Preschool Education IN Applied Sciences

Teaching Guide

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The Food-based Early Education Lab

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SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
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Dedicated to the preschool teachers and staff who selflessly serve our nation's children and families.

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
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The Science Education Partnership Award (SEPA) funds innovative pre-kindergarten to grade 12 (P-12) science, technology, engineering and mathematics (STEM) and Informal Science Education (ISE) educational projects. SEPA projects create partnerships among biomedical and clinical researchers and teachers and schools, museums and science centers, media experts, and other educational organizations. SEPA P-12 resources target state and national K-12 standards for STEM teaching and learning and are rigorously evaluated for effectiveness. SEPA is administered by the National Institute of General Medical Sciences (NIGMS), a component of the National Institutes of Health (NIH).

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Welcome To PEAS!

Children's natural curiosity provides the perfect foundation for you to nurture interest in science![1] However, we understand planning for science learning in the preschool classroom can be tricky. In our many conversations with preschool teachers, we have heard you describe challenges with creating developmentally appropriate science learning experiences, including limited time, lack of science training/knowledge, difficulty identifying developmentally appropriate activities, insufficient resources, and more.

While you may be able to find many ideas for science learning online, some online activities fail to engage children in the science learning that is important for preparing children for kindergarten.[2] For example, popular activities may focus more on craft projects versus exploration.[3] While, these activities may save time because they are quick and easy to find, they do little to support children's learning.[4]

PEAS takes an alternative approach treating you as a partner in designing science learning activities and building on your expertise, knowledge, and creativity. When you are confident in your own knowledge and ability to create science learning activities independently, it can positively impact children's engagement and interest in science, and ultimately better prepare them for kindergarten. PEAS was created to support you as you create high-quality, integrative science learning activities for your classroom!

As a new PEAS teacher, you have the opportunity to engage with:

1) Kick-starter Workshop;
2) PEAS Teaching Guide featuring model science learning activities;
3) On-demand training modules to extend learning; and
4) A menu of additional teacher supports including, but not limited to, science teaching kits, individualized coaching, and learning communities.

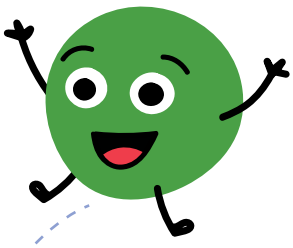
You will begin your journey with PEAS by attending a **Kick-starter Workshop**. The workshop will provide an overview of the PEAS program, introduce you to the PEAS Practices, provide you an opportunity to engage with model learning activities, and more!

Over the course of a school year, you will continue to engage with the PEAS team by completing on-demand, **Training Modules**, engaging children in **Model Science Learning Activities** featured in this **Teaching Guide**, and meeting with your coach and/or your fellow teachers in learning communities to discuss and reflect on what you have learned.

Over the next year and beyond, PEAS will support you as you learn how to develop science learning that helps children learn how to question, explore, and reflect on their own ideas about the world and how it works. We hope the PEAS approach brings enjoyment, learning, and growth to you and your students!

Sincerely,
The PEAS Team

[1] Cabell et al., 2013; French et al., 2004. [2] McClure et al., 2017. [3] Peterson et al., 2019. [4] NRC 2007.



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Science In Your Classroom

Why Science?

Did you know, you can help narrow children's achievement gap by providing high-quality science learning experiences in your classroom?[1] Engaging children in early science learning is important as it plants the seeds for future success in grade school.[2] Early science learning provides significant context for developing children's language, literacy, and mathematics skills.[3] As a result, these experiences can lead to improved cognitive development and ultimately improved academic outcomes.[4] For English-language learners, early science learning experiences can also lead to gains in language, especially as it relates to speaking and building vocabulary.[5]

There is little doubt that preschoolers are capable of engaging in meaningful science learning.[6] However, approaches to early science learning can vary greatly in practice. Sometimes early science learning experiences look more like an art project (e.g., tracing leaves, painting pumpkins). These theme-based activities may be engaging for children, but they do not promote science learning. Another example is when teacher-directed early science learning activities are used to stress academic learning and scientific vocabulary. High-quality science learning experiences lie between these two extremes with an emphasis on prolonged science learning experiences over time versus a series of isolated activities.[7]

Children's attitudes about science, and how they see themselves as science learners, are formed early.[8] But if children do not engage in high-quality science learning early, they may lose interest and confidence that they can "do" science and be a scientist when they grow up. Children who are provided with developmentally appropriate, high-quality early education are more likely to utilize their natural curiosity and excel in their development.[9]

All children can benefit from skilled teachers, like yourself, who know how to foster, guide, and build on their interests to create high-quality science experiences in- and outside the classroom.[8]

What is High-Quality Science Learning?

Building on Children's Everyday Experiences

High quality science learning focuses on topics related to children's everyday experiences. These experiences serve as a foundation for teacher-child and child-child communication and provide opportunity for meaningful science investigations. High-quality science learning that builds on children's everyday experiences can take many different forms, but it is recommended that they have three core components: (1) relates to children's interests; (2) supports children's ability to lead a science investigation; and (3) provides opportunities for children to reflect, represent, and apply what they have explored.[10]

[1] Cabell et al., 2013; Straits, 2018; McClure et al., 2017. [2] Duncan et al., 2007; Straits, 2018; [3] Gelman et al., 2009. [4] Marshburn et al., 2008; Straits, 2018. [5] Gomez Zwiep and Straits, 2013; Straits et al., 2018. [6] NSTA, 2014. [7] Straits, 2018. [8] Early STEM Matters, 2018. [9] Barnett et al., 2008; Ramey et al., 1998; Reynolds et al., 2008. [10] Straits, 2013.

Focusing on Process and Exploration

High-quality science learning engages children in learning over time and views exploration as a process. This approach to learning promotes higher level reasoning and advanced communication skills which work together to support learning content across multiple learning domains.[1] Children who are involved in investigations in their environment over time have also been shown to be more motivated and better able to recall learned information long-term.[2] These explorations often allow for close observations, reflection on observations, and the generation of new and sophisticated science ideas resulting in growth and development in scientific knowledge and practices.[3]

Integrating Science Learning Across Domains

Integration of learning across domains is foundational to high-quality science learning. Science requires children to use language, mathematics, and social skills, providing a meaningful context for which these important concepts are learned. Teachers can support and extend science learning across varying learning domains (e.g., cognitive, social emotional, health) and environments (e.g., meal/snack-time, centers, formal learning). Integration across domains serves to deepen understanding of science concepts, promotes problem-solving, and supports understanding of how it relates to the real world.[4]

For example, a teacher might read a book about how apples grow to teach an important life science concept. Reading the book alone will help teach children about a healthy food, how plants grow, and potentially new words. If the book is used in coordination with an approach that emphasizes the practices of science, children could discuss what they already know about foods such as edible plants or the needs of living things. An exploration of the needs of living things can be the foundation for learning about other Life Science phenomenon, such as seed germination. For example, you could discuss the needs of living things and investigate how living things (in this case "seeds") respond to their environment. You can continue to engage children in the practices of science by exploring if an apple seed can germinate with or without soil or with or without light.

Partner with Families & Community to Promote Science Learning

Families and the larger community are critical to long-term promotion of science learning among young children. In fact, high-quality science learning engages family and community members as partners in the promotion of science learning in your classroom and beyond. As a preschool teacher, you are in an ideal position to support family and community engagement in science learning.

[1] Zucker et al., 2016; French, 2004; Peterson and French, 2008. [2] Kermani & Aldemir, 2015. [3] Gropen et al., 2107; Gelman & Brenneman, 2004; Gerde, Schacter, & Wasik, 2013. [4] Peterson et al., 2008.

Engage family members by:

(1) encouraging families to share their own expertise and ideas about science

(2) inviting family members to the classroom to participate in science learning activities or read books about science topics

(3) asking families to send in materials that represent their family

(4) asking family members to help children explore their world at home by gathering materials for sharing at school (e.g., gathering different types of leaves or seeds)

(5) providing family-child home activities to extend science learning happening in the classroom.

Engage the community by:

(1) visiting local farms, and

(2) inviting local scientists, medical professionals, farmers, master gardeners, and others to their classrooms to talk with children about their careers in science.

The PEAS Practices and the Model Science Learning Activities presented in this guide were created for the preschool classroom with these beliefs in mind. PEAS aims to support you as you provide high-quality, integrative science learning experiences that focus on nurturing children's innate curiosity about the natural world.[1] Through this process we will focus on investing in you by building on your existing knowledge, skills, and confidence for providing learning experiences that are engaging and better prepare young children for kindergarten.

The Benefits of Using Food to Teach Science

Did you know a child's dietary quality and their readiness for school are positively related?[1-3] As a preschool teacher, you are in a critical position to not only prepare your children for kindergarten, but also help them learn positive health behaviors.[4] We all know the challenges of getting children to eat healthy foods, like fruits and vegetables. You have likely observed yourself, simply offering fruits and vegetables to children, does not guarantee they will eat them.[5] In fact, it can take as many as 15 positive taste exposures to increase a neurotypical child's willingness to consume a new food.[6,7]

But there is good news! Without even realizing it, we are exposed to dozens of scientific concepts every time we interact with food! This fact makes food-based learning the ideal tool for teaching young children about healthy foods,[8] while also providing opportunities to integrate learning with science, literacy, mathematics, and more! But we know you may face barriers for using hands-on food and gardening experiences in your classroom, including limited time and competing school readiness priorities.[9,10] So while PEAS aims to help you improve children's science learning and language development, we also promise to provide you with support as you help children develop an appetite for healthy foods through integrative food-based learning.

[1] Miller, Lumeng, Delproposto, Florek, Wendorf, & Lumeng, 2013. [2] Datar, & Sturm, 2006. [3] Burrows, Goldman, Olson, Byrne, & Coventry, 2017. [4] Mita, Li, & Goodell, 2013. [5] Smith, Rogers, Blissett, & Ludlow, 2020. [6] Fisher, Hughes, Miller, Horodynski, Brophy-Herb, Contreras, & Lumeng, 2022. [7] Johnson, 2016. [8] Nekitsing, Blundell-Birtill, Cockroft, Hetherington, 2018. [9] Hughes, Gooze, Finkelstein, & Whitaker, 2010. [10] Carraway-Stage, Henson, Dipper, Spangler, Ash, & Goodell, 2014.

Preparing Your Classroom for Science Learning

Planning for a Lesson

The PEAS Practices encourage you to engage children in science learning over time. Science learning activities that emphasize the practices of science may span across a couple of days, or in some cases, over more than one week (e.g., observing plant growth). When lesson planning, don't be afraid to explore a single science topic over multiple days or even weeks. At this young age, teaching children about the process of science should take priority. Finally, make sure to take advantage of the integrative nature of science learning by aligning learning activities with other important learning domains such as language, mathematics, and health.

Inventory Your Science Learning Resources

Getting your preschool classroom ready for science learning isn't hard! You will find many of the materials used in engaging science learning are simple and easy to obtain. You might even be surprised about how many materials you already have on hand or can borrow. Remember, the ideal science learning experiences happen in children's everyday lives (indoors and outdoors),[1] so you don't necessarily need fancy materials to engage children. You can find a list of possible science learning materials that may be useful across a variety of science topics online (www.morepeasplease.org). Don't forget about equipping your science center and other parts of your classroom with some of these materials to allow children to continue exploration during free play.

Consider Developmental Appropriateness

PEAS is written for teachers of all levels serving children ages 3-5 years. As you know, this is a large age span when considering the development of children. You will have to be a critical reader of the PEAS Practices and corresponding Model Science Learning Activities, making sure that the suggestions are developmentally appropriate and applicable to your children and their families.

Consider Health & Safety

It is important to consider safety in your classroom when using hands-on learning. Make sure to review your center's policy and protocols for classroom safety, including addressing potential allergies. Children with allergies or immune-system related illness may need special consideration and/or accommodation. Children with food allergies or intolerances can have mild to serve reactions if they taste, touch, or in some cases, smell an allergen. Always check with families and your Health and/or Nutrition Manager ahead of time.

Encourage good hygiene among children by providing time for children to wash their hands with soap and warm water before and after engaging in hands-on science learning activities. When children are working with animals, insects, and other science materials, make sure to remind children not to put their fingers in their mouth or nose. When using food-based learning, never serve food that is raw or undercooked (including meats or eggs), unpasteurized milk, spoiled, or expired foods. Store all cleaning supplies and sharp objects (e.g., pairing knives) in a safe space outside the reach of children. Make sure to thoroughly wash all cooking utensils, supplies, equipment, counters, tabletops, and sinks after food has been used as a learning tool.

If working with water (or other) or food, watch out for spilled materials on the floor that may lead to slipping hazards. Children should stay away from outlets when working with water.

Bridging the Gap Between Preschool and Kindergarten: Connecting the Standards

To gauge children's learning and developmental progress, we have aligned the PEAS Practices and Model Science Learning Activities with the Head Start Early Learning Outcomes Framework (ELOF), North Carolina Foundations for Early Learning and Development, and Teaching Strategies GOLD. ELOF and Teaching Strategies GOLD connections are provided at the beginning of each Model Science Learning Activity. Additional standard alignment is provided at www.morepeasplease.org.

Early science learning environments can further be strengthened by considering the Next Generation Science Standards (NGSS) which are important to kindergarten readiness in science, but also language and mathematics. While the NGSS do not specifically address preschool, the PEAS Practices and Model Science Learning Activities are aligned to NGSS standards to demonstrate how you can promote kindergarten readiness among your preschoolers (www.morepeasplease.org).[2]

SCIENCE AT THE CENTER OF AN INTEGRATED CURRICULUM:

10 Benefits Noted by Head Start Teachers

1. Science responds to children's need to learn about the world around them.
2. Children's everyday experience is the foundation for science.
3. Open-ended science activities involve children with a wide range of developmental levels.
4. Hands-on science activities let teachers observe and respond to children's individual strengths and needs.
5. The scientific process of trial-and-error welcomes error and interprets it as valuable information, not as failure.
6. Science strongly supports language and literacy.

a. Nonfiction books become a powerful foundation for conversation with adults and peers.

b. Vocabulary growth is supported by children's prior knowledge and experience of the everyday world, coupled with observation and hands-on activities.

c. Receptive language (listening comprehension) is fostered as children listen to the teacher read aloud and talk about the science activity.

d. Expressive language is fostered as the teacher leads children through a cycle of scientific reasoning and especially as the teacher supports the children in developing a report of their findings.

7. Science helps children with limited language to participate in the classroom and learn English.
8. The problem-solving skills of science easily generalize to social situations.
9. Science demonstrations help children become comfortable in large group conversations.
10. Science connects easily to other areas, including center-based play, math, artistic expression and social studies.

Conezio, K. et al. (2002). Science in the Preschool Classroom: Capitalizing on Children's Fascination with the Everyday World to Foster Language and Literacy Development. Young Children.

[1] Straits, 2018. [2] NGSS, 2013.

PRESCHOOL EDUCATION IN APPLIED SCIENCES

Getting To Know PEAS

How to Use This Guide

Teaching Guide

The goal of the PEAS Teaching Guide is to provide you with additional support as you engage with the PEAS program. The Teaching Guide introduces the PEAS Practices, provides model science learning activities featuring healthy foods, and provides content specific background information related to featured life science topics. Each of these features of the guide were designed to serve as a framework for you as you learn how to design engaging, hands-on science learning activities!

PEAS Practices & On-Demand Training Modules

The PEAS Practices are designed to help you support high-quality science learning in your classroom. PEAS is not intended to be a curriculum. Instead, PEAS provides you with evidenced-based strategies you can use to create your own high-quality learning experiences based on children's interests. Beyond the kick-starter workshop, the on-demand training modules are designed to provide you self-paced learning opportunities focused on the PEAS Practices and Model Science Learning Activities.

Model Science Learning Units

Model learning activities are intended to support your use of the PEAS Practices in your classroom as you learn new strategies for teaching high-quality science in your classroom. This guide features 3-thematic model units (12 total activities) focused on a Life Science topic to serve as a model for you on how to effectively design high-quality science learning activities. Each model unit includes guided hands-on, integrative learning in the Life Sciences through topic engaging activities with simple procedures, and conversation starters that will facilitate teacher-child conversation interaction around science. Every unit addresses all of the PEAS Practices and includes:

1) **Background Information:** General background content to help you support children's learning about the highlighted science concepts.

2) **Model Science Learning Units:** A set of 4 learning activities aligned with the practices of science. In this guide, you will find units focused on living things, seeds, and plant anatomy (roots, stems, and leaves).

   - ***Activity Overview***: General description of the learning activity.
   - ***Suggested Weekly Planner***: A suggested weekly calendar for implementing model science learning units in your classroom.

- ***Standard Connections***: Knowledge and skills children should be able to demonstrate at the completion of the activity. Each learning activity provides the most relevant standards from the Head Start ELOF and Teaching Strategies GOLD. Although each lesson has multiple points of alignment with these standards, only the primary standard addressed is noted and detailed at the end of each lesson. See www.morepeasplease.org for additional standard alignment.
- ***Materials List***: List of materials needed to complete the learning activity in a classroom with approximately 15 children.
- ***Key Science Words with Child-Friendly Definitions***: Key science words with child-friendly definitions and Spanish translations.
- ***Preparation Instructions***: Directions for preparing for the learning activity.
- ***Step-by-Step Directions***: Detailed directions for engaging children in the learning activity.
- ***Teaching Scripts***: Detailed scripts for what you can say to support children's learning and engagement in the activity.

Additional Online PEAS Resources

Additional useful resources to support your integration of the PEAS approach into your classroom can be found in this guide and at www.morepeasplease.org:

PEAS Whiteboard Training Videos

A series of whiteboard training videos are available to help you learn the PEAS Practices and prepare to implement the Model Learning Activities in your classroom.

PEAS Practices Classroom Poster

A large poster visually depicting the PEAS Practices to help you remember each practice as you engage in child-led science learning in your classroom. The poster is included as part of the PEAS Science Teaching Kit.

PEAS Teaching Photographs & Pictorial Glossary

A set of virtual cards featuring images and related words in English and Spanish. A subset of cards feature child friendly definitions.

PEAS DESIGN Worksheet

Quick lesson planning template to help you incorporate the PEAS Practices into your science learning activities as you plan. See also Aligning Your Science Topic with the PEAS Practices in this guide.

WHAT ARE THE

PEAS Practices?

High-Quality Learning Experiences for Every Classroom

The PEAS Practices are designed to help you support high-quality science learning in your classroom. PEAS is not a curriculum. Instead, PEAS provides you with evidenced-based strategies you can use to create your own high-quality learning experiences based on children's interests. If you already use a science curriculum or set of science activities, PEAS can support the work you are already doing.

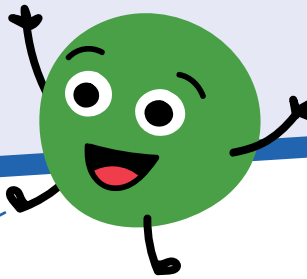
PEAS has four practice areas:

1) **Practice Science**
2) **Engage the Senses**
3) **Apply Science Talk**
4) **Support Learning**

Evidenced-Based Strategies

Each Practice is supported by three evidenced-based strategies you can use to support high-quality science learning in your classroom. You do not have to use every strategy every time you create a science learning experience. Each component should also be reinforced by **Family & Community Engagement**.

[1] Kermani & Aldemir, 2015. [2] NGSS, 2013; Llewellyn, 2002.



The PEAS Practices and Teaching Strategies

PRACTICE	STRATEGIES
Practice Science	Engaging in the Process of Science
	Learning the Big Ideas (Patterns, Cause/Effect, Structure/Function, Stability/Change)
	Using the Tools of Science
Engage the Senses	Exploring with the Senses
	Experiencing Culturally Relevant Vegetables
	Benefiting from Repeated Exposures
Apply Science Talk	Using Child-Friendly Definitions and Modeling Descriptive Words
	Asking Fair WH and Open-Ended Questions
	Revoicing and Restating Children's Ideas
Support Learning	Using Effective Verbal Praise
	Enthusiastically Role Modeling
	Encouraging Peer Collaboration

In the next section you will find more detailed descriptions of each Practice and set of strategies. Each are also supported by the **Model Learning Activities** featured in this guide to help you learn and "practice" implementing the strategies in your classroom.

The learning activities featured in this guide will focus on the Life Sciences. Life Science is the branch of science that deals with living things, including plants, animals, and human beings. This area of science is ideal for the preschool classroom because it lends itself to hands-on learning and can be found in children's everyday environments.[1] Ultimately, early learning in the Life and Health/Nutrition Sciences provides a solid foundation for engaging in science learning related to living things, their relationships with one another, and how to care for our bodies and other living things (e.g., healthy eating, animal/plant life cycle). Further, the life sciences is one of four disciplinary core ideas presented in the NGSS, meaning it is also important when preparing children for kindergarten.[2]

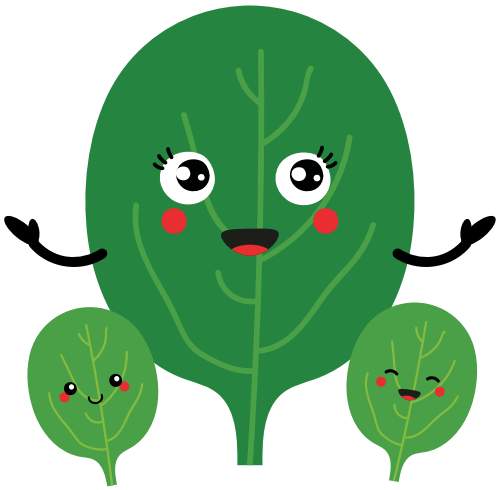
P PEAS PRACTICE: Practice Science

We can practice science in the classroom by exploring a phenomenon, or an observable event, such as how a seed grows.

Phenomena are "observable events" that can be observed, compared, contrasted, or experimented upon.[1]

An important first step when practicing science is to identify a phenomenon to explore!

Identify engaging phenomena by observing what children show interest in and talk about throughout the day.

