PRE-K MATH: HOW MANY LITTLE SEEDS?

UNIT OVERVIEW

Students will explore plants, including their attributes and growth cycle, over the course of one month or longer. This interdisciplinary unit on plants consists of 4 sequence learning plans. Each activity or learning plan works best with a small group of 4-5 students, in centers, over the course of one week. Duration of student engagement in tasks will vary, but the recommendation for each activity is 20 minutes or less. This Common Core-aligned task for mathematics is to be used in correlation with the Common Core-aligned task for literacy, Plants Are All Around Us.

TASK DETAILS

Task Name: How Many Little Seeds?

Grade: Pre-K

Subject: Math

Depth of Knowledge: 3

Task Description: Students explore the concept of addition and subtraction combining and dividing seeds in a pot. Students pretend to be busy gardeners, adding seeds to the pot to plant and grow, or hungry birds, swooping down from high above to subtract seeds from the pot to eat.

Standards:
PK.OA.1 Demonstrates an understanding of addition and subtraction by using objects, fingers, and responding to practical situations (e.g. if we have 3 apples and add two more, how many do we have all together?).
PK.CC.4 Count to answer "how many?" questions about as many as 10 things arranged in a line, a rectangular array, or a circle, or as many as 5 things in a scattered configuration; given a number from 1-10, count out that many objects.

NYC Department of Education
Dennis M. Walcott, Chancellor

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The task and instructional supports in the following pages are designed to help educators understand and implement tasks that are embedded in Common Core-aligned curricula. While the focus for the 2011-2012 Instructional Expectations is on engaging students in Common Core-aligned culminating tasks, it is imperative that the tasks are embedded in units of study that are also aligned to the new standards. Rather than asking teachers introduce a task into the semester without context, this work is intended to encourage analysis of student and teacher work to understand what alignment looks like. We have learned through the 2010-2011 Common Core pilots that beginning with rigorous assessments drives significant shifts in curriculum and pedagogy. Universal Design for Learning (UDL) support is included to ensure multiple entry points for all learners, including students with disabilities and English language learners.

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Acknowledgements: Special thanks to PS 112M, Central Park East II, Children's Aid Society, Bay Ridge Child Care, Nuestros Ninos, A to Z Learning Center, and Hanson Place.

PRE-K MATH: HOW MANY LITTLE SEEDS?
TASK ADMINISTRATION DETAILS

The section includes guidelines to a culminating common core aligned task for mathematics, based on the unit *Plants*. These guidelines include how to prepare students for mathematical activities, steps to play a game using addition and subtraction, ways to challenge and support students' mathematical learning and formative assessment questions.

Plants: *How Many Little Seeds?*

Math - Operations and Algebraic Thinking

GUIDELINES FOR ADMINISTERING THE TASK

Young children begin to acquire informal knowledge of mathematics in the context of their everyday experiences early in life. In pre-k students use mathematical reasoning in typical activities such as setting the table for snack time, rotating blocks to build a structure, and exploring ways to equally share an apple with two friends. Pre-k teachers can help build on their students' implicit explorations and curiosities of the world around them by explicitly making them aware of their thinking about mathematics. To nurture pre-k students' individual mathematical growth and development, structure classroom environments with mathematical activities, tools, language, and always model positive attitudes about math and multiple approaches to solving problems (Clements & Sarama, 2000).

The following task consists of an interactive word problem using addition and subtraction, ideas for preparing students, a tiered list of vocabulary words, formative assessment questions, and guidelines for collecting student work. Teachers are encouraged to adapt this activity to a different theme or unit of study.

IDEAS FOR PREPARING STUDENTS

- Read books and predict what will happen next. The Tiny Seed by Eric Carle or From Seed to Plant by Gail Gibbons will help bridge literacy and mathematics (see Literacy task).
- Encourage students to bring seeds from home to school. The seeds can be from a fruit they ate or planted at home. Count how many seeds you have all together.
- Sort seeds in plastic bags by plant-type or size. Encourage students to touch and observe the seeds in the bags.
- Model positive attitudes about mathematics using empowering language, such as, "This is an exciting math challenge!" and "Let's think of different ways to solve math problems."
- Show images or video clips of birds eating seeds and gardeners planting seeds to provide visual representations prior to this task.
- Create a word problem with students using pictorial symbols for words. Visit Storybird (at http://storybird.com/) to learn more about creating a visual story online.

Pre-K Math: How Many Little Seeds?
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DAY ONE: Activities for Preparing Students

Activity #1: *Building a Number Line with Students*

Objective: Students will help the teacher build a large number line on the floor and learn how to use as a tool to explore various mathematical concepts.

Estimated Time for Building Number Line: 15-20 minutes as a center time activity

Set-up & Materials:

- Number lines can be used in pre-k to demonstrate: one-to-one correspondence, counting forwards and backwards, counting on, and as a model of addition and subtraction.
- Create a large number line on the floor and play movement games with your students!
- Invite students to help you create a large horizontal line on the floor with tape.
- Write the numbers 0-10 on index cards or Post-its
- Attach the numbers just below the line from left to right with equal space in between.
- Encourage students to help by writing the numbers 0-10 on paper, or by sequencing the numbers.
- Please note that if the number zero is new to your students, explore the concept by adding items and then subtracting all of the items until there is none left.

Pre-K Math: How Many Little Seeds?
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Activity #2: *Ten Little Flower Seeds*

Objective: Students will explore counting down from 10-0 along the number line, singing and moving to a song about seeds.

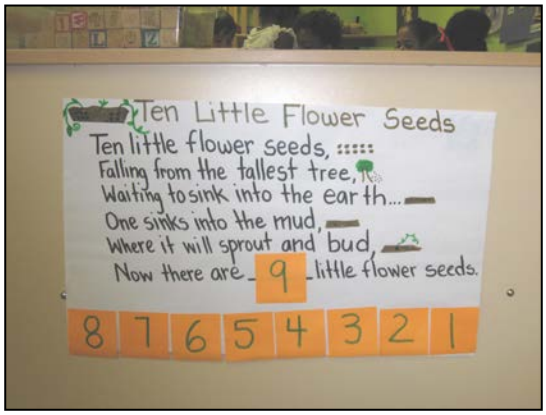
Estimated Time for Song: 10 minutes at meeting time

Set-up & Materials:

- Create a number line on the floor with your students (see above).
- Write the song "little flower seeds" on chart paper with images for students to follow along.
- Have 10 students stand along the number line and pretend to be the "seed sinking into the mud," sitting down as their number is called.
- Pause and prompt students to note how many are left.

Ten Little Flower Seeds (to the tune of *Little Speckled Frogs*)

Ten little flower seeds,
Falling from the tallest tree,
Waiting to sink into the earth…
One sinks into the mud,
Where it will sprout and bud,
Now there are ____ little flower seeds.



Pre-K Math: How Many Little Seeds?
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DAY TWO: An Interactive Word Problem

Objective: Students will explore the concept of addition and subtraction by combining and separating up to 5 seeds in a pot. Students will pretend to be a "busy gardener" adding seeds to a pot, or a "hungry bird" subtracting seeds from a pot.

Estimated Time: 15-20 minutes in centers across 3 days

Set-up:

- Set-up as a center-time table activity.
- Place a variety of real seeds or beans on sorting plates for each student.
- Give student a paper "planter pot" to use as a game board.
- Write the interactive story (below) on chart paper with pictorial representations of birds and gardeners alongside the sentences. You may also want to create in Storybird.

Materials:

- Camera
- Chart paper
- *How many little seeds? An interactive math story*
- Images of birds and gardeners
- Large "pots" (made out of heavy paper or cardstock)
- Sorting cups, trays or plates with seeds
- Variety of large seeds or beans (safe for small children)
- Student Reflection Sheet
- Teacher Notes Template
- Writing and drawing tools
- A large felt board with a felt pot and felt seeds to attach

Math Words/Vocabulary

Linguistic Access: In this performance-based assessment help students distinguish between vocabulary words and mathematical language functions (i.e. combine, take away, explain) to provide entry points to the mathematical content for all students. Introduce the most essential vocabulary and language functions first with concrete models for students to grasp the meaning. The following vocabulary words are not meant to be memorized, but rather conceptualized through hands-on experiences.

