



Hands-On Activities

A Literacy, Math, and Science Resource Manual

Office of Overseas Programming and Training Support (OPATS)
May 2015



Peace Corps Publication No. M0106

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Introduction

History of This Manual

Peace Corps is very excited to be launching this manual to support literacy, math and science. This book is a resource for Peace Corps Volunteers, teachers, community leaders, mentors, learning coaches, and others who are interested in delivering “hands-on” educational activities in classrooms and communities. The original manual was created in 1998 in Morocco under a United States Agency for International Development funded project called “Training for Development” that focused on improving the primary school completion rates for girls in Morocco’s rural areas. One of the ways to keep girls (and boys) in schools was to introduce teachers to student-centered methodologies so that students felt more engaged in the learning process. We would like to thank Michelle Rinker who created the manual with input from Moroccan elementary teachers, and Monique Bidaoui-Nooren who was the USAID TFD project director. Thanks are also in order to Joanie Cohen-Mitchell who oversaw the upgrading of the manual and Julieann Rapoport for her work in revising and editing the content to be current and relevant for today’s Volunteers.

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February 2014

Language Experience Approach & Literacy

The Language Experience Approach to teach literacy focuses on students participating in the creation of their own reading and writing materials. The method draws on children's firsthand experiences that are either a) naturally occurring (e.g., events in daily life, unstructured play, observations of the environment), or b) are planned (e.g., classroom read alouds, adult-facilitated scavenger hunt, watching a cultural performance). An initial step of this approach involves asking students to dictate their own stories or experiences to use as reading and writing material. Eventually, the use of dictated accounts is reduced and finally eliminated as students use other-author texts to refine and extend their reading and writing skills and increase their expressive skills with more complex and challenging writing and speaking activities.

An important advantage of this approach is that, from the start, students learn to recognize words in print that are already very familiar to them because they are their own words. For many students, learning to read their own words, in the meaningful context of their own dictated accounts, is easier than grappling with the unfamiliar language and contexts of a published reading program.

Because students compose the account, comprehension is inherent to their interaction with the text, leading them to expect written language to make sense. As a result of the LEA experience, students expect other-author texts to contain meaningful ideas and understandable language. Dictation also develops and strengthens students' skill at composing their thoughts in writing. Reading skills and composing skills develop in tandem in an LEA program.

The flexible nature of LEA allows each teacher to tailor instruction to the specific interests and needs of individual students. For example, students' personal and cultural backgrounds are readily reflected in their dictated accounts and in their writing, especially when they are encouraged to base their accounts on their experiences outside of school.

Getting Started with LEA for literacy learning

Materials: Paper for writing (or a slate, blackboard or exercise book)

Procedure:

1. Create or recall a shared experience: going for a walk, having a guest come into the class, reading a book together, an experience at the market, playing soccer, etc. whatever resonates with the students.
2. The group then talks about the experience: the facilitator should ask questions and point things out. The students' understanding of the experience is deepened while oral vocabulary and language skills are developed and reinforced.
3. As students formulate and express their ideas, you can guide them in creating a dictated account. Students offer statements that they want included in the account, or the teacher selects statements from the ongoing conversation and suggests that they be used.

4. Record the students' statements on paper or the blackboard, constructing the text while the students watch. Seeing their words written down, students connect what they just said to what appears on the paper or on the blackboard.
5. As you record the experience, take the opportunity to talk about written language and demonstrate various concepts of print (letter and sound names, left to right, right to left or up and down, capital and lowercase letters, whole words or symbols, etc.).
6. Read the completed account to the students, modeling the sound of fluent, expressive reading. Students should then read it with you several times until they become familiar with it. They may also try reading it on their own if they feel confident.
7. With repetition, students will learn to recognize specific words from the account and develop the decoding skills, phonics, and structural analysis, using the account as a resource. Students at a more advanced stage may also write their own thoughts to supplement and extend the dictation.
8. For very beginning readers, a simple two-three word paragraph is sufficient as they master letter sounds and site reading.

Hands-On Approach to Mathematics and Science

Much like LEA for literacy, a hands-on approach to math and science builds upon students' current reality and/or shared experiences to build new skills. Rather than memorizing facts and formulas, a hands-on approach to math and science uses students' experiences in their daily lives and their basic understanding of the world to develop foundational skills and concepts in math and science. In this manual, the activities presented are designed to do just that and therefore, when choosing which activities to introduce to your students, you should always be thinking of their context and how the activity can be best adjusted to meet the students where they are.

These hands-on activities are viewed as supplemental to a school curriculum for math or science and will also work well in after-school and camp settings. As always when introducing new activities into your work site, work closely with your counterpart teachers/work partners to be sure that the activity is appropriate and feasible.

Innovation Welcome

This purpose of this Hands-On Manual is to help Volunteers and educators implement classroom activities that are engaging and meaningful for students. Please keep in mind that not all of the activities in this manual will work in your context or at your site. We expect that some of the materials suggested will not exist in your context and that you will need to make adaptations (e.g., shells or bottle tops instead of rocks, sand rather than water, the use of a blackboard when there is no paper). Alternatively, you may find that some of the proposed activities just do not resonate in your cultural context or in the classrooms in which you work. Ultimately, each Volunteer or educator should use his/her discretion and best judgment in which activities would be most appropriate for the context and population of students receiving this instruction. Most likely, this process will involve trial and error in determining which methods are most effective. Remember



to reach out to your fellow volunteers and colleagues for suggestions on what methods have been successful and share best practices with each other.

Additionally, we would love your feedback! We are constantly building our own library of best and promising practices for Education Volunteers at Peace Corps. Please send your great ideas and activities that have shown promise to OPATS Literacy Specialist: OPATS_EdTeam@peacecorps.gov.

Literacy Session: Alphabet Chart

Subject:

Approximate Grade Level Range:

Correspondence to Literacy Wheel:

Learning Objective:

Preparation of Materials and/or Environment:

Language Arts

Grade 1



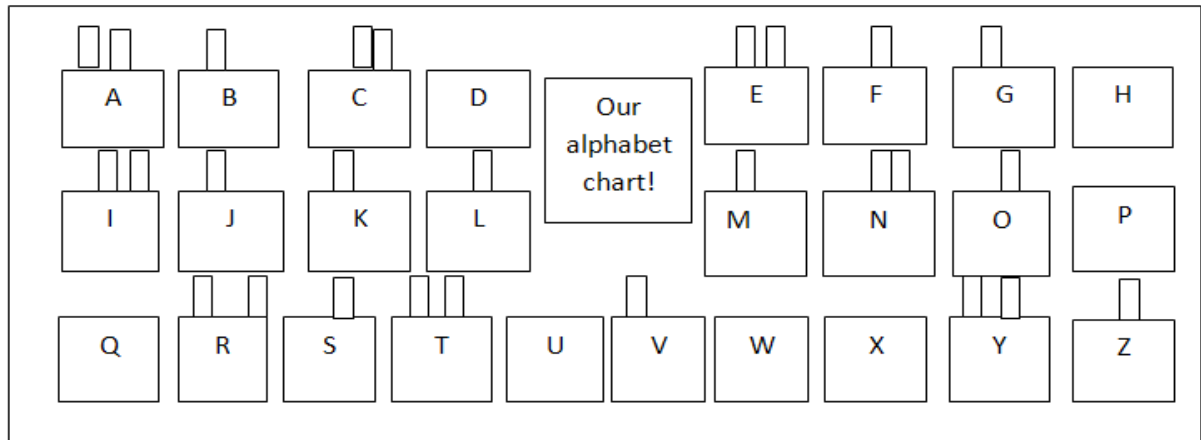
- Alphabet Knowledge

To promote letter recognition, especially the initial letter of words

- Label each of 26 envelopes with a letter of the alphabet.
- Post a large sheet of paper or dedicate a section of the wall to this activity.
- Tack or tape the envelopes to the paper or wall in alphabetical order to form an alphabet chart (example attached)
- Cut approximately 100 slips of paper on which students can print vocabulary words.

	Instructional Sequence
<p>Activity</p>	<p>Students will identify the first letter of new vocabulary words.</p> <ol style="list-style-type: none"> 1. At the end of a language arts or reading lesson in which new vocabulary has been introduced, review vocabulary words with the students. 2. Assign a single vocabulary word or set of vocabulary words to each student; ask the students to write each word on a separate slip of paper. 3. Students will take their slips of paper and place each one in the envelope that corresponds with the first letter of the word on the slip.

	Instructional Sequence
Notes	<ul style="list-style-type: none"> • This exercise can be carried out after any language arts or reading lesson. • After the activity is completed, the instructor should check each envelope to be sure that the words have been correctly “filed.” • The instructor can periodically review all of the words in an envelope with the students and ask them for additional words that begin with that same letter.
Ideas for Improvement	What went well? What would you do differently next time?



Literacy Session: Alphabet Circle

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

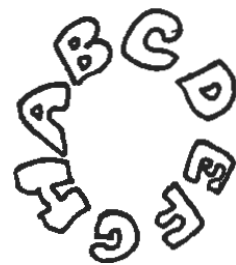
Learning Objectives:

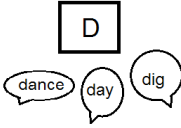
Preparation of Materials and/or Environment:

Language Arts

Grade 1

- Alphabet Knowledge
 - Phonological and Phonemic Awareness
1. To reinforce letter recognition
 2. To identify the initial sound of a spoken word and generate other words with the same initial sound
- Print each of the letters of the alphabet on a separate square of paper or cardboard.
 - Put these squares in a box or basket.
 - Have students arrange chairs or sit on the floor in a circle.



	Instructional Sequence
Activity 	<p>Students will recall words that begin with each letter of the alphabet.</p> <ol style="list-style-type: none"> 1. With the students seated in a circle, pass around the box of letters; each student will pick a letter square. 2. Moving in one direction around the circle, ask each student to: <ul style="list-style-type: none"> • Hold the square in such a way that everyone in the circle can see the letter; • Say the name of the letter aloud; and • Share a word or name that begins with that letter. 3. If there are fewer than 26 students in the group, pass the box again and continue the exercise. 4. When all of the letters have been selected, have the students deposit their squares in the box and begin the exercise again. Instruct students to think of a new word or name for each letter, rather than to repeat a word used in the previous round.
Notes	This activity can be repeated multiple times if students are able to rise to the challenge of thinking of new words with each round. Depending on the size of the group, it may be helpful to have the students work in pairs or teams in later rounds.
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: World Bingo

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objective:

Preparation of Materials
and/or Environment:

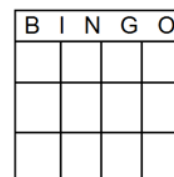
Language Arts

Grades 1–2

- Alphabet Knowledge
- Phonological and Phonemic Awareness

To recognize and read grade-appropriate words

- Make a list of 20 vocabulary words drawn from spelling, reading, math, or science lessons.
- Prepare a Bingo Card for each student in the class by drawing a three by three grid on heavy-weight paper or cardboard. (*examples attached*)
- Fill the Bingo Cards with words from the vocabulary list; vary the words on each card so that no two cards are identical.
- Write each of the 20 words on a small slip of paper and place the slips in a basket or box.
- Procure 10 place markers (e.g., bottle caps) for each player.