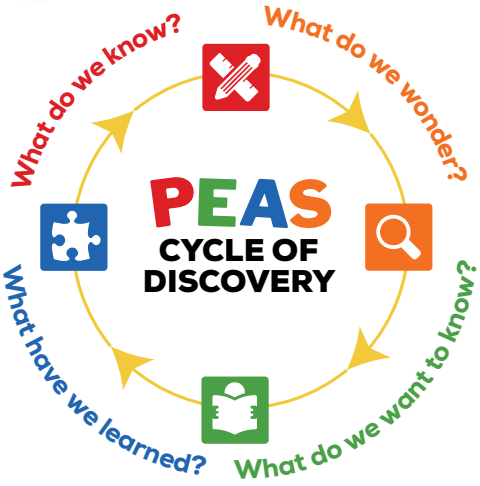


Think of a **topic** related to science and identify a phenomenon that occurs within that topic. In this unit, we will use the life sciences topic of seeds, and we will explore the phenomenon of how seeds grow.

[1] Straits, 2018. [2] NGSS, 2013. [3] Conezio et al., 2002; Piasta et al., 2004; Gelman et al., 2004; Tu et al., 2006; Shepardson & Britsch et al., 2001.

Teaching Strategies:

Engaging in the Process of Science



The first step to engaging children in high quality science learning is identifying a phenomenon! Use the process of science (right) to explore phenomena over time. Over multiple learning activities, children should be encouraged to ask questions; classify objects; make observations and predictions; collect "data"; develop explanations; and represent their findings.[1]

There are four questions that guide us in the process of science: "**What do we know?**", "**What do we wonder?**", "**What *more* do we want to know?**", and "**What have we learned?**"

Learning the Big Ideas of Science

Expose children to the big ideas of science to grow their science learning and prepare them for kindergarten![2] The big ideas include observing and identifying **patterns**; **cause and effect**; **structure and function**; and **stability and change**.

Using the Tools of Science

Observation tools (magnifying glasses, microscopes, observation jars) help children describe their world. **Measurement tools** (rulers, measuring cups, pipettes, balance scale) help children quantify their world. **Communication tools** (documentation panels, prediction panels and science journals) help children communicate predictions, record and share observations, and support learning retention.[3]

PRACTICE SCIENCE
Applying the Strategies

Engaging in the Process of Science	**What do we know?** Ask children to *describe* what they know about seeds. Ask basic questions about seeds (e.g. Where have you seen seeds before?).
	What do we wonder? Ask *questions* about the characteristics of seeds (e.g., Do seeds need food and water?), make *predictions* (e.g. Do seeds need soil to grow?), make *observations*, and report and discuss their *findings*.
	What more do we want to know? Ask children to *explain* what they have learned and ask new questions about seeds. Learn more about seeds by reading a book. Make new observations about seeds by having children share and categorize items brought from home.
	What have we learned? *Integrate* and *reflect* on what children learned about seeds (e.g., "There are many kinds of seeds. Seeds need food, water, nutrients and sun to grow!"). Allow children to taste edible seeds (vegetables).
Learning the Big Ideas of Science	**Patterns:** Compare and contrast different types of seeds by their characteristics (e.g., Is it rough or smooth? Does it grow? Does it breathe? Does it reproduce?).
	Cause and Effect: Make a prediction about what changes seeds undergo over the course of a few days.
	Structure and Function: Discuss the structures that seeds have to be able to move (e.g., helicopter seeds can fly through the air, "spiky seeds" can grab on to animals, "dandelion seeds can float through the wind).
	Stability and Change: Observe seeds over time to see the way seeds change (e.g., seeds in plastic bags germinate, seeds sprayed with water form a milky coat, seeds in soil sprout).
Using the Tools of Science	**Observation Tools:** Observe seeds with *magnifying glasses* and a *microscope*.
	Measurement Tools: Observe and quantify seeds with a *balancing scale.*
	Communication Tools: Record predictions and observations using *Documentation Panels*, *Prediction Panels*, and *Science Journals*.
Family & Community Engagement	**Share Classroom Work with Families.** Display the *Prediction Panels* after each activity. Encourage children to share the question and their response with parents/guardians during drop-off and pick-up. If children ride the bus, consider saving materials for parent-teacher conferences or share via text/social media with families.
	Bring Materials from Home. Ask children/parents to bring in seeds or a drawing of seeds from home for sharing, observation, and categorization.
	Invite Guest Speakers. Invite parents and/or community members (e.g. master gardener, farmer, extension agents, students, parents) to class to talk about roots, stems, and leaves.


FAMILY & COMMUNITY ENGAGEMENT
PRACTICE SCIENCE
ENGAGE SENSES
PEAS
PRACTICES
SUPPORT LEARNING
APPLY SCIENCE TALK
FAMILY & COMMUNITY ENGAGEMENT

NOTES

E

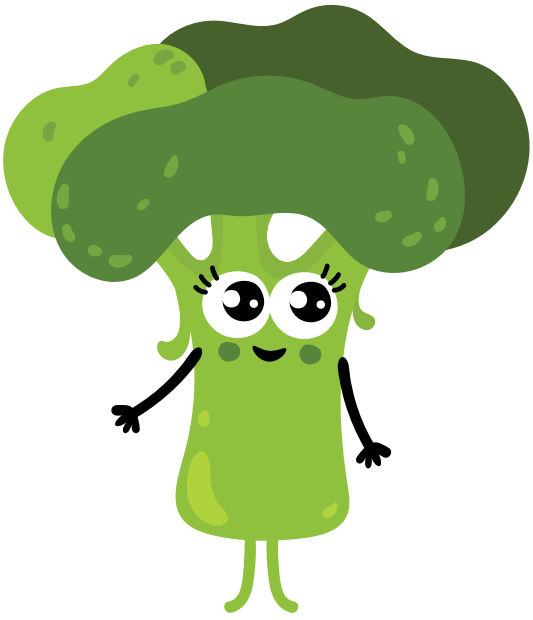
PEAS PRACTICE:
Engage the Senses

We can engage the senses in the classroom through experiences with healthy foods, such as vegetable plants.

Experiencing healthy foods with all 5 senses is important!

We experience foods everyday each time we see, prepare, taste, or grow food!

Experiences with healthy foods can help us make positive choices about what we eat and teach us even more about the science of living things!



Vegetables are the ideal food to feature during science learning activities because they are directly related to the life sciences. In the classroom, engaging children in positive experiences with food helps them build knowledge about healthy foods.[1] You can incorporate experiences with food through hands-on activities that use multiple senses for science exploration, cooking, and gardening!

[1] Dev et al., 2019. [2] Birch, 1999. [3] Venutra & Worobey, 2013. [4] Sullivan & Birch, 1990. [5] Cooke, 2007. [6] Bennett et al., 2018.

Teaching Strategies:

Explore with the Senses

While exploring science phenomena, encourage children to use their five senses: **sight**, **touch**, **hearing**, **smell**, and **taste**. Incorporating food into science learning is an opportunity to use all five senses while encouraging healthy eating habits! When exploring healthy foods that help us grow, like vegetables, the gold standard is for children to use their sense of taste.[2] But experiencing food with the other senses still counts! If children express hesitancy to taste a new food, instead of pressuring them to try it, encourage them to use their other senses instead.[3]

Benefit from Repeated Exposures

Sometimes young children are hesitant to try new things. Whether it is digging in soil or trying a new vegetable, create opportunities for repeated exposures.[4] Exposures occur when a child uses their senses to engage in a new experience. For example, you might create opportunities for children to explore vegetables in **different forms** (e.g., cooked, mixed in another dish) and **different contexts** (e.g., science, reading, gardening). Repeated exposures help create familiarity. The more familiar children become, the more likely they are to try it again in the future![5]

Experience Culturally Relevant Vegetables

Exposing children to foods that are used within their own culture can help bridge the gap between home and school experiences.[6] To learn about the cultures represented in your classroom, engage families to find out what types of vegetables they eat and how they are prepared at home.

E

ENGAGE THE SENSES

Applying the Strategies

Explore with the Senses	**Sight:** Children will observe carrot, peas, tomatoes, spinach using their sense of sight to explore a variety of edible vegetable plant.
	Sound, Touch, & Smell: Children will observe carrot, peas, tomatoes, and spinach plants using their senses of sound, touch, and smell to explore peas and tomatoes.
	Taste: Children will be encouraged to use their sense of taste to explore carrot, peas, tomatoes, spinach.
Benefit from Repeated Exposures	Children will experience vegetable plants (carrot, peas, tomatoes, spinach) in a variety of **different forms** (whole, cut) and **different contexts** (language, science, meals/snacks).
Experience Culturally Relevant Vegetables	Children will explore vegetable plants that are culturally relevant to children in the classroom. Culturally relevant vegetables are identified as vegetables commonly prepared by parents and/or appearing on the school menus frequently.
Family & Community Engagement	**Share Classroom Work with Families.** Display the *Prediction Panels* after each activity. Encourage children to share the question and their response with parents/guardians during drop-off and pick-up. If children ride the bus, consider saving materials for parent-teacher conferences or share via text/social media with families.
	Bring Materials from Home. Ask children/parents to bring in leaves or a drawing of leaves from home for sharing, observation, and categorization.
	Invite Guest Speakers. Invite parents and/or community members (e.g. master gardener, farmer, extension agents, students, parents) to class to talk about plants.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A PEAS PRACTICE: Apply Science Talk

We can apply science talk in the classroom by having conversations with children about science.[1]

Science Talk supports your ability to integrate language development into science learning experiences.

Introduce science words and concepts using child-friendly definitions and modeling descriptive words.

Ask questions children can answer from simple observation. Restate children's ideas to facilitate conversations about science.

Teaching Strategies:

Using Child-Friendly Definitions

Use everyday words that children already know to introduce them to new science words or concepts.[2] For example, while exploring the role of a seed coat you might ask, "Who has worn a bicycle helmet before? Why do you wear a helmet?" Later explain that seeds need to be kept safe too, which is the role of a seed coat![3] As you introduce new words, provide multiple opportunities for children to hear and use them in different classroom contexts![4]

Modeling Descriptive Words

Model words that will help children describe the phenomena they are observing, such as the properties of objects and physical characteristics (e.g., attributes and prepositions).[5] For example, when discussing leaves of a plant describe them to children as "smooth, green leaves that are on the stem of the plant." Modeling descriptive words during science learning can help children develop the language skills needed to describe their own observations!

Asking Fair WH & Open-Ended Questions

Ask "fair" WH (e.g., why, what, when, how etc.) questions can be answered through observation.[6] For example, "What do you see on the bottom of the plant?" This is something children can answer by observing. Compare to an "unfair" question such as, "What do roots do for plants?" Children cannot answer this question through observation. When talking to children about science, it is also important to keep your questions open-ended, avoiding questions that can be answered with "yes" or "no".

Revoicing & Restating Children's Ideas

Use revoicing to help children clarify their ideas about science. Put what the child has said into your own words and verify with the child that you heard them correctly.[8] By revoicing children's ideas, you give them more "think time" and help other children follow the discussion. You can also encourage children to restate ideas of their peers,[7] asking the first child to confirm if the restatement is correct.

[1] Carrier et al., 2013. [2] Beck et al., 2007. [3] Carrier, 2013; Nagy & Townsend et al., 2012. [4] Beck & McKeown, 2007. [5] Worth et al., 2004. [6] Straits, 2018. [7] Keely, 2006

A

APPLY SCIENCE TALK

Applying the Strategies

Child-Friendly Definitions & Descriptive Words	**Child-Friendly Definitions:** Use words that children already know to introduce new science words/concepts (e.g., "Plants absorb water through their stem when they are thirsty just like you take a sip of water when you are thirsty!"). Be sure to repeat new science words/concepts multiple times in different contexts.
	Descriptive Words: Emphasize attributes (e.g., "This carrot is orange, long, and crunchy") and prepositions (e.g., "I can see that the roots are on the "bottom" of plant).
Asking WH & Open-Ended Questions	**Asking WH Questions:** Ask children "fair" why, what, when, and how questions. (e.g., "What do plants look like?" "How is the carrot plant different than the spinach plant?"). Remember, fair questions are questions that can be answered based on observation.
	Asking Open-Ended Questions: Ask children questions that are open-ended and cannot be answered with a simple "yes" or "no" (e.g., instead of asking "Do you think the roots of the carrot are important?" Ask "Why do you think the roots of the carrot are important?").
Revoicing & Restating Children's Ideas	**Revoicing Ideas:** Support children as they put their ideas into words (e.g., "Let me see if I understand the reason for your prediction. You think that the leaves of the carrot will turn blue because it will suck up the water through its stem?")
	Restating Other Children's Ideas: Children reinforce new words and concepts as they consider the ideas of classmates and have time to think and process (e.g., "Maverick, can you tell us in your own words Keyshawn's prediction about the carrot?")
Family & Community Engagement	**Share Classroom Work with Families.** Display the *Prediction Panels* after each activity. Encourage children to share the question and their response with parents/guardians during drop-off and pick-up. If children ride the bus, consider saving materials for parent-teacher conferences or share via text/social media with families.
	Bring Materials from Home. Ask children/parents to bring in a plant or a drawing of a plant from home for sharing, observation, and categorization.
	Invite Guest Speakers. Invite parents and/or community members (e.g. master gardener, farmer, extension agents, students, parents) to class to talk about roots, stems, and leaves.


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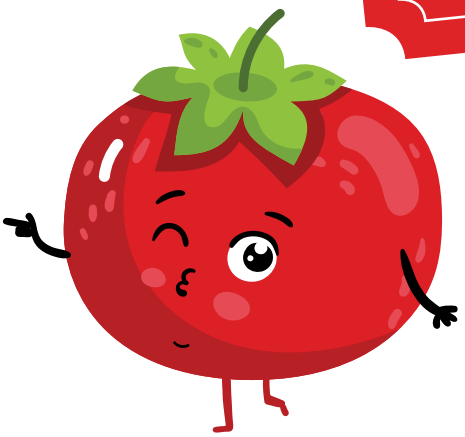
PEAS PRACTICE:
Support Learning

We support learning when we create a positive physical and social environment that make children feel comfortable and safe.[1]

A supportive social and physical learning environment is important to help children develop autonomy, and promotes communication between teachers and children.

Effective verbal praise, enthusiastic role modeling, and encouragement for peer collaboration can help create a supportive science learning environment.

Supportive learning strategies should be applied throughout the other 3 PEAS Practices!



The Support Learning practice provides a critical foundation to the other practices. Some of the strategies may even be familiar to you!

[1] Dev, 2019. [2] Duncan, Kemple, & Smith, 2000. [3] Bustamante et al., 2017. [4] Beck & McKeown, 2007. [5] Rochelle & Teasley, 1995.

Teaching Strategies:

Using Effective Verbal Praise

Praise can be an powerful strategy to use when supporting science learning. But what is praise and what makes it effective? Effective praise is specific and relevant. **Specific Praise** combines a "liked" behavior with an identifiable action. For example, "Wow, Jordan! I liked the way you put all the rocks together because they are non-living. Good thinking!" **Relevant Praise** includes culturally appropriate statements/methods of delivering praise. For example, if Jordan might prefer to be praised in private rather than in front of the class.

Enthusiastically Role Model

Children learn best when an adult is present to help scaffold their learning and model the desired behavior.[3] You demonstrate role modeling in the classroom by 1) **modeling the steps in the process of science**; 2) **modeling ways to use words to describe our world** (e.g., using Science Talk); and 3) **modeling how to explore science phenomena with the senses** (e.g., exploring a tomato with our five senses).

Encouraging Peer Collaboration

Science learning occurs best when children problem-solve, have conversations, and collaborate with their peers.[4] Different from simply "grouping" children together, collaborative learning allows children to work together on an activity towards a shared goal.[5] For example, during a science learning activity you can suggest "Maria, would you like to go to tell Keyshawn how you designed your experiment?"

S

SUPPORT LEARNING

Applying the Strategies

Using Effective Verbal Praise	**Specific Praise:** Use specific verbal praise by combining a liked behavior with an observable action as children demonstrate they have learned something new about living and non-living things (e.g., "Yes, the rabbit is alive because it can "reproduce" and have babies! Good use of a new word, Amari!")
	Relevant Praise: Use relevant praise by praising children using culturally appropriate methods (e.g., pulling Halona aside you say to her, "You really are trying to explore the spinach with your senses of sight and smell. That's a great way to learn more about our edible living things. What does it smell like to you?")
Enthusiastically Role Model	**Modeling Steps in the Process of Science:** Role model by modeling the steps in the process of science (e.g., "I wonder what would happen if we put this pea and this rock in water. I think we should set up an experiment to see if our predictions are correct!" or "I'm going to use my magnifying glass to check if the pea has changed at all after being in the water").
	Modeling Ways to Use Words to Describe Our World: Role model by modeling ways to use words that help children describe their experiences (e.g., "I would say that the carrot is long, orange, and bumpy. How would you describe it?")
	Modeling How to Explore Science Phenomena with the Senses: Role model how to use the five senses (sight, sound, touch, smell, taste) to explore different science phenomena (e.g., "This pea looks plump and green after sitting in the water. I think it got a little bigger!" or "This spinach looks bright green, smells fresh and makes a crunchy sound when I bite into it! What does it taste like to you?").
Encourage Peer Collaboration	Encourage children to collaborate by facilitating conversations between them about living and non-living things. (e.g., Michaela and Devon, what have you observed about the pea in the water compared to the rock in the water? Let's record it on our documentation panel!")
Family & Community Engagement	**Share Classroom Work with Families.** Display the *Prediction Panels* after each activity. Encourage children to share the question and their response with parents/guardians during drop-off and pick-up. If children ride the bus, consider saving materials for parent-teacher conferences or share via text/social media with families.
	Bring Materials from Home. Ask children/parents to bring in one of their child's favorite non-living items from home for sharing, observation, and categorization.
	Invite Guest Speakers. Invite parents and/or community members (e.g. master gardener, farmer, extension agents, students, parents) to class to talk about living and non-living things.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Unit 1 LIVING THINGS

MODEL SCIENCE LEARNING

A Word About Living Things

Living and non-living things are classified based on their characteristics.

Living things consume energy (food), grow, adapt, reproduce, and respond to their environment.[1] Non-living things do not need to consume energy and do not have the ability to grow, reproduce, or adapt and respond to their environment.[1]

Identifying living and non-living things can be challenging because many living things do not exhibit all characteristics of living things during all stages of the lifecycle.[2]

In addition, some things were at one time living but are now not living. We call these things *once living,* now *non-living* things. The concept of living versus once living things will be introduced over the four learning activities in this unit.

Before harvesting, vegetable plants are living things. Once they are harvested, they are no longer living. We enjoy eating many different vegetables such as peas, carrots, sweet potatoes and spinach! Since vegetables are living, they provide the vitamins, minerals, and fiber that are critical to healthy growth and development. Once vegetables are harvested (e.g., no longer in the ground, on the vine etc.), they are once living, now non-living things.

THE BIG IDEA ABOUT LIVING THINGS

Children understand the difference between living and non-living things and make comparisons between the two by observable characteristics.

Concepts About Living Things:

- All things can be classified as living or non-living.
- Things that are classified as living may also include things that were "once living" but are now dead (e.g. twig, harvested carrot).
- Living things have characteristics that are different from non-living things.
- We eat many living things.

Essential Questions About Living Things:

- What types of things are living? Non-living?
- What are the key characteristics of living things?
- How are living things different from non-living things?
- What living things are edible?

[1] University of Illinois Extension, 2020. [2] National Park Service, n.d.

WEEK AT A GLANCE

	DAY 1	DAY 2	DAY 3	DAY 4
Question of the Day	What do we know about living things?	What do we wonder about living things?	What more do we want to know about living things?	What have we learned about living things?
Teaching Strategies GOLD Alignment Suggested Studies: Pets or Insects	What are the characteristics of living things?	What are the characteristics of living things? (observe)	How are living things different from non-living things?	What do living things eat? What do other living things eat?
New Vocabulary English (Spanish)	living (los seres vivos), non-living (los seres no vivos), growing (crecer), reproduce (reproducir), breathing/respiration (respirar), observe (observer), classify (clasificar)	predict (predecir)	Once Living, Now Non-Living (antes era vivo, ahora no está vivo)	edible (comestible)
Large Group	Share a living thing.	Observe the characteristics of living and non-living things.	**Read-Aloud:** Read about living things and ask more questions.	What living things can we eat? Share edible and non-edible living things.
Small Group	Describe, observe, and classify living things by their characteristics.	Make a prediction about living and non-living things.	Sort living things based on characteristics.	Taste edible living things.
Your Ideas				
Plan Community & Family Engagement	Display the ***Documentation Panel*** from today's learning activity. Encourage children to share the question "What are the characteristics of living things?" Share their classroom responses with parents/guardians.	Encourage children to share the question and their response with parents/guardians.	Display the ***Documentation Panel*** from today's learning activity. Consider sending home a list of conversation starters about living and non-living things at home to engage parents!	Extend children's learning and engage families by sending home a "nature walk" challenge. Encourage families to discuss the living and non-living things they see on their walk together!

Unit 1 LIVING THINGS

ACTIVITY 1:

What Do We Know?

OVERVIEW

Ask children to tell you what they know about living things. Support children by helping them describe living and non-living things as they observe images and real examples.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

1. **Children will be able to describe living and non-living things they have observed using adjectives related to differences (e.g. color, texture, size, length, shape, weight, and if a living thing is edible or non-edible).** [GOAL P-SCI 1]
2. **Children will be able to categorize living and non-living things into groups based on their characteristics (e.g., growth, response to the environment, having offspring, and the need for food, air, and water).** [GOAL P-SCI 3]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Insects or Pets Study areas.

- What are the characteristics of insects? Pets? Prompt children to think about the characteristics of living things and how they apply to each.

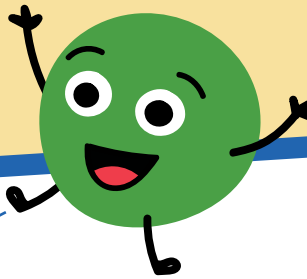
For more information on standard alignment, visit www.MorePeasPlease.org.