- Tier 1: line, more, less, enough, fewer
- Tier 2: all together, number
- Tier 3: add, addition, subtract, subtraction, total, sum
- Language Functions: combine, take away, and explain

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Directions to Facilitators:

1. Prepare each student with a tray of seeds and a paper planter pot. Encourage students to create and/or design their own planters before beginning the game.

2. Prepare the felt board with two colors of felt seeds that can be readily added and/or subtracted, to model to concepts students.

3. During center time invite a small number of about 4 students to play a game with a math story.

4. Explain to students that they'll be using addition and subtraction to play a game. Model what this means: "*Addition* means to combine seeds in the pot, like this…*subtraction* means to separate the seeds, like this..."

5. <u>Read and model the following steps to play the game to students</u>:

    a) *I'll read a story about a busy gardener, who plants seeds in a pot, and a hungry bird, who eats the seeds from the pot.*

    b) *When the gardener plants seeds, the seeds are added to the pot. When the bird eats seeds, the seeds are subtracted from the pot.*

    c) *As you listen to the story you will follow along pretending to be a gardener, adding seeds, or a hungry bird, subtracting seeds from the pot.*

    d) *Can you show me how to be a busy gardener, adding seeds to your pot? Now show me how to be a hungry bird, subtracting seeds from your pot.* Encourage

    e) *Encourage students to dramatize movements and make sounds like birds!*

6. Read aloud the interactive word problem (see appendix). Be sure to model addition and subtraction with the teacher-made felt pieces.

7. Prompt and support your students to add and subtract the seeds in the pots.

8. Explain to students that this is one way to add and subtract, by combining and separating seeds. Encourage them to share aloud other ways they add and subtract. Provide examples as needed.

Prior to playing the game students practice adding seeds to the pot like gardeners and subtracting seeds from the pot like birds.

Additional Supports for Students:

The following are additional ideas and resources to help you motivate your students to participate in this task and in other mathematical activities in you classroom.

Mathematical Supports

- Offer a wide range of mathematical manipulatives such as counting chips, Unifix cubes, and interlocking links to use in place of seeds. Provide larger manipulatives for students who have difficulty grasping seeds.
- Incorporate technology and computer games for students to practice and experience other functions for addition and subtraction. Visit the National Council for the Teachers of Mathematics' Illuminations website.
- Partner students to work together, take turns, and explore different approaches to addition and subtraction. This works well for students who want to observe the process before fully engaging in the task on their own.
- Create matching number cards. Write numeral 0-5 on index cards and include a pictorial representation of the corresponding quantity. Use these cards with students who will benefit from visual representations of numbers to practice one-to-one correspondence.
- Motivate students to play the game with a different theme. For example, if students are interested in dinosaurs play the game with "dinosaur eggs."
- Provide pictures, manipulatives, and writing materials to encourage students to show you how they got the answer in other ways than verbal communication. Verbally expressing thoughts about mathematics may be challenging for many pre-k students as their expressive and receptive language skills are still developing.

Mathematical Extensions

- Challenge students to guess how many more or how many fewer seeds they need to find a sum: "We have 4 seeds and we want 8 seeds. What do we need to do to get 8 seeds?"
- Challenge students to demonstrate different ways to find a total. "We added 2 seeds to 3 seeds for a total of 5 seeds. How else can we combine seeds to make 5? Let's try to combine 1+1+3 seeds."
- Introduce the mathematical symbols for addition, subtraction, and equal to. Do not expect pre-k students to internalize these symbols. Use pictorial representations or concrete examples of the numerical quantity, such as, drawing how many seeds alongside the number.

References:

Campbell, P.F., & Langrall, C. (1993). Making equity a reality in classrooms. *The Arithmetic Teacher;* 41, 2; ProQuest Education Journals.

Sarama, J., & Clements, D.H. (2000). Standards for preschoolers. *Teaching Children Mathematics*, 7 (1), 38-41.

Pre-K Math: How Many Little Seeds?
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Formative Assessment

Questions for Students: These questions have various Depth of Knowledge (DOK) levels in order to provide multiple entry points for students. Work alongside students to scaffold mathematical concepts and document what they can do and know about mathematics:

- Please explain your answer.
- Did anyone find a different answer?
- How many more seeds?
- How many fewer seeds?
- How many seeds do you have all together?
- Where else do we add/subtract in school?
- When we add/subtract do we end up with more or fewer seeds than we started with?
- What are some different ways to find [a sum of a number]?

Questions for Teacher Reflection: Use the following reflections as a guideline on what to notate about your students' processes while engages in this task, and how to evaluate their work.

- Did the student add more seeds when prompted?
- Did the student subtract seeds when prompted?
- Did the student observe the teacher and his/her peers before manipulating the materials?
- Did the student count each seed to answer "how many?"
- Did the student call out the correct number without counting?
- Did the student count on from a number (i.e. 3, 4, 5) or start counting from number one to answer how many?
- Did the student count the same seed multiple times, needing guidance to accurately count the seeds?

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Guidelines for Collecting Student Work:

To document student performance in mathematics notate: 1) exactly what the student says in response to prompts, 2) how the student physically manipulates materials and, 3) how the student demonstrates the mathematical concepts.

Some methods for documenting and collecting work in mathematics are:

- Draw and/or write how students combine and separate seeds while playing the game. Take photos of the student's process and how they demonstrate a student's steps with addition and subtraction.
- With media consent, video record students in the process. Encourage students to draw, write, and describe the game.
- Ask students to articulate their thinking about math and dictate what they say. Prompt students with reminders and ask questions.

Plants: *How Many Little Seeds?*

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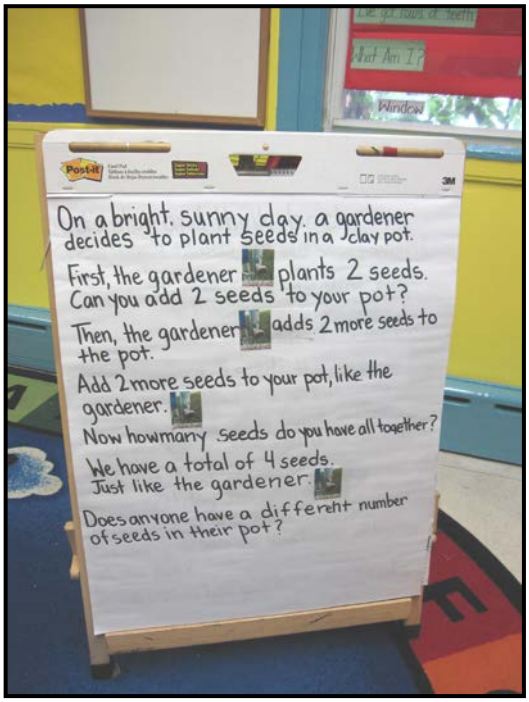
APPENDIX

A: How Many Little Seeds Interactive Word Problem
B: Scoring Rubric
C: Teacher Notes Page
D: Student Work Template

Pre-K Math: How Many Little Seeds?
Task Administration Details

How Many Little Seeds? An Interactive Word Problem



On a bright sunny day a gardener decides to plant seeds in a clay pot.

First, the gardener plants 2 seeds. Can you add 2 seeds just like the gardener?

[Add 2 seeds to the felt board].

Then, the gardener adds 2 more seeds to the pot. Add 2 more seeds to your pot just like the gardener.

Now, how many seeds do you have all together?

[Add 2 more seeds to the felt board.]

Let's stop and think back. How many seeds did we start with? (2 seeds)

[Point to the first 2 seeds on the felt board.]