	Instructional Sequence
Activity	<p>Students will listen to a spoken word and determine whether or not that word appears in print on his or her Bingo Card.</p> <ol style="list-style-type: none"> 1. If students' reading level permits, choose one student to be the game leader who will "call" the words; otherwise, the instructor serves that role. 2. Bingo Cards are distributed among the game players (minus the leader). 3. The game leader draws a slip of paper from the basket and calls the word aloud. 4. Players search their cards for the word; if the word appears on their card, they place a bottle cap or other marker on top of the word. 5. The game leader continues to draw and call words until one player covers three words in a row (in a horizontal, vertical, or diagonal line) on his or her Bingo Card. This player calls "Bingo." 6. The winner reads the "winning" words aloud for confirmation.
Notes	This game can also be played until all of the words on a Bingo Card are covered.
Ideas for Improvement	What went well? What would you do differently next time?

flower	roots	plant
leaf	seed	stem
bud	water	soil

elephant ●	snake ●	bear
dog	lion ●	● bird
insect	● fish	cat

Literacy Session: Matching Words Memory Game

Subject:

Approximate Grade Level Range:

Correspondence to Literacy Wheel:

Learning Objective:

Preparation of Materials
and/or Environment:

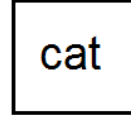
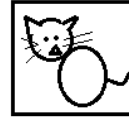
Language Arts

Grades 1–3

- Phonics
- Vocabulary

To decode and show understanding of grade-appropriate words

- Procure 20 index cards or squares of paper.
- Write vocabulary or other familiar words on 10 of the cards.
- On the other 10 cards, draw or paste pictures that correspond to each of the written words.



	Instructional Sequence
Activity	<p>Students will use memory and reading skills to match words to their corresponding pictures.</p> <ol style="list-style-type: none"> 1. Shuffle the cards and place them face down on the table in a grid formation. 2. The first player chooses two cards and turns them over in place so that all players can see them. The player names the picture or reads the word on each card; if the cards are a match, the player collects the cards and takes another turn. If the cards do not match, they are turned back over and the next player takes a turn. 3. The game is over when all of the matching pairs have been found. <div style="text-align: center;"> </div>
Notes	This game can be played in a large group or in smaller teams.
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Touch and Feel Box

Subject:

Approximate Grade Level Range:
 Correspondence to Literacy Wheel:
 Learning Objective:
 Preparation of Materials
 and/or Environment:

Language Arts

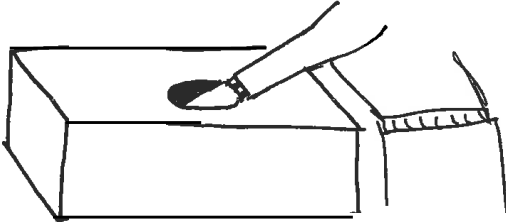
Grades 1–3

- Vocabulary



To use descriptive language to communicate ideas

- Procure a box and its cover; make a hand-sized hole in the cover.
- Collect various objects from home, school, and nature that will fit in the box. Examples might include a toothbrush, pencil, pineapple, and hammer.
- Place objects inside the box.

	Instructional Sequence
<p>Activity</p>	<p>Students will explore objects through touch and use their verbal fluency to communicate a description of these objects.</p> <ol style="list-style-type: none"> 1. One at a time, each student will reach into the box and grab onto a single object. No looking through the hole!  <ol style="list-style-type: none"> 2. Keeping his or her hand in the box, the student will offer five adjectives to describe what s/he feels. Examples of adjectives may include soft, bumpy, prickly, cold, round, and sharp. 3. The student will guess what the object is. 4. Instructor will keep a list of all of the adjectives generated. Encourage students to use new words rather than repeat the descriptive words used by their classmates.
<p>Notes</p>	<p>Students can be encouraged to bring in interesting items from home or nature for another round of the game.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Literacy Session: Word Rocket Ship

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objective:
Preparation of Materials
and/or Environment:

Language Arts

Grades 1–4

- Vocabulary
- Writing

To expand students' vocabularies

- Prepare small slips of paper (approximately 3 cm x 8 cm).
- Cut a rocket ship out of cardboard or construction paper.



	Instructional Sequence
Activity	<p>Students will document new vocabulary words learned at school and create a classroom display of these words.</p> <ol style="list-style-type: none"> 1. Affix a rocket ship cut-out to a wall at the front of the classroom. 2. Instruct students to write down new or interesting words they encounter each day in their reading, writing, math, science, or other lessons. 3. At a certain time each day or each week, the instructor collects the words, writes each one on a slip of paper, and attaches the slips of paper at the "tail" of the rocket ship, as if the words were the ship's fuel. 4. As the "tail" grows, the rocket ship can be moved around so that the display creates patterns on the classroom walls.
Notes	Students can be encouraged to use the words on the wall in their writing assignments.
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Acrostic Name Poems

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objectives:

Preparation of Materials
and/or Environment:

Language Arts

Grades 1–4

- Phonological and Phonemic Awareness
- Vocabulary

1. To apply phonological and phonemic awareness to vocabulary choices
2. To bring personal meaning to literacy learning

- Paper
- Colored pencils or markers

S	_____
H	_____
E	_____
R	_____
I	_____
D	_____
O	_____
N	_____

	Instructional Sequence
Activity	<p>Each student will create a vertical poem using the letters of his or her name.</p> <ol style="list-style-type: none"> 1. Instructor will model several examples of acrostic poems, in which a single word is written vertically on the page and another word or sentence stems from each of these initial letters to form a poem. 2. Students will write an acrostic poem using their names. Encourage them to use words that focus on their positive qualities. 3. Students will then read and show their poems to their classmates, either in the large group or in pairs. <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: left;"> <p>I love it</p> <p>Cool and creamy</p> <p>Excellent</p> <p>Chocolate</p> <p>Rum and raisin</p> <p>Everyone loves it</p> <p>Absolutely</p> <p>Marvelous!</p> </div> <div style="text-align: left;"> <p>Loveable</p> <p>Always good in math</p> <p>Youngest in my family</p> <p>Loves cats</p> <p>Athlete</p> </div> </div>
Notes	If this activity is employed with younger students, the instructor can serve as a scribe, asking students to say, rather than write, a word or phrase for each letter of his or her name.
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Folding Stories

Subject:

Approximate Grade Level Range:

Correspondence to Literacy Wheel:

Learning Objective:

Preparation of Materials
and/or Environment:

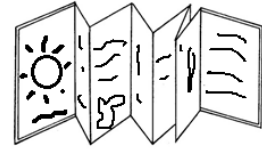
Language Arts

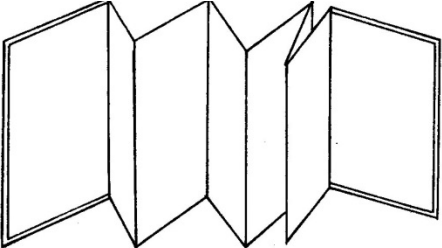
Grades 1–4

- Writing

To compose a brief written narrative

- Give each student a long strip of paper measuring approximately 8 cm x 60 cm. (*Cut or tape paper together, as necessary.*)
- Pencils or pens



	Instructional Sequence
Activity	<p>Each student will compose a narrative that will be written on a long strip of paper; this “mini-book” will be shared with the class.</p> <ol style="list-style-type: none"> 1. Have each student fold his or her paper in an accordion pattern, so that the pages of the “mini-book” are composed of eight separate sections.  <ol style="list-style-type: none"> 2. Instruct students to compose a short story, writing one or two sentences on each page. The first page serves as a title page. Tiny illustrations can accompany the text. 3. Display the folding books around the classroom.
Notes	<p>If younger or less advanced students do not yet have the skills to write the story themselves, they can dictate their stories to the instructor. See “Language Experience Approach” on page 2 of this manual’s introduction.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Literacy Session: Handmade Shape Books

Subject:

Language Arts

Approximate Grade Level Range:

Grades 2–4

Correspondence to Literacy Wheel:

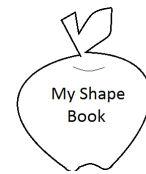
Writing

Learning Objectives:

1. To compose a brief written narrative
2. To experience a model of arts integration in literacy activities

Preparation of Materials and/or Environment:

- Paper
- Scissors
- Colored pencils or markers
- Stapler or hole-punch
- *If hole-punch:* String or ribbon



Instructional Sequence	
Activity	<p>Each student will compose a narrative that will be written on specially-shaped pages.</p> <ol style="list-style-type: none"> 1. Have each student create “Shape Books” by laying several pieces of paper on top of each other and cutting a shape—such as a flower, a truck, a ball, or a triangle. The pages must have ample room for the student to compose his or her story. <div style="text-align: center;"> </div> <ol style="list-style-type: none"> 2. Instruct students to write a short narrative on these creatively-shaped pages. 3. Pages can be attached with a staple: alternatively, use a hole-punch and tie the pages together with ribbon or string. 4. Books can be shared around the classroom as well as with students in another class.
Notes	<p>If younger or less advanced students do not yet have the skills to write the story themselves, they can dictate their stories to the instructor. See “Language Experience Approach” on page 2 of this manual’s introduction.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Literacy Session: Potato Stories

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objectives:

Preparation of Materials
and/or Environment:

Language Arts

Grades 2–4

- Writing
1. To compose a brief imagined story
 2. To experience a model of arts integration in literacy activities
- Ask each student to bring in a potato from home—the more oddly shaped the potato, the better!
 - Paper
 - Pencils or colored pencils



