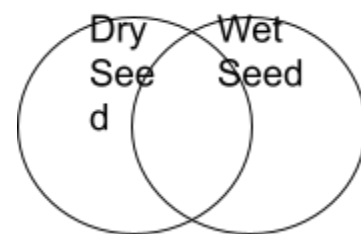


TTCD Lesson Plan (5): Seed Exploration

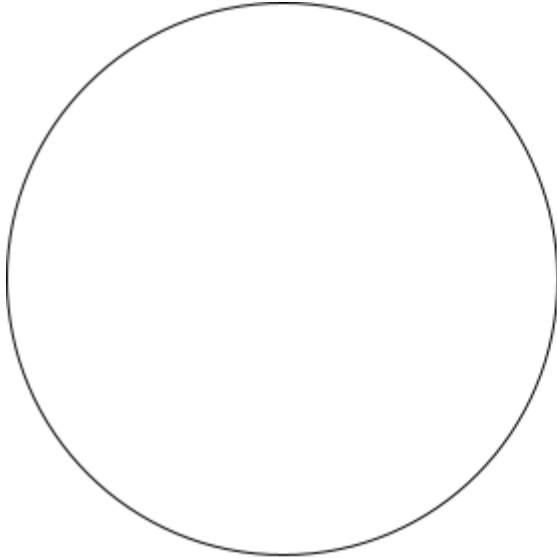
Unit: Hydroponics	Grade(s): All	Class Size: 1-30	Lesson Duration: 60 minutes	Location: Classroom
Topic(s):	Plant life cycle, seeds			
Student Prerequisites:	N/A			
Essential Questions:	Where does a seed get its energy to grow into a plant? Why do seeds from different plants look different?			
Student Objectives:	Students will observe the differences in seeds from different plants. Students will learn the parts of a seed.			
Standards:	Supports NGS Standards: 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.] Can support Cultural Standards when combined with other lessons in this curriculum: C.3: Culturally-knowledgeable students are able to actively participate in various cultural environments by: attain[ing] a healthy lifestyle through which they are able to maintain their own social, emotional, physical, intellectual and spiritual well-being. And E.2: Culturally-knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them by: understand[ing] the ecology and geography of the bioregion they inhabit.			
Local Context:	Use fruits and vegetables that students might encounter in their daily lives. Make connections to seeds found in the local ecosystem, either by collecting seeds outside with students or showing some examples of native plant seeds.			
Vocabulary:	Seed, venn diagram, embryo, germinate, dissect			
Dena'ina language words:				
Materials:	- A variety of fruits that contain seeds, such as peppers, lemons, apples, cucumbers, and tomatoes. <i>Edit the seed sorting worksheet to match your samples.</i> - Sharp knife and cutting board, or plastic knives for students - Paper or cloth to place over desks			

	• ~50 lima beans, half of them soaked and half of them dry • Seed sorting worksheet (page 4) • Hummus and other dips for snacking on samples (<i>optional</i>) • Plastic baggies and paper towels for extension activity (<i>optional</i>) • A variety of unfamiliar dry seeds, such as calendula, broccoli, squash, and corn for extension activity (<i>optional</i>) • A variety of native plant seeds to use as a comparison • Dissecting microscope or hand lenses
Instructor Prep:	• Soak ½ of the lima bean seeds overnight. • Print out seed sorting worksheet on a large poster, if possible. Otherwise just use printer paper. A laminated sheet works best. • Set up paper or cloth to protect desks from getting sticky. • Organize students into pairs for the introduction, and into small groups (2-4 students) for the activity. • Prepare extension activities (<i>optional</i>)
Introduction:	1. Distribute one dry and one wet lima bean seed to each student or pair. Briefly explain that you need their help filling in this venn diagram on the board. 2. Have students first discuss with a partner what they notice about these two seeds. Then, have each pair share their observations with the class as you write them on the board. 3. Have students split their wet seeds in half. ○ What do you notice? ○ Can you see a tiny plant inside your seed? This is called the embryo. The rest of the stuff inside the seed is stored food for the embryo. ○ Why do you think the embryo needs so much food stored up? ○ Does anyone know how this plant will get its food after it germinates? 4. Ask the class: Do all plants have the same number of seeds? Are all seeds the same size? Why do you think some seeds look so different from other seeds? Jot some answers down on the board.
Activity:	1. Briefly explain that you are going to distribute the fruits of a few plants to each group to dissect. Give students a minute to decide how they are going to assign tasks among the group (one person cutting, others removing and sorting seeds, another person counting seeds, etc.) 2. Have students wash their hands thoroughly. 3. Collect or set aside lima bean seeds, and distribute one of each type of fruit to each group, a seed sorting worksheet, and a plastic knife if not already cut. 4. In their groups, students are to sort and count the number of seeds found in each fruit.