[Encourage students to explain their thinking about math in their own words and language.]

How many more seeds did we add? (2 seeds)

[Refer to the felt board]

How many seeds do we have? (4 seeds) 2 seeds plus 2 more seeds equals 4 seeds.

After planting 4 seeds, the gardener waits and waits for a sprout to appear.

The gardener waters the soil and places the pot in sunlight. But, still no sprouts!

[Encourage students to dramatize the story.]

The next day the gardener adds 1 more seed to the pot.

[Add 1 seed to the felt board. Pause and wait for students to add 1 more seed.]

Now, how many seeds do you have? Please explain how you have ___seeds.

[Encourage students to explain how they have 5 seeds.]

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The gardener continues to wait for a seed to sprout when, suddenly, a chirping sound comes from above. What do you think is making that sound? It's a hungry bird!

[Encourage students to dramatize the story.]

The hungry bird swoops down from above and subtracts 3 seeds from the gardener's pot. Can you pretend to be a bird and subtract 3 seeds from your pot?

[Remove 3 seeds from the felt board.]

You started with 5 seeds in your pot and subtracted 3 seeds. Now how many seeds do you have?

[Record the students' responses on the teacher note page.]

Next, the hungry bird subtracts 2 seeds from the pot. Now you have 0 seeds in your pot, just like the gardener.

[Remove all the seeds from the felt board. Prompt students to remove all of the seeds.]

[Encourage students to solve the following problem independently and provide guidance only if necessary. Document what they know and can do on their own and what supports are provided.]

Next, the gardener adds 2 seeds pot and then adds 3 more. How many do you have in your pot?

The hungry bird quickly swoops down again and subtracts 2 seeds from the gardener's pot. How many seeds do you have in your pot?

[At the end of the lesson encourage students to draw a reflection on paper. Please note that this is an extension to the task and the standard.]

Task Extension: Draw about how you added and/or subtracted seeds.

Pre-K Math: How Many Little Seeds?
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Scoring Rubric

1	2		3
Not Yet	**In Process**		**Proficient**
Student inconsistently explores concrete objects to demonstrate ways to combine and/or separate number sets, and does not answer how many questions.	Student inconsistently explores concrete objects to demonstrate ways to combine and/or separate number sets, but begins to count to answer how many questions.	Student consistently uses concrete objects to demonstrate ways to combine and/or separate number sets, but inaccurately counts to answer how many questions.	Student consistently uses concrete objects to demonstrate ways to combine **and** separate number sets, and accurately answers how many questions by counting or calling out the answer.

Pre-K Math: How Many Little Seeds?
Task Administration Details

Teacher Notes:

Student Name & Date	Observation, Dictation & Evidence of Understanding	Rubric Rating & Rationale

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Name: _____ **Date:** _____

Draw about how you added seeds, just like the gardener, and subtracted seeds, just like the bird while playing the game.

PRE-K MATH: HOW MANY LITTLE SEEDS?

UNIVERSAL DESIGN FOR LEARNING (UDL) PRINCIPLES

Plants – Math Grade Pre-K
Common Core Learning Standards/
Universal Design for Learning

The goal of using Common Core Learning Standards (CCLS) is to provide the highest academic standards to all of our students. Universal Design for Learning (UDL) is a set of principles that provides teachers with a structure to develop their instruction to meet the needs of a diversity of learners. UDL is a research-based framework that suggests each student learns in a unique manner. A one-size-fits-all approach is not effective to meet the diverse range of learners in our schools. By creating options for how instruction is presented, how students express their ideas, and how teachers can engage students in their learning, instruction can be customized and adjusted to meet individual student needs. In this manner, we can support our students to succeed in the CCLS.

Below are some ideas of how this Common Core Task is aligned with the three principles of UDL; providing options in representation, action/expression, and engagement. As UDL calls for multiple options, the possible list is endless. Please use this as a starting point. Think about your own group of students and assess whether these are options you can use.

REPRESENTATION: *The "what" of learning.* How does the task present information and content in different ways? How do students gather facts and categorize what they see, hear, and read? How are they identifying letters, words, or an author's style?

In this task, teachers can…

- ✓ **Anchor instruction by linking to and activating relevant prior knowledge (e.g., using visual memory, concept anchoring, or concept mastery routines)** by posting number lines at accessible places within the classroom, at children's eye level. Label two clothespins: one as "right arrow" along with the word "add"; and the other as "left arrow" along with the word "subtract" -- to build a common language for algebraic thinking and practice.

ACTION/EXPRESSION: *The "how" of learning.* How does the task differentiate the ways that students can express what they know? How do they plan and perform tasks? How do students organize and express their ideas?

In this task, teachers can…

- ✓ **Provide alternatives for physically interacting with materials** by attaching a number line onto the desk to encourage 1:1 correspondence in placing seeds on the number line for counting; providing larger seeds to count with; and/or providing rubber placemats onto desks to facilitate manipulation of seeds.

ENGAGEMENT: *The "why" of learning.* How does the task stimulate interest and motivation for learning? How do students get engaged? How are they challenged, excited, or interested?

In this task, teachers can…

- ✓ **Provide tasks that allow for active participation, exploration, and experimentation by encouraging** class participation in the math game and by connecting information on plants to students' prior knowledge.

Visit http://schools.nyc.gov/Academics/CommonCoreLibrary/default.htm to learn more information about UDL.

PRE-K MATH: HOW MANY LITTLE SEEDS? ANNOTATED STUDENT WORK

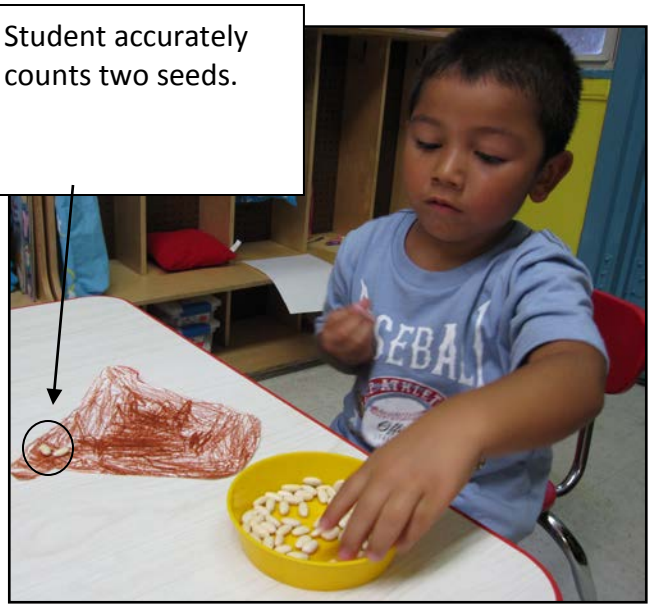
Student work collections in pre-k are concrete representations of student performance and thinking across the Common Core State Standards and curriculum. In order to articulate student performance and thinking across the standards, teachers annotate student work to provide more information on what, when, where, and how a task took place. Annotated student work tells us something unique about the students and his/her approach to learning. Some suggestions for annotations include factual observations notes on students engaged in the task, reflections notes and discussions with students and teacher reviewing and monitoring notes.

How Many Little Seeds?