	Instructional Sequence
Activity	<p>Students will use the shape of their potato as an outline for a drawing; subsequently, students will use their drawings as the basis for a brief creative writing exercise.</p> <ol style="list-style-type: none"> 1. Each student traces the shape of his or her potato on a piece of paper. 2. Instruct students to use the outline of the potato as the basis for a new drawing. 3. Each student will write a brief, imaginative story based on his or her drawing. Encourage creativity! 4. The resulting stories can be displayed around the classroom and/or shared with students from other classes. <div style="text-align: center;"> </div>
Notes	<p>If younger or less advanced students do not yet have the skills to write the story themselves, they can dictate their stories to the instructor. See “Language Experience Approach” on page 2 of this manual’s introduction.</p> <ul style="list-style-type: none"> • If potatoes are not a common staple of the local diet, choose another fruit or vegetable that is likely to have an interesting shape.
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Literacy Session: Squiggle Art Stories

Subject:

Approximate Grade Level Range:
 Correspondence to Literacy Wheel:
 Learning Objectives:

Preparation of Materials
 and/or Environment:

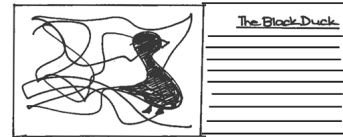
Language Arts

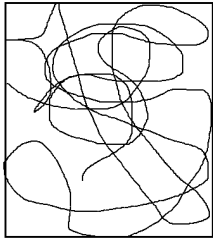
Grades 2–4

- Writing

1. To compose a brief imagined story
2. To experience a model of arts integration in literacy activities

- Paper
- Pencils
- Crayons or colored pencils



	Instructional Sequence
<p>Activity</p> 	<p>Students will draw random lines, imagine an object within those lines, and write a story about this imagined object.</p> <ol style="list-style-type: none"> 1. Each student poises his or her pencil on a blank piece of paper. 2. While the instructor slowly counts aloud to ten, students will move their pencils around the page to create a design. At “ten,” they will put down their pencils. 3. Each student will observe the shapes s/he created and will “find” an object within the drawing: for example, a flower, a person, an animal, a seashell. 4. Using crayons or colored pencils, the students will color in their object so that it is visible on the page. 5. Each student will write a story using the imagined object as the main character. Older students can be expected to develop a more detailed and organized narrative. 6. The resulting stories can be shared among the students.
<p>Notes</p>	<p>If younger or less advanced students do not yet have the skills to write the story themselves, they can dictate their stories to the instructor. See “Language Experience Approach” on page 2 of this manual’s introduction.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Literacy Session: Junk Box Stores

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objective:

Preparation of Materials
and/or Environment:

Language Arts

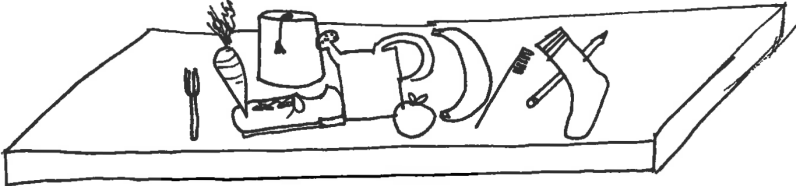
Grades 2–4

- Writing

To compose an imagined story with compulsory vocabulary

- Collect culturally-appropriate items from home, school, and outdoors that the students will find interesting or humorous—like a toothbrush, a vegetable, a sock, or funny sunglasses.
- Place the objects in a box at the front of the classroom.
- Paper
- Pencils



	Instructional Sequence
Activity	<p>Students will write a story that includes mention of each of the objects in the box.</p> <ol style="list-style-type: none"> 1. One at a time, students will take turns choosing an object from the box and placing it on a desk or table at the front of the room. Be sure that all students know each item's name, spelling, and function.  <ol style="list-style-type: none"> 2. Instruct students to write a story that mentions all of the items on the table. Older students can be expected to develop a more detailed and organized narrative. 3. Students can read their resulting stories in pairs, small groups, or to the whole class.
Notes	<p>If younger or less advanced students do not yet have the skills to write the story themselves, they can dictate their stories to the instructor. See "Language Experience Approach" on page 2 of this manual's introduction.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Literacy Session: Paper Word Chain

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

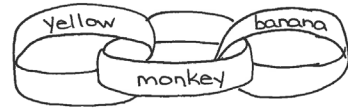
Learning Objective:

Preparation of Materials
and/or Environment:

Language Arts

Grades 3–4

- Vocabulary



1. To identify parts of speech in context
 2. To categorize vocabulary
- Select a reading for the day's lesson.
 - Distribute a copy of the reading to each student and/or prepare the reading in its entirety on a central chalkboard or newsprint.
 - Cut strips of paper approximately 3 cm x 12 cm.
 - Have markers or pencils for all students, along with adhesive (glue, tape, stapler) to share.

	Instructional Sequence
<p>Activity</p> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">funny</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">bear</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">sweet</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">melon</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">smart</div>	<p>Students will use listening and reading skills to identify parts of speech and to categorize sets of words.</p> <ol style="list-style-type: none"> 1. Instructor will communicate to students what part(s) of speech or categories of words they will be asked to identify—e.g., “Listen for the adjectives and nouns” or “Notice all of the words that describe color.” 2. Instructor will read the selection aloud to the students. 3. Ask students to make a list of a certain number of words, e.g., five nouns and five adjectives, or four colors and four animals. (<i>The teacher may read the selection again, if necessary.</i>) 4. Students will write each of these words on a strip of paper. 5. Students will then combine their slips of paper with those of their classmates to make a paper chain for each category or part of speech. These chains—for example, the “adjective chain,” the “noun chain,” or the “color chain”—can be used to decorate the classroom.
<p>Notes</p>	<p>If categorization of words is employed, the instructor should review the reading selection beforehand in order to choose categories (colors, animals, clothing, food, numbers, size) that are most relevant to the lesson's reading comprehension goals.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Literacy Session: Mystery Pictures

Subject:

Approximate Grade Level Range:

Correspondence to Literacy Wheel:

Learning Objectives:

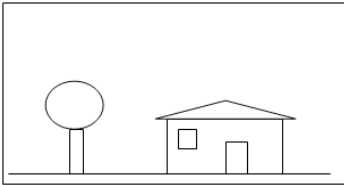
Preparation of Materials
and/or Environment:

Language Arts

Grades 3–6

- Vocabulary
- 1. To practice attentive listening
- 2. To develop or strengthen the ability to use spoken language to provide precise instructions
- Distribute two sheets of paper and colored pencils or crayons to each student.



	Instructional Sequence
Activity	<p>Each student will give precise spoken instructions to a classmate in an attempt to guide the listener to re-create a simple drawing.</p> <ol style="list-style-type: none"> 1. Students will be divided into pairs. 2. Without allowing his or her partner to see, each student will draw a simple picture on paper, using three colors and three simple geometric shapes (e.g., circles, squares, rectangles, triangles). <div style="text-align: center;">  </div> <ol style="list-style-type: none"> 3. One student will take a blank sheet of paper and attempt to imitate his or her partner's drawing, based on precise spoken instructions given by the partner. These step-by-step instructions should describe the shape, size, color, and placement of each element of the drawing. The listening partner may ask questions but cannot be shown the drawing. 4. When the activity has been completed, the students will compare the two drawings and identify the successes and challenges of their communication. 5. Repeat the activity with the members of each pair switching roles, so that the listener is now the one providing instructions.
Notes	When students compare their drawings, the instructor should help them to identify their successes in communication (since their communication failures will be evident!).
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Newspaper Word Search

Subject:

Approximate Grade Level Range:

Correspondence to Literacy Wheel:

Learning Objectives:

Preparation of Materials
and/or Environment:

Language Arts

Grades 4–5

- Vocabulary
- Phonics

1. To read and comprehend informational texts
2. To apply higher-level phonics and word analysis skills to decode unfamiliar words
3. To recognize the occurrence and function of parts of speech

Cut out small (approximately 15 cm x 20 cm) sections of discarded newspapers or other publications—one section of text per student.



	Instructional Sequence
Activity	<p>Using sections of a local or otherwise culturally-appropriate newspaper or publication, students will search for words that match a particular word category or part of speech.</p> <ol style="list-style-type: none"> 1. Distribute the newspaper cut-outs, one to each student. 2. Choose a category or part of speech that is relevant to recent lessons. Some possibilities include: nouns; plural nouns; adjectives; words with a given number of syllables; present, past, or future tense verbs. 3. Instruct students to underline the words that match the search. 4. Instructor will ask each student to read his or her words aloud and will write these on a master list for all of the class to see.
Notes	<p>Alternatively, ask students to choose a certain number of unfamiliar words from the newspaper section and write them in alphabetical order.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Literacy Session: Webbing a Story

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objectives:

Preparation of Materials
and/or Environment:

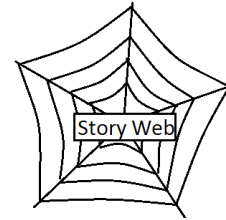
Language Arts

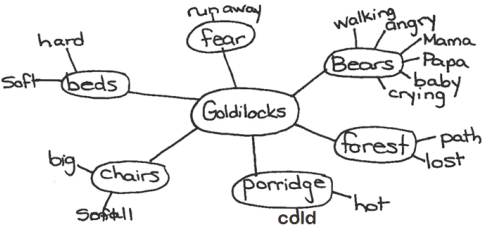
Grades 3–6

- Fluency
- Writing

1. To demonstrate reading comprehension through recounting
2. To describe characters, settings, and events in depth
3. To visualize the interplay among key details in a text

- Chalkboard or newsprint
- Markers or crayons



	Instructional Sequence
Activity	<p>Students will work collectively to visually represent the components of a story they have read.</p> <ol style="list-style-type: none"> 1. Instructor will stand in front of the class and document the students' input. 2. Begin by writing the title of the story to be discussed in the center of the board or paper. Draw a circle around it. 3. Ask students to call out everything they remember about the story: main characters, setting, events, and significant physical items. Write these in their own circles, stemming from the center. Write these in their own circles, stemming from the center. 4. Next, ask students to provide additional information about each of these ideas; illustrate these details stemming from the secondary circles. 5. Display this and other story webs around the classroom. 
Notes	Younger students can be introduced to “webbing” an idea by putting their own names in the center of the web and using the additional circles to describe themselves.
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Chain Stories

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objectives:

Preparation of Materials
and/or Environment:

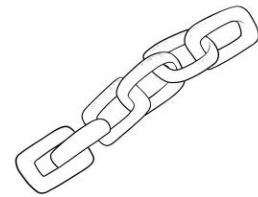
Language Arts



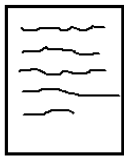
Grades 3–6

- Fluency
- Writing

1. To compose creative narratives that develop imagined events, using sequences and descriptive details
2. To engage effectively in collaborative literacy activities

- Arrange desks or tables to form a large circle with all students facing inward.
- Paper
- Pencils



	Instructional Sequence
<p>Activity</p>   	<p>Students will work in collaboration to create stories with several serial authors.</p> <ol style="list-style-type: none"> 1. Each student will have five minutes to write the beginning of a story, which should include the story's setting and main characters. 2. After five minutes, the instructor calls time by ringing a bell or clapping hands. 3. Students put their pencils down and pass their papers clockwise around the circle to the next student. 4. Students then have five minutes to: <ul style="list-style-type: none"> • Read the story that has been handed to them, and • Imagine and write the next sequence of events in the story. 5. This process can be repeated several times. 6. Final stories can be read aloud to the class.
<p>Notes</p>	<p>The physical “passing of the story” can be more complicated if desired: e.g., students’ papers can be handed around the circle past two or five classmates, or until the instructor claps or rings a bell again.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Literacy Session: Spelling Race

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Language Arts

Grades 3–6
• Spelling



Learning Objectives:

1. To practice spelling
2. To engage effectively in collaborative literacy activities

Preparation of Materials and/or Environment:

- Prepare two sets of alphabet cards; each set should have one card per letter of the alphabet (e.g., 26 cards for English).
- Write recent spelling or vocabulary words on slips of paper.
- Place the slips of paper in a basket, box, or cup.

	Instructional Sequence
Activity	<p>Students will work in collaboration to determine the correct spelling of words.</p> <ol style="list-style-type: none"> 1. Choose one student from the class to be the game leader. 2. The remaining students are divided into two teams and given one deck of the alphabet cards per team. 3. The game leader chooses a word from the basket and reads it aloud to both groups. 4. Each team must use their alphabet cards to form the correct spelling of the word. If the same letter is used more than once in a word, students may substitute the blank side of another letter card for the duplicated letter; the team must specify what letter is represented by the blank card. <ol style="list-style-type: none"> 5. The first team to spell the word correctly earns five points. The first team to reach 25 points wins the game!
Notes	This game can be used for spelling practice, vocabulary, or reading skills.
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Pen Pals

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

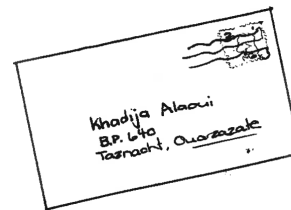
Learning Objective:

Preparation of Materials
and/or Environment:

Language Arts

Grades 3–6

- Writing
- Fluency



To produce clear writing that is appropriate to a particular purpose and audience

- Contact your municipal or regional school district for help in arranging a pen pal exchange with another school.
- Communicate with the school director or classroom teacher from the assigned exchange to collect the names of the children to whom your students will be writing.
- Match each of your students to a student from the other school.
- Distribute paper, pencils, and mailing envelopes to students.

	Instructional Sequence
<p>Activity</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Dear _____, My name is _____. I am 9 years old. How old are you? Do you like cookies? My favorite food is ice cream. Your friend, _____</p> </div>	<p>Students will correspond in writing with children of the same age who live in a different area of the country.</p> <ol style="list-style-type: none"> 1. Instructor will give each student the name of his or her new pen pal. 2. Instruct students to write an introductory letter that includes information about themselves, including their name, age, family (e.g., number of siblings), description of their home village or town, current weather, favorite food or books. Students may pose similar questions to their new pen pals, e.g., How old are you? How many brothers and sisters do you have? What is your favorite fruit? 3. Instructor will collect the letters and mail them to the exchange school. 4. This correspondence can be ongoing over the course of the school year.
<p>Notes</p>	<ul style="list-style-type: none"> • Available technology permitting, letters may be composed via electronic mail rather than sent by post. • Be aware of any cultural differences between your students and their pen pals. If necessary, guide your students to avoid any potential culturally-inappropriate questions or comments.
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

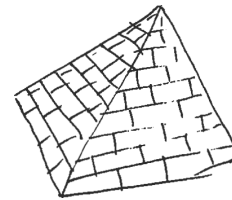
Literacy Session: Story Pyramids

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Language Arts

Grades 3–6
Fluency



Learning Objective:

Preparation of Materials
and/or Environment:

To document key ideas and details from a text

- On a chalkboard or sheet of newsprint, draw a model of an eight-layer story pyramid, in which the bottom of the pyramid is composed of eight spaces, each large enough for a printed word. Each subsequent pyramid layer is composed of one less space (seven spaces, then six, then five, then four, then three, then two); the top of the pyramid consists of a single space.
- Distribute a sheet of paper and a pencil to each student.

	Instructional Sequence
Activity	<p>Students will utilize the pyramid structure to describe the plot, character, and setting of a story they have read.</p> <ol style="list-style-type: none"> 1. Instruct students to draw an eight-layer story pyramid on their sheets of paper. 2. Each student should complete his or her pyramid as follows: <ul style="list-style-type: none"> • Line 1: Name of main character • Line 2: Two words that describe the main character • Line 3: Three words that describe the setting of the story • Line 4: Four words that explain the problem presented in the story • Line 5: Five words that describe the action at the beginning of the story • Line 6: Six words that describe the action in the middle of the story • Line 7: Seven words that describe the action at the end of the story • Line 8: Eight words that describe the solution to the problem 3. Students can cut out their pyramids in triangle form and attach them to the classroom wall as a display.
Notes (example)	<p style="text-align: center;">Anansi spider mischievous Jamaica rainforest tropics</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">_____</p>

	Instructional Sequence
Ideas for Improvement	What went well? What would you do differently next time?

Literacy Session: Newspaper Investigations

Subject:

Approximate Grade Level Range:
Correspondence to Literacy Wheel:

Learning Objective:

Preparation of Materials and/or Environment:

Language Arts

Grades 4–6

- Fluency
- Writing



To read and comprehend informational texts

- Collect local and culturally-relevant newspapers.
- Paper
- Pencils

	Instructional Sequence
Activity	<p>Students will read local newspapers to find and utilize certain information.</p> <ol style="list-style-type: none"> 1. Each student will be given a section or sections of a newspaper. 2. Possible activities include: <ul style="list-style-type: none"> • Make a list of adjectives used in articles about sporting events. • Make a list of nouns that appear in a front-page article. • Make a list of qualifications needed for jobs that appear in the classified section. • Use TV listings to create math problems about time and duration. • Over a week’s time, keep track of sunrise times, weather reports, or prayer times; graph them and identify trends or patterns. 3. Students can trade sections and switch activities.
Notes	There are many other potential uses for newspaper research. Use your own imagination, notice what the students find most interesting, and/or think about relevant cultural themes.
Ideas for Improvement	What went well? What would you do differently next time?

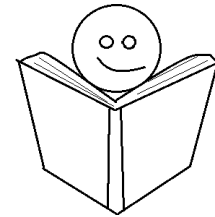
Literacy Session: Cross-Grade Read-Aloud

Subject:

Language Arts

Approximate Grade Level Range:

Grades 5–6
(Grades 1–4 will act as
“audience members”)



Correspondence to Literacy Wheel:

- Fluency
- Writing

Learning Objectives:

1. To compose creative narratives that develop imagined events, using sequences and descriptive details
2. To produce clear writing that is appropriate to a particular purpose and audience
3. For younger students to practice listening skills

Preparation of Materials
and/or Environment:

- Arrange an inter-classroom schedule that will allow students from Grades 5 and 6 to visit the classrooms of younger students during the school day.

	Instructional Sequence
Activity	<p>Older students will prepare original stories to read aloud to younger students.</p> <ol style="list-style-type: none"> 1. Each student in Grades 5 and 6 will compose an original story to read aloud to younger students; older students should be instructed to write a story that is appropriate (in terms of content as well as vocabulary) for the younger grades. 2. Once their stories are written, students will practice reading them aloud. They should be reminded to use an expressive tone to hold the children’s attention and to read at a pace that is slow enough for listeners to understand each word. 3. Older students arrive at the younger students’ classroom at the agreed-upon time. Depending on the amount of time allotted, each older student can read to the whole classroom, to small groups, or to a single “reading buddy.”
Notes	<p>This activity can be scheduled on a regular basis (e.g., weekly or monthly) to promote interaction among the older and younger students.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Daily Calendar

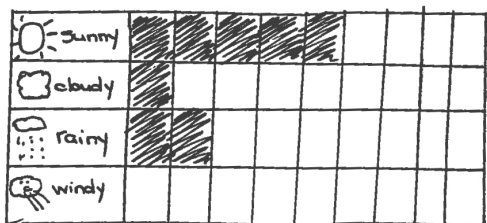
Subject:

Approximate Grade Level Range:

Math Domains:

Learning Objectives:

Preparation of Materials
and/or Environment:



(weather chart)

Mathematics

Grades 1–2

- Counting
- Geometry

1. To practice the counting sequence
2. To recognize shapes and their attributes

- Prepare a monthly calendar grid on the wall or on newsprint—seven squares across and five squares down.
- Label the top section of each square with its corresponding day of the week.
- Using colored construction paper, cut out simple geometric shapes (circle, triangle, square) to fit in the squares on the grid.



- Number the shapes 1 to 31 to represent each day in a month.
- Tacks or tape

JANUARY				

	Instructional Sequence
Activity	<p>Using a monthly calendar as a point of departure, students will practice counting, shape recognition, and pattern recognition.</p> <ol style="list-style-type: none"> 1. Each school day, one student will attach the appropriate number card to the correct square in the calendar grid. The class will recite the day and date together, e.g. "Today is Friday, May 2, 2014." 2. Review the shape of the day's date: Is it a circle, a square, or a triangle? 3. The class will record whether the date is an even or odd number. 4. Keep a tally pad of the number of days that the students have been in school. 5. Optional: Create a monthly weather chart to accompany the calendar. Note if each day is sunny, cloudy, rainy, or windy (or whatever weather is common in your area).
Notes	At the end of each month, review the patterns that have emerged, e.g. recite the shapes in the order that they appear on the calendar ("circle, triangle, triangle, square, circle"), review the even or odd numbers in sequence, or notice the weather patterns.
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Counting Collections

Subject:

Mathematics

1, 2, 3...