YOU WILL NEED

- 1 sheet large paper (25"x30") for *Documentation Panel*
- Image of a rabbit eating a carrot
- 3 photographs or examples of ***living things*** (e.g. vegetable plant growing in soil, reptile)

NOTE: If you have access to real examples, use those instead of photographs!

- 3 real examples of ***non-living things***
- 2 small boxes for observing materials
- *Science Journals* (1 per child)
- Coloring/writing utensils



Living: Things that are currently alive (grow/develop, use energy, reproduce, respond to environment)

Spanish Translation: Los seres vivos (lohs sehr-ehs bee-bohs)

Child-Friendly Definition: Things that grow, need food, make more of themselves (e.g. have babies), and interact with the world around them

OTHER DEFINITIONS

Non-Living: Things that are not currently alive or were never alive (don't grow, don't need energy, don't reproduce by themselves, don't respond to environment)

Spanish Translation: los seres no vivos (sehr-ehs no bee-bohs)

Child-Friendly Definition: Things that don't grow, don't need food, don't make more of themselves, and don't interact with the world around them

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Growing: Process of natural development by increasing in size and changing physically

Spanish Translation: crecer (kreh-sehr)

Child-Friendly Definition: To get bigger just like you grow bigger (taller, stronger) each year

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Reproduce: Biological process by which new individual organisms are produced from existing organisms

Spanish Translation: reproducer (rreh-proh-doo-seer)

Child-Friendly Definition: To create another living thing of the same kind

Breathing/Respiration: Process of producing energy typically by intaking oxygen and releasing carbon dioxide

Spanish Translation: respirar (rrehs-pee-rahr)

Child-Friendly Definition: When we breathe we push air in and out of our lungs

---

Observe: The act of looking at something or someone carefully to gain information

Spanish Translation: observer (ohb-sehr-bahr)

Child-Friendly Definition: To watch something carefully to see what is happening

---

Classify: To arrange a group of people or things in categories according to their characteristics

Spanish Translation: clasificar (klah-see-fee-kahr)

Child-Friendly Definition: To put things into groups based on how they are like each other or how they are different.

PREPARATION

Watch the PEAS "How to Prepare" Video for Living Things.

Write the activity question, "What are characteristics of living things?" at the top of your *Documentation Panel*.

You will continue to add to this panel in future activities, so make sure to keep it posted somewhere visible in the classroom!

DOCUMENTATION PANEL
What are characteristics of living things?

Eliza	grow
Jaycian	have babies
Laurel	move
Kameron	breathe
Ruth	eat
Isla	play

ACTIVITY 1: What Do We Know?

LARGE GROUP

What to Do		What You Could Say
Share a Living Thing	Describe and show children a living thing you like.	**"One of the living things that I like are rabbits! I like them because they are small, furry, have long ears, short fluffy tails, and big hind legs for hopping. Rabbits are living because they like to hop and play and eat! They eat crunchy carrots just like me!"** (Show a picture of a rabbit eating carrots.)
Define Living and Non-Living	Introduce the words **living** and **non-living**. Provide a child-friendly definition.	**"Living things grow, need food, make more of themselves (e.g. have babies), and interact with the world around them.** **Non-living things don't grow, don't need food, don't make more of themselves, and don't interact with the world around them."**
What Do We Know?	Ask children to tell you what they know about living things.	**"Now you tell me what you know about living things. Maybe someone can tell me about a living thing you like?"**
	Record children's ideas on the first ***Documentation Panel***. Make sure to include their name next to their answer. Keep this panel, you will continue to build on this panel by adding additional ideas throughout the other activities. Introduce new words as they arise. Provide a child-friendly definition.	Ask children: **"How do you know if something is living?"** Tell the children: **"So far, we have defined living things as having these characteristics [insert characteristics that were described by children]."** For example, you might say: **"Just like Terrance said, living things need food and water so they can grow. We also said they grow and change, have babies or make more of itself (reproduce), move by themselves, breath (respiration), and do different things based on the world around them."**

SMALL GROUP

What to Do		What You Could Say
Compare and Contrast a Living and Non-Living Thing	Compare children's ideas to the ***Documentation Panel*** created in Large Group.	Ask children: **"Now that we know some of the things to look for when deciding if something is living, let's continue to learn more and investigate what makes something living or non-living? Is this rabbit living? What do we think? How do we know?"** (Show a picture of a rabbit eating carrots.)
	Provide children with verbal praise as they answer appropriately.	For example, you might say, **"Exactly Marcus! I like how you used our *Documentation Panel* to conclude that the rabbit is living because it has babies!"**

What to Do		What You Could Say
	Continue your conversation using a non-living item.	Ask children: "**Is this [rock] living? What do we think? How do we know?"** To further the conversation, you can ask children, **"How are the rabbit and [rock] the same? How are the rabbit and [rock] different?"**
	The difference between non-living and dead can be confusing to young children. Providing children with examples like a log or brown leaf can help. These things were once living but are now dead.	Ask children if the carrot the rabbit is eating is living or non-living. Explain that there are things that were one living but are now no longer able to grow and develop on their own, like the carrot, since it is no longer in the ground!
Describe, Observe, and Classify Living Things by their Characteristics	Next, pass around two small boxes. One box should contain 3 living (e.g. whole carrot with stem/ leaves, flower, insect) and the other 3 non-living things. Describe the items. Introduce the word: observe. Provide a child-friendly definition.	**"To observe something means to watch it carefully to see what is happening or what it looks like."** Explain to the children that the class is going to observe each item in the box and talk about whether it is living or non-living.
Ask "WH" Questions and Model Using Descriptive Words	Remember to use WH (who, what, where, when, why and how) and open-ended questions to help children describe their observations. Encourage children to use their senses to explore the living and non-living things by allowing children to touch and smell each item. Children should not put the objects in their mouth.	Ask children "fair" questions that can be answered through observations: How does this object move? Can you put the objects here into two groups based on how they move? How does this object eat? Can you put the objects here into two groups based on how they eat? Remember that these questions are designed to explore the structure/function of living things. While a plant may not "eat" like we eat, they still obtain energy by converting sunlight to food, thus it is still living.
	Role model and encourage children to use descriptive words.	Provide children with verbal praise when descriptive words are used appropriately.
Ask Children to Record a Living Thing in their Science Journal.	Ask children to draw one of the living things they observed or talked about in their ***Science Journal.*** When working with younger children, provide an example they can use as a model.	Encourage children to write a word or draw a picture that represents a characteristic of living things. Encourage children to share their journal entries with each other.

Unit 1 LIVING THINGS

ACTIVITY 2:

What Do We Wonder?

OVERVIEW

This two-part activity will support children as they explore and continue to define the characteristics of living and non-living things. Children will observe, discuss, and classify a set of preselected living and non-living materials. Support children as they make predictions and record which materials are living and non-living. Children will record observations of living and non-living things in their *Science Journal*.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

1. Children will be able to ask a question that can be answered through an investigation, "What makes something living?" [GOAL P-SCI 4]
2. Children will be able to verbally make a prediction based on past observations, "I think the need for water and air makes something alive." [GOAL P-SCI 5]
3. Children will be able to analyze and interpret data and summarize the results of an experiment. [GOAL P-SCI 6]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE:

This unit can align with the TSG Insects or Pets Study areas.

- What are the characteristics of insects? Pets? Support children as they observe the characteristics of living things.

For more information on standard alignment, visit www.MorePeasPlease.org.

Predict

To forecast what would happen under certain conditions

Spanish Translation:
predecir (preh-deh-seer)

Child-Friendly Definition:
To guess about what we think will happen

OTHER DEFINITION

Experiment: A scientific procedure undertaken to make a discovery, test a hypothesis, or demonstrate a known fact.

Spanish Translation: experimentar (ex-speer-ee-men-tar)

Child-Friendly Definition: **A test about a question we have**

YOU WILL NEED

Part 1

- *Documentation Panel* from Activity 1 listing class-generated characteristics of living things
- 1 sheet large paper (25"x30") for *Prediction Panel*
- 3 photographs or real examples of ***living or once things*** (e.g. pea seeds, spinach leaves, insect)
- 3 real examples of ***non-living things (e.g, shoe, bird's nest)***
- 3"x5" photograph of each of the 3 living things and 3 non-living things (photographs should be of the items presented for examples of living/non-living items)
- Photograph of grasshopper and grasshopper nymph; seed and plant
- 2 small boxes for observing materials
- Stickers or sticky notes (6 per child)
- *Science Journals* (1 per child)
- Coloring/writing utensils

Part 2

- *Documentation Panel* from Activity 1 listing class-generated characteristics of living things
- 1 sheet large paper (25"x30") for *Prediction Panel*
- 6 observation jars
- 3 small rocks (small enough to fit in jars)
- 1 packet pea seeds
- Magnifying glasses (1 per child)
- Stickers or sticky notes (6 per child)
- *Science Journals* (1 per child)
- Coloring/writing utensils

PREPARATION

Part 1

- Prepare the *Documentation Panel* by writing the learning activity question "Is it living?" at the top. Below the question, create a chart with seven rows and six columns. On the left side of each row, attach the image of your living and non-living items. Next, label each column with one characteristic of living things previously identified by the class (see *Documentation Panel* from Activity 1).

Part 2

- Prepare the *Prediction Panel* by writing the learning activity question "Is it living?" at the top. Below the question, create a chart with seven rows and four columns. On the left side of each row, attach the image of your living and non-living items. Next, label column one as "living", column two as "non-living" and column three as "still need to explore". Older preschool children can also create a Venn diagram (two large overlapping circles) to represent class predictions.

ACTIVITY 2: What Do We Wonder?

LARGE GROUP - PART 1

What to Do		What You Could Say
Build on the Characteristics of Living Things	Using the ***Documentation Panel*** from Activity 1, tell children: Based on children's responses added, record additional characteristics of living things on the previous ***Documentation Panel***.	**"Let's build on what we know about living things. So far, we have defined living things as having these characteristics *[insert characteristics that were described by children]*. Can we add to our list?"**
Describe, Observe, and Classify Living and Non-Living Things	In small group, pass around two small boxes. One box should contain 3 living (e.g., peas seeds, spinach leaves, reptile/animal) and the other box should contain 3 non-living things. Depending on the size of the insect, it may need to be placed in a separate container.	Explain to the children that the class is going to observe each item in the box and talk about whether it is living or non-living. Support children as they describe the items.
	Ask children to classify each item in the boxes as living or non-living by using the ***Documentation Panel***. Model the activity first then help them make comparisons between the living and non-living things based on the characteristics of living things.	**"Do insects need food and water? Do insects grow? Do insects reproduce?"**
Ask "WH" Questions and Model Using Descriptive Words	Children can help complete the chart by placing a sticker or sticky note on the chart. Encourage children to use their senses to explore the living and non-living things by allowing children to touch and smell each item.	Remember to use WH (who, what, when, where, why and how) and open-ended questions to help children describe their observations. Ask children "fair" questions that can be answered through observations: **"Can the seed make more of itself ("babies")? Do the baby (seed) and the parent (plant) look the same?"**
	To illustrate the idea of seed reproduction, show children a picture or a physical seed compared to a grown plant. Encourage children to use their senses to explore the living and non-living things by allowing children to touch and smell each item. Role model and encourage children to use descriptive words.	Explain that the seed is the "baby" that will grow up one day to be a plant. Other living things, such as a grasshopper larvae/nymph do look like the parent. Show children a picture of a grasshopper "baby" and "parent". Compare both of these living life cycle to a rock. A rock does NOT make more of itself or have "babies", it never changes. Provide children with verbal praise when descriptive words are used appropriately.

SMALL GROUP OR INTERACTIVE CHOICE TIME - PART 1

What to Do		What You Could Say
Ask Children to Record their Observations of Living and Non-Living Things in their *Science Journal*	Ask children to draw one of the living things they observed or talked about in their Science Journal. When working with younger children, provide an example they can use as a model.	**Encourage children to write a word that represents a characteristic of living things.** **Encourage children to share their journal entries with each other.**

LARGE GROUP - PART 2

What to Do		What You Could Say
Define Predict	Introduce the word: **predict**. Tell children what it means to make a prediction and provide a child-friendly definition.	**"When we predict or make a prediction, it means we make a guess about what we think will happen."** Explain to children that the class is going predict whether something is living or non-living based on their characteristics.
Make a Prediction	In a small group, pass around two small boxes. One filled with pea seeds and one filled with small rocks. Review the ***Documentation Panel*** created by the class in Part 1.	Ask each child to make a prediction about each object: **"Is it living?"**
	Use a ***Prediction Panel*** to record their answers on a large piece of paper or erasable board. Make sure to include their name next to their answer. Use the "still need to explore" column if you or the children in your class are unsure about whether a given object is living or not-living.	Tell children you will continue to investigate about this item as a class. This a great way for children to see that science is a process and we are all still learning!

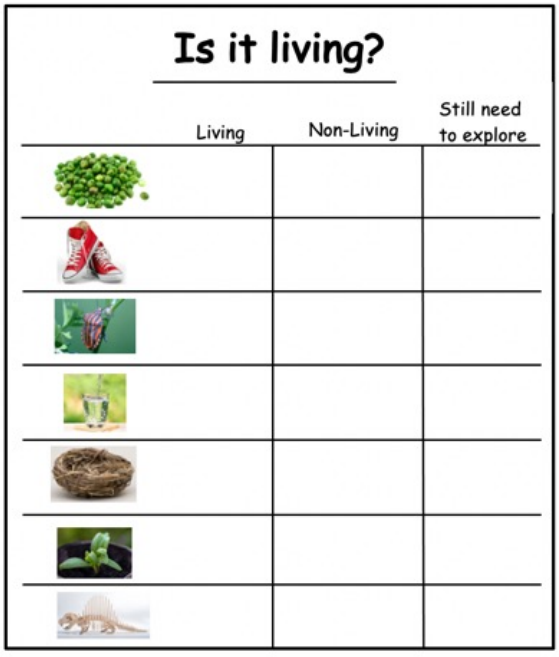
ACTIVITY 2: What Do We Wonder?

SMALL GROUP OR INTERACTIVE CHOICE TIME - PART 2

What to Do		What You Could Say
Design an Experiment	Introduce the word **experiment**. Based on children's predictions, sort the items into two groups (living and non-living). In 3 of the ***observation jars***, place 3 pea seeds. In the other 3 jars, place a small rock. Add a small amount of water to the jars. Create a label to identify each jar. Place the jars in your science center and allow children to observe using a ***magnifying glass*** throughout the day.	Discuss with children that the seed is living while the rock is not living. Explain that the class is going to set up an experiment to explore the characteristics of living things. Tell children, **"An experiment is a test about a question we have".** Tell the class, the question for our experiment is **"Do living things grow?"**
Ask Children to Observe Living and Non-Living Things Over Time and Record Observations in their Science Journal	Over the course of 1-2 days ask children to draw their observations of the living (pea seed) and non-living thing (rock) in their ***Science Journal***. Discuss the changes that happen and why. Encourage children to share their observations with each other.	For example, you might say: **"That's right Macy, the pea that we placed in the observation jar grew. Living things need water to survive. But the rock did not change because non-living things do not need water. They do not change."**
Ask "WH" Questions and Model Using Descriptive Words	Remember to use WH (who, what, where, when, and how) and open-ended questions to help children describe their observations. Role model and encourage children to use descriptive words.	Encourage children to use their senses to explore the living and non-living things by allowing children to touch and smell each item as appropriate (e.g., **"The pea looks round and green after being in the water. Using my sense of sight, I would say it grew!"**) Ask children "fair" questions that can be answered through observations: How does it change? Can you find a difference between the rock and the seed that you saw? **Let's sort the objects into two groups based on how/if they change!** Provide children with verbal praise when descriptive words are used appropriately.

What to Do		What You Could Say
Compare Predictions with Documentation Panel	Compare and contrast children's original predictions with the results of the Documentation Panel. If new observations about the characteristics of living things are made (e.g., living things respond to their environment), record on the class ***Documentation Panel*** from Activity 1.	
Display Class Findings for Families & Ask Families to Share Materials from Home for Next Activity	Encourage children to share the question and their response with parents/ guardians. To prepare for Activity 3, ask children to bring in or draw a picture of one of their favorite non-living things from home. Families can also share photographs via texting or social media.	

Prediction Panel Examples



ACTIVITY 3:

What More Do We Want to Know?

OVERVIEW

Ask children to explain what they have learned about living things and what they still want to know. Read a book about living things. Children will share and discuss the non-living things they brought from home with the class. Children will sort the non-living things brought from home based on their characteristics. Children will create an original drawing of the non-living things they observed in their *Science Journal*.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

1. Children will be able to describe living and non-living things they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to gather information about living and non-living things by looking at books and discussing prior knowledge related to the first two activities. [GOAL P-LIT 2]
3. Children will be able to categorize living and non-living things into groups based on their characteristics (e.g., growth, response to the environment, having offspring, and the need for food, air, and water). [GOAL P-SCI 3]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE:

This unit can align with the TSG Insects or Pets Study areas.

- How are the characteristics of non-living things different from living things? Prompt children to think about how insects and/or pets are different from the non-living things observed in this activity.

For more information on standard alignment, visit www.MorePeasPlease.org.

YOU WILL NEED

- *Documentation Panel* from Activity 1 listing class generated characteristics of living things
- Variety of non-living things (e.g., puzzle, rock, magnifying glass, microscope)
- Variety of once living, now-non-living things (e.g., twig, leaf, carrot)
- *Suggested Book*: "What's Alive" by Kathleen Weidner (4-8 years)
- Suggested Book: "What do living things need?" by Elizabeth Austen (Infant-4 years)
- Magnifying glasses (1 per child)
- *Science Journals* (1 per child)
- Coloring/writing utensils

PREPARATION

Prepare a selection of items for children to choose as one of their "favorite" non-living things in case they were not able to bring something from home.

Once Living, Now Non-Living

Things that were once alive (able to grow/develop, use energy, reproduce, respond to the environment) but are now non-living (don't grow, don't need energy, don't reproduce by themselves, don't respond to the environment)

Spanish Translation: antes era vivo, ahora no está vivo (ahn-tehs eh-rah bee-boh ah-oh-rah no ehs-tah bee-boh)

Child-Friendly Definition: Things that at one time grew, needed food, made more of themselves and interacted with the world around them but now do not.

ACTIVITY 3: What More Do We Want to Know?

LARGE GROUP

What to Do		What You Could Say
Show and Talk about Non-Living Things	Have a short version of a "show and talk" about non-living things. Allow children to share and describe the non-living things they brought from home with the class.	Ask children to tell you something about one of their favorite non-living things. Encourage children to use descriptive words.
Ask More Questions about Living and Non-Living Things	Prompt children to ask more questions about living and non-living things. If children present phenomena that you are unable to address today, let them know that you can talk about those concepts later. To prompt children's ideas, share a non-living thing that may be confusing. For example, a stick from a tree or a brown leaf.	Ask children, **"What more do you want to know about living and non-living things?"** **"Is it a living or non-living thing? How do you know? Let's return to our definition and characteristics chart."**
	Introduce the phrase **once living, now non-living**. Provide a child-friendly definition. Explain that the carrot and twig are both once living, now non-living things as well.	**"Once living, now non-living things grew at one time, needed food, made more of themselves and interacted with the world around them but now do not."** **Tell children "This leaf was once living. When it was attached to a tree the leaf helped the tree make energy by taking the sunlight and turning it into food. Now that the leaf is no longer attached to the tree, it is not living."**

READ ALOUD

What to Do	
Read about Living Things	Extend children's understanding of living and non-living things by reading a book. If new observations about the characteristics of living things are made (e.g., living things respond to their environment), record on the class ***Documentation Panel*** from Activity 1.

SMALL GROUP OR INTERACTIVE CHOICE TIME

What to Do		What You Could Say
Sort Non-Living based on their Characteristics	As a class, sort their non-living materials based on the characteristics we have discussed about living things.	Ask children "fair" questions that can be answered through observations: **How does it move? How does it eat? How does it grow?**
Observe Non-Living Things	Revisit the ***Documentation Panel*** created in Activity 1 and ***compare and contrast*** the characteristics of living things with the non-living items shared.	Ask children: **"How are the characteristics of non-living things different from living things?"**
	To encourage peer collaboration, have children work in pairs. Provide children with ***magnifying glasses*** to allow for closer observation of some of the non-living items shared. Encourage them to explain to a peer what materials look like under the magnifying lens.	
Ask Children to Record Non-Living Things in their Science Journal.	Ask children to draw one of the non-living things they observed or talked about in their ***Science Journal***. When working with younger children, provide an example they can use as a model.	Encourage children to write a word that represents a characteristic of living things. Encourage children to share their journal entries with each other.

Unit 1 LIVING THINGS

ACTIVITY 4: What Have We Learned?

OVERVIEW

Ask children to explain what they learned about living and non-living things. Expand children's understanding by introducing edible and non-edible living things. Children will use a *magnifying glass* to observe living and non-living material and have the opportunity to taste the edible plants. Children will create an original drawing of the living and non-living things they observed in their *Science Journal*.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

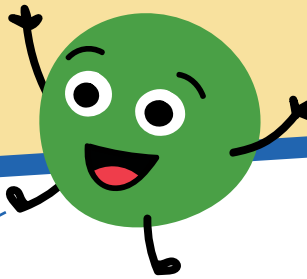
1. Children will be able to describe living and non-living things they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to demonstrate understanding by stating that eating a variety of edible living things (e.g., vegetables) helps them grow and be healthy. [GOAL P-PMP 5]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Insects or Pets Study areas.

- What do living things eat? Pets? Prompt children to think about the kinds of things insects, pets, or other living things eat. Are the living things we eat the same or different from what insects and/or our pets eat?
- What do other living things eat? Pets? After discussing the kinds of living things, we eat, prompt children to think about the kinds of things insects, pets, or other living things eat. Are the living things we eat the same or different from what insects and/or our pets eat?

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

- *Documentation Panel* from Activity 1 listing class generated characteristics of living things
- Edible Living Things to Explore: dried pea seeds, halved apple with core and seeds visible
  NOTE: *Plants that are used for exploration are separate from the edible plants for taste testing. Plants that are handled by children during exploration should NOT be consumed due to sanitation concerns.*
- Non-Edible Living Things: Grass clippings, flower, insect
  NOTE: *If non-edible living things are unavailable, photographs will work. Cultural differences may exist for some living things we consider non-edible in the United States. Consider using this opportunity to discuss cultural foods.*
- 2 small boxes for observing materials
- Magnifying glasses (1 per child)
- Balance scale (optional)
- Cutting board/knife
- Measuring Cups
- *Science Journals* (1 per child)
- Coloring/writing utensils
- Bowls or plates (1 per child)
- Eating utensils
- Napkins
- See **perishable** items in recipe

"Living Things" Yogurt Dip

(Servings 20)

Ingredients:

1 cup low fat yogurt (plain or vanilla)
½ tsp cinnamon
1 tsp honey
Carrots, 3, sliced thinly for dipping
Apples, 2, sliced thinly for dipping
Snap peas, 1 bag fresh
Whole grain crackers, 2 per child

Instructions:

Combine yogurt, cinnamon, and honey in a small bowl. Stir to combine.

Portion into individual bowls/plates for children.

Serve with carrot sticks, apple slices, snap peas and crackers for dipping

TIP: If you would like children to prepare the recipe individually, divide the dip ingredients into children's individual bowls ahead of time. Allow children to mix with separate spoons.

Edible

Things that are suitable for human consumption

Spanish Translation: comestible (koh-mehs-tee-bleh)

Child-Friendly Definition: Things that we can eat

ACTIVITY 4: What Have We Learned?

PREPARATION

1. Collect any needed materials.
2. Purchase enough edible living things (carrots, peas, tomatoes) for each child to taste each vegetable.
3. Prepare vegetables for the children to taste. Leave one of each vegetable whole for observation.
4. Procure food items needed to make Yogurt Dip (recipe on previous page).
5. Prepare fruits and vegetables according to the recipe for the children to taste. If possible, leave one of each fruit/vegetable whole for observation.

BUILD ON PRIOR LEARNING

- Carrots, peas, and apples are living things. Tell children: "Remember when we read about how seeds, trees, flowers, and plants?"
- You can further explain: "All of these things are living. Carrots are a vegetable, which is a plant. Peas are a type of seed. They may not eat or drink like we do, but they do need water, air, and food. Carrots and peas also move and grow, even though we may not be able to see them move and grow with our eyes. Both are living and we can eat them too!"

EXTENDED LEARNING

Ask new questions!

- After discussing the kinds of living things we eat, prompt children to think about the kinds of things insects, pets, or other living things eat. What do other living things eat? Pets? Are the living things we eat the same or different from what insects and/or our pets eat?
- Since this question is not a "fair" question, consider researching the answer to this question or setting up a new experiment! For example, your class may choose to observe what insects or pets eat.

LARGE GROUP

What to Do		What You Could Say
What Have We Learned?	To prompt children's discussion, share an apple with children. Ask children to decide how it should be classified according to the list of characteristics in the class ***Documentation Panel*** about living things from Activity.	**"What have we learned about living and non-living things?"**
Define Edible	Provide a child friendly definition for the word **edible**. Ask children to tell you what are some edible living things that they eat at home or school.	**"Edible living things are things that are safe for us to eat."**
Share Edible Living and Non-edible Living Things	Have selected edible and non-edible living things in two boxes. One box should contain 3 edible and 3 non-edible living things. Take each box out and describe them to the children. Explain to the children that the class is going to observe each item in the boxes and talk about whether it is living or non-living. If possible, pass the items around for observation and ask them to look at specific features of the items and describe what they see (e.g., texture. length, size, smell etc.).	Ask children questions that can be answered through observations: **What colors do you see? When you touch it what does it feel like? Can you group the objects by how they feel?**
Describe, Observe, and Classify Edible and Non-Edible Living Things	Sort objects into two groups, edible living things and non-edible living things. Ask children which things they think are edible and which are non-edible. Explain to them why one should not eat nonedible living things, like grass or rocks. The item may be poisonous, or it may have been sprayed with pesticides. Support children as they describe the items. Remember to role model and encourage children's use of descriptive words.	Tell children: **"We can eat some living things, but others we cannot. Some of those that we can't eat just taste bad, others are poisonous and will make you very sick".** Tell children: **"A pinecone is living, but we don't eat the pinecones we find outside. However, we eat vegetables every day and vegetables are a type of plant we can eat! Edible living things, like carrots and peas, are good for our body and can help us grow and be healthy."** Provide children with verbal praise when descriptive words are used appropriately.

ACTIVITY 4: What Have We Learned?

SMALL GROUP, LARGE GROUP OR INTERACTIVE CHOICE TIME

What to Do		What You Could Say
Observe and Describe Edible Seeds	Allow children to observe the edible living things (carrots, peas, apples) more closely. Let children pass the edible living things around and look and feel them closely. Allow them time to observe each vegetable using a ***magnifying glass***. Children can also explore the weight of different seeds (light or heavy) are and compare them to one another using a ***balancing scale***.	Describe what they are looking at using descriptive words. Role model how to use observation tools (e.g., **"I hold my magnifying glass with one hand up to my eye so that I can observe the edible living things more closely"**).
Make Yogurt Dip	Have children observe you prepare the Yogurt Dip. If allowable in your center, support children as they make their on yogurt dip in individual bowls. Food preparation activities can support development of fine motor skills.	Describe what they are looking at using descriptive words. Tell children: **"Yogurt makes a great dip, it is smooth and creamy and has calcium to make our bones strong!"**
Taste Edible Living Things.	Have children wash their hands. Pass out a small sampling of the fruits and vegetables (edible living things) with the yogurt dip. Emphasize again that we should eat a variety of edible living things to help them grow and be healthy. Make sure children recognize that not all living and non-living things are edible. Remind children they should always check with an adult before sampling any plants outside.	As children are tasting the edible seeds, remember to enthusiastically role model tasting the same foods. Talk positively about peas and apples: **"These pea pods are green and smooth!" "This apple is red and crunchy! I like eating apples! What does it taste like to you?"**
Ask Children to Record Edible Living Things in their *Science Journal*.	After children finish eating and wash their hands, ask children to draw the edible living things they just observed in their ***Science Journal***. Place the vegetables (edible living things) in the middle of the table so they can see them. When working with younger children, provide an example they can use as a model.	

NOTES

Unit 2 SEEDS

MODEL SCIENCE LEARNING

A Word About Seeds

Seeds are very important – they provide food as well as the basis for all plant life in our world.[1]

Seeds are living things that contain the baby plant and enough food to nourish it until it can produce its own food. Germination (jər-mə-ˌnāt •shən) is what happens when a seed takes in water and begins to grow into a new plant.

During germination, the seed's outer coat is softened by water and breaks open allowing the new "baby" plant to grow out of the seed.

Seeds need water, air (oxygen), and the right temperature to germinate, grow and be healthy.[2] However, once a seed sprouts and turns into a plant, additional things are needed for it to grow into a mature plant.[3]

THE BIG IDEA ABOUT SEEDS

Children will understand seeds are living things that need specific things to germinate (light, water, space, food, temperature, and soil).

Concepts About Seeds:

- There are different types of seeds.
- Seeds are living.
- Seeds need certain things to germinate (e.g. water, oxygen, the right temperature).
- Some seeds are edible and some are not – always ask an adult before eating seeds.
- We can use science tools (e.g. microscope) to help us explore seeds.

Essential Questions About Seeds:

- How do seeds differ in shape, size, length, weight, edibility, and color?
- Are seeds living or non-living?
- What does a seed need to germinate?
- Are seeds edible/non-edible?
- What tools can we use to explore seeds?

[1] Encyclopedia Britannica, 2020. [2] University of Illinois Extension, 2020.

WEEK AT A GLANCE

	DAY 1	DAY 2	DAY 3	DAY 4
Question of the Day	What do we know about seeds?	What do we wonder about seeds?	What more do we want to know about seeds?	What have we learned about seeds?
Teaching Strategies GOLD Alignment Suggested Studies: Gardening	What are the characteristics of seeds?	What does a seed need to grow?	What are the characteristics of seeds?	What foods do we eat (fruit and vegetables) that come from seeds?
New Vocabulary English (Spanish)	seed (la semilla)	germination (germinación), seed coat (capa de la semilla)	–	edible seeds (semilla comestible)
Large Group	Share a variety of seeds.	Observe the characteristics of seeds.	Read-Aloud: Read about seeds and ask more questions.	Share edible seeds and non-edible seeds.
Small Group	Describe, observe, and classify seeds by their characteristics.	Make a prediction about living and non-living things.	Sort seeds based on their characteristics of seeds.	Taste edible seeds.
Your Ideas				
Plan Community & Family Engagement	Display the Documentation Panel from today's learning activity. Encourage children to share the question and their response with parents/ guardians.	Encourage children to share the question and their response with parents/ guardians. Ask children to bring in or draw a picture of seeds from home for sharing. Families can also share photographs via texting or social media.	Display the Documentation Panel from today's learning activity. Consider sending home a list of conversation starters about how seeds move to engage parents!	Share information about today's activity with families. You could even send home a few seeds for families to grow at home!

Unit 2 SEEDS

ACTIVITY 1:

What Do We Know?

OVERVIEW

Ask children to tell you what they know about different types of seeds. Support children by helping them describe seeds as they observe images and real examples.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

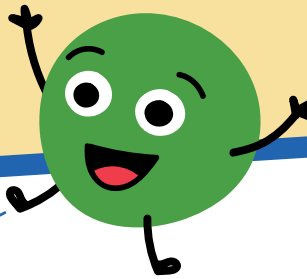
1. Children will be able to describe seeds they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to categorize seeds into groups based on their characteristics (e.g., growth, response to the environment, having offspring, and the need for food, air, and water). [GOAL P-SCI 3]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE:

This unit can align with the TSG Gardening Study.

- What are the characteristics of seeds? Prompt children to think about the characteristics of living things and how they apply to seeds.

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

- *Documentation Panel* from Support Learning Activity 1: "Characteristics of Living Things"
- 1 sheet large paper (25"x30") for *Documentation Panel*
- *Photographs:* pea plant, peas on dinner plate, spinach seeds, carrot seeds, dried pea seeds, and tomato seeds
- Dried peas, dried corn, tomato seeds
- Small cup or box
- *Science Journals* (1 per child)
- Coloring/writing utensils

Seed
A tiny container that holds a baby plant and its food to protect it until it is ready to grow.

Spanish Translation: la semilla (seh-mee-yah)

Child-Friendly Definition: A very small package that has a little plant inside and food that can help it grow into a new, bigger plant.

PREPARATION

Watch the PEAS "How to Prepare" Video for Seeds.

Write the activity question, "What are characteristics of seeds?" at the top of your *Documentation Panel*.

You will continue to add to this panel in future activities, so make sure to keep it posted somewhere visible in the classroom!

DOCUMENTATION PANEL
Characteristics of Seeds

Emma	flat
Marcus	round
Kaya	smooth
Robert	pretty
Vicky	brown
Jose	flat
Balaji	small
Shawn	bumpy
Christia	black

BUILD ON PRIOR LEARNING

- Building on prior learning, remind children verbally about the characteristics of living vs. nonliving things. You can provide examples using the Documentation Panel your class created to describe the characteristics of living and non-living things in Activity 1 of the Living Things unit.
- Ask children to think about whether seeds are living or non-living. Model the activity first then using the Documentation Panel, help them make comparisons between the seeds they are observing and the characteristics of living things (e.g., Do seeds grow? Do seeds need food? Do seeds move? Do seeds breathe? Do seeds reproduce?). Remember, seeds can be moved by animals, wind, or humans! They are alive!

ACTIVITY 1: What Do We Know?

LARGE GROUP

What to Do		What You Could Say
Share a Seed	Describe and show children one of your favorite seeds.	**"One of my favorite seeds are peas. I like pea seeds because they are small and wrinkly."** (Show the seeds.) **"I like peas because you can plant them in the soil and water them and they can grow new pea plants."** (Show picture with plants.) **"I also like to cook peas and eat them as part of my dinner."** (Show picture of peas on dinner plate.) **"But not all seeds are for eating."**
Define Seed	Introduce the word seed and provide a child-friendly definition.	**"A seed is a tiny container that holds a baby plant and its food to protect it until it is ready to grow."**
What Do We Know?	Ask children to tell you what they know about seeds.	**"Now you tell me what you know about seeds. Maybe someone can tell me what seeds are? What do seeds look like? What are your experiences with seeds?"**

SMALL GROUP

What to Do		What You Could Say
Describe, Observe, and Classify Seeds by their Characteristics	Show children a variety of other seed types (tell children which seeds are edible and non-edible).	**"We are going to classify the seeds based on things we can observe like their shape (e.g. round, oval), texture (smooth/rough, soft/hard, etc.), color (black, yellow, white), edible/non-edible (e.g. peas/[non-edible seed]), and smell."** Introduce new words as they arise. Provide a child-friendly definition.
	Encourage children to explore and describe different types of seeds by comparing and contrasting their observable characteristics.	**"A seed is a tiny container that holds a baby plant and its food to protect it until it is ready to grow."** Ask children questions that can be answered through observations: **"What sound do the seeds make? Can you put them into groups based on how they sound? For example, seeds that make a loud sound versus seeds that make a light tapping sound?"** To help engage all students in the discussion remember to use science talk strategies of revoice and restate. For example, revoicing children's thoughts in the form of a question can give them more time to organize their thoughts when they may be struggling to put their ideas into words. **"Kaya, I think I heard you say that heavier seeds make a louder sound when tapped on the desk? Is that correct?"**

SMALL GROUP

What to Do		What You Could Say
		Restating can be used to encourage children to restate each other's ideas, giving them time to process what has been said, and evaluate the ideas themselves. Example, **"Can someone repeat Kaya's ideas about the heavier seed making a louder sound in their own words?"**
Record children's observations on the *Documentation Panel*	Make sure to include their name next to their answer. Keep this panel. You will continue to build on this panel by adding additional ideas throughout the other activities.	Remember to encourage and support children's use of descriptive words. Provide children with verbal praise when descriptive words are used appropriately.
	Experiment with sound by placing the seeds in a small cup or box and shaking.	Encourage children to use their senses to explore the seeds by allowing children to touch and smell real peas and tomato seeds.
Ask Children to Record Seeds in their *Science Journal*	Ask children to draw the different types of seeds they observed in their ***Science Journal.***	Encourage children to write a word that describes a characteristic of seeds. When working with younger children, provide an example they can use as a model. Encourage children to share their journal entries with each other using descriptive words.

Unit 2 SEEDS

ACTIVITY 2: What Do We Wonder?

OVERVIEW

In this series of activities, support children as they explore the needs of seeds to germinate and continue to define the characteristics of seeds. Through each activity, children will make predictions, observe, talk about what they observe, and record their observations of what a seed needs to germinate ("begin to grow").

In part 1, help children set up, engage, and talk about an experiment with seeds in varying growing conditions (soil, water, sun). In part 2, children will observe and talk about seeds germinating under a microscope. In part 3, children will observe seeds and talk about how they germinate and grow into a plant over time. Children will discuss and record observations of seeds through the week in their *Science Journal*.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

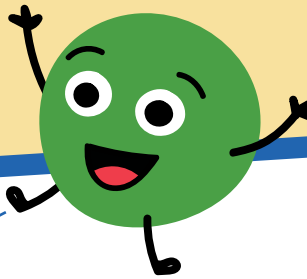
1. **Children will be able to ask a question that can be answered through an investigation, "What does a seed need to germinate?"** [GOAL P-SCI 4]
2. **Children will be able to verbally make a prediction based on past observations, "I think a seed needs water to germinate because..."** [GOAL P-SCI 5]
3. **Children will be able to analyze and interpret data and summarize the results of an experiment.** [GOAL P-SCI 6]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE:

This unit can align with the TSG Gardening Study.

- What does a seed need to grow? Prompt children to think about the different types of seeds and how they grow; compare their similarities and differences.

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

Part 1

- *Documentation Panel* from Practice Science Activity 1: "Characteristics of Seeds"
- 1 sheet large paper (25"x30") for *Prediction Panel*
- 1-2 packets of basil seeds (at least 3 per child)

  NOTE: Basil seeds are used in this activity because of their quick germination time
- Small clear plastic craft bags 2x3" (1 per child)
- Cotton balls (1 per child)
- 1 spray bottle filled with water
- Yarn
- Scissors
- Tape
- *Science Journals* (1 per child)
- Coloring/writing utensil

Part 2

- 1 packet of basil seeds
- 1 packet peas seeds
- 1 packet tomato seeds
- 1 spray bottle filled with water
- Petri dish (1 per center)
- Microscopes (1 per center)
- *Science Journals* (1 per child)
- Coloring/writing utensil

Part 3

- *Prediction Panel* from Part 1 listing class generated predictions of what a seed needs to grow
- 2 sheets large paper (25"x30") for *Prediction Panel* and *Documentation Panel*
- 2 packets of basil seeds
- 6 small plastic cups (3 for each experimental condition)
- 1 spray bottle filled with water
- Small container of potting soil
- *Science Journals* (1 per child)
- Coloring/writing utensil
- Fresh basil Leaves **(perishable)**

Germination
(ˈjər-mə-ˌnāt ·shən)
To begin to grow from a seed to a new plant.

Spanish Translation:
germinación
(hair-mee-nah-syohn)

Child-Friendly Definition:
It is the beginning when the seed begins to grow.

ACTIVITY 2: What Do We Wonder?

OTHER DEFINITIONS

Seed Coat: The outer, protective skin covering the seed.

Spanish Translation: capa de la semilla (kahpa dey la seh-mee-yah)

Child-Friendly Definition: The outside of the seed that protects its inside. It protects the seed like wearing a helmet while riding your bicycle protects you.

Cotyledon (kädəˈlēdn): The first leaves that appear from a germinating seed; otherwise known as a "seed leaf".

Spanish Translation: cotiledón (koh-teel-lay-dohn)

Child-Friendly Definition: The first leaf that comes out of a seed.

PREPARATION

Part 1

1. Fill spray bottle with water
2. Punch small holes into the top of each plastic bag
3. Cut yarn for hanging the seed bags
4. Write the learning activity question "What does a seed need to grow?" at the top of your *Prediction Panel*. You will continue to add to this panel in future activities, so make sure to keep it posted somewhere visible in the classroom!
5. Fill spray bottle with water

Part 2

1. Write the learning activity question "What does a seed need to germinate?" at the top of your *Prediction Panel*.
2. Write the learning activity question "Does a plant need soil to grow?" at the top of your *Documentation Panel*.

PREDICTION PANEL
What does a seed need to germinate?

Marian	Water
Harmoni	Food
Chase	Sun
Trinity	Magic
Charlotte	Time
Micah	Water

DOCUMENTATION PANEL
Does a plant need soil to grow?

Livvy	Yes
Nolan	Yes
Cheyanne	No
Phoebe	Not sure
Ambrose	Yes
Isaac	No

LARGE GROUP - PART 1

What to Do		What You Could Say
Build on the Characteristics of Seeds	Using the first ***Documentation Panel*** from Activity 1,	Tell children: **"Let's build on what we know about seeds. So far, we have defined seeds as having these characteristics [insert characteristics that were described by children]. Are there any other ways we can describe seeds? What can we add to our list?"**
Describe and Observe Classify Seeds	In a small group, give each child a small pinch of basil seeds. Describe the seeds and tell them that because the seeds are tiny, it is easy to drop them. Tell them not to drop the basil seeds.	Help them make comparisons between the seeds they are observing and the characteristics of living things (e.g. **Do seeds grow? Do seeds need food? Do seeds move? Do seeds breathe? Do seeds reproduce?**).
	Introduce the word **observe** and provide a child-friendly definition. Based on children's responses added, record additional characteristics of seeds on the previous ***Documentation Panel*** from Activity 1.	Explain to the children that they will observe seeds. Encourage children to explore and describe different types of seeds by comparing and contrasting their observable characteristics.
What Does a Seed Need to Grow?	Ask children to tell you what things they think seeds need to grow. Record children's observations on the ***Prediction Panel***. Make sure to include their name next to their answer.	
Define Germinate	Introduce the word **germinate** and provide a child-friendly definition.	Explain to the children that the seeds are beginning to grow, and they need water to start this process.
	Understanding the concept of living versus non-living can be tricky for children. Seeds need water and nutrients (soil) to grow, and they have the potential to produce living things (plants), so they are living.	You can explain this to children by saying **"Seeds need water, warmth, and time to grow. They grow up one day to be plants. Because seeds can do this, they are living."**

ACTIVITY 2: What Do We Wonder?

SMALL GROUP AND INTERACTIVE CHOICE TIME - PART 1

What to Do		What You Could Say
Observe Seeds Growing	Using the water bottle, spray a small amount of water on their seeds. Encourage children to look out for changes and tell them what changes should start to happen (i.e. after a few moments the seed coat will begin to turn mucousy and white).	Ask children to tell you and the other children what they observe as the seed changes.
Define Seed Coat and Cotyledon	Once seeds have sprouted, introduce the words **seed coat** and **cotyledon**. Allow children to provide predictions for what they think the function of seed coats and cotyledons are.	Be sure to provide child-friendly definitions. Explain the function of the coat and cotyledon for the seed.
Ask "WH" Questions and Model Using Descriptive Words	Remember to use WH (who, what, where, when, and how) and open-ended questions to help children describe their observations as they watch their seeds germinate. Role model and encourage children to use descriptive words such as those related to ***color*, *texture* (smooth, rough, shiny, bumpy, soft, hard etc.), *size* (small, large, minute, short, long,)** and ***weight* (light vs. heavy)** when relevant.	Ask children "fair" questions that can be answered through observation: **When you look at the seed, what do you see? When you touch the seeds, how do they feel before we spray the water? How do they feel after we spray the water?** Continue to use revoice and restate during discussion times. For example, when making observations and asking "fair" questions use this time to revoice children's thoughts. **"Cheyanne, I heard you say that some seeds felt bumpy, is that correct? Can you tell me more about how a seed feels bumpy?"** Also, during this time use the strategy of revoicing and restating. Example, **"Can someone else tell me how Cheyanne described a bumpy seed?"**
Create Basil Seed Bags for Observation	Once children have finished their observations of the growing seed, wet a cotton ball, wring out the excess water, and support each child as they wipe the basil seeds onto it. Ask each child to place the cotton ball into a small, clear, plastic, craft bag with a hole punched into the top (younger children may need additional support). Seal the bag. Write each child's name and date on the bag. Run yarn through the hole to hang from a window in the classroom or another location where sunlight can reach the seed bags. The children can now watch the full process of germination as their basil seeds sprout into a plant throughout the week. You could also take pictures of the seeds throughout the week!	

What to Do		What You Could Say
Ask Children to Draw Seeds in their *Science Journal*	Over the course of the week ask children to draw their observations of their basil seed sprouting in their Science Journal. Encourage children to write a word that represents their growing seed. When working with younger children, provide an example they can use as a model.	Encourage children to share their journal entries with each other. Provide children with verbal praise when the new words about seeds are used.
Observe Seeds during Center Time	During center time, place a small amount of basil, peas, and tomato seeds in separate Petri dishes. Spray the dish with a small amount of water to begin the germination process. Place the Petri dish under a microscope and allow children to observe seeds germinating.	Encourage children to work in pairs while observing so they can share their observations with each other.

SMALL GROUP AND INTERACTIVE CHOICE TIME - PART 2

What to Do		What You Could Say
Define the word Predict & Use Senses to Observe Basil	Pass around fresh basil to each child. Explain that basil seeds can grow into a plant just like the one they are holding. Build on prior learning by encouraging children to use their five senses to explore the seeds and basil plant (feel the leaves, smell the aroma). Review the ***Documentation Panel*** created by the class in Part 1.	Tell children: ***"Basil is an edible plant that we often use when making salads."*** Introduce the word **predict** again and provide a child-friendly definition. Explain to the children that the class is going to predict what a seed needs to grow.
Make a Prediction	In a large group, discuss how the previous activities showed the need for water for a seed to germinate. Use a ***Prediction Panel*** to record their answers on a large piece of paper or erasable board. Make sure to include their name next to their answer.	Ask each child to make a prediction: **"What else does a seed need to germinate?"** Discuss the idea of cause/effect by explaining how certain things can help a seed grow (sun, soil, time).
Define Experiment	Introduce the word **experiment**. Explain to children that the class is going to set up an experiment to explore what else a seed needs to grow.	Tell children: **"Now that we know plants need water to grow big and strong, we are going to set up an experiment to find out 'Does a seed need soil to grow?'"**

ACTIVITY 2: What Do We Wonder?

What to Do		What You Could Say
	Create 2 groups otherwise known as conditions. Using small plastic cups, create 3 basil seed cups per condition. Write Condition 1: "no soil" on the first set of 3 cups and place a few seeds inside. These cups should be placed near or on a window. Write Condition 2: "soil" on the second set of cups. Add a small amount of soil to each along with a few seeds. These cups should be placed near or on a window. Over the course of the week make sure to provide all of the cups in both conditions with the same amount of water and sunlight.	Explain to children that they will be watching the conditions to see what changes occur and if there is growth. Ask children to describe how they will know if the seeds are germinating. For example, a "tiny plant" will emerge.
Ask Children to Record their Observations of Seeds in their *Science Journal.*	Over the course of the week ask children to draw their observations of the experimental conditions in their Science Journal. When working with younger children, provide an example they can use as a model.	Discuss the changes that happen and why. Encourage children to share their observations with each other.
Ask "WH" Questions and Model Using Descriptive Words	Remember to use WH (who, what, where, when, and how) and open-ended questions to help children describe their observations as they watch their seeds germinate. Role model and encourage children to use descriptive words such as those related to color, texture (smooth, rough, shiny, bumpy, soft, hard etc.), size (small, large, minute, short, long,) and weight (light vs. heavy) when relevant.	Ask children "fair" questions that can be answered through observation: **What size are the seeds/seedlings? Can you put them into groups based on their size? In which conditions did we see a tiny plant emerge?**
Compare Predictions with *Documentation Panel*	In a large group at the end of the week create a ***Documentation Panel*** of the selected experimental conditions (soil vs. no soil) to discuss which seeds grew the best. Using the ***Prediction Panel*** created in step 2, compare and contrast children's original predictions with the results of the ***Documentation Panel***.	Ask children: **Do seeds need soil to germinate? What is our evidence for answering this question?** Documentation Panels provide another time to use revoice and restate. As you compare and contrast predictions to the data of the experiment, use the strategies of revoicing and restating. For example, **"Chase, let me see if I can repeat your comparison of your prediction and the actual data from our seed experiment. Chase said, 'I thought that the seed would need soil, but we found that the seed did not need soil to start growing.' Is this what you said?"**

What to Do		What You Could Say
		Also, during this time, use the strategy of restating children's ideas. For example, **"Can someone else tell me what Chase said about what a seed needs to start growing?"**
Display Class Findings for Families & Ask Families to Share Materials from Home for Next Activity	To prepare for Activity 3, ask children to bring in or draw a picture of seeds from home for sharing. Families can also share photographs via texting or social media.	Encourage children to share the question and their response with parents/ guardians.

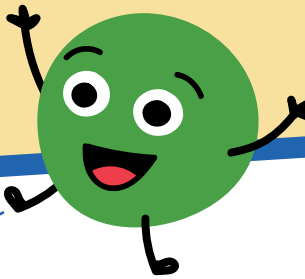
Unit 2 SEEDS

ACTIVITY 3:

What More Do We Want to Know?

OVERVIEW

Ask children to explain what they have learned about seeds and what they still want to know. Read a book about how seeds move. Children will share and discuss the seeds they brought from home with the class. Children will sort and categorize the seeds brought from home based on observable characteristics.



HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

1. **Children will be able to describe seeds they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible).** [GOAL P-SCI 1]
2. **Children will be able to gather information about seeds by looking at books and discussing prior knowledge related to the first two activities.** [GOAL P-LIT 2]
3. **Children will be able to categorize seeds into groups based on their characteristics (e.g., growth, response to the environment, having offspring, and the need for food, air, and water).** [GOAL P-SCI 3]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Gardening Study.

What are the characteristics of seeds? Prompt children to think about the different types of seeds and compare their similarities and differences.

For more information on standard alignment, visit www.MorePeasPlease.org.

YOU WILL NEED

- *Documentation Panel* from Practice Science Activity 1: "Characteristics of Seeds"
- *Photographs:* spinach seeds, carrot seeds, dried peas, and tomato seeds
- Dandelion, acorn, sweet gum ("spiky seed"), samara fruit ("helicopter seeds"), tomato seeds, dried peas
- *Suggestd Book: "Seeds Move"* by Robin Page (3-8 years)
- *Suggested Book: "Seed to Plant"* by Gail Gibbons (Board Book, Infant-3 years)
- Magnifying glasses (1 per child)
- *Science Journals* (1 per child)
- Coloring/writing utensils

PREPARATION

Prepare a selection of seeds or pictures of seeds for children to choose from in case they were not able to bring something from home.

ACTIVITY 3: What More Do We Want to Know?

LARGE GROUP

What to Do		What You Could Say
Show and Talk about Seeds	Have a short version of a show and talk about seeds. Allow children to share and describe the seeds they brought from home with the class. Encourage children to use descriptive words.	Ask children to tell you something about some of their favorite seeds, what they found interesting about seeds, and something that they did not know. Reminder to continue to use the Apply Science Talk strategies of revoice and restate during any discussion. Use them whenever you feel it is appropriate, especially when you want to clarify a child's idea or ensure participation of all children in the discussion.
Ask More Questions about Seeds	Prompt children to ask more questions about seeds. If children present phenomena that you are unable to address today, let them know that you can talk about those concepts later.	**"What do you *still* want to know about seeds?"**
	To prompt children's ideas, share a seed that moves.	**"We know that seeds grow but how do they move? Have you ever noticed how there are plants and trees all over the place - they are near our school, they might be near your house, they are in the park! How do you think they get there? Do you think trees and flowers produce seeds?"** **"Seeds move lots of different ways - through the wind and animals like birds that pick them up and move them from one place to another."**
	Show children a dandelion (either physical or picture). Demonstrate how the seeds move by blowing on the dandelion and watching it disperse.	**"Have you ever seen a dandelion like this before in your yard? Have you ever blown on it?"**

READ ALOUD

What to Do	
Read about Seed Movement	Extend children's understanding of different types of seeds by reading a book. Be sure to point out the spinach! If new observations about the characteristics of seeds are made, record them on the class Documentation Panel from Activity 1. Encourage children to talk about how the observed seeds are similar or different.

SMALL GROUP AND INTERACTIVE CHOICE TIME

What to Do		What You Could Say
Sort Seeds based on Characteristics of How Seeds Move	Share the other seeds with the class.	**"The Samara Fruit seed ("helicopter seed") travels through the air like a helicopter! This sweet gum seed ("spiky seed") moves by grabbing onto animals like your pet dog! The acorn seed might get hidden by a squirrel and moved from place to place. And did you know - some seeds, like our pea here, might get eaten by a bird and then transported somewhere else through its poop. Cool!"** Ask children questions that can be answered through observations: **How could this seed move? Can you put them into groups based on how they move?**
Observe Seeds	To encourage peer collaboration, have children work in pairs. Provide children with ***magnifying glasses*** to allow for closer observation of the seeds.	Encourage them to explain to their peer what the seeds look like under the magnifying lens.
Ask Children to Record Seeds in their *Science Journal*.	Ask children to draw the seeds they have observed in their ***Science Journal*** and how they think they move. When working with younger children, provide an example they can use as a model.	Encourage children to write a word that represents how seeds move. Encourage children to share their journal entries with each other.
Role Model and Provide Praise as Appropriate.	Remember to role model and encourage children's use of descriptive words.	Provide children with verbal praise when descriptive words are used appropriately.

Unit 2 SEEDS

ACTIVITY 4:

What Have We Learned?

OVERVIEW

Ask children to tell something they saw and learned about seeds. Expand children's understanding by introducing edible and non-edible seeds. Children will use a magnifying glass to observe each seed type, have the opportunity to taste the edible seeds, and report their observations to a peer.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

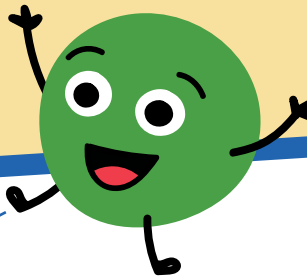
1. Children will be able to describe seeds they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to demonstrate understanding by stating that eating a variety of edible living things (e.g. vegetables) helps them grow and be healthy. [GOAL P-PMP 5]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Gardening Study.

- What foods do we eat (fruit and vegetables) that come from seeds? Prompt children to talk about the kinds of seeds used in a garden to grow fruits and vegetables.
- What is a garden? Prompt children to talk about seeds and why they are important to gardens.

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

- *Documentation Panel* from Support Learning Activity 1: "Characteristics of Seeds"
- 1 sheet large paper (25"x30") for *Documentation Panel*
- Small box for observing seeds
- Edible Seeds to Explore: tomato seeds, dried peas
  NOTE: Seeds that are used for exploration are separate from the seeds for taste testing. Seeds that are handled by children during exploration should NOT be consumed due to sanitation concerns
- Edible Seeds to Taste: tomatoes, frozen peas
- Non-edible Seeds: acorns, dandelions, winged seeds, seasonal seeds
- 3"x5" photograph of each of the edible and non-edible seeds presented
- Magnifying glasses (1 per child)
- Balancing scale (1 per group)
- Bowls or plates (1 per child)
- Napkins
- Cutting bard/knife & measuring cups
- *Science Journals* (1 per child)
- Coloring/writing utensils
- See **perishable** items in recipe below

Edible Seed

A tiny plant with leaves, stem, root parts that will help grow a new plant that we can eat to grow and be healthy

Spanish Translation: semilla comestible (seh-mee-yah koh-mehs-tee-bleh)

Child-Friendly Definition: Little packages that have food that we can eat! Like peas!

Mango, Tomato, & Corn "Seed" Salsa

(Servings 20)

Ingredients:

1 mango (fresh or thawed from frozen), diced ~1 cup

2 cups grape tomatoes, diced

1 - 14.5oz can corn, rinsed and drained

½ cup cilantro, chopped

⅓ cup red onion, diced (optional)

1 lime, juiced

whole grain pita chips

Instructions:

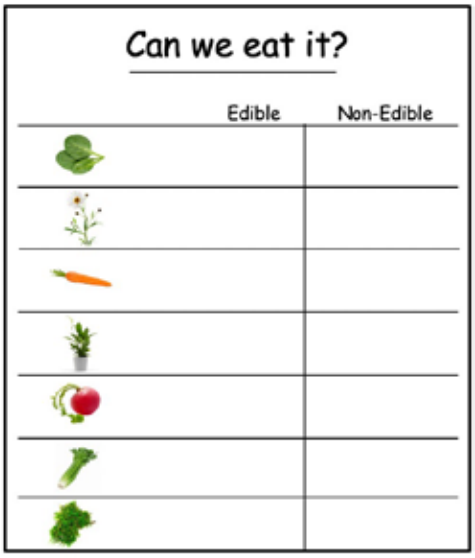
Combine mango, tomatoes, corn, cilantro, red onion and lime juice in a large bowl. Stir to combine.

Portion into individual bowls/plates for children.

Serve with whole grain pita chips for dipping.

ACTIVITY 4: What Have We Learned?

PREPARATION



1. Write the learning activity question "Can we eat it?" at the top of the *Documentation Panel*. Create a chart with seven rows and three columns. On the left side of each row, attach the image of your edible and non-edible seeds. Next, label column one as "edible" and column two as "non-edible".
2. Collect any needed seeds.
   NOTE: Seeds can be purchased or found outside depending on the season (i.e. acorns can be collected in the fall).
3. Purchase edible seeds, enough for each child to taste each vegetable. Vegetables seeds or vegetables with seeds inside are preferred.
4. Procure food items needed to make Seed Salsa.
5. Prepare vegetables for the children to taste. Leave one of each vegetable whole for observation.
6. Put all the observation seeds in a box so that you can pull them out one at a time and show the children.

BUILD ON PRIOR LEARNING

- If some of the seeds have wings, show and label them. Make sure to ask children what they think the wings are for. Tell children: "Remember how we made observations about how seeds move and read a book about how seeds move?"
- You can further explain: "Seeds with wings use its wings to fly and find a new home to grow into a plant. Some seeds are sticky so they can stick to animals and people. Other seeds drift in the ocean or streams before they find new homes."

EXTENDED LEARNING

Ask new questions!

- What is a garden? Provide a child-friendly definition using the TSG Gardening Study materials. Prompt children to talk about seeds and why they are important to gardens.
- Since this question is not a "fair" question, consider researching the answer to this question, showing children pictures of people planting in a garden, plant your basil seeds from Day 2, or even visit a local garden!

LARGE GROUP

What to Do		What You Could Say
What Have We Learned?	To prompt children's discussion about seeds, share a tomato sliced in half with the children. Ask children to decide how it should be classified according to the list of characteristics of seeds in the class ***Documentation Panel*** from Activity 1.	**"What have we learned about seeds?"** During the discussion of what children have learned is another great opportunity to use revoice and restate as children piece together and clarify their ideas.
Define Edible	Provide a child friendly definition for **edible** seeds. Ask children to tell you some edible seeds that they eat at home or when they eat away from home.	**"Little packages that have food that we can eat to grow and be healthy! Like tomatoes!"**
Share Edible Seeds and Non-edible Seeds	Have selected edible and non-edible seeds in a box.	Take each type out and describe them to the children. If possible, pass the seed(s) around for observation and ask them to look at specific features of the seed and describe what they see (e.g., texture. length, size, etc.). Remind children not to put the seeds in their mouth. Ask them to talk about how the seeds differ from one another and how they are similar to one another.
	In a large group, ask each child to classify each of the items on the first column of the prepared ***Documentation Panel***: **"Can we eat it?"** Use a ***Documentation Panel*** to record their answers on a large piece of paper or erasable board. Make sure to include their name next to their answer.	To assist in their response, ask children: "**What do all edible seeds have in common? Do they have similar characteristics? What are they? How can you tell if something is edible?"** Repeat the same discussion about non-edible seeds.
	Tell children some seeds we can eat, but others we cannot. Ask children which seeds they think are edible and non-edible.	**"Edible seeds are good for our body and can help us grow and be healthy."** Explain to them one should not eat nonedible seeds because they may make us sick or may have been sprayed with pesticide. Remind children to always check with an adult before sampling any seeds.

ACTIVITY 4: What Have We Learned?

SMALL GROUP AND INTERACTIVE CHOICE TIME

What to Do		What You Could Say
Observe and Describe Edible Seeds	Allow children to observe the edible seeds. If the seeds are inside of a vegetable, slice the vegetable length wise to expose the seeds inside. Let children pass the seeds around and look and feel them closely. Allow them time to touch and observe each vegetable using a ***magnifying glass***. Children can also explore how light or heavy different seeds are using a ***balancing scale***.	Verbally describe what children are observing.
Make Mango, Tomato & Corn Seed Salsa	Have children observe you prepare the salsa. If allowable in your center, support children as they make their on seed salsa in individual bowls. Food preparation activities can support development of fine motor skills.	Describe what they are looking at using descriptive words. Tell children: **"Salsa makes a great dip, it is full of edible seeds like tomatoes and corn and makes a perfect snack!"**
Taste Edible Seeds **Ask "WH" Questions and Model Using Descriptive Words.**	Have children wash their hands. Pass out a small sampling of the salsa (edible seeds) for tasting. Emphasize again that we should eat a variety of edible seeds to help them grow and be healthy. As children are tasting the edible seed salsa, remember to enthusiastically role model tasting the same foods.	Talk positively about tomatoes, **"These tomatoes are red, round, smooth, and juicy! I like eating tomatoes! What does it taste like to you?".**
Ask Children to Draw Seeds in their *Science Journal*	After children finish eating and wash their hands, ask children to draw the seeds they just observed in their ***Science Journal***. Place the vegetables (edible seeds) in the middle of the table so they can see them. When working with younger children, provide an example they can use as a model.	

NOTES

Unit 3 PLANT PARTS

MODEL SCIENCE LEARNING

A Word About Plant Parts

Plants have three main parts: roots, stems, and leaves. Each plays a role in helping the plant grow and be healthy.

We can eat the roots, stems, or leaves of most **vegetable plants**. They provide vitamins, minerals, and fiber that is critical to our healthy growth and development.

Roots anchor the plant in the soil and absorb water and nutrients for the plant. *Fibrous roots* are many fine roots that branch out over a wide space underground. *Tap roots* have a single, thick, main root that grows into the ground. Many of these are edible, such as radishes, beets, and carrots.[1] These are called *root vegetables*.

Stems grow up from the roots, transporting water and nutrients to the plant. Secondary stems called *petioles* branch off from the main stems and give the leaves access to sunlight. *Stem vegetables* have stems that are edible, such as asparagus, celery, and rhubarb.

Leaves produce food for plants through *photosynthesis* (when plants absorb carbon dioxide and release oxygen into the air while converting sunlight into energy). *Leaf vegetables* are plants with edible leaves, and include many diverse plants, such as spinach, kale, and romaine lettuce.[1]

THE BIG IDEA ABOUT ROOTS, STEMS & LEAVES

Children will understand the structure and function of plant parts.

Concepts About Plant Parts:

- Plants have several different parts (roots, stems, leaves, flowers, and seeds).
- The different parts of a plant play specific roles in the plant's growth and survival (e.g. the roots gather water and leaves produce food for the plant).
- We can use tools to explore plants.

Essential Questions About Plant Parts:

- What are the external parts of a plant?
- How do the parts of a plant differ?
- How do the parts of a plant help it grow and survive?
- Do all plants have the same parts?
- What tools can we use to explore plants?

[1] University of Illinois Extension, 2020.

WEEK AT A GLANCE

	DAY 1	DAY 2	DAY 3	DAY 4
Question of the Day	What do we know about the parts of a plant?	What do we wonder about the parts of a plant?	What more do we want to know about the parts of a plant?	What have we learned about the parts of a plant?
Teaching Strategies GOLD Alignment Suggested Studies: Gardening	What are the characteristics of plants that grow in a garden?	What are the characteristics of roots and stems?	What are the characteristics of leaves?	What kinds of plants can we eat?
New Vocabulary English (Spanish)	root (la raíz), stem (el tallo), leaf (la hoja)	absorb (ahb-sohr-behr)	photosynthesis (la fotosíntesis)	edible roots, stems, and leaves (los raíces, tallos y hojas comestibles)
Large Group	Share a root, stem, and/or leaf.	Observe the characteristics of roots and stems.	**Read-Aloud:** Read about leaves and ask more questions.	What plants can we eat? Share edible and non-edible plants.
Small Group	Describe, observe, and classify roots, stems, and leaves by their characteristics.	Make a prediction of what roots and stems do for a plant.	Sort leaves based on characteristics.	Taste edible plants (roots, stems, and leaves).
Your Ideas				
Plan Community & Family Engagement	Display the ***Documentation Panel*** from today's learning activity. Consider asking families to send in a picture or note with vegetable roots, stems, or leaves that they eat at home!	Encourage children to share the question and their response with parents/guardians. Ask children to bring in or draw leaves from home for sharing.	Display the ***Documentation Panel*** from today's learning activity. Encourage children to share the question and their response with parents/guardians.	Share information about today's activity with families. You could even send home a scavenger hunt for children to complete with their families looking for roots, stems, and leaves in their home and outdoors!

Unit 3 PLANT PARTS

ACTIVITY 1: What Do We Know?

OVERVIEW

Ask children to tell you what they know about the parts of plants (i.e. roots, stems, leaves). Support children as they describe the parts of a plant, and as they observe images and a real example.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

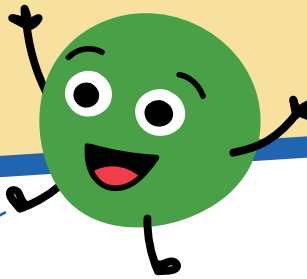
1. Children will be able to describe roots, stems, and leaves they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to categorize roots, stems, and leaves into groups based on their characteristics (e.g., growth, response to the environment, having offspring, and the need for food, air, and water). [GOAL P-SCI 3]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Gardening Study.