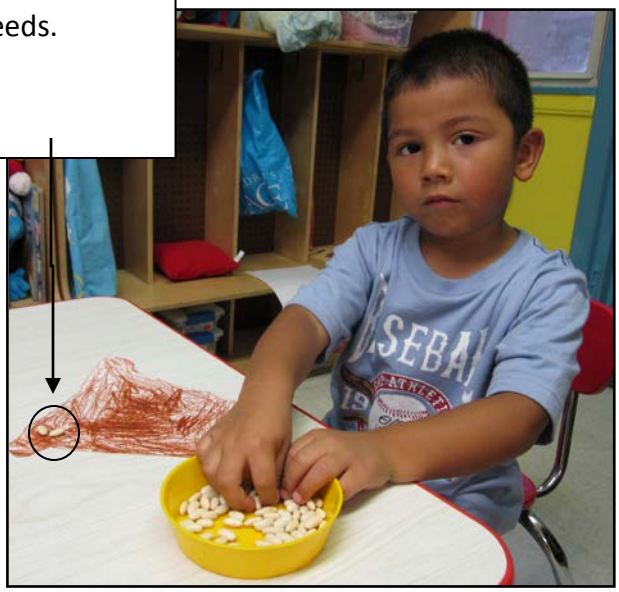
Math - Operations and Algebraic Thinking

SAMPLE STUDENT WORK

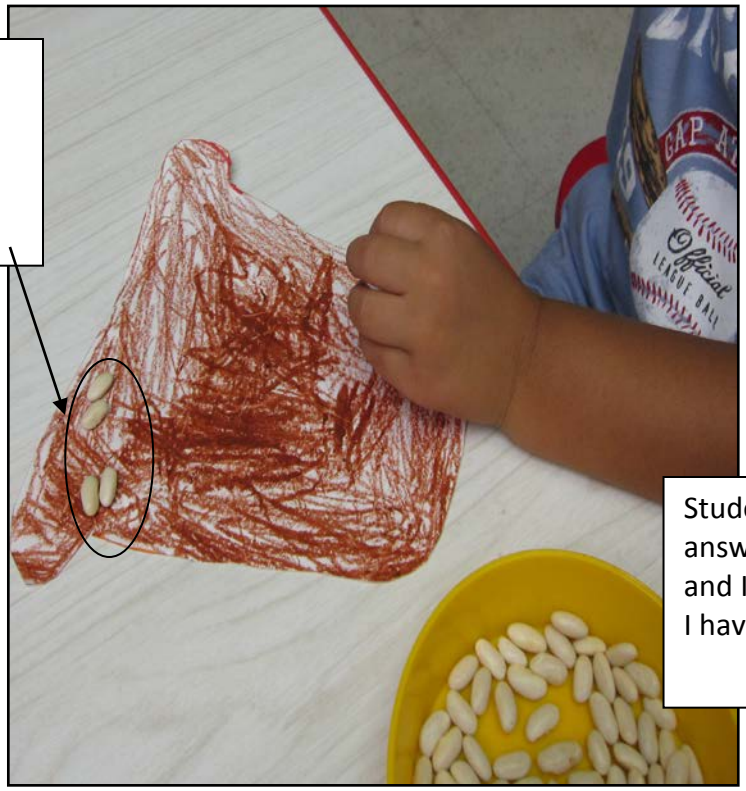
Student accurately counts two seeds.



Student adds two more seeds.



Student accurately combines two sets of seeds.



Student states a correct answer, “I had two seeds and I added two seeds. Now I have four seeds.”

Pre-K Math: How Many Little Seeds? An Interactive Word Problem
Annotated Student Work

How Many Little Seeds?

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Student Name	Teacher Notes	Rubric Rating
Mason (see above photos)	During the interactive math story, Mason accurately combines and separates seeds on the paper pot when prompted by the teacher during the read aloud of the word problem. At the end of the activity, Mason independently continues to combine and separate seeds on his pot. He places one seed and then adds one more seed and states, "The gardener plants one seed and adds one more seed, then he has two seeds!" and he counts to two with his finger. Mason continues combining seeds on his pot and then playfully states, "Then he adds two more seeds" and he counts to four. Mason then proceeds to subtract seeds and states, "Here comes the hungry bird and eats 3 seeds." Mason counts and separates 3 seeds from the pot and states, "1 seed".	Proficient—*Mason consistently and accurately combined and separated small numbers of seeds, and accurately demonstrated how many*

How Many Little Seeds?

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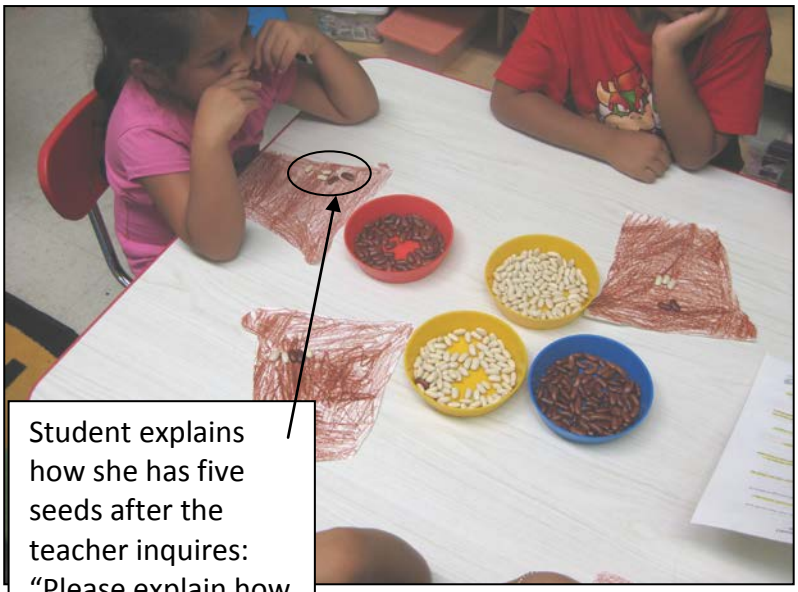
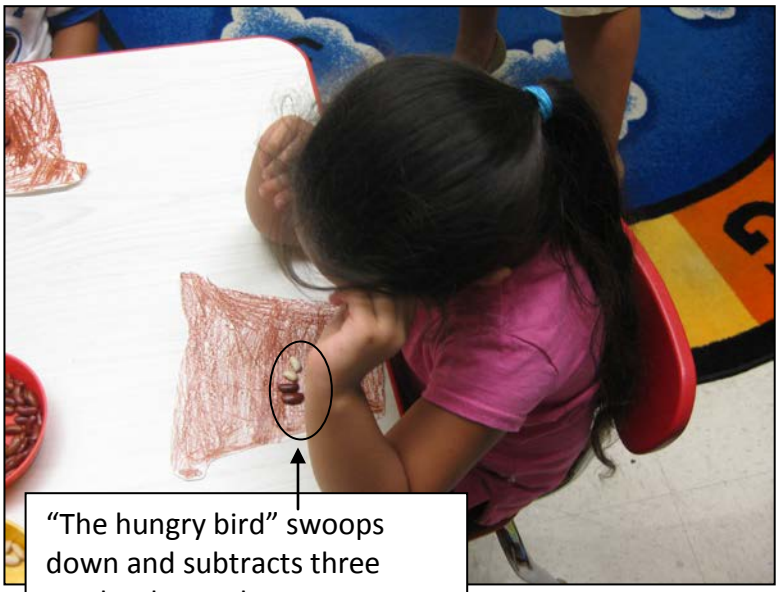


Student explains how she has five seeds after the teacher inquires: "Please explain how you have five seeds."



"The hungry bird" swoops down and subtracts three seeds. The student pauses before removing all three seeds.

Student subtracts three seeds from the pot and responds "two," when prompted, "How many seeds do you have?"

The hungry bird swoops down and subtracts two more seeds. The student subtracts two seeds from the pot, until there are zero seeds left.