Approximate Grade Level Range:

Grades 1–2

Math Domains:


- Counting
- Measurement
- Operational Thinking

Learning Objectives:

1. To understand the relationship between numbers and quantities
2. To classify objects into categories
3. To make comparisons (*greater than, less than, equal to*)
4. To represent and solve addition and subtraction problems

Preparation of Materials and/or Environment:

- Collect small, common items such as stones, beans, bottle caps, buttons, and sticks to be used as counters for math lessons.
- Store each item type in a separate jar or other container.
- Encourage students to add to the collections; communicate with families to ask them to send more of these items, if possible.

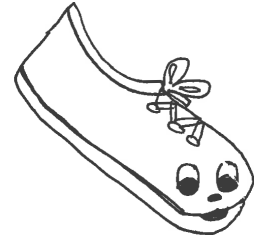
	Instructional Sequence
Activity	<p>Students will use collected materials as counters to assist them in counting, classifying, comparing, and solving basic mathematical operations.</p> <ol style="list-style-type: none"> 1. Individual or groups of students are given single-category items in quantities of up to 10 or 20 to practice counting: How many beans do you have? 2. Individual or groups of students are given a mix of items in quantities of up to 10 or 20 to practice sorting: How many beans do you have? Sticks? Buttons? 3. Ask each student to compare his or her piles: Do you have more sticks than buttons? Do you have fewer bottle caps than beans? <ul style="list-style-type: none"> • Introduce addition and subtraction using groups of 10 to 20 items: How many sticks do you have? If I give you three more, now how many do you have? 
Notes	

	Instructional Sequence
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Object Sorting

Subject:

Mathematics



Approximate Grade Level Range:

Grades 1–3

Math Domains:

- Counting
- Measurement

Learning Objectives:

1. To understand the relation numbers and quantities
2. To classify objects into categories
3. To make comparisons (greater than, less than, equal to)

Preparation of Materials and/or Environment:

- Identify an object that all students are required to have with them at school, such as a shoe, pencil case, or book bag.
- Have a chalkboard or large sheet of newsprint ready.
- Chalk or markers

	Instructional Sequence
<p>Activity</p>	<p>Students will use everyday objects to count and classify.</p> <ol style="list-style-type: none"> 1. All students will contribute their item (e.g. their shoe or books bag) to a pile. 2. The class will sort the items based on various attributes, such as closures, material, or color: <ul style="list-style-type: none"> • How many of the shoes have laces? How many have buckles? Velcro? • How many of the shoes are made of plastic? Cloth? Leather? • How many of the shoes are black? Brown? White? Blue? 3. Divide the class into the same number of groups as the number of attributes considered. In the example above, there would be three groups: one for closures, one for materials, and one for colors. 4. Instructor will guide each group to create a bar graph to represent their findings, where the horizontal axis describes the attributes and the vertical axis represents the corresponding number of items.
Notes	<ul style="list-style-type: none"> • Steps 3 and 4 are most appropriate for second and third graders. • This activity can be carried out multiple times with different items. Take care to choose items that every student will have.

	Instructional Sequence
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Stone Math

Subject:

Mathematics

Approximate Grade Level Range:

Grades 2–3

Math Domains:

- Counting
- Measurement



Learning Objectives:

1. To understand the relationship between numbers and quantities
2. To estimate the length or width of an object
3. To measure the length or width of an object

Preparation of Materials and/or Environment:

- Collect dozens of small stones or other objects. (See notes.)
- Have a chalkboard or large sheet of newsprint ready.
- Chalk or markers

	Instructional Sequence
<p>Activity</p>	<p>Students will use stones to “measure” the dimensions of everyday objects.</p> <ol style="list-style-type: none"> 1. Instructor will divide the stones into piles of ten for display on a desk or table; adjust the number of piles in accordance with the counting ability of the students. 2. The class will count by tens (10–20–30) to determine the total number of stones. 3. Have students estimate how many stones they would need to create a line of stones as long as the side of their math book or workbook. 4. Lay the math book or workbook on the table. Starting at the top of the book, place stones alongside the binder until you reach the bottom of the book. Count the number of stones and record the result on the chalkboard. 5. Measure other objects in the class using the stones. Record these results as well.

	Instructional Sequence
Notes	<ul style="list-style-type: none"> This activity can be carried out with a variety of countable items, including popcorn (kernels or popped), seashells, or other small, hard objects. This activity can also be used as the basis for comparisons: Which object took the greatest number of stones to measure? Which object required the fewest stones? How much longer is one object than another?
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Measuring with String

Subject:

Approximate Grade Level Range:

Math Domain:

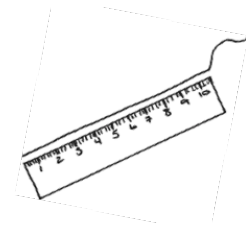
Learning Objectives:


Preparation of Materials and/or Environment:

Mathematics

Grades 2–3

- Measurement
 - Data
1. To measure length and circumference
 2. To determine if one object is longer or larger than another
- String
 - Scissors
 - Pencils
 - Paper
 - Ruler or meter stick (optional)



	Instructional Sequence
<p>Activity</p> 	<p>Students will use string as a measurement tool to compare the size of various objects.</p> <ol style="list-style-type: none"> Each student will wrap a piece of string around his or her head in order to measure its circumference, cutting the string where the ends meet. The instructor will direct the students to find five objects in the classroom that are smaller than their heads by comparing the length or circumference of each object to their piece of string. Instruct students to find five classroom objects that are larger than their heads by applying the same method. Students can measure their string with a ruler or meter stick and document their head circumference on a classroom chart.
Notes	This activity can be expanded by measuring students' height or the length of their arms and repeating the comparison exercises.

	Instructional Sequence
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Coin Math

Subject:

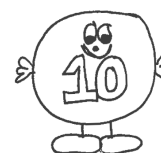
Mathematics

Approximate Grade Level Range:

Grades 2–3

Math Domains:

- Operational Thinking
- Measurement



Learning Objective:

To use the values of coins in the solution of arithmetic problems

Preparation of Materials and/or Environment:

- Make sets of coins of varying values for each student.

	Instructional Sequence
Activity	<p>Students will use coins from their local currency to solve addition word problems.</p> <ol style="list-style-type: none"> 1. Instruct students to find four coins that have a combined value of 26. <div style="text-align: center; margin: 10px 0;"> </div> 2. Students will announce the solution, which the instructor will represent on the board, drawing the four coins in their relative sizes with their number values written inside each circle. 3. Repeat the activity with three coins that have a combined value of 31 cents. <div style="text-align: center; margin: 10px 0;"> </div> 4. Repeat again with five coins that have a combined value of 46 cents. <div style="text-align: center; margin: 10px 0;"> </div> 5. Have students work in pairs, taking turns to create a “coin math challenge” (similar to the ones presented by the instructor) for their partner to solve.
Notes	<ul style="list-style-type: none"> • Create word problems that are consistent with the local currency, e.g. if you have 20 cent coins rather than 25 cent coins, you’ll need to adjust the examples above. • Be sure that the math problems presented can be solved by the array of coins the students have been given.
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Math Graphs

Subject:

Mathematics

Approximate Grade Level Range:

Grades 2–4

Math Domains:

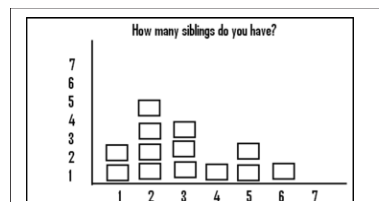
- Counting
- Measurement
- Data

Learning Objectives:

1. To classify objects into categories
2. To make comparisons (*greater than, less than, equal to*)
3. To represent a data set in a bar graph

Preparation of Materials and/or Environment:

- Multiple sheets of newsprint or dedicated wall space
- Markers or crayons
- Rulers or meter stick

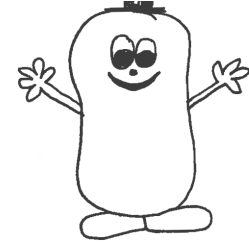


	Instructional Sequence
Activity	<p>Students will collect and record data on a bar graph.</p> <ol style="list-style-type: none"> 1. Divide the class into groups of three or four students. 2. Each group will devise a question that can be answered by the other members of the class. Some examples: How many siblings do you have? Which of these colors do you like best? Which of these animals would you most like to have for a pet? 3. Instructor or students will write the survey question at the top of the sheet or wall, e.g. "How many siblings do you have?" The group will design a bar graph, with the horizontal axis labeled "number of siblings" and the vertical axis representing a count no higher than the total number of students in the class. 4. Students will circulate around the room, answering each question by filling in a square on the graph that corresponds to their answer.
Notes	<p>The questions posed should have a set of predetermined answers from which to choose. For example, a bar graph to survey favorite colors should list a given set of colors on the horizontal axis, such as blue, green, red, yellow, orange, pink, white, black, purple, and gray.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Bean Math

Subject:

Mathematics



Approximate Grade Level Range:

Grades 2–4

Math Domains:

- Counting
- Operational Thinking

Learning Objectives:

1. To understand the relationship between numbers and quantities
2. To create addition and subtraction problems
3. To solve addition and subtraction problems

Preparation of Materials and/or Environment:

- Collect dozens of dried beans.
- Paint the beans white on one side only.
- Distribute paper and pencils to students.

	Instructional Sequence
Activity	<p>Students will use dried beans to create and solve addition and subtraction problems.</p> <ol style="list-style-type: none"> 1. Each student will take 10 or 20 beans. 2. Instruct students to shake the beans between their hands and let them drop onto the desk or table; each student will count the number of their beans that fall white-side up and those that fall black or red-side up. <div data-bbox="836 1113 1128 1228" data-label="Image"> </div> 3. Students will use these numbers to create addition and subtraction equations. For example, 14 black beans and 6 white beans can be represented as "$14 + 6 = \underline{\quad}$," while 7 white beans and 3 black beans might generate the equation "$10 - 3 = \underline{\quad}$." Students will write down their math problems, leaving the answers blank. 4. Repeat Steps 2 and 3 until each student has generated a total of ten unsolved addition and/or subtraction equations. 5. Pairs of students will switch papers and solve each other's math problems.
Notes	<p>This activity can be adapted to more advanced math levels by assigning the ones place to the painted beans and the tens place to the black beans, or vice versa. (In this case, each student is given only 10 beans.) As such, 6 black beans and 4 white beans form the number 64; a second shake will produce another two-digit number. These two numbers can be added, subtracted, or multiplied.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Foot Math

Subject:

Mathematics

Approximate Grade Level Range:

Grades 3–4

Math Domain:

- Geometric Measurement
- Data

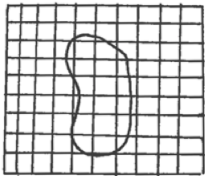


Learning Objectives:

1. To recognize concepts of perimeter measurement
2. To recognize concepts of area measurement
3. To distinguish between linear and area measurements
4. To represent a data set on a graph

Preparation of Materials and/or Environment:

- Graphing or grid paper (centimeter-squared, if possible)
- String
- Pencils
- Scissors

	Instructional Sequence
<p>Activity</p> 	<p>Students will use graph paper to measure the area and perimeter of their feet.</p> <ol style="list-style-type: none"> 1. Each student will place his or her right foot on a sheet of graph paper. <i>(Note: Have students remove their shoe first.)</i> 2. The student will use a pencil to trace the outline of his or her foot. 3. To find the area of the foot, the student will count how many squares are inside the outline s/he drew. Depending on the ability of the students, half-squares can be ignored or counted as half a centimeter <i>(or other unit of measurement)</i>. 4. To find the perimeter of the foot, the student will lay a string along the outline of the foot and cut the string where the ends meet. Use a ruler to measure the length of the string. 5. The results of the activity can be displayed on a class chart or graph.
<p>Notes</p>	<p>This activity can be carried out by measuring hands—in addition to or instead of feet.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Measuring Liquid Volume

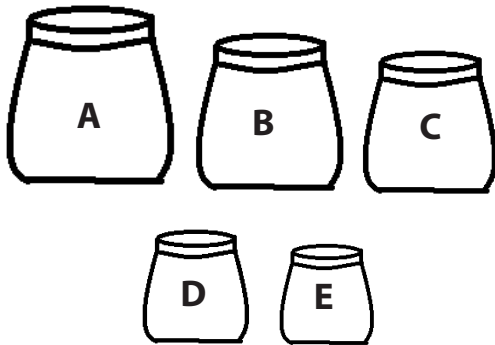
Subject:

Approximate Grade Level Range:

Math Domain:

Learning Objectives:

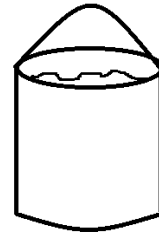
Preparation of Materials and/or Environment:



Mathematics

Grades 3–4

- Measurement
- Data



1. To estimate liquid volume
2. To measure liquid volume in comparative terms

- Divide the number of students in the classroom by four or five; the result will be the number of container sets that will be required for this activity.
- Collect plastic, glass, or metal containers of various sizes.
- Make sets of five containers, arranging them in order according to their size.
- With a marker, label the five containers A, B, C, D, and E, respectively—with the largest container marked A and the smallest container marked E.
- Procure a bucket or pail of water for each set of containers.
- Prepared worksheet (*attached*)

	Instructional Sequence
Activity	<p>Students will experiment with water to discover the comparative capacities of a variety of containers.</p> <ol style="list-style-type: none"> 1. Divide the class into groups of four or five students; give each group a set of five labeled containers, a bucket of water, and a worksheet. 2. In accordance with the instructions on the worksheet, have each group guess and then confirm how many times they will need to pour water from one of the smaller containers into a larger container until the larger container is full.
Notes	Instruct students to follow the worksheet instructions carefully; provide adequate supervision to avoid confusion.
Ideas for Improvement	What went well? What would you do differently next time?

Measuring Liquid Volume Worksheet

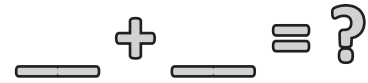
Student Name _____

Experiment	Estimation	Actual Amount
1. How many times will you need to fill Container "B" with water and pour the water into Container "A" until Container "A" is full?		
2. How many times will you need to fill Container "C" with water and pour the water into Container "A" until Container "A" is full?		
3. How many times will you need to fill Container "D" with water and pour the water into Container "B" until Container "B" is full?		
4. How many times will you need to fill Container "E" with water and pour the water into Container "C" until Container "C" is full?		

Mathematics Session: Addition Game

Subject:

Mathematics



Approximate Grade Level Range:

Grades 3–4

Math Domains:

- Operational Thinking
- Operations in Base Ten

Learning Objective:

To use place value understanding and properties of addition and subtraction to perform multi-digit arithmetic

Preparation of Materials and/or Environment:

- Using a marker, prepare cards numbered 1 through 9.
- Place the cards in a box or basket.
- Draw a 3 by 3 grid of boxes on the chalkboard.
- Distribute paper and pencils to students.

	Instructional Sequence
<p>Activity</p> $ \begin{array}{ c c c } \hline 3 & 7 & 4 \\ \hline 2 & 1 & 5 \\ \hline + & 5 & 8 & 9 \\ \hline \end{array} $	<p>Students will create and solve three-digit addition equations.</p> <ol style="list-style-type: none"> 1. Each student will draw a 3 by 3 grid of boxes on his or her own paper. 2. Instructor will select a number from the basket and announce it to the students. 3. Students will write the number in one of the top six squares in their grid. The bottom row of three squares should be left empty. 4. Instructor will continue to draw one number at a time, until six numbers have been drawn and the top two rows of students' grids are complete. 5. Students will place a "plus sign" to the left of the empty bottom row and solve the three-digit addition equation. The student with the largest resulting sum wins! 6. This activity can be repeated multiple times.
<p>Notes</p>	<p>If a student's sum is a four-digit number, s/he may simply write the thousands-place digit to the left of the grid and to the right of the addition sign.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Round Off

Subject:

Mathematics

Approximate Grade Level Range:

Grades 3–4

Math Domain:

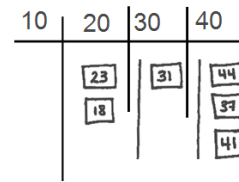
- Operations in Base Ten

Learning Objective:

To use place value understanding to round whole numbers to the nearest ten

Preparation of Materials and/or Environment:

- Prepare a Round-Off Game Board for every student in the class. *(See attached)*
- 100 paper slips, numbered 1 through 100, for each student pair *(Also attached)*
- Box or basket for each student pair



	Instructional Sequence
<p>Activity</p>	<p>Students will practice rounding numbers to the nearest ten.</p> <ol style="list-style-type: none"> 1. Students will work with a partner. Every student is provided with a Round-Off Game Board; each pair is given 100 paper slips in a box or basket. 2. One player picks a slip of paper from the box and announces the number aloud. 3. The player's partner must round off the number to the nearest ten and place the slip of paper under the correct column on his or her Round-Off Game Board. 4. The partner then takes a turn and repeats the activity. The turn-taking continues until one of the pair is able to collect five numbers in the same column on his or her Round-Off Game Board.
<p>Notes</p>	<p>It may serve to refresh students' memories about the rules of rounding -off before the game begins: If the one's place is occupied by a digit ranging in value from 0 through 4, then the number is rounded down; if the one's place is occupied by any digit 5 through 9, then the number is rounded up.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Round-Off Game Board

0	10	20	30	40	50	60	70	80	90	100

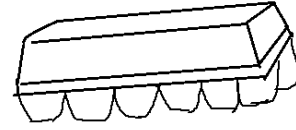
Round-Off Game Slips

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Mathematics Session: Egg Carton Multiplication

Subject:

Mathematics



Approximate Grade Level Range:

Grades 3–4

Math Domain:

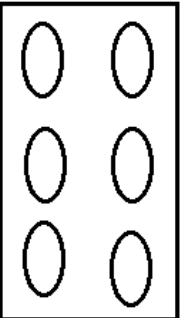
- Operational Thinking

Learning Objective:

To represent and solve problems involving multiplication

Preparation of Materials and/or Environment:

- Cut empty egg cartons in two, so that each side has six cups; prepare enough so that each student has one half-carton. (*As an alternative, use small paper or plastic cups.*)
- Dried beans or small stones—12 or 24 per student

	Instructional Sequence
<p>Activity</p> 	<p>Students will practice multiplication experientially by counting and sorting beans.</p> <ol style="list-style-type: none"> Give each student half an egg carton and 12 or 24 beans. (<i>See notes.</i>) Instruct the students to divide their beans equally into the empty egg cups; suggest that they put one bean in each cup and repeat until they run out of beans. Pose the question “How many beans are in each of the six cups?” Record the corresponding multiplication equation on the chalkboard or newsprint, i.e., 2 (beans) x 6 (cups) = 12 (beans). Instruct the students to repeat the exercise using only four of the egg cups; record the resulting equation, i.e., 3 (beans) x 4 (cups) = 12 (beans) on the board. Repeat using three egg cups (4 x 3 = 12) and then two egg cups (6 x 2 = 12).
<p>Notes</p>	<p>Students who are unfamiliar with multiplication can begin the activity with 12 beans; more advanced students can begin with 24 beans.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Multiplication Tiles

Subject:

Mathematics



Approximate Grade Level Range:

Grades 3–4

Math Domains:

- Operational Thinking
- Geometric Measurement

Learning Objectives:

1. To represent and solve problems involving multiplication
2. To relate area to the operation of multiplication

Preparation of Materials and/or Environment:

- Collect two or three dozen of the same rectangular item, such as books or notebooks that are all the same size.
- One die from a pair of dice (*As an alternative, use cards numbered one through six.*)

	Instructional Sequence
<p>Activity</p>	<p>Students will practice multiplication experientially and collectively by organizing objects into rows and columns.</p> <ol style="list-style-type: none"> 1. With the classroom working as a large group, one student rolls the die and announces the resulting number to the class; this is the first multiplication factor. 2. Students count out that number of objects and lay them in a column on the floor. 3. Another student rolls the die and announces the second multiplication factor. 4. Students count out that number of objects and lay them horizontally, adjacent to the column to form an “L” shape. 5. Instructor writes the corresponding equation on the board, e.g., $3 \times 2 = \underline{\quad}$. 6. Have the students fill in the “L” with additional objects to form a square or rectangle defined by the columns and rows on the floor. 7. Students will count the total number of objects on the floor to solve the equation.
<p>Notes</p>	<p>This activity can be repeated with different objects or with different numbers of objects.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Math Puzzles

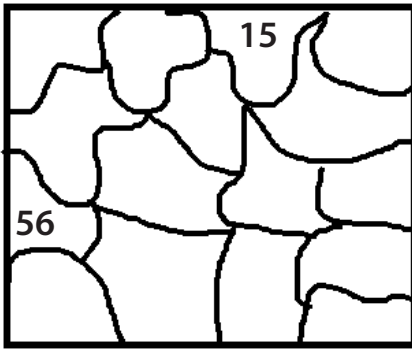
Subject:

Approximate Grade Level Range:

Math Domain:

Learning Objective:

Preparation of Materials
and/or Environment:



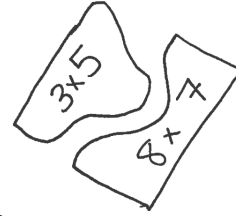
Mathematics

Grades 3–4

- Operational Thinking

To solve multiplication problems

- Glue a picture or drawing onto a large piece of cardboard.
- Create a jigsaw puzzle by cutting the picture into interlocking pieces; the pieces must be large enough so that a multiplication equation can be written on each of them.
- Lay the assembled puzzle pieces on a second sheet of cardboard and trace each piece onto the cardboard beneath.
- Write a different multiplication problem (e.g. “3 x 8” or “9 x 6”) on the back of each puzzle piece.
- Write the answer to the problem on the corresponding shape on the puzzle base.
- Be careful to avoid duplication of answers; if one piece has “3 x 8” written on it, avoid the inclusion of a piece with the equation “6 x 4” written on it!

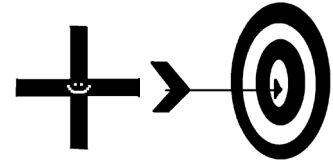


	Instructional Sequence
Activity	Students will assemble the jigsaw puzzle by matching the mathematical equation on the back of each piece to its correct solution on the puzzle base.
Notes	This activity can be adapted to beginning math students by substituting addition or subtraction problems for multiplication equations.
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Target Addition

Subject:

Mathematics



Approximate Grade Level Range:

Grades 3–5

Math Domain:

- Operational Thinking

Learning Objective:

To use the relationship between addition and subtraction as a mental strategy in solving math problems

Preparation of Materials and/or Environment:

- Create a Target Addition Game Board. (*See notes and attached*)
- Bottle caps and stones (*See notes*)

	Instructional Sequence
Activity	<p>Students will play a game of mental strategy using addition and subtraction.</p> <ol style="list-style-type: none"> 1. Students will work with a partner; each pair is given a Target Addition Game Board. 2. One partner will be given 10 bottle caps; the other, 10 stones. 3. The partners will choose a target number between 25 and 55. 4. The first player begins by placing his or her marker on a number and announcing the number aloud. 5. The next player continues by choosing another square on the game board and adding that number to the first number called by his or her partner; the player calls the total aloud. 6. The game continues, with each player, in turn, choosing a new square and announcing the new total. 7. The first player to reach the target number (without going over) wins the game!
Notes	<ul style="list-style-type: none"> • Make enough Game Boards so that each pair of students will have their own. • Collect sufficient bottle caps and stones so that half the class will have their own set of 10 bottle caps and the other half will have their own set of 10 stones.
Ideas for Improvement	What went well? What would you do differently next time?

Target Addition Game Board

1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5

Mathematics Session: Grocery Shopping Math

Subject:

Mathematics



Approximate Grade Level Range:

Grades 3–5

Math Domain:

- Operational Thinking

Learning Objective:

To solve arithmetic problems in a real-life context

Preparation of Materials and/or Environment:

1. Visit a local neighborhood store in advance of this activity to schedule your students' visit with the owner.
2. Prepare a Price List Worksheet (based on existing inventory) where students can note the prices of common items for sale in the store like milk, eggs, soda, broom, or reusable grocery bag.
3. Pencils

Instructional Sequence	
<p>Activity</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center; font-size: small; margin: 0;">PRICE LIST WORKSHEET</p> <p>Eggs _____</p> <p>Milk _____</p> <p>Soda _____</p> <p>Broom _____</p> <p>Flour _____</p> <p>Soap _____</p> <p>Rice _____</p> </div>	<p>Students will go “shopping” at a neighborhood store, bodega, or épicerie.</p> <ol style="list-style-type: none"> 1. The class will visit the store, each student with a Price List Worksheet and pencil. 2. Students will fill in their Price Lists based either on the prices marked on the items or on direct conversation with the shopkeeper. 3. Upon their return to the classroom, students will use these prices to create math problems for a classmate to solve. <i>(See notes.)</i> 4. As a follow-up activity, ask students to bring in empty boxes, cans, and containers from home to create a classroom store. Put price tags on the items and create additional math problems for the class to solve.
<p>Notes</p>	<p>The difficulty of these math problems is entirely dependent on the students' math levels. Younger students can pose addition problems: “If Ahmed buys a bottle of milk and a carton of eggs, how much will he spend?” Older students can create problems involving multiplication, division, or fractions: “If Ana buys five bottles of soda and three brooms, how much will she spend?” “If a kilo of rice costs \$2, how much will $\frac{1}{4}$ of a kilo of rice cost?”</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Paper Fractions

Subject:

Mathematics

Approximate Grade Level Range:

Grades 3–5

Math Domain:

- Numbers and Operations: Fractions

Learning Objectives:

1. To understand fractions as numbers that are part of a whole
2. To understand the equivalence and comparison of fractions

Preparation of Materials and/or Environment:

- Four sheets of paper per student
- Pencils
- Scissors

	Instructional Sequence															
<p>Activity</p> <div style="text-align: center;"> <table border="1" style="margin: auto;"> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{1}$</td> </tr> </table> <table border="1" style="margin: auto;"> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{2}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{2}$</td> </tr> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{4}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{4}$</td> </tr> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{4}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{4}$</td> </tr> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> </tr> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> </tr> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> </tr> <tr> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> <td style="text-align: center; padding: 5px;">$\frac{1}{8}$</td> </tr> </table> </div>	$\frac{1}{1}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	<p>Students will create a Fractions Toolkit.</p> <p>Each student will:</p> <ol style="list-style-type: none"> 1. Label a full sheet of paper “1/1.” 2. Take a second sheet of paper; fold it in half, lengthwise. Cut along the crease. Label each of the two resulting sheets “1/2” and lay them on top of the first sheet. 3. Take a third sheet of paper; fold it into four equal sections. Cut along the creases. Label the resulting four sections “1/4” and lay them on top of the second sheet. 4. Take a third sheet of paper and make eight equal sections by folding the paper once horizontally and then twice lengthwise. Cut along the creases. Label the resulting eight sections “1/8” and lay them on top of the third sheet. 5. Have students use these fraction strips to identify equivalent fractions and to compare the sizes of unequal fractions. For example: <ul style="list-style-type: none"> • How many 1/8 strips does it take to equal 1/2? • Are two strips of 1/4 larger or smaller than five strips of 1/8? In other words, is 2/4 larger or smaller than 5/8?
$\frac{1}{1}$																
$\frac{1}{2}$	$\frac{1}{2}$															
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<p>Notes</p>	<p>The four sheets of paper given to each student must be the same size.</p>															
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>															

Mathematics Session: Word Fractions

Subject:

Mathematics



Approximate Grade Level Range:

Grades 3–5

Math Domain:

- Numbers and Operations: Fractions

Learning Objectives:

1. To understand fractions as parts of a whole
2. To apply knowledge of fractional numbers to parts of words

Preparation of Materials and/or Environment:

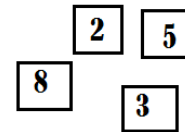
- Paper
- Pencils

	Instructional Sequence
Activity	<p>Students will divide words into parts and assign numerical value to those fractions.</p> <ol style="list-style-type: none"> 1. Instructor will write a word consisting of four letters on the chalkboard. 2. Show students how the word (“play,” for example) can be broken into parts, or fractions: <ul style="list-style-type: none"> • $P = 1/4$, or one letter out of a total of four letters • $PL = 2/4$, or two letters out of a total of four letters • $PLA = 3/4$, or three letters out of a total of four letters • $PLAY = 4/4$, or four out of four letters 3. Have the students practice with another word consisting of four letters, then with another word consisting of three letters. 4. Challenge students to create five word puzzles for a classmate to solve, like these: <ul style="list-style-type: none"> • $3/4$ of the word PLAY + $2/3$ of the word TEA = PLATE • $2/4$ of the word LAKE + $1/3$ of the word YOU = LAY
Notes	<p>To make their puzzles more complicated, more advanced students can specify which half or third of a word to use, for example:</p> <ul style="list-style-type: none"> • The first $1/2$ of the word HAND + the second $1/2$ of the word LIVE = HAVE • The first $2/3$ of the word RAT + the second $2/3$ of the word ICE = RACE
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Mathematics Session: Number Cards

Subject:

Mathematics



Approximate Grade Level Range:

Grades 4–5

Math Domains:

- Operational Thinking and
- Operations in Base Ten

Learning Objectives:

1. To use place value understanding and properties of addition and subtraction to perform multi-digit arithmetic
2. To use the relationship between addition and subtraction as a mental strategy in solving math problems

Preparation of Materials and/or Environment:

- Using a marker, prepare various sets of cards numbered 1 through 9.

	Instructional Sequence											
<p>Activity</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>8</td> <td>4</td> <td>3</td> </tr> <tr> <td>2</td> <td>5</td> <td>9</td> </tr> <tr> <td>1</td> <td>6</td> <td>7</td> </tr> </table>	8	4	3	2	5	9	1	6	7	<p>Students will use single-digit number cards to create complex addition problems.</p> <p>Working in groups of two or three, students will use a set of number cards for the following activities:</p> <ul style="list-style-type: none"> • Activity 1: <p>Students place their cards on a table in a 3 by 3 grid. Their objective is to arrange all nine cards to form an addition equation consisting of two three-digit numbers that, when added together, result in another three-digit number.</p> <ul style="list-style-type: none"> • Activity 2: <p>Students place their cards face down on a table. One student picks four, five, or six cards, arranges them to form two numbers (each consisting of two or three digits), and creates an addition problem for another student to solve. The other student writes the problem down on a piece of paper, returns the cards face down on the table, draws four to six new cards, and creates an addition problem for another classmate. Repeat this activity, taking turns among students, until each student has five problems to solve.</p> <ul style="list-style-type: none"> • Activity 3: <p>Students place their cards on a table in a 3 by 3 grid. Their objective is to arrange the cards so that the numbers in all of the rows and columns (horizontally, vertically, and diagonally) add up to 15.</p>		
8	4	3										
2	5	9										
1	6	7										

	Instructional Sequence
Notes	
Ideas for Improvement	What went well? What would you do differently next time?