- What grows in gardens? Prompt children to think about the characteristics of plants that grow in a garden.

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

- *Documentation Panel* from Support Learning Activity 1: "Characteristics of Living Things"
- 1 sheet large paper (25"x30") for *Documentation Panel*
- *Photographs:* whole carrots including leaves, carrot growing, child eating a carrot, tree.

NOTE: It is important that photographs include root, stem, and/or leave so children can see entire plant

- Variety Vegetable Cards (included in PEAS Teaching Kit)
- 1 carrot (with stem and leaves)
- *Science Journals* (1 per child)
- Coloring/writing utensils

Roots, Stems, & Leaves Child-Friendly Definitions

Roots move food to the rest of the plant. Roots also hold food for the plant.

Stems helps to keep the plant standing up straight. Stems also connects the root to the leaves and can help provide water to the leaves.

Leaves helps the plant make food by trapping sunlight.

Root Full Definition: The part of a plant body that functions to help with absorption and food storage or as a means of anchorage and support. It is usually underground, and it differs from a stem because it lacks buds or leaves.

Spanish Translation: la raíz (rrah-ees)

Stem Full Definition: The plant part that supports another part (e.g., leaf, fruit). Liquid can travel from the root through the stem to the leaves.

Spanish Translation: el tallo (tah-yo)

Leaf Full Definition: An outgrowth from a plant stem that functions primarily in food manufacture via photosynthesis.

Spanish Translation: la hoja (oh-hah)

PREPARATION

Watch the PEAS "How to Prepare" Video for Plant Parts.

Write the activity question, "What are characteristics of roots, stems and leaves?" at the top of your *Documentation Panel*.

DOCUMENTATION PANEL
What are characteristics of roots, stems and leaves?

Aisha	leafy
Camila	help each other
Alejandro	grow
Lucas	we eat them
Oliver	green

Unit 3 PLANT PARTS

ACTIVITY 1: What Do We Know?

LARGE GROUP

What to Do		What You Could Say
Share a Carrot as an Example of Roots, Stems, and Leaves	Describe and show children a whole carrot.	Tell the children: **"A vegetable I enjoy are carrots. I like to observe them whole because you can see all the parts of the plant."** (Point to and name the roots, stem, and leaves.) **"Whole carrots are long, have a rough surface, and long green stems that come out of the top."** (Pass around the whole carrot for children to observe.) **"I like carrots because after you eat them, you can recycle their tops by placing them in water. The top of the carrot will grow into new carrot plants."** (Show picture of carrots growing.) **"I like the taste and crunch of carrots. And they are good for my eyes!"** (Show picture of child eating carrots.)
Explore Roots, Stems, and Leaves	Introduce the words **root, stem, and leaf.** Provide a child-friendly definition.	**"Roots move food to the rest of the plant. Roots also hold food for the plant."** **"The stem helps to keep the plant standing up straight. The stem also connects the root to the leaves and can help provide water to the leaves."** **"The leaf helps the plant make food by trapping sunlight."**

SMALL GROUP OR INTERACTIVE CHOICE TIME

What to Do		What You Could Say
What Do We Know?	Ask children to tell you what they know about roots, stems, and leaves.	**"Now you tell me what you know about roots, stems, and leaves. Maybe someone can tell me what roots are? Stems? Leaves? What do they look like? Where can you find them?"**
Describe, Observe, and Classify Roots, Stems, & Leaves by their Characteristics	Show children a picture of a tree. Show children the cards from the Roots, Stems, and Leaves Variety Vegetable Cards.	Explain that just like a tree has big roots at the bottom, a big trunk as a stem, and leaves at the top – plants too have roots, stems, and leaves! As you go through the cards, tell children: **"We are going to describe the photographs based on things we can observe like their shape (e.g. round, oval) texture (smooth/rough, soft/hard, etc.), color (black, yellow, white), edible/non-edible (e.g. peas). Then we are going to classify the plants as a root, stem, or leaf."** Ask children "fair" questions that can be answered through observations: **What color are the vegetables? Let's sort them into groups based on their color! What shape are the vegetables? Let's sort them into groups based on their shapes!**

What to Do		What You Could Say
	Direct children's attention to the Variety Vegetable Cards again. Point out the circle on each card indicating a root, stem, or leaf on each vegetable.	Tell children, **"Now let's classify the vegetables based on roots, stems, or leaves."**
	Record children's observations for each plant on the Documentation Panel. Make sure to include their name next to their answer. Keep this panel, you will continue to build on this panel by adding additional ideas throughout the other activities.	Tell children: **"As we continue our investigation, we will keep adding to what we know about roots, stems, and leaves."**
Ask Fair WH & Open-Ended Questions	Encourage children to use their senses to explore the roots, stems, and leaves by allowing children to touch and smell a real carrot. Experiment with sound by placing the carrot in a small cup or box and shaking. Remember to encourage and support children's use of descriptive words.	Ask children questions that can be answered through observation: **What color are the plants? Let's put them into groups based on their color? Which vegetable plants are roots that grow under the ground (carrot, sweet potato)? Which vegetable plants are leaves that look like leaves on a tree (spinach)?** Provide children with verbal praise when descriptive words are used appropriately.
Build on Prior Learning	Building on prior learning, remind children verbally about the characteristics of living vs. nonliving things. You can provide examples using the ***Documentation Panel*** your class created to describe the characteristics of living and non-living things from Unit 1.	
	Model the activity first, then using the ***Documentation Panel*** listing class generated characteristics of roots, stems, and leaves, help them make comparisons between the roots, stems, and leaves they are observing and the characteristics of living things.	Ask children to think about whether the vegetable plants are living or non-living (e.g., **Do they grow? Do they need food? Do they move? Do they breathe? Do they reproduce**). Support discussion as children put their ideas into words: **"What I'm hearing is that you think..."**
Ask Children to Draw Roots, Stems, & Leaves in their Science Journal.	Ask children to draw the different types of roots, stems, and leaves they observed in their ***Science Journal.***	Encourage children to write a word that describes a characteristic of roots, stems or leaves. When working with younger children, provide an example they can use as a model. Encourage children to share their journal entries with each other.
Display Class Findings for Families	Display the ***Documentation Panel*** from today's learning activity. Consider asking families to send in a picture or note with vegetable roots, stems, or leaves that they eat at home!	

Unit 3 PLANT PARTS

ACTIVITY 2: What Do We Wonder?

OVERVIEW

Support children as they explore the parts of a plant by conducting two small experiments with vegetable stems and roots. Through each experiment, children will make predictions, observe, talk about what they observe, and record their observations of the role stems and roots play in a plant's growth and survival. In part 1, help children setup, engage, and talk about an experiment to explore the role of stems using carrot tops and food coloring. In part 2, children will explore and talk about the role of roots using carrots. Children will record observations of stems and roots throughout the week in their *Science Journal*.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

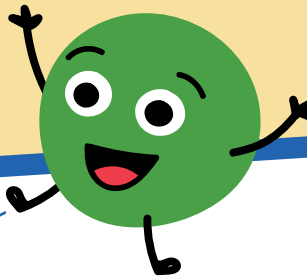
1. Children will be able to ask a question that can be answered through an investigation, "What does the stem do?" [GOAL P-SCI 4]
2. Children will be able to verbally make a prediction based on past observations, "I think the stem carries water to the plant." [GOAL P-SCI 5]
3. Children will be able to analyze and interpret data and summarize the results of an experiment. [GOAL P-SCI 6]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Gardening Study.

- What grows in gardens? What do the roots and stem do for the plant? Prompt children to think about the characteristics of plants that grow in a garden.

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

Part 1

- *Documentation Panel* from Apply Science Activity 1: "Characteristics of Roots, Stems, and Leaves"
- 1 Sheet large paper (25"x30") for *Prediction Panel*
- *Photographs: carrots growing in a garden, shredded carrots, baby carrots, chopped carrots*
- 2 glass jars (large enough to hold carrot upright)
- Food dye (any color except yellow)
- Cutting board/knife
- *Science Journals* (1 per child)
- Coloring/writing utensils
- 2-3 real stems (e.g. small twigs from trees, flowers, whole carrots, whole celery, asparagus) **(perishable)**
- 2 whole carrots with leaves and stem **(perishable)**

Part 2

- *Documentation Panel* from Apply Science Activity 1: "Characteristics of Roots, Stems, and Leaves"
- 1 sheet large paper (25"x30") for *Prediction Panel*
- *Photographs:* carrots growing in a garden, carrots shredded, baby carrots, chopped carrots)
- 2 glass jar or 4 oz. clear plastic cup
- 6-8 toothpicks, blunted
- *Science Journals* (1 per child)
- Coloring/writing utensils (1 per child)
- 2-3 real roots (e.g. turnips, carrots, radishes, or roots at the bottom of a plant that has been pulled from the ground) **(perishable)**
- 2 whole carrots with leaves and stem **(perishable)**

Absorb

To take in or soak-up energy or a liquid by chemical or physical action

Spanish Translation: absorber (ahb-sohr-behr)

Child-Friendly Definition: The way a plant pulls in water and nutrients when it is thirsty. You quench your thirst by drinking a glass of water!

PREDICTION PANEL
What do stems do for plants?

PREDICTION PANEL
What do roots do for plants?

ACTIVITY 2: What Do We Wonder?

PREPARATION

Part 1

1. Write the learning activity question "What do stems do for plants?" at the top of your *Prediction Panel*.
2. Gather a variety of stems for the children to observe.

NOTE: While all vegetables have stems, only the ones that we eat the stems of are considered stem vegetables.

TIP: You can use this same method to recycle carrot tops and grow new carrots! Using the same procedure (without food dye), place the carrot top near a sunny window. Change the water daily. When the tops sprout shoots, plant them in soil.

Part 2

1. Write the learning activity question "What do roots do for a plant?" at the top of your Prediction Panel.
2. Gather a variety of roots for the children to observe.

NOTE: While carrots are roots, potatoes are not. Potatoes can sprout roots, but they are a part of the tuber family. Other root vegetables include onions, radishes, and parsnips.

LARGE GROUP - PART 1

What to Do		What You Could Say
Build on the Characteristics of Stems	Using the ***Documentation Panel*** from Activity 1 listing class generated characteristics of roots, stems, and leaves.	Tell children: **"Let's build on what we know about stems. So far, we have defined stems as having these characteristics [insert characteristics that were described by children]. Can we add to our list?"**
Describe, Observe, and Classify Stems	Pass around the real stem examples for children to describe and observe. Re-introduce the word **stem**.	Tell children: **"Carrots are an edible plant that we can eat in many different ways, but we don't eat the stem."** (Show images of carrots growing in a garden, whole, and in various transformations).
	Collect other stem examples and then pass around. Then pass around just the whole carrot (with roots, stems and leaves) again. Based on children's responses, record additional characteristics of Roots, Stems and Leaves on the ***Documentation Panel*** from Activity 1.	Encourage children to use their five senses to explore the carrot stem (feel the stems, smell the aroma). Encourage children to discuss how the stems differ and are similar.
Make a Prediction	Use a ***Prediction Panel*** to record their answers on a large piece of paper or erasable board. Make sure to include their name next to their answer.	Ask each child to make a prediction: **"What do stems do for plants?"** Tell children: "**There are many shapes, sizes, and types of stems. Different kinds of plants need different stems. The stem transports food and water around the plant."**

What to Do		What You Could Say
	Using a whole carrot again, point out the different parts of the plant (roots, stems, and leaves).	Discuss the idea of structure/function by explaining how parts of a plant work together to help the plant grow and stay healthy. Describe the role of the stem. Tell children: **"Stems help move water and food around the plant."**

SMALL GROUP OR INTERACTIVE CHOICE TIME - PART 1

What to Do		What You Could Say
Design an Experiment	Explain to children that the class is going to set up an experiment to explore what the stem does for a plant. In one jar, add water and food coloring (you can even mix colors to create new ones!). The carrot root (orange part) should be covered with water). Add enough coloring to make the water fairly dark. Next, prepare the carrot by cutting the root 1 inch below the stem. This will leave you with the leaves attached to 1 inch of the root. Place the carrot in the jar.	Tell children, **"We are going to investigate - does water move through the stem of a carrot plant? To do this, we are going to create 2 conditions. In one jar, we will put a carrot stem in water. In another jar, we will just put a carrot stem with no water."** Explain to the children that you will let the carrot sit in water overnight. As time passes, the bottom of the carrot will draw the water from the root (main body of the carrot) into the stems and to the leaves. The food coloring will allow children to observe the water's path as it moves through the carrot's roots, stems, and leaves.
Taste Edible Plants	Have children wash their hands. Dice the leftover main body of the carrot that was not used in the experiment. Pass out to children for tasting. Emphasize again that we should eat a variety of edible roots to grow and be healthy. As children are tasting the edible root (carrot), remember to enthusiastically role model tasting the same foods.	Talk positively about carrots: "**These carrots are a pretty bright orange, and sweet and crunchy! I like eating carrots! What does it taste like to you?"**
Ask Children to Record Observations of Stems in their Science Journal	Over the next few days, ask children to draw their observations of their carrot stems in their ***Science Journal***. When working with younger children, provide an example they can use as a model.	Encourage children to share their journal entries with each other. Provide children with verbal praise when the new words about stems are used.

ACTIVITY 2: What Do We Wonder?

What to Do		What You Could Say
Ask "WH" Questions and Role Model Using Descriptive Words	Remember to use WH (who, what, where, when, and how) and open-ended questions over the next few days to help children describe their observations as they watch their carrot stem change colors. Role model and encourage children to use descriptive words such as those related to c***olor***, ***texture*** **(smooth, rough, shiny, bumpy, soft, hard etc.),** ***size*** **(small, large, minute, short, long,) and** ***weight*** **(light vs. heavy)** when relevant.	Ask children questions that can be answered through observation: **What color are the leaves of the carrot in water? How did the colors change? What color are the leaves of the carrot without water? How did it change?** Support discussion as children put their ideas into words: **"What I'm hearing is that you think..."** Reinforce new words and concept by asking children to restate other children's ideas: **"Kayah, can you tell us in your own words..."** Respond and provide support for children's ideas: **"Do you agree that...? Why do you think that?"**
Compare Predictions with Observations	Once the food dye has moved into the leaves of the carrot, allow children to observe the change. Revisit the class ***Prediction Panel*** and **compare/contrast** original ideas to what really happened. Emphasize observations of the change over time.	Tell children: **"Before we talked about how there are many shapes, sizes, and types of stems. Different kinds of plants need different stems. A tree needs a really thick, tall stem to hold it up, while a dandelion only needs a small stem that isn't very strong."**
	If new observations about the characteristics of plants are made (e.g. plants need water to live), record on the class ***Documentation Panel*** from Activity 1 listing class generated characteristics of roots, stems, and leaves.	**"Some plants have thorns on their stems to keep them from getting eaten, and some have fuzzy stems that keep the plant from getting too hot or cold. No matter what they look like, all the stems have the same functions and do the same things for the plant. Stems help support the plant. Stems also act like a plumbing system for the plant. They help move water and food around the plant."**
Display Class Findings for Families & Ask Families to Share Materials from Home for Next Activity	Encourage children to share the question and their response with parents/ guardians. To prepare for Activity 3, ask children to bring in or draw leaves from home for sharing.	

LARGE GROUP - PART 2

What to Do		What You Could Say
Build on the Characteristics of Roots	Using the ***Documentation Panel*** from Activity 1 listing class generated characteristics of roots, stems, and leaves.	Tell children: **"Let's build on what we know about roots. So far, we have defined roots, stems, and leaves as having these characteristics [insert characteristics that were described by children]. Can we add to our list?"**
Describe, Observe, and Classify Roots	Pass around the real stem examples for children to describe and observe. Re-introduce the word **root**.	**"Roots move food to the rest of the plant. Roots also hold food for the plant."**
	Collect other root examples and pass around. Then pass around just the whole carrot (with roots, stems and leaves) again. Based on children's responses added, record additional characteristics of Roots, Stems and Leaves on the previous ***Documentation Panel*** from Activity 1.	Encourage them to discuss how the roots differ and are similar. Encourage children to use their five senses to explore the carrot (feel the stems, smell the aroma).
Make a Prediction	Use a ***Prediction Panel*** to record their answers on a large piece of paper or erasable board. Make sure to include their name next to their answer.	Ask each child to make a prediction: **"What do roots do for plants?"** Tell children: **"Carrots are an edible plant that we can eat in many different ways. The part we eat is the root!"** Show images of carrots growing in a garden, whole, and in various transformations (e.g. shredded, baby carrots).
	Using a whole carrot, again point out the different parts of the plant (roots, stems, and leaves). Introduce the word **absorb**.	Discuss the idea of structure/function by explaining how parts of a plant work together to help the plant grow and stay healthy. Describe the role of the root. Tell children: **"Roots help anchor a plant in the ground. They can also help absorb and save (store) water and food."**

ACTIVITY 2: What Do We Wonder?

SMALL GROUP OR INTERACTIVE CHOICE TIME - PART 2

What to Do		What You Could Say
Design an Experiment	Explain to children that the class is going to set up an experiment to explore what the root does for a plant. Create 2 groups otherwise known as conditions. Find two clear jars or glasses that are tall enough for your carrot. Label 1 jar "condition 1: water" and 1 jar "condition 2: no water". Place toothpicks in each carrot to hold the carrot upright in the jar. Fill one jar halfway with water. Once the carrot is inserted in the jar, approximately half of the carrot should be covered with water. Gently place the carrot in the jar. In the second jar, place the carrot inside with no water. Place both jars on or near the window. Check the jar daily. Add water as needed to condition 1 to make sure the bottom of the carrot stays wet. Within a week, you should observe roots beginning to grow.	Tell children, **"We are going to set up an experiment to see - Can we grow roots on a carrot by placing it in water?"** Explain to children that the class will create 2 conditions. One condition will have a carrot in water and one condition will have a carrot without any water. Emphasize to children that both groups will receive the same amount of sunlight. The only thing that is different between the 2 conditions is the water. 
Ask Children to Record Observations of Roots in their *Science Journal*	Over the next several days ask children to draw their observations of their carrot in the water from part 2 in their Science Journal. When working with younger children, provide an example they can use as a model. Encourage children to share their journal entries with each other. Provide children with verbal praise when the new words about roots are used.	

What to Do		What You Could Say
Ask "WH" Questions and Role Model Using Descriptive Words	Remember to use WH (who, what, where, when, and how) and open-ended questions to help children describe their observations as they watch their seeds germinate. Role model and encourage children to use descriptive words such as those related to ***color***, ***texture*** **(smooth, rough, shiny, bumpy, soft, hard etc.),** ***size*** **(small, large, minute, short, long,) and** ***weight*** **(light vs. heavy)** when relevant.	Ask children questions that can be answered through observation: **What size are the roots? Let's put them into groups according to their size!**
Compare Predictions with Observations	Once the carrot has sprouted roots, allow children to observe the change. **Emphasize observations of the change over time.** Revisit the class ***Prediction Panel*** from Step 3 and **compare/contrast** original ideas to what really happened. Compare and contrast children's original predictions with the observed results. If new observations about the characteristics of roots, stems, and leaves are made (e.g., plants need water to live), record on the class ***Documentation Panel*** from Activity 1 listing class generated characteristics of roots, stems, and leaves.	Tell children: **"Before we talked about how roots help anchor the plant in the ground. They are also important for absorbing and saving (storing) water and food for the plant. Roots hold food for the plant. There are many root vegetables that can be eaten such as carrots, radishes, turnips, and many more!"**
Display Class Findings for Families & Ask Families to Share Materials from Home for Next Activity	To prepare for Activity 3, ask children to bring leaves in or draw a picture from home for sharing. Families can also share photographs via texting or social media.	Encourage children to share the question and their response with parents/ guardians.

Unit 3 PLANT PARTS

ACTIVITY 3:

What More Do We Want to Know?

OVERVIEW

Ask children to explain what they have learned about the parts of a plant and what they still want to know. Read a book about growing spinach (a leaf vegetable). Children will share and discuss the leaves they brought from home with the class. Children will sort the leaves brought from home based on their characteristics.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

1. Children will be able to describe roots, stems, and leaves they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to gather information about leaves by looking at books and discussing prior knowledge related to the first two activities. [GOAL P-LIT 2]
3. Children will be able to categorize leaves into groups based on their characteristics (e.g., size, shape, smell, sound). [GOAL P-SCI 3]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Gardening Study.

- What grows in gardens? What do leaves do for the plant? Prompt children to think about the characteristics of plants that grow in a garden.

For more information on standard alignment, visit www.MorePeasPlease.org.

YOU WILL NEED

- *Documentation Panel* from Apply Science Talk Activity 1: "Characteristics of Roots, Stems, and Leaves"
- Photographs or real examples of a variety of different leaves
- *Photographs*: spinach growing, spinach cooked, spinach raw, child eating spinach
- *Suggested Book*: *"Sylvia's Spinach!"* by Katherine Pryor (4-8 years)
- *Suggested Book*: *""Plants Feed Me?"* by Lizzy Rockwell (3-6 years)
- Magnifying glasses (1 per child)
- *Science Journals* (1 per child)
- Coloring/writing utensils
- Spinach leaves **(perishable)**

Photosynthesis
The process that green plants use to turn sunlight into food using carbon dioxide and water

Spanish Translation: la fotosíntesis (foh-toh-seen-the-sees)

Child-Friendly Definition: The process that green plants use to make their food from the sunlight.

PREPARATION

Prepare a selection of photographs/ drawings of leaves for children to choose from in case they were not able to bring something from home.

ACTIVITY 3: What More Do We Want to Know?

LARGE GROUP

What to Do		What You Could Say
Show and Talk about Leaves	Reintroduce the word **leaves**. Have a short version of a show and talk about leaves where some children can tell you something about one of their favorite leaves, what they found interesting about leaves, and something that they did not know. *Be sure to have extra leaves for children who forgot or were unable to bring in leaves for sharing.*	**"The leaf helps the plant make food by trapping sunlight."** Allow children to share and describe the leaf/leaves they brought from home with the class. Encourage children to use descriptive words.
Ask More Questions about Leaves	To prompt children's ideas, share a variety of different leaf types.	Prompt children to ask more questions about leaves: "**What do you *still* want to know about leaves?"** If children present phenomena that you are unable to address today, let them know that you can talk about those concepts later.
Sort Leaves based on their Characteristics	As a class, sort the leaves based on their characteristics (e.g., size, shape, color, smell, sound). Build on the ***Documentation Panel*** created in Activity 1 listing class-generated characteristics of roots, stems, and leaves and **compare and contrast** the characteristics.	

READ ALOUD

What to Do		What You Could Say
Read about Roots, Stems, & Leaves	Extend children's understanding about leaves by reading a book about spinach.	Be sure to point out the spinach, carrots, peas, and tomatoes!
	Introduce the word **photosynthesis**. Provide a child-friendly definition.	Tell children: **"The main role of the leaf is to produce food for the plant. This happens through photosynthesis, the process by which the sun helps plants make their own food."**

SMALL GROUP OR INTERACTIVE CHOICE TIME

What to Do		What You Could Say
Observe Leaves	Provide children with ***magnifying glasses*** to allow for closer observation of the leaves. To encourage peer collaboration, have children work in pairs. Encourage them to explain to their peer what the leaves look like under the magnifying lens.	Ask children questions that can be answered through observation: **What do the leaves feel like? Do you see tiny lines or bumps?** Support discussion as children put their ideas into words: **"What I'm hearing is that you see..."**
Ask Children to Draw Seeds in their *Science Journal*	Ask children to draw in their Science Journal the leaves they observed. When working with younger children, provide an example they can use as a model.	Encourage children to write a word that represents a characteristic of seeds.
Display Class Findings for Families & Ask Families to Share Materials from Home for Next Activity	Display the ***Documentation Panel*** from today's learning activity. Encourage children to share the question and their response with parents/guardians.	

NOTES

Unit 3 PLANT PARTS

ACTIVITY 4:

What Have We Learned?

OVERVIEW

Ask children to explain what they learned about the parts of plants. Expand children's understanding by introducing children to edible and non-edible plant parts. Children will use a *magnifying glass* to observe each plant type, have the opportunity to taste the edible plants, and report their observations to a peer.

HEAD START EARLY LEARNING OUTCOMES FRAMEWORK

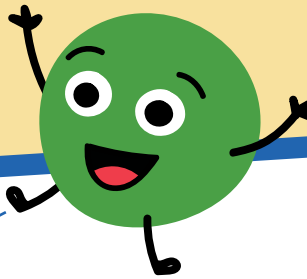
1. Children will be able to describe roots, stems, and leaves they have observed using adjectives related to differences (e.g., color, texture, size, length, shape, weight, and if a living thing is edible or non-edible). [GOAL P-SCI 1]
2. Children will be able to demonstrate understanding by stating that eating a variety of edible living things (e.g. vegetables) helps them grow and be healthy. [GOAL P-PMP 5]

TEACHING STRATEGIES GOLD (TSG) ALIGNMENT GUIDANCE

This unit can align with the TSG Gardening Study.

- What foods do we eat (fruit and vegetables) that grow in a garden? Prompt children to talk about the kinds of edible plants that grow in gardens.

For more information on standard alignment, visit www.MorePeasPlease.org.



YOU WILL NEED

- *Documentation Panel* from Apply Science Talk Activity 1: "Characteristics of Roots, Stems, and Leaves"
- 1 sheet large paper (25"x30") for *Documentation Panel*
- Real examples of non-edible plants such as daisies (flowering), peace lily (flowering), mosses (non-flowering)
- Photographs: edible and non-edible plants (photographs should be of the physical items presented)
- Small box for observations
- Magnifying glasses (1 per child)
- Measuring cups
- Bowls or plates (1 per child)
- Napkins
- Balance scale (optional)
- Cutting board/knife
- *Science Journals* (1 per child)
- Coloring/writing utensils
- Spinach, whole carrot with stem/leaves (edible plants to explore) **(perishable)**

NOTE: Plants that are used for exploration are separate from edible plants for taste testing. Plants that are handled by children during exploration should NOT be consumed due to sanitation concerns.

NOTE: Feel free to include other examples of roots, stems, and leaf vegetables such as celery (stem), collards, or other leafy green (leaves), or radish (root)

- See **perishable** ingredients for Salad recipe on following page.

Edible Roots, Stems, and Leaves

Parts of plants that support its growth and function that we can eat to grow and be healthy

Spanish Translation: los raíces, tallos y hojas comestibles (lohs rrah-ees-says, tah-yos, ee oh-hahs koh-mehs-tee-blehs)

Child-Friendly Definition: Parts of plants that have food that we can eat! Like carrots, celery, and spinach!

ACTIVITY 4: What Have We Learned?

Spinach & Strawberry "Plant Parts" Salad with Balsamic Vinaigrette

(Servings 20)

Ingredients:

1 bag fresh spinach

2 cups strawberries (fresh or thawed from frozen), sliced*

2 carrots, chopped or shredded

¼ cup balsamic vinegar

2 Tbsp honey

¼ cup olive oil

Whole grain crackers

**TIP: If your classroom has a strawberry allergy, pears (fresh or canned) can be substituted for strawberries in this recipe.*

Instructions:

Combine spinach, strawberries, and carrots in a large bowl. Stir to combine.

Combine balsamic vinegar, honey, and olive oil in small bowl. Stir to combine.

Pour dressing into salad bowl. Stir well.

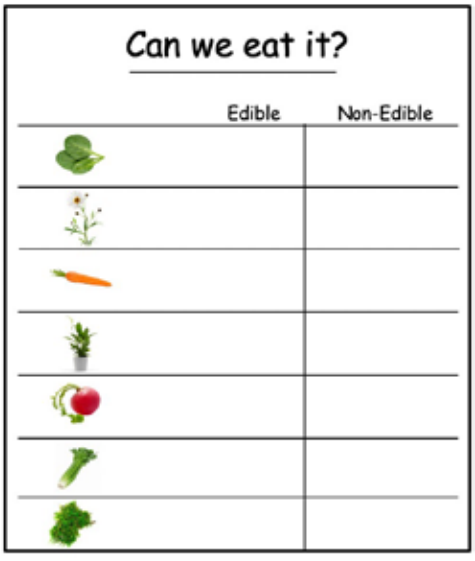
Portion into individual bowls/plates for children.

Serve with whole grain crackers.

PREPARATION

1. Write the learning activity title "Can we eat it?" at the top of the Documentation Panel. Create a chart with seven rows and three columns. On the left side of each row, attach the image of your edible and non-edible roots, stems, and leaves. Next, label column one as "edible" and column two as "non-edible".
2. Collect any needed plants. Plants can be purchased or found outside depending on the season.
3. Purchase edible vegetable plants. Purchase enough for each child to taste each vegetable.
4. Procure food items needed to make Spinach & Strawberry Salad (recipe above).
5. Prepare fruits and vegetables according to the recipe for the children to taste. If possible, leave one of each food whole for observation.
6. Put all the observation plants in a box so that you can pull them out one at a time and show the children.

TIP: If you would like children to prepare the recipe individually, divide the dip ingredients into children's individual bowls ahead of time. Allow children to mix with separate spoons.



LARGE GROUP

What to Do		What You Could Say
What Have We Learned?	To prompt children's discussion, share spinach and/or a whole carrot with children. Ask children to decide how it should be classified according to the list of characteristics of roots, stems, and leaves in the class ***Documentation Panel*** from Activity 1.	Ask children: **What have we learned about roots, stems, and leaves?**
Define Edible Roots, Stems, and Leaves	Provide a child friendly definition about **edible roots, stems, and leaves** (e.g., edible roots, stems, and leaves are plant parts that we can eat). Ask children to tell you name some edible roots, stems, and leaves that they eat at home or when they eat away from home.	**"Edible roots, stems, and leaves are the parts of plants that are food that we can eat! Like carrots, celery, and spinach!"**
Describe, Observe, and Classify Edible Roots, Stems, and Leaves and Non-edible Roots, Stems, and Leaves	Have selected edible and non-edible roots, stems, and leaves in a box. Take each type out and describe them to the children. If possible, pass the roots, stems, and leaves around for observation and ask them to look at specific features of the roots, stems, and leaves and describe what they see (e.g. texture, length, size, etc.).	Ask them to talk about how the spinach leaves and leaves on the carrot "differ" from one another and how they are "similar" to one another. Tell children some roots, stems, and leaves we can eat, but others we cannot. Some of those that we can't eat taste bad, others will make you very sick. Ask children which vegetable plants they think are edible and non-edible. **"A pinecone is a part of a plant, but we don't eat the pinecones we find outside. However, we eat vegetables every day and vegetables are a type of plant we can eat! Edible plant parts, like carrots and peas, are good for our body and can help us grow and be healthy."** Explain to them why one should not eat non-edible things, like grass or rocks. These items may make you sick or may have been sprayed with pesticides. Remind children to always check with an adult before sampling roots, stems, or leaves.

ACTIVITY 4: What Have We Learned?

What to Do		What You Could Say
	Next, ask each child to classify each of the items on first column of the prepared Documentation Panel: "Can we eat it?" Use a ***Documentation Panel*** to record their answers on a large piece of paper or erasable board. Make sure to include their name next to their answer. Remember to role model and encourage children's use of descriptive words.	To assist in their response, ask children: **What are the characteristics of edible roots, stems, and leaves? Do they have similar characteristics? What are they?** Repeat the same discussion about each of the items on the ***Documentation Panel***. Provide children with verbal praise when descriptive words are used appropriately.

SMALL GROUP, LARGE GROUP, OR INTERACTIVE CHOICE TIME

What to Do		What You Could Say
Observe and Describe Edible Roots, Stems, and Leaves	Allow children to observe the edible roots, stems, and leaves. Let children pass the roots, stems and leaves around and look and feel them closely. Allow them time to touch and observe each vegetable using a ***magnifying glass***. Children can also explore how **light or heavy** different roots, stems, and leaves are using a ***balancing scale***.	Describe what they are looking at using descriptive words. Role model how to use observation tools (e.g., **"I hold my magnifying glass with one hand up to my eye so that I can observe the edible living things more closely"**). Support discussion as children as they put their ideas into words: **"What I'm hearing is that you think..."** Reinforce new words and concepts by asking children to restate other children's ideas: **"Damion, can you tell us in your own words..."** Respond and provide support for children's ideas: **"Do you agree that...? Why do you think that?"**
Make Spinach & Strawberry Salad	Have children observe you prepare the salad recipe. If allowable in your center, support children as they make their on spinach and strawberry salad in individual bowls. Food preparation activities can support development of fine motor skills.	Describe what they are looking at using descriptive words.
Taste Edible Roots, Stems and Leaves	Have children wash their hands. Pass out a small sampling of the spinach & strawberry salad (edible roots, stems, and leaves) for tasting.	Emphasize again that we should eat a variety of edible roots, stems, and leaves to help them grow and be healthy.

What to Do		What You Could Say
	As children are tasting the edible roots, stems, and leaves, remember to enthusiastically role model tasting the same foods. Talk positively about carrots and spinach: "This spinach is green, smooth, and crunchy! I like eating spinach! What does it taste like to you?"	
Ask Children to Draw Seeds in their *Science Journal*	After children finish eating and wash their hands, ask children to draw the roots, stems, and leaves they just observed in their ***Science Journal***. Place the vegetables (edible leaves) in the middle of the table so they can see them. When working with younger children, provide an example they can use as a model.	
Share Activity with Families	Share information about today's activity with families. You could even send home a scavenger hunt for children to complete with their families looking for roots, stems, and leaves in their home and outdoors!	

NOTES

USING PEAS TO CREATE HIGH-QUALITY SCIENCE

Learning Experiences

Choosing a Science Topic

Try using the PEAS Practices to explore other science phenomenon with your children! Before you get started, consider your science topic. The PEAS Model Learning Activities featured topics and phenomena in the Life Sciences. However, because the PEAS Practices are focused on strategies for engaging children in science learning, not a specific topic. This means you can use the Practices to explore any science topic!

In the preschool and kindergarten science classroom, common science topics include concepts from the Life Sciences, Physical Science, and Earth and Space Science.[1] The below table provides ideas for developmentally appropriate topics in the sciences. Consider starting with a topic you already teach in your classroom. This approach will give you an opportunity to build the PEAS Practices into learning activities you are already familiar with. Once you feel comfortable with the Practices, don't be afraid to try something new!

Common Science Topics in the Preschool Classroom

Life Sciences	**Humans**	Learning about humans, their lifecycle, and their needs
	Animals	Learning about animal species, lifecycles, needs, habitats, and characteristics
	Plants	Learning about plant species, their lifecycles, needs and characteristics
Physical Science	**Matter**	Learning about different kinds of matter (e.g., wood, metal, water)
	Forces/Motion	Learning about how objects are affected by forces and motion
	Water	Learning about the physical properties and functions of water
	Light	Learning about the physical properties of light
Earth & Space Science	**Wind/Air**	Learning about the properties and functions of air
	Earth	Learning about the universe, stars, and Earth
	Weather	Learning about the characteristics of different seasons and observing the weather
	Recycling/ Environment	Learning about natural resources and how human action may cause changes in the environment

[1] Piasta et al., 2015; NGSS, 2013. [2] Straits, 2013. [3] NGSS, 2013; Llewellyn, 2002

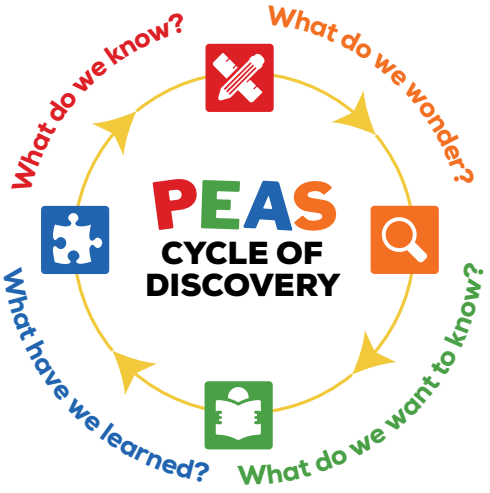
Identifying a Phenomenon to Explore

Once you have identified your topic, you can begin implementing the PEAS Practices by identifying a phenomenon! Deciding what science phenomenon to explore can be the most difficult part. Remember, the best science learning experiences relate to children's interests. Phenomena are "observable events". So, pay close attention to what children show interest in and talk about as they play in- and outside the classroom. These topics may be a good starting place for science exploration.

Finally, be sure to consider the phenomenon can be investigated by children. In other words, will exploring the phenomenon provide opportunities for children to reflect, represent, and apply what they have explored?[2]

A good way to determine this is thinking about the PEAS Process of Science. Ask yourself:

- Can the characteristics or behaviors of the thing or phenomenon be observed, compared, and contrasted? ("**What do we know?**")
- Can you explore the phenomenon through experimentation? ("**What do we wonder?**")
- What can we learn about the phenomenon through reading? Can we construct an explanation about the phenomenon? ("**What more do we want know?**")
- What additional questions can be asked about the phenomenon? ("**What have we learned?**")



The next table presents ideas for phenomena you can explore in the different areas of science. Remember to build your learning activities around "observable events" that can be explored through the Process of Science. This might include observing animal behavior, such as what body parts does an animal use to find food? It could also include observing plants, such as the ideal conditions plants need to grow. All three areas of science are considered disciplinary core ideas in the Next Generation Science Standards (NGSS), meaning each are important when preparing children for kindergarten.[3] Use our aligned standards and the NGSS to support your ideas for what and how children should learn (www.morepeasplease.org).

Science Phenomena to Explore in Your Classroom

Life Sciences	**Humans**	Observe how we use our senses and related body parts (e.g., see, hear, take in food, water, air) Observe how food is needed for humans to grow and live (e.g., stories and observable examples) Observe how certain foods are good for our body (e.g., stories and observable examples)
	Animals	Observe that some animal babies look like their parents, and some do not Observe how animals use their body parts (e.g., see, hear, take in food, water, air) Observe how animals need food to grow and live Observe that animals eat different types of foods Observe microhabitats of animal habitats (e.g., soil samples from school yard, a dead log from the woods) Observe the lifecycle of animals/insects (e.g., caterpillar to butterfly)
	Plants	Planting seeds and caring for plants Observe different types of plants (e.g., air plants, aquatic plants) to explore how plants have different needs Observe how plants provide many resources to use in our everyday lives (e.g., oxygen, food, medicine, clothing) Observe where our food comes from (e.g., indoor, outdoor gardening)
Physical Science	**Matter**	Observe solids and liquids, how temperature affects each (melting/freezing) Observe the characteristics of different kinds of matter Use blocks and construction sets to convey objects can be built from smaller pieces
	Forces/Motion	Observe motion and force with pulleys and ramps Observe the effect of pulling and pushing using different strengths Observe the effect pulling and pushing can have on speed and direction of an object
	Water	Freeze water and observe what makes it melt faster (e.g., salt, warm water, sitting in sun vs. shade) Manipulate the flow of water through tubes or a hose to see how the flow or directions changes Observe if objects will sink or float Observe waves
	Light	Observe reflection with a prism Observe using a flashlight on various types of materials Observe how the sunlight changes throughout the day Observe shadows Observe how we use our senses to detect light Observe how different colors are made (e.g., paint)
Earth & Space Science	**Wind/Air**	Observe wind blowing Blow on light (e.g., feather) and heavy objects; observe, compare/contrast differences
	Earth	Using telescopes, observe the solar system Observe rocks, soils, and sand and discuss where each is found and the role they play in plant and animal life Observe how maps are used
	Weather	Observe different types of weather (e.g., sunlight, wind, rain, snow) Measure and record weather conditions to observe patterns over time Observe changes in the season e.g., (summer, spring, winter, fall)
	Recycling/ Environment	Classifying objects that can be recycled by type (e.g., plastic, metal, paper) Compost food waste from snack time and read a story about recycling; observe what happens to food that is used in compost

Aligning Your Science Phenomenon with PEAS Practices

Once you have identified your phenomenon, you are ready to design your science learning activities! As presented earlier in this guide, the foundation of **PEAS** are the teaching practices. Follow the below 6 steps and corresponding lesson planning template as you create your science learning activities with the PEAS Practices in mind. You can download a copy of this template for free at: www.morepeasplease.org

STEP 1

Decide on a Phenomenon: Decide on the science phenomenon that you and/or the children in your classroom want to explore. Remember, phenomena are events that we can **observe** (e.g., a plant growing). This is also an important time to think about children's interests and building on children's prior learning experiences.

STEP 2

Embrace the Process of Science: PEAS children engage in the **Process of Science** by learning about phenomena over a series of activities where learning builds and provides the foundation for future learning by asking the questions:

- **What do we know?** Children describe what they know about a science concept (e.g., What are seeds? What do they look like? Where can they be found?). Children use their five senses to observe the characteristics of the thing being explored (e.g., some seeds are big, some seeds are little).

- **What do we wonder?** Children explore a science concept by learning how to ask questions that can be investigated (e.g., what does a seed need to germinate ("start to grow")?), make *predictions* (e.g., a seed needs water to grow), conduct *experiments*, make *observations*, and *report* and discuss their findings.

- **What more do we want to know?** With teacher support, children explain what they have learned so far and ask new questions. Learning is extended through reading (e.g., reading a book about how seeds move or edible plants). Children also make new observations by sharing and categorizing items brought from home based on what they have learned.

- **What have we learned?** Children *integrate*, *reflect*, and *describe* what they learned about the science concept (e.g., "There are many kinds of seeds. Seeds need water to germinate. The wind, animals, and bodies of water can help seeds move".).

There are many books and online resources that can support you as you design your science learning activities. Make sure to use the *Choosing and Using High-Quality, Developmentally Appropriate Science Resources* tool on page 110-111 to ensure you are selecting and creating meaningful learning activities if using these resources.

STEP 3

Select Strategies for Applying the PEAS Practices: The PEAS approach is naturally integrative, emphasizing four practice areas: Practice Science, Engage the Senses, Apply Science Talk, and Support Learning. Select which strategies you want to apply across the science learning activities you are designing. Remember, you **do not** have to use all the strategies is every learning experience you create.

- **Practice Science:** Strategies include engaging children in the **Process of Science** which starts by identifying a phenomenon (see Step 2). You also want to consider emphasizing the **Big Ideas** of science by integrating repeating patterns, cause and effect, structure and function, and/or stability and change concepts; and supporting children's use of the **Tools of Science** exploration by incorporating observation (e.g. magnifying glasses, microscopes, and observation jars), measurement (e.g. rulers and tape measures, measuring cups and spoons, pipettes, and balance scales, and communication tools (e.g. Documentation Panels, Prediction Panels, and writing in Science Journals to create drawings and record observations) in learning activities.

- **Engage the Senses:** Strategies include **Exploring with the Senses**; providing children opportunities to **Experience Culturally Appropriate Vegetables**; and planning for **Repeated Exposures** to help children better learn new ideas and learn to like healthy foods.

- **Apply Science Talk:** Strategies include introducing science words/concepts along with **Child-Friendly Definitions** and **Descriptive Words**; **Asking WH & Open-ended Questions**; and **Revoicing and Restating Children's Ideas** to help facilitate children's discussions in the classroom about science. Think ahead about the kinds of questions/comments that you can use to keep children focused, observant, and engaged.

- **Support Learning:** Strategies include **Using Effective Verbal Praise** when children explore science phenomena or try a new experience; **Enthusiastically Role Modeling** for children; and **Encouraging Peer Collaboration** including peer interaction, sharing, and conversation. Remember, support learning strategies can also be applied when learning with food by role modeling healthy behaviors, using praise when new foods are tried, and using verbal cues to talk about fullness and hunger.

- **Engaging Families and the STEM Community:** Don't forget to engage families and the larger science community! Always design science learning experiences to help children make the connection between the classroom and outside world. Think about how and where you might find experts on the topic to invite in your classroom.

STEP 4

Indicate Standards and Learning Objectives: When designing learning activities for your classroom, think about what your children will know, understand, and be able to do by the end. How will you address learning standards in science and across the domains? Suggested standards following the North Carolina Early Learning Foundations, Head Start Early Learning Outcomes Framework, Teaching Strategies GOLD, and more can be found online (www.morepeasplease.org). We also recommend writing a learning objective (or more) for your learning activities. A useful way to format your learning objective is: "Students will be able to [verb]..." See the PEAS Model Learning Activities in this *Teaching Guide* for examples.

STEP 5

Gather Learning Materials, Consider Safety Issues, Learning Needs: This is also a good time to determine what materials you have on hand to support exploration of the phenomena of interest. Consider what materials might need to be gathered, collected, or purchased. How will you consider safety issues in advance? Do you have any children who may have food allergies or immune-system illnesses? Also, how might you need to modify your activity to meet the needs of *all* learners?

STEP 6

Nail Down Your Assessment: When planning an assessment, it is important to review the standards and learning objectives you established in earlier steps of DESIGN for PEAS Teachers and use those to develop how you will assess children's learning. Also be sure to consider what made the learning activities work and what you could do in the future to improve the experience. Use the aligned standards and NGSS to support your ideas for what and how children should learn (www.morepeasplease.org).

PEAS
Preschool Education IN Applied Sciences

COMPLETED EXAMPLE

SCIENCE LEARNING ACTIVITY
DESIGN Worksheet

DECIDE PHENOMENON

What phenomena have your children shown interest in exploring?	What have children already observed about this phenomenon? What questions have they asked?
How do seeds change? How do seeds grow intro plants? What are the needs of seeds?	Seeds can be found outside Seeds can be found in foods we eat There are different kinds of seeds What is a seed? Can we eat all seeds? Does a seed need water to grow?

EMBRACE THE PROCESS OF SCIENCE

What do we know?	What do we wonder?	What more do we want to know?	What have we learned?
Observe, compare, and ask questions about different kinds of seeds Documentation Panel of children's observations of seeds New Word: Seeds	Experiment to determine what a seed needs to grow Prediction Panel – Record and check predictions Observe "germination" with magnifying glasses & microscope New Word: Germination	Read a book about how seeds move Share and discuss new seeds (brought from home, found on the playground, or provided by teacher)	Observe edible and non-edible seeds Using magnifying glasses to observe Taste edible seeds

SELECT STRATEGIES

Practice Science

- ☑ **Process of Science** (above WH questions)

Big Ideas
- ☑ Repeating Patterns
- ☑ Cause/Effect
- ☑ Structure/Function
- ☑ Stability/Change

Tools of Science
- ☑ Observation Tools
- ☑ Measurement Tools
- ☑ Communication Tools

Engage the Senses

Exploring with Senses
- ☑ See
- ☑ Touch
- ☑ Smell
- ☑ Taste
- ☑ Hear

Experience Culturally Appropriate Vegetables
- ☑ Food(s):

Benefiting from Repeated Exposures
- ☑ Food(s):

Apply Science Talk

- ☑ **Child Friendly Definitions**

Providing Descriptive Words
- ☑ Attributes
- ☑ Prepositions

- ☑ **Asking WH and Open-Ended Questions**
- ☑ **Revoicing & Restating Other Children's Ideas**

Support Learning

- ☑ **Use Effective Verbal Praise**
- ☑ **Enthusiastically Role Modeling**
- ☑ **Encourage peer Collaboration**
- ☑ **Ideas for Family & Community Engagement:**

INDICATE STANDARDS & OBJECTIVES

Head Start ELOF Standards

Cognition (Scientific Reasoning): P-SCI 1-6 (Mathematics): P-MATH 6
Language and Community (Literacy): P-LIT 2 and 6
Perceptual, Motor, and Physical Development (Health, Safety, Nutrition): P-PMP 5

Other Important Standards

NC Early Learning Standards:
CD 1, CD3, CD 11, CD 14, CD 15, LDC 1, LDC 2, LDC 3, LDC 7, LDC 8, LDC 11, LDC 15
HPD 1, HPD 5, HPD 8, APL 1, APL 2, APL 4, APL 5, APL 6, APL 8, APL 9

Learning Objectives

1. Children will be able to describe what they know about different types of seeds.
2. Children will be able to observe seeds and talk about what a seed needs to "germinate".
3. Children will be able to describe how seeds move.
4. Children will be able to describe what they have learned, including what seeds are edible.

GATHER MATERIALS & CONSIDER SAFETY

What materials need to be gathered?	What materials need to be collected or purchased?
Images of different seeds Magnifying Glasses Paper – Documentation/Prediction Panels Spray Bottle Scissors, Yarn, Tape Small cup or box for sharing seeds Science Journals & Writing Utensils	Variety of seeds (including spinach & pea seeds) Edible seeds for taste testing (peas, tomatoes) Book "Seeds Move" Cotton Balls, Clear Plastic Bags

Safety Issues & Considerations

Double check for food allergies

Remind children to not put seeds in their mouth while observing

NAIL DOWN ASSESSMENT

Child groups seeds by observable characteristics

Child makes a prediction that the seed will change in some way

Child uses magnifying glass and microscope to explore seeds and observe germination

Child uses new words like seeds and germination to describe observations

Child asks questions and shares observed changes and differences in seeds using descriptive words

Child asks questions and follows directions in completing learning activities

Child finds seeds in foods and compares the look and feel of different seeds

Tips for Using Online Science Resources

At some point, you might find yourself needing more ideas or resources to guide you as you design your own learning activities. You may already be using social media as a way to identify new ideas and resources for science learning. These sites are easy to navigate, typically include eye-catching graphics, and the resources are easy to find, save, and share. Many online science resources may originate from reputable resources that have a long history of early science education. However, some online early science activities may not be designed with best practices in mind and fail to engage children in the practice-based science learning that is important for preparing children for kindergarten.[1] These "pseduo-science" activities tend to fall into three categories.[2]

1. Craft projects that focus little on science exploration (e.g., making a seed necklace, this activity is more likely to interest children in jewelry than seeds and what they do).
2. Dramatic demonstrations that present confusing science concepts (e.g., using baking soda and vinegar to make a volcano is more of an example of chemical reactions versus teaching about the earth's crust or lava).
3. Following steps to make an unexpected reaction happen (making a potato-powered light bulb is a neat activity but does not effectively teach preschool children about electricity).

These activities do not typically engage children in asking their own questions, identifying problems, doing investigations, designing and trying out new solutions, or generating ideas and learning how things work the way they do. These activities may save time because they are quick and easy to find, but they do little to support children's learning.[3] To help support you in finding strong science activities online, we recommend using the Choosing and Using High Quality Developmentally Appropriate STEM Resources tool (see below Table).

When using the tool, keep in mind: (1) following up or developing connecting activities is important; and (2) providing experiences that are connected help maximize children's science learning which is critical to building their knowledge and vocabulary while enhancing understanding.[2]

Choosing and Using High-Quality, Developmentally Appropriate Science Resources

CONSIDERATIONS FOR HIGH-QUALITY SCIENCE EXPERIENCES		PEAS ALIGNMENT
How meaningful is this activity to children?	❑ Does it connect to children's day-to-day experience? ❑ Is it interesting and engaging to children? ❑ Are there ways to follow-up on it?	**Support Learning**
What is there for children to DO?	❑ Can children act on or engage with real objects or materials? ❑ Can children observe how objects/materials respond to their actions? ❑ Can children vary their actions and get a different result? ❑ Can children develop a new strategy or try a different idea?	**Practice Science** **Engage the Senses**
What is there for children to FIGURE OUT?	❑ Is there a problem to solve? ❑ Are there multiple ways to solve the problem?	**Practice Science**

What is there for children to THINK about?	❑ Are there opportunities for them to make claims? ❑ Can they come up with their own ideas based on evidence? ❑ Does the activity engage children in thinking about scientific concepts?	**Practice Science**
What is there for children to TALK about?	❑ Are there opportunities for children to ask, describe, and explain their observations, experiences, and ideas? ❑ Will the activity engage dual language learners and other children with language or cultural differences?	**Practice Science** **Apply Science Talk**
What opportunities are there for children to COLLECT and RECORD data?	❑ Can children write, draw, or make models during or after the experience? ❑ Can children document be using a camera, video, recorder, or audio-recording device? ❑ Can children demonstrate what they are doing and observing?	**Practice Science**
What is there for children to LEARN ABOUT?	❑ Does the activity connect children to concepts in life, physical, or earth/space science? ❑ Does it connect and support meaningful learning opportunities for food-based learning? ❑ Does it connect them to other concepts in mathematics or engineering?	**Practice Science** **Engage the Senses** **Support Learning**
What opportunities are there for children to SHARE their findings with others?	❑ Can they share what they are finding out/thinking/learning about? ❑ Can they use different media such as digital, drawing, and modeling tools? ❑ Can they use demonstration and role-playing?	**Practice Science** **Apply Science Talk**
What opportunities are there to integrate language and literacy?	❑ Are there opportunities to introduce and use interesting words with children? ❑ Are there opportunities for children to have conversations on the topic?	**Practice Science** **Apply Science Talk** **Support Learning**
What opportunities are there for children to COLLABORATE?	❑ Do children have a choice in when and how they want to collaborate? ❑ Are there opportunities for children to work individually in small and large groups?	**Support Learning**

Adapted and Aligned to PEAS from Peterson, S. et al. (2019). To Pin or Not to Pin? Choosing, Using, and Sharing High-Quality STEM Resources. Young Children, 74(3).

[1] McClure et al., 2017. [2] Peterson et al., 2019. [3] NRC 2007.

GLOSSARY OF KEY

Science Terms

LIVING THINGS LEARNING ACTIVITIES
Living: Things that are currently, or were at one point, alive (grow/develop, use energy, reproduce, respond to environment) ***Spanish Translation:*** los seres vivos (lohs seh-rehs bee-bohs) ***Child-Friendly Definition:*** Things that grow, need food, make more of themselves (e.g. have babies), and interact with the world around them
Non-Living: Things that are not currently alive nor were ever alive at any point (don't grow, don't need energy, don't reproduce by themselves, don't respond to environment) **Spanish Translation:** los seres no vivos (lohs seh-rehs no bee-bohs) ***Child-Friendly Definition:*** Things that don't grow, don't need food, don't make more of themselves, and don't interact with the world around them
Once Living, Now Non-Living: Things that were once alive (able to grow/develop, use energy, reproduce, respond to the environment) but are now non-living (don't grow, don't need energy, don't reproduce by themselves, don't respond to the environment) **Spanish Translation:** antes era vivo, ahora no está vivo (ahn-tehs eh-rah bee-boh ah-oh-rah no ehs-tah bee-boh) ***Child-Friendly Definition:*** Things that at one time grew, needed food, made more of themselves and interacted with the world around them but now do not
Growing: Process of natural development by increasing in size and changing physically **Spanish Translation:** crecer (kreh-sehr) ***Child-Friendly Definition:*** To get bigger just like you grow bigger (taller, stronger) each year
Reproduce: Biological process by which new individual organisms are produced from existing organisms **Spanish Translation:** reproducir (rreh-proh-doo-seer) ***Child-Friendly Definition:*** To create another living thing of the same kind
Breathing/Respiration: Process of producing energy typically by intaking oxygen and releasing carbon dioxide **Spanish Translation:** Respirar (rrehs-pee-rahr) ***Child-Friendly Definition:*** When we breath we push air in and out of our lungs
Observe: The act of looking at something or someone carefully in order to gain information **Spanish Translation:** observer (ohb-sehr-bahr) ***Child-Friendly Definition:*** To look at something carefully to see what is happening
Classify: to arrange a group of people or things in categories according to their characteristics **Spanish Translation:** clasificar (klah-see-fee-kahr) ***Child-Friendly Definition:*** To put things into groups based on how they are like each other or how they are different

Observe: The act of looking at something or someone carefully in order to gain information
Spanish Translation: observer (ohb-sehr-bahr)
Child-Friendly Definition: To look at something carefully to see what is happening

Predict: To forecast what would happen under certain conditions
Spanish Translation: predecir (preh-deh-seer)
Child-Friendly Definition: To guess about what we think will happen

Edible: Things that are suitable for human consumption
Spanish Translation: comestible (koh-mehs-tee-bleh)
Child-Friendly Definition: Things that we can eat

SEEDS LEARNING ACTIVITIES

Seed: A tiny container that holds a baby plant and its food to protect it until it is ready to grow.
Spanish Translation: la semilla (lah seh-mee-yah)
Child-Friendly Definition: A very small package that has a little plant inside and food that can help it grow into a new, bigger plant

Germination (ˈjər-mə-ˌnāt ˙shən): To begin to grow from a seed to a new plant.
Spanish Translation: germinación (hair-mee-nah-shihn)
Child-Friendly Definition: It is the beginning when the seed begins to grow

Seed Coat: The outer, protective skin covering the seed
Spanish Translation: capa de la semilla (kah-pah dey lah seh-mee-yah)
Child-Friendly Definition: The outside of the seed that protects its inside. It keeps the seed safe like a helmet keeps your head safe when you're riding a bike

Cotyledon (kädəˈlēdn): The first leaves that appear from a germinating seed; otherwise known as a "seed leaf"
Spanish Translation: cotiledón (koh-tee-ley-dohn)
Child-Friendly Definition: The first leaves that come out of a seed

Edible Seeds: A tiny plant with leaves, stem, root parts that will help grow a new plant that we can eat to grow and be healthy
Spanish translation: semilla comestible (seh-mee-yah koh-mehs-tee-bleh)
Child-Friendly Definition: Little packages that have food that we can eat! Like peas!

Plant: a living thing that grows in the earth or water that usually has roots, stems, leaves and flowers and produces seeds
Spanish Translation: la planta (lah plahn-tah)
Child-Friendly Definition: A living thing that can make its own food to grow

Check: to make certain that something is correct by examining it
Spanish Translation: revisar (rreh-bee-sahr)
Child-Friendly Definition: look over what we have done carefully to make sure it is right

Experiment: a scientific procedure undertaken to make a discovery, test a hypothesis or demonstrate a known fact
Spanish Translation: el experimento (ehks-peh-ree-mehn-toh)
Child-Friendly Definition: a test to learn about a question we have

Edible Plants: Plants that we can eat the roots, stems, leaves, fruits, and/or seeds of
Spanish Translation: plantas comestibles (lahs plahn-tahs koh-mehs-tee-blehs)
C***hild-Friendly Definition:*** Plants that are food that we can eat! Like lettuce and carrots!

PLANT PARTS (ROOTS, STEMS, LEAVES) LEARNING ACTIVITIES

Root: The part of a plant body that functions to help with absorption and food storage or as a means of anchorage and support. It is usually underground, and it differs from a stem because it lacks buds or leaves
Spanish Translation: la raíz (lah rrah-ees)
C***hild-Friendly Definition:*** Roots move food to the rest of the plant. Roots also hold food for the plant

Stem: The plant part that supports another part (e.g. leaf, fruit). Liquid can travel from the root through the stem to the leaves
Spanish Translation: el tallo (ehl tah-yo)
Child-Friendly Definition: The stem helps to keep the plant standing up straight. The stem also connects the root to the leaves and can help provide water to the leaves

Leaf: An outgrowth from a plant stem that functions primarily in food manufacture via photosynthesis
Spanish Translation: la hoja (lah oh-hah)
Child-Friendly Definition: The leaf helps the plant make food by trapping sunlight

Absorb: To take in or soak-up energy or a liquid by chemical or physical action
Spanish Translation: absorber (ahb-sohr-behr)
Child-Friendly Definition: The way a plant pulls in water and nutrients when it is thirsty. You quench your thirst by drinking a glass of water!

Photosynthesis: The process that green plants use to turn sunlight into food using carbon dioxide and water
Spanish Translation: la fotosíntesis (lah foh-toh-seen-the-sees)
Child-Friendly Definition: The process that green plants use to make their food from the sunlight

Edible Roots, Stems, and Leaves: Parts of plants that support its growth and function that we can eat to grow and be healthy
Spanish Translation: los raíces, tallos y hojas comestibles (lohs rrah-ees-says, tah-yos, ee oh-hahs koh-mehs-tee-blehs)
Child-Friendly Definition: Parts of plants that have food that we can eat! Like carrots, celery, and spinach!

More Words To Support Science Learning

The below reference tables provide more science terms with Child-Friendly definitions you might consider using in your science learning experiences.

PROCESS OF SCIENCE
Cause: a reason for an action or condition **Spanish Translation:** la causa (la kow-sah) ***Child-Friendly Definition:*** what made something happy
Compare: to examine the character of qualities in order to discover similarities or differences **Spanish Translation:** comparer (kohm-pah-rahr) ***Child-Friendly Definition:*** to look for how two things are similar
Contrast: to examine the differences between things that have comparable natures **Spanish Translation:** contrastar (kohn-trahs-tahr) ***Child-Friendly Definition:*** to look for how two things are different
Data: factual information used as a basis for reasoning, discussion or calculation **Spanish Translation:** los datos (lohs dah-tohs) ***Child-Friendly Definition:*** facts about something
Design: a plan or drawing produced to show the look and function of an object or procedure **Spanish Translation:** el diseño (ehl dee-she-nyoh) ***Child-Friendly Definition:*** a plan made to test a question we have
Effect: something that follows a cause; an outward sign **Spanish Translation:** el efecto (ehl eh-fehk-toh) ***Child-Friendly Definition:*** to make happen
Observation: the action or process of watching something or someone carefully in order to gain information **Spanish Translation:** la observación (lah ohb-sehr-bah-syohn) ***Child-Friendly Definition:*** to watch something carefully to see what is happening
Patterns: an arrangement of things that repeat in a logical way design **Spanish Translation:** el patrón (ehl pah-trohn) ***Child-Friendly Definition:*** seeing repeating things like colors or shapes
Prediction: forecasting what might happen under specific conditions **Spanish Translation:** la predicción (lah preh-deek-syohn) ***Child-Friendly Definition:*** a guess about what we think will happen
Record: to put something in writing **Spanish Translation:** anotar (ah-noh-tahr) ***Child-Friendly Definition:*** to write down

WORDS TO USE WHILE OBSERVING

Color: a phenomenon of light or visual perception that enables one to differentiate objects
Spanish Translations: el color (ehl kohl-lohr)
Child-Friendly Definition: characteristic that helps us see objects clearly
Words to Describe Color: black, brown, purple, white, gray, green, blue, etc.

Length: a measured distance or dimension of an object
Spanish Translations: el largo (ehl lahr-goh)
Child-Friendly Definition: the distance from one end to another of an object
Words to Describe length: long, short, longer than, shorter than

Shape: spatial form or contour of an object
Spanish Translations: la forma (lah fohr-mah)
Child-Friendly Definition: the outline of an object
Words to Describe Shape: oval, round, pointy, circular, square, curvy/straight, triangular, star-shaped, etc.

Size: physical magnitude of an object
Spanish Translations: el tamaño (ehl tah-mah-nyoh)
Child-Friendly Definition: the amount of space an object takes up – how large or small something is
Words to Describe Size: thick, thin, small, large, minute, short, long

Texture: the visual or feel of a surface of something
Spanish Translations: la textura (lah tehks-too-rah)
Child-Friendly Definition: the way something feels
Words to Describe Texture: smooth, rough, shiny, bump, soft, etc.

Weight: the mass of an object
Spanish Translations: el peso (ehl peh-soh)
Child-Friendly Definition: the amount something weighs; how heavy something is
Words to Describe Weight: heavy, light

OBSERVING TOOLS

Magnifying Glass: a specially shaped piece of glass that is attached to handle to make objects look larger than they are
Spanish Translation: la lupa (lsh loo-pah)
Child-Friendly Definition: tool to help us see objects bigger

Microscope: optical instrument that enlarges small instruments
Spanish Translation: el microscopio (ehl mee-krohs-koh-pyoh)
Child-Friendly Definition: tool that helps us see small objects larger

Observation Jars: Clear jars that are used to observe items
Spanish Translation: la jarra de observación (lah hah-rrah deh ohb-sehr-bah-syohn)
Child-Friendly Definition: containers to put objects in to watch how they change or grow

MEASURING TOOLS
Balance Scales: tool used for weighing **Spanish Translation:** la balanza (lah bah-lahn-sah) ***Child-Friendly Definition:*** tool used to see how heavy an object is
Measuring Cups & Spoons: tools used to measure weight or volume **Spanish Translation:** la taza medidora/la cuchara medidora (lah tah-sah med-dee-dohr-ah) ***Child-Friendly Definition:*** tools used to measure amounts of things
Measuring Tape: a tool marked off in units used for measuring length **Spanish Translation:** la cinta métrica (lah seen-tah meh-tree-kah) ***Child-Friendly Definition:*** a tool used to measure how long an object is
Pipette: small tool that consists of a narrow tube into which fluid is drawn by suction **Spanish Translation:** la pipeta (lah pee-peh-tah) ***Child-Friendly Definition:*** a tool used to move liquid from one place to another
Rulers: a tool marked off in units used for measuring length **Spanish Translation:** la regla (lah rreh-glah) ***Child-Friendly Definition:*** a tool used to measure how long an object is
COMMUNICATION TOOLS
Documentation Panel: Visual representation of observations written in a chart format **Spanish Translation:** el panel de documentación (ehl pah-nuhl deh doh-koo-mehn-tah-syohn) ***Child-Friendly Definition:*** chart to write down what we saw happen
Prediction Panel: Visual representation of predeictions written in a chart format **Spanish Translation:** el panel de predicción (ehl pah-nuhl deh preh-deek-syohn) ***Child-Friendly Definition:*** chart to write down what we think will happen
Science Journal: Journals used to document activities in science **Spanish Translation:** el cuaderno científico (ehl kwah-dehr-noh syehn-tee-fee-koh) ***Child-Friendly Definition:*** book to write down what we do in science

CREATE YOUR OWN DEFINITIONS

CREATE YOUR OWN DEFINITIONS

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