Pre-K Math: How Many Little Seeds? An Interactive Word Problem
Annotated Student Work

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Student Name	Teacher Notes	Rubric Rating
Mariah (see above photos)	During the interactive math story, Mariah responds to prompts by combining and separating seeds. While combining seeds, she responds to question, "How many seeds do you have?" By stating "I have four seeds, and I add one more seed, and now I have five seeds." In response to the following prompt: "The hungry bird swoops down and subtracts three seeds", Mariah pauses and counts five seeds. She removes three seeds and states "two." When prompted to remove two more seeds. Mariah accurately subtracts two seeds from the pot and states "zero."	Proficient—*Mariah consistently and accurately combined and separated small numbers of seeds, and accurately demonstrated how many.*

Pre-K Math: How Many Little Seeds? An Interactive Word Problem
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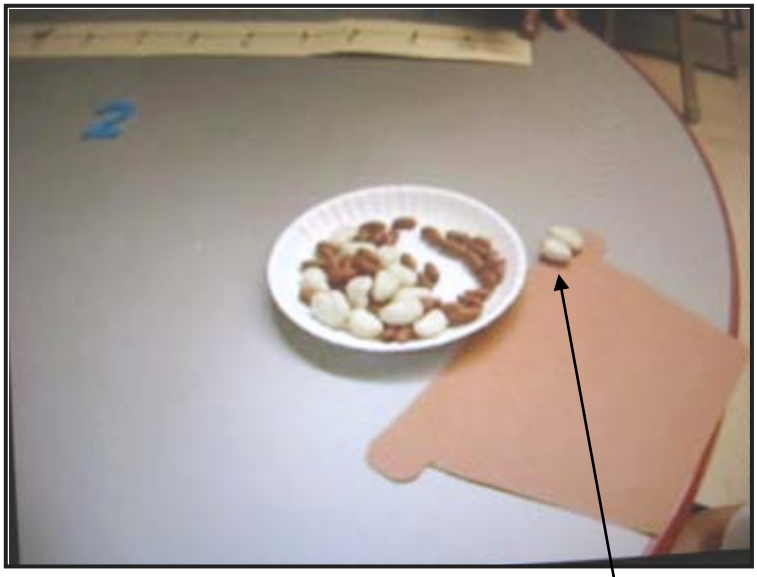

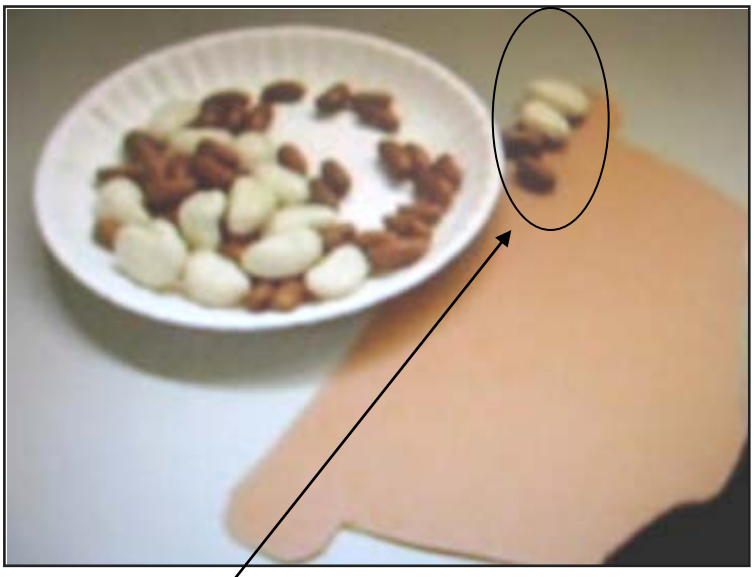

Student demonstrates two seeds plus two seeds with prompting and support from the teacher. The student responded that she has "four" seeds.

Student Name	Teacher Notes	Rubric Rating
Renei	Renei clearly demonstrated how to combine one seed plus one seed and stated that there are "two seeds" all together. Renei also demonstrated two plus two seeds equals "four" seeds. Renei was unable to demonstrate the following subtraction when prompted and supported. I modeled how to remove two seeds and stated how many are left to show Renei what subtraction means. To follow-up, I will redo this task with Renei using subtraction only to help Renei understand the concept of subtraction. Then, I will try the task with addition only before combining the two concepts.	In Process— *Renei combined small number sets, but was unable to separate sets, state how many she was separating, and consistently demonstrate how many.*

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Following this interactive math task, this student asks if he can have a turn. Standing in front of his peers he adds a seed, as modeled by the teacher, and says "The gardener adds one seed."

"The gardener plants two more seeds."

He steps away from the board and pauses before asking his classmates, "How many seeds does the gardener have in his pot?

Pre-K Math: How Many Little Seeds? An Interactive Word Problem
Annotated Student Work

Student Name	Teacher Notes	Rubric Rating
Adam (see above photos)	During the interactive math story, Adam accurately separates and combines seeds as prompted by the read aloud. Following this activity, Adam asks to use the flannel board to prompt his friends in adding and subtracting seeds, as modeled by his teacher. Adam adds one seed and states, "the gardener plants 1 seed." He then adds two more seeds and states, "the gardener plants 2 more seeds." He steps away from the flannel board and pauses before asking his classmates, "how many seeds does the gardener have in his pot?"	Proficient— *Adam consistently and accurately combined and separated a small numbers of seeds and accurately demonstrated the process of adding/subtracting. .*

How Many Little Seeds?

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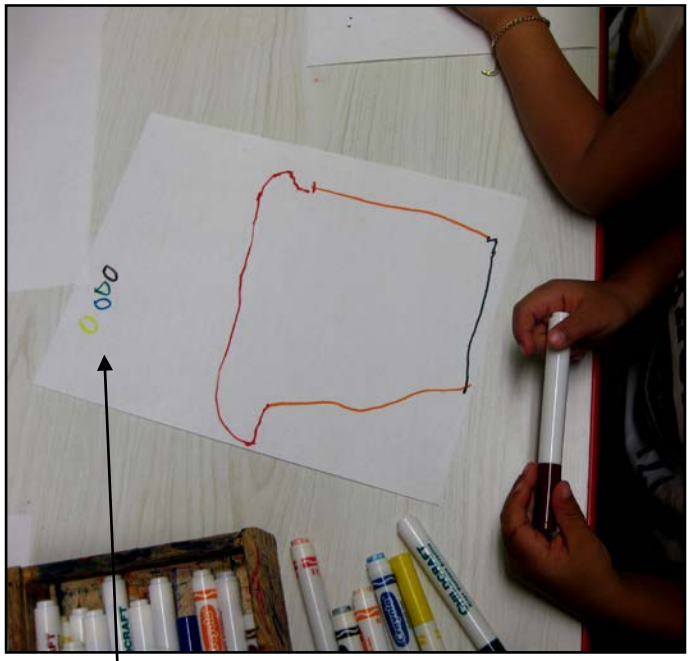
SAMPLE STUDENT WORK—Math Extensions

After engaging in the interactive word problem with a small group of students, a few teachers asked: "Who would you like to draw about how you added and subtracted seeds?" Students were given autonomy to approach this extension in their own unique way. As a result students demonstrated their reflections on the math task by drawing seeds on paper, drawing birds and gardeners, writing numerals, and dictating their reflections to teachers. The teacher provided prompting and support to students as needed. The responses varied from student to student within each class, and across classes. Below are a few student examples.