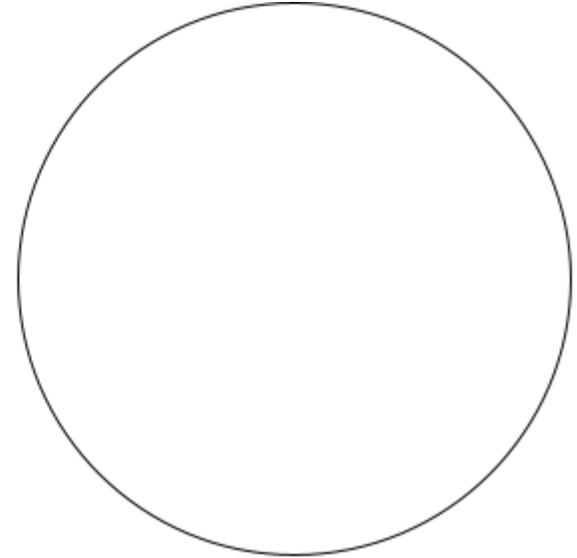


	- Once groups are finishing up their dissections, distribute scopes or hand lenses and have students choose one seed to dissect, as we did the lima bean seed. Direct students to create a scientific sketch of the inside of this seed in their TTCD journal, labeling the embryo, stored food, and seed coat. - Enjoy some time to taste the sample fruits. Distribute hummus and other dips to try (<i>optional</i>). - Allow students to take seeds home to try and germinate.
Wrap Up:	Return to the board from the beginning of class, and ask again: Why do you think some seeds look so different from other seeds? <i>Evidence of learning: Review scientific sketches for accurate labels of the embryo, stored food, and seed coat. Observe students working in their teams, with a focus on teamwork and communication.</i>
Lesson Adaptations:	- Have younger students sort their seeds into piles. How many seeds do you think are in each pile? Help students to count and write down the number of seeds next to each circle. - Older students can use scopes to identify the parts of each seed. Have students create a scientific sketch of the lima bean seed on one page of their notebook and a sketch of their favorite or most interesting seed on the next page. List similarities and differences between the seeds. Why do you think these plants have different-looking seeds? <i>Evidence of learning: students will be able to apply what they learned earlier to hypothesize why a plant might have a thicker seed coat or more food stores.</i>
Extensions:	- Give each group a few native plant seeds to observe. - Can anyone identify what plant they come from? - How are these seeds similar or different from the other ones we have observed today? - What part of the plant do they come from? - Try to germinate some of the seeds in the classroom. Have students predict which ones will be successful. Is it likely that the fruits will grow in this environment? Why or why not?
Reflections:	How did it go? What did students understand most/least? What could change about instruction or lesson plan?
Resources Used	AIMS Education Foundation “Primarily Plants” Curriculum

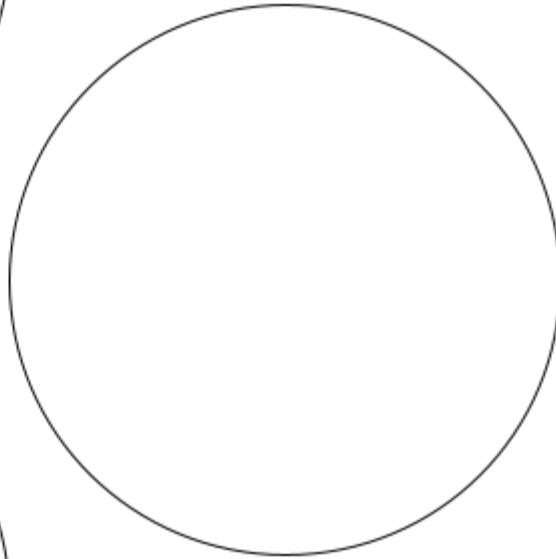
Seed Sorting Worksheet



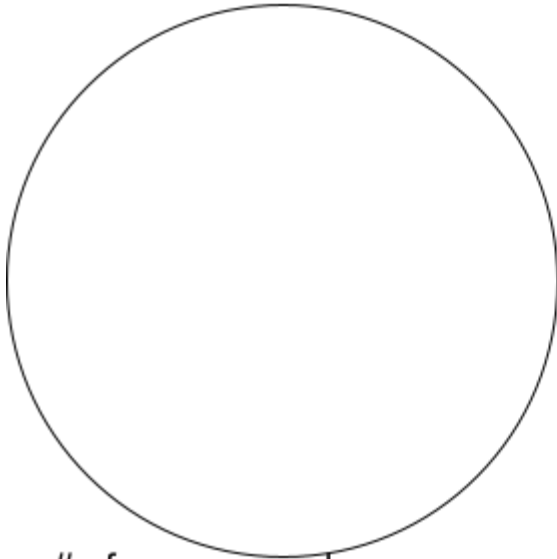
of tomato seeds:



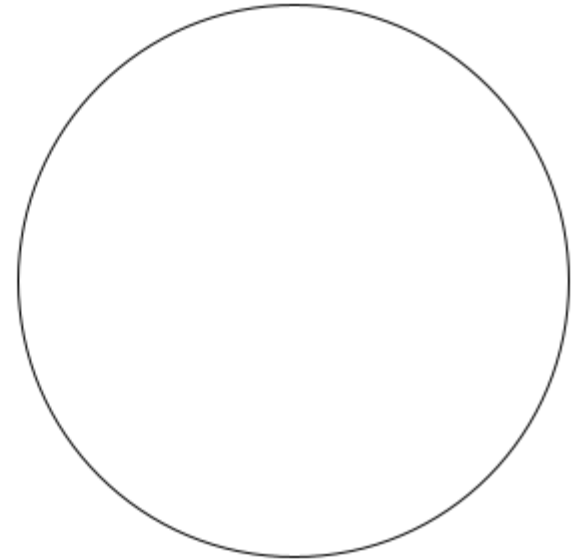
of lemon seeds:



of apple seeds:



of pepper seeds:



of cucumber seeds: