the “source” of each of the two sets of seeds and their germination results compared to others who have submitted their results.
- In order to fulfill the research objectives of the Tomatosphere program, seed transportation to the International Space Station (ISS) and return (1,200,000 seeds) is requested.
- Seeds should remain on-orbit for a minimum of 10 days to support the intended science.

### DESCRIPTION

Tomatosphere-US, a curriculum-based program for schools, involves students in a germination experiment with two sets of tomato seeds – a control group and a group

that has been to the International Space Station (ISS). Teachers register for the project and receive approximately 30 seeds for each class registered. They are sent out in the

spring (or, soon after registration if this takes place after the spring mailing). When the project is completed, teachers submit results to the website, <http://tomatosphere.org>, and receive notification of the source of the two sets of tomato seeds, and a certificate of participation for students.

Here is the website: [Tomatosphere-US \(nasa.gov\)](http://tomatosphere-us.nasa.gov)

**\*Let me know if you decide to participate and need any assistance with additional supplies!**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

What do you know about seeds?

- |                                           |     |    |
|-------------------------------------------|-----|----|
| 1. All seeds grow.                        | YES | NO |
| 2. All seeds are the same.                | YES | NO |
| 3. Seeds need water to grow.              | YES | NO |
| 4. Seeds have stored food inside of them. | YES | NO |
| 5. Only people plant new seeds.           | YES | NO |

How many parts does a seed have? \_\_\_\_\_

-----

Name: \_\_\_\_\_ Date: \_\_\_\_\_

What do you know about seeds?

- |                                           |     |    |
|-------------------------------------------|-----|----|
| 1. All seeds grow.                        | YES | NO |
| 2. All seeds are the same.                | YES | NO |
| 3. Seeds need water to grow.              | YES | NO |
| 4. Seeds have stored food inside of them. | YES | NO |
| 5. Only people plant new seeds.           | YES | NO |

How many parts does a seed have? \_\_\_\_\_