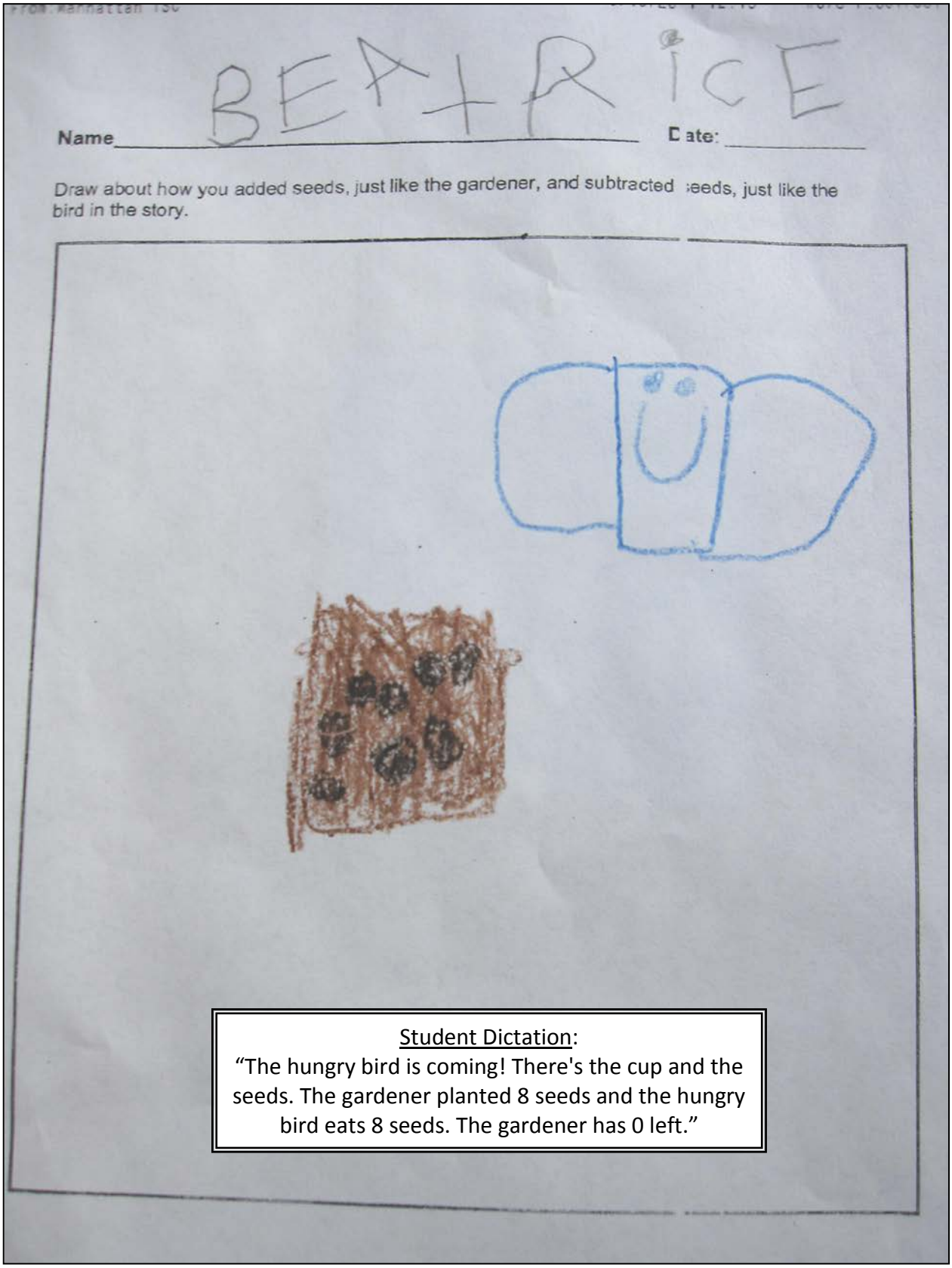
Please note this is an extension to the activity; not an expectation of the standard.

Student begins by drawing dots for "seeds" with the written numeral alongside the quantity.



Student prompts teacher for guidance with drawing a pot. Together the teacher and student found a resolution to trace the template.

Pre-K Math: How Many Little Seeds? An Interactive Word Problem
Annotated Student Work



Student Dictation:
"The hungry bird is coming! There's the cup and the seeds. The gardener planted 8 seeds and the hungry bird eats 8 seeds. The gardener has 0 left."

PRE-K MATH: HOW MANY LITTLE SEEDS? INSTRUCTIONAL SUPPORTS

The instructional supports on the following pages include a unit outline with formative assessments and suggested learning activities. This interdisciplinary unit is to be used in correlation with the curriculum embedded Common Core-aligned task for literacy, Seeds Are All Around Us!

Unit Outline –Pre-K Literacy/Math

INTRODUCTION: This unit outline provides an example of how teachers may integrate performance tasks into a unit. *Teachers may (a) use this unit as it is described below; (b) integrate parts of it into a currently existing curriculum unit; or (c) use it as a model or checklist for a currently existing unit on a different topic.*

Pre-Kindergarten Unit: *Plants*

UNIT TOPIC AND LENGTH:

- Students will explore plants, including their attributes and growth cycle, over the course of one month or longer. This unit on plants consists of 6 sequenced learning plans. Each activity or learning plan works best with a small group of 4-5 students, in centers, over the course of one week each. Duration of student engagement in tasks will vary, but the recommendation is 20 minutes or less per student.

COMMON CORE LEARNING STANDARDS:

ELA & Literacy: Reading

- PK.RI.1: With prompting and support, ask and answer questions about details in a text.
- PK.RI.10: With prompting and support, actively engage in group reading activities with purpose and understanding.

ELA & Literacy: Writing

- PK.W.2: With prompting and support, use a combination of drawing, dictating, or writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.

Mathematics: Counting and Cardinality

- PK.CC.4: Count to answer "how many?" questions about as many as 10 things arranged in a line, a rectangular array, or a circle, or as many as 5 things in a scattered configuration; given a number from 1-10, count out that many objects.

Mathematics: Operations and Algebraic Thinking

- PK.OA.1: Demonstrates an understanding of addition and subtraction by using objects, fingers, and responding to practical situations (e.g. if we have 3 apples and add two more, how many do we have?).

Mathematics: Measurement and Data

- PK.MD.1: Identify measurable attributes of objects, such as length, and weight. Describe them using correct vocabulary. (e.g. small, big, short, tall, empty, full, heavy, and light.)

BIG IDEAS/ENDURING UNDERSTANDINGS:

- We can learn about plants by exploring nature and reading informational books on

ESSENTIAL QUESTIONS:

- What is a plant?
- How do the parts of plants help us identify them?

Unit Outline –Pre-K Literacy/Math

plants. ➢ Plants have parts with names. ➢ We can measure, add, subtract, and count the parts of a plant. ➢ Plants require specific conditions and care to grow.	➢ Why is it important to take care of plants? How many more seeds do we need? ➢ What do you notice about how plants grow? ➢ How can we measure the growth of these plants?

CONTENT:

- **Plant Facts**
  - Plants in the local environment
  - Basic Parts of Plants: stem, leaf, root, seed, flower)
  - Care of Plants in different environments

- **Informational Text**
  - Texts that provide facts on plants
  - Details from text that provide the needed information
  - Images and media that provide information

- **Math Operations**
  - 1 to 1 correspondence
  - Adding/Subtracting Plant Parts
  - Counting Plant Parts

- **Math Data**
  - Measurable Attributes used as the way botanists describe plants: observation as scientists

SKILLS:

- **Explore and observe** plants in the local environment.
- **Identify** parts of plants. (i.e. stem, leaf, root, seed, flower, etc.)
- **Draw** plants and plant parts.
- **Describe** the role of a botanist as scientist; observer and caretaker of plants.
- **Develop and implement** a plan to take care of classroom and school plants

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- **Comprehend** non-fiction picture books to learn about plants.
- **Recognize and explain** that books provide information and facts on living things, such as plants.
- **Articulate** what is known and what is wondered about plants.
- **Identify** important details from read-aloud texts.

- **Explore then describe** how to add and subtract seeds and other plant parts to get a total number.
- **Count** to answer how many plants or plant parts.
- **Demonstrate** one to one correspondence by matching numeral to number of plant parts.

- **Identify** measurable attributes of plants. (i.e. small, big, short, tall, etc.)

VOCABULARY/KEY TERMS:

Tier 1

Seed, plant, flower, powder, wind, insects, juice, bees, ground, birds, eat, water, dirt, wings, spin, fall, animals, people, clothes, leaves, green, sun, rice, black, paper, rain, night, morning, eat, line, more, less, enough, fewer

Unit Outline –Pre-K Literacy/Math

Tier 2

Shape, size, color, different, grow, grows, kind, parts, begin, many, itself, land, top, bottom, blows, itself, sweet, rubs, onto, off, fruit, die, bigger, protects, ripens, breaks, ready become, fall, base, open, pop, berries, streams, ponds, rivers, ocean, travel, stick, shore, scatters, float, parachutes, hide, acorns, nuts, hooks, fur, drop, onto, flower bed, vegetable garden, beautiful, envelopes, boxes, directions, explain how care for, beginning, seed coat, curled, inside, each, stored, outside, protect, soak, soften, certain, things happen, first, on, in, too, root, stems, shines, warms, sunlight, air, all, finally, new, tasty, raise, clean, glass, jar, wedge, between, slide, fill, find, piece, roll it up, construction paper, place, few, days, begin, down, watch, while, clay, pot, scientists, study, heat, forest fire, live, season, desert, mountain, short, shut, live, island, weigh, pounds, feet, across, tomato, squash, all together, number

Tier 3

Tulip, daisy, rose, pea, buttercup, corn, oak tree, apple tree, zinnia, dandelion, aster, petal, stigma, pistil, stamens, sepal, stem, egg cell, ovules, sticky, pollen, pollination, grain, land, hummingbirds, nectar, tube, pod, fluff, sprout, germination, breaks open, minerals, full grown, buds, nutrition, vitamins, shoots, botanists, annuals, perennials, cactus, Sumatra, venus flytrap, rafflesia plant, violet add, addition, subtract, subtraction, total, sum

Math Language Functions: combine, take away, explain

ASSESSMENT EVIDENCE AND ACTIVITIES:

INITIAL ASSESSMENT :

- Prompt students to share what they already know about plants, making connection to real life experiences.
- Document student observations while on a nature walk; ask questions about what they wonder.
- After a whole group read aloud on plants, discuss and document the details they learned from the book.
- Dictate student responses on chart paper or on a Know-Wonder-Learn chart. Write the students' names next to their responses.
- Identify and differentiate between different plants and parts of a plant by their measurable attributes. If a student will not share aloud in a whole group setting, prompt the student one to one.
- Introduce a variety of plant seeds in plastic specimen jars or plastic bags. Encourage students to sort by size and/or shape and to draw what they notice about the seeds. Document their process and ask mathematical questions.
- Introduce counting and subtracting while singing a song about seeds. Document students' performance as they sing the song, follow hand movements, and countdown using fingers.

FORMATIVE ASSESSMENT:

- Demonstrate solutions to plant related pre-mathematical concepts including adding and subtracting of seeds or beans.

- Identify and differentiate between different plants and plant parts by their measurable attributes.

FINAL PERFORMANCE TASK:

- Encourage students to use a combination of drawing, dictating, or writing to provide details about what

they learned from an informational text about plants *(See Literacy Task, "How Plants Grow").*

- Demonstrate solutions to plant-related mathematical concepts by adding and subtracting seeds or beans *(See Math Task, "How Many Little Seeds?").*

EXTENSION:

Create a class Storybird at: Storybird- Web 2.0 Application for Sharing Observations and Stories

Children work in small groups of three or four to devise a plan to take care of classroom plants in a Web 2.0 application, such as Storybird. Children work together to develop strategies to ensure that each plant will receive the proper care and placement in the classroom. Students monitor the plant's growth in the classroom over a three to four week period and, with prompting and support, detail their work on the visual chart.
Teachers can document the process through observation notes, pictures, and videos of students engaged in the development of their plan.

LEARNING PLAN & ACTIVITIES:

Week 1: *How plants grow!* A neighborhood walk and literacy task with and informational text provide students with an introduction to plants.

Week 2: *Let's observe the sprout!* Planting seeds to observe and track the growth cycle of a plant.

Week 3: *How many little seeds?* A mathematical game with addition & subtraction

Week 4: *Parts of plants*: Measure and graph how tall a stem is, and explore which ones have grown leaves, buds, or blossoms. What do the parts of a plant do to help it live and grow?

Week 5: *Plants help us grow big and strong too.* Plants are a healthy food that we need to eat every day. Let's try different plants as food and choose our favorite.

Week 6: *Class trip to a garden.* Visit the local community garden (i.e. Brooklyn Botanical Garden or New York Botanical Garden) to learn more about plants and living things that grow.

RESOURCES

WEBSITES:

- Eartheasy.com (http://eartheasy.com/grow_gardening_children.htm) --Tips and resources on what to plant for young gardeners...
- New York Botanical Garden (http://www.nybg.org/edu/) --Children's gardening program information at the New York Botanical Gardens
- Brooklyn Botanical Garden -- Information about the Brooklyn Botanic Garden Educational Program
- United States Department of Agriculture (http://www.bbg.org/discover/gardens/childrens_garden/)-- A database on national plants.
- Lowes' Gardening with Young Children (http://www.lowes.com/cd_Gardening+with+Children_1272982901_) -- Benefits of gardening with children, what to plant and safety in the garden.

- Teacher's College Press (http://www.tcpress.com/) -- A free downloadable Project Planning Journal from *Young Investigators* by Judy Harris Helm and Lilian Katz; a free download
- Storybird (http://storybird.com/) --Web 2.0 application for sharing observations and stories
- Home Depot/kidsgardening.org (http:kidsgardening.org/sponsors/homedepot—Youth Garden Grants sponsor
- National Gardening Association:: Grants and Awards (assoc.garden.org/grants/- Programs will receive gift cards to Home Depot and Gardening with Kids

CHILDREN'S BOOKLIST:

From Seed to Plants by Gail Gibbons: A simple introduction to growth from seed to plant.

From Seed to Sunflower by Gerald Legg: Large illustration and simple text present the life cycle of a sunflower.

Oh Say Can You Seed? All About Flowering Plants by Bonnie Worth: The Cat in the Hat examines various parts of plants seeds and flowers; basic photosynthesis and pollination.

The Reason for a Flower by Ruth Heller: Brief text and lavish illustrations explain plant reproduction and the purpose of a flower.

The Tiny Seed by Eric Carle: The story of a small seed that starts with other seeds on a journey from a flower to its very own spot.

The Dandelion Seed by Joseph Anthony: The story describes the journey of a little dandelion seed.

City Green by DyAnne DiSalvo-Ryan: Marcy transforms an abandoned lot by planting sunflowers. The last page explains how to start a neighborhood community garden.

Flower Garden by Eve Bunting: In an urban neighborhood a girl and her father by flowers at a grocery store and plant a window box.

Fran's Flower by Lisa Bruce: A little girl learns about the foods that nurture a plant.

Jack's Garden by Henry Cole: A cumulative story that traces a little boy's backyard flower garden from tilling the soil to enjoying the blossoms.

The Maybe Garden by Kimberly Burke-Weiner: A little girl envisions the garden of her dreams. It is nothing like the garden her mother enjoys.

Planting a Rainbow by Lois Ehlert: A mother and her child plant bulbs in the fall, order seeds in the winter, anticipate the first shoots in spring, select seedlings in the summer and watch a rainbow of colors grow.

Sunflower House by Eve Bunting: Lyrical rhyming text about planting sunflowers.

Sunflower Sal by Janet S. Anderson: A little girl finds peace and success in growing hundreds of sunflowers throughout her village.

The Little Red Hen by Lucinda McQueen

Children's Alphabet and Number Books:

Alison's Zinnia by Anita Lobel

Counting Wildflowers by Bruce McMillan

The Flower Alphabet Book by Jerry Pallotta

TEACHER RESOURCES:

Chalfour, Ingrid & Worth, Karen. (2003). *Discovering Nature with Young Children: A pre-school nature curriculum designed to guide children's learning through open and focused science explorations.* St. Paul, MN: Red Leaf Press

Midden, Karen, Olthof, Marla & Starbuck, Sara (2002). *Hollyhooks and Honeybees: Garden Projects for Young Children.* St. Paul, MN: Red Leaf Press

Neumann-Hinds, Carla. (2007). *Picture Science: Using digital Photography to Teach Young Children.* St. Paul, MN: Red Leaf Press

Sangliolo, Maria. (2011). *Maria and Friends-Planting Seeds.* CD. Amazon.com

PRE-K MATH: HOW MANY LITTLE SEEDS?

SUPPORTS FOR ENGLISH LANGUAGE LEARNERS

Grade PRE-K MATH: HOW MANY LITTLE SEEDS?

Supports for ELLs

Title: How Many Little Seeds?	**Grade:** Pre-K

Linguistic Access:

In these supportive materials, a distinction between the vocabulary and the language functions is needed to provide entry points to the math content. Both need to be clarified to ensure comprehension and to avoid misunderstanding. This can be done by introducing and/or reviewing the most essential vocabulary and language functions in context and with concrete models, when applicable, in order for English Language Learners (ELLs) to better understand the meaning of the terms. The following vocabulary/language functions are suggested:

Vocabulary Words/Phrases:

Tier I (non-academic language): line, more, less, fewer, enough

Tier II (general academic language): all together, number

Tier III (math technical language and concepts that must be carefully developed): addition, subtraction, total, add, sum

Language Functions: combine, take away, explain

Content Access:

For this anchoring task, a clear understanding of addition and subtraction is required. Many opportunities need to be provided whereby students physically bring sets together and/or combine them into one new set.

Students need to physically experience the separation of one set into parts to find out what is left (the remainder). Students need to know at an early age that this is only one model for subtraction.

Scaffolds and Resources:

- Students need to have previous experiences with number lines and picture graphs. For example, students can build their own number line with the teacher's assistance.
- Additionally, teachers can create six matching cards (each one showing one of the faces on a die) for students to use with the pictures of objects (1 to 6), the numerals (1 to 6), and the words (one to six) to help develop the concept and vocabulary. Furthermore, this will provide necessary preparation for the Mathematics Game.

- Teacher gives appropriate wait time for ELLs to respond.

PRE-K MATH:
HOW MANY LITTLE SEEDS?

SUPPORTS FOR STUDENTS WITH DISABILITIES

PRE-K Math: How Many Little Seeds?

Instructional Supports for Students with Disabilities using UDL Guidelines

Background Information

Learners differ in the ways that they perceive and comprehend information and may require a different process to acquire the same content. In addition, learners may differ markedly in the ways they engage, maintain attention to task and demonstrate what they know and have learned. Hence, the goal of a UDL curriculum is the interrelated components which comprise the goals, methods, materials and assessment. In this way, all students would then be able to generalize their mathematical understanding for real world application.

Day 1: PREPARING STUDENTS

Provide options for perception- Offer ways of customizing the display of information

- Offer students individual desk top number lines.
- Illustrate and concretize concepts using prepared clothes pins containing arrows to represent counting down (subtracting) seeds from the Number Line.

Provide options for physical action- Vary the methods for response and navigation

- *Offer students seeds of varying sizes (large vs. small) and rubber placemat or tray to facilitate manipulation of seeds.*

Provide options for comprehension- Guide information processing, visualization and manipulation

- Display the Ten Little Flower Seeds song at eye level. Choral read the lines of the song one at a time.
- Sketch, illustrate or affix flannel board prompts to provide explicit models for learning the verse.
- Offer students the opportunity to echo, sing along and/or repeat the same verse using pair share or individualize support.
- Stop, orient and support comprehension and clarify vocabulary using illustration, clip art technology and or flannel board materials
- Record the song and offer students the opportunity to listen on headphones for reinforcement
- Ask students to replay the song in their mind and sing in large group, small group or individually.
- After removing one seed at a time, offer students the opportunity to count how many seeds are left, counting down from ten on their individual desk-top number lines

Provide options for executive functioning- Enhance capacity for monitoring progress

- Provide prompts, reminders and ground rules/management plans that reduce the frequency of off-task behaviors in response to struggles or low stamina, as appropriate

- Offer children models and mentors that support the range of attention, cognitive, sensory and language strengths and challenges

Provide options for self-regulation- Facilitate personal coping skills and strategies

- Provide options for self regulation when students assemble for group activities, e.g., requests/permission to assemble on the rug, in chairs around a table, take a short "stretch" and/or excuse yourself for other appropriate actions.
- Provide appropriate procedures for transitions when students assemble for group activities, e.g., excuse yourself for personal needs, to work with related service providers or to "rejoin" the group to decrease distractions.

Provide options for comprehension- Highlight patterns, critical features, big ideas, and relationships

- Provide feedback and models for incorporating positive strategies for success, e.g., group leaders to facilitate at the flannel board for the group.

Day 2: How many Little Seeds? A Mathematics Game

Provide options for recruiting interest- Optimize relevance, value and authenticity

- Establish clear expectations for group work. Assign work group roles. Post class-created rubric where all students can view.
- Establish clear protocols for class discussions***:*** whole group; small groups; think-pair-share; and turn and talk.

Provide multiple means of action and expression- Provide options for physical action

- Illustrate through multiple media- Offer students the opportunity to view a "gardener placing seeds into the ground" and "birds taking seeds out of the ground." Generalize the concept, role play, demonstrate and practice the concept of using the flower pot and the flannel board number line and seeds. Think about using prompts or costumes, e.g., straw hat to portray the gardener and a feather headband to portray the bird in role.

- Enhance capacity for monitoring progress. Establish rituals and routines that prompt learners to identify the type of feedback, advice, and/or assistance as they practice taking the role of the Gardener, Bird and Record Keeper at the flannel board Number Line.
- Offer students the opportunity to create and perform a short skit.
- Increase mastery-oriented feedback**.** While students are observing/listening to classmates practice the steps needed to play the Mathematics Game, periodically select students to retell, sketch or elaborate to monitor comprehension.

Provide options for perception- Offer alternatives for auditory information

- If available, utilize an FM system to decrease distractions from extraneous/ambient noise.
- Offer children preferred seating, as appropriate.
- Repeat auditory prompts and encourage children to echo your questions, e.g., "How many seeds are in the pot now?"
- Provide alternatives to word call questions. Pointing to the Flannel Board Number Line, ask, "Do you see two seeds?" and "Can you come up and point to the number 5?" Or "Can you show me the total using your fingers?"

Provide options for comprehension-Activate or supply background knowledge

- Anchor instruction by linking to and activating relevant prior knowledge.
- Allow one or two students to model for the class.
- Ask children to predict, "What do you think would happen if there were five seeds in the pot and the gardener ***added*** two more seeds?" Ensure the students have a solid grasp of the vocabulary used for Operations and Algebraic Thinking.
- Prepare word cards for the following key words: gardener, bird, total, addition and subtraction. Place Velcro strips on the back of the word cards to connect actions in the mathematics game to the vocabulary words.

Formative Assessment Questions

As students play the game, use flexible grouping to assemble students. Allow individual attention as appropriate. Offer students the opportunity to work in pairs and small groups as appropriate. Provide multiple entry points for all students as the teacher questions and documents how students respond to the questions while playing the game.

Provide options for sustaining effort and persistence- Foster collaboration and community

- A teacher should be pre-teach and be present at the table to create cooperative learning groups with clear goals, roles and responsibilities. Provide prompts that guide learners in when and how to ask peers and/or teacher(s) for assistance. Encourage and support opportunities for peer tutors and construct communities of learners engaged in the Math Game for an appropriate length of time prior to assessment.

Provide options for sustaining and persistence- Increase mastery-oriented feedback.

- As students are prompted to respond to the assessment questions, the teacher should explain that responses will be written in the student's exact words. Offer preferential seating and ensure that all students assessed have optimal conditions for response. Limit extraneous noise. Request parental permission AND practice using video equipment prior to the assessment, if a camera will be used to capture the student in process of playing the game for assessment. Encourage student response through question repetition as needed. Prompt students to refocus on task, as appropriate.

- Document the student responses on the Teacher Template applying the Rubric. Ensure that appropriate concrete objects (Flower Pot, Desk Top Number Line and large sized seeds) are in proper repair for all the students.