Mathematics Session: Alphabet Addition

Subject:

Mathematics



Approximate Grade Level Range:

Grades 4–6

Math Domain:

- Operational and Algebraic Thinking

Learning Objectives:

1. To write and read expressions in which letters stand for numbers
 2. To add multiple one-digit and two-digit numbers, using strategies based on place value and the properties of addition
- Create an Alphabet Math Chart that assigns a number value to each letter of the alphabet. *(See attached)*
 - Distribute paper and pencils to students.

Preparation of Materials and/or Environment:

	Instructional Sequence
Activity	<p>Students will substitute numbers for letters in order to find the “number value” of a word or name.</p> <ol style="list-style-type: none"> 1. Each student will write the letters of his or her name on a paper. Using the Alphabet Math Chart for reference, the student will create an addition problem that includes the number equivalent for each letter of his or her name. For example: $\text{FATIMA} = 6 + 1 + 20 + 9 + 13 + 1$ 2. Have the students solve the equation using whatever strategy they have been taught for the adding of multiple numbers. 3. This activity can be repeated multiple times, using spelling or vocabulary words. 4. As a homework assignment, have students find the “value” of the names of their family members.
Notes	<ul style="list-style-type: none"> • The Alphabet Math Chart can be revised to reflect the alphabet of the students’ native language or their language of instruction. • This activity can also be used with math students who are not yet proficient in double-digit or triple-digit addition. The Alphabet Math Chart can be revised to include only single-digit numbers, so that the letter “Z,” for example, would be represented as “9 + 9 + 8.”
Ideas for Improvement	What went well? What would you do differently next time?

Alphabet Math Chart

A = 1	B = 2	C = 3	D = 4	E = 5	F = 6
G = 7	H = 8	I = 9	J = 10	K = 11	L = 12
M = 13	N = 14	O = 15	P = 16	Q = 17	R = 18
S = 19	T = 20	U = 21	V = 22	W = 23	X = 24
Y = 25	Z = 26				

Mathematics Session: Geometry Board

Subject:

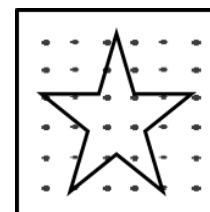
Mathematics

Approximate Grade Level Range:

Grades 1–6

Math Domains:

- Geometry
- Geometric Measurement



Learning Objective:

To construct, manipulate, and measure two-dimensional geometric shapes in the physical world

Preparation of Materials and/or Environment:

- With the help of family and community members, construct a Geometry Board for each student or student pair in the class. (*See attached*)
- Rubber bands

	Instructional Sequence
Activity	<p>Students will use the Geometry Boards to create lines and shapes. Working individually or in small groups, students can use the Geometry Boards for a variety of activities:</p> <ul style="list-style-type: none"> • Activity 1: Students use rubber bands to create basic shapes such as squares, rectangles, or triangles. Students can also use the rubber bands to make letters on the board. • Activity 2: With information regarding how far apart the nails are placed, students can measure the perimeter and/or area of the geometric shapes they make. • Activity 3: Students create parallel, perpendicular, and intersecting lines. • Activity 4: Students create and measure angles of various sizes.
Notes	<ul style="list-style-type: none"> • Geometry Boards can be shared across classrooms and grades. • There are many more possibilities for the use of a Geometry Board. Share ideas with other instructors!
Ideas for Improvement	What went well? What would you do differently next time?

Construction of Geometry Boards

Materials Required:

- Flat pieces of wood, approximately 25 centimeters by 25 centimeters
- Ruler
- Pencil
- Small nails

Geometry Boards are to be constructed by older students or members of the community—including parents, aunts and uncles, grandparents, or teachers.

Step 1:

Sand the edges of the boards so that there are no splinters that can injure the children.

Step 2 (optional):

Boards may be painted in a variety of colors.

Step 3:

Using a ruler and pencil, create a grid on the board where each mark is 1 centimeter from the next mark, both horizontally and vertically. Each board should have between 20 and 24 rows, with the same number of marks in each row.

Step 4:

Hammer a nail into each mark on the board, taking care that all the nails protrude equally.

Mathematics Session: Tangrams

Subject:

Mathematics



Approximate Grade Level Range:

Grades 4–6

Math Domain:

- Geometry

Learning Objective:

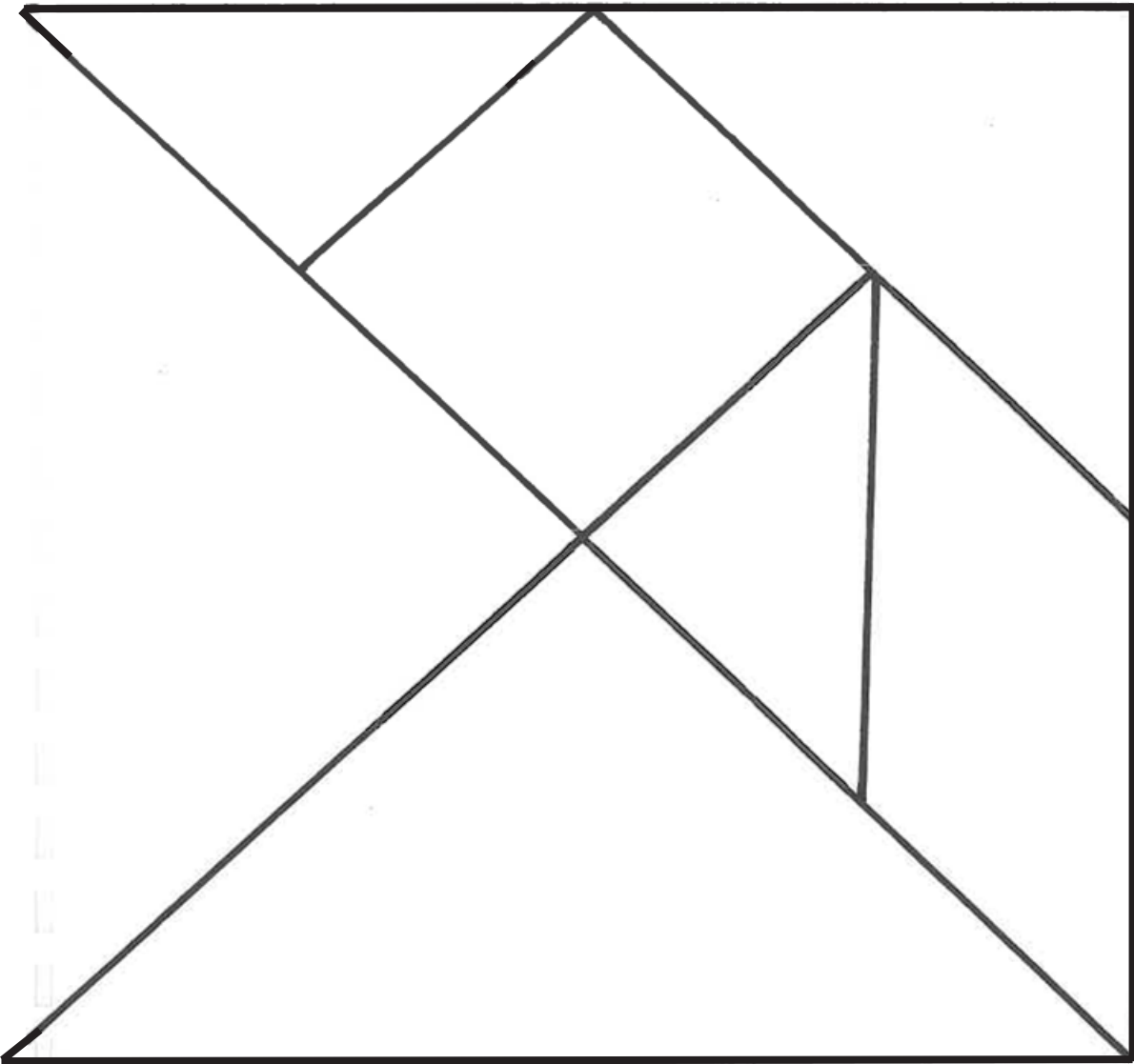
To identify, visualize, and create geometric shapes

Preparation of Materials and/or Environment:

- Glue a copy of the Tangram Master Sheet (see *attached*) to cardboard or heavy paper; cut out the pieces of the tangram along its lines. Make one of these for each student in the class.
- Distribute paper and pencils to students.

	Instructional Sequence																								
Activity	<p>Students will use pieces of a tangram to create geometric shapes.</p> <ol style="list-style-type: none"> 1. Instructor will use the parts of the tangram to introduce or review geometric shapes such as the square, the rectangle, the triangle, and the parallelogram. 2. Challenges: <ul style="list-style-type: none"> • Can students reassemble the pieces of the tangram to create a square? • Can students create a square using only two pieces of the tangram? • Can students create a triangle using three pieces of the tangram? • Can students create a parallelogram using two pieces of the tangram? 3. Have each student or student pair make a chart to record the geometric possibilities, as follows: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Using this number of tangram pieces...</th> <th>Can you make a square?</th> <th>Can you make a triangle?</th> <th>Can you make a parallelogram?</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>YES or NO</td> <td>YES or NO</td> <td>YES or NO</td> </tr> <tr> <td>2</td> <td>YES or NO</td> <td>YES or NO</td> <td>YES or NO</td> </tr> <tr> <td>3</td> <td>YES or NO</td> <td>YES or NO</td> <td>YES or NO</td> </tr> <tr> <td>4</td> <td>YES or NO</td> <td>YES or NO</td> <td>YES or NO</td> </tr> <tr> <td>5</td> <td>YES or NO</td> <td>YES or NO</td> <td>YES or NO</td> </tr> </tbody> </table>	Using this number of tangram pieces...	Can you make a square?	Can you make a triangle?	Can you make a parallelogram?	1	YES or NO	YES or NO	YES or NO	2	YES or NO	YES or NO	YES or NO	3	YES or NO	YES or NO	YES or NO	4	YES or NO	YES or NO	YES or NO	5	YES or NO	YES or NO	YES or NO
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4	YES or NO	YES or NO	YES or NO																						
5	YES or NO	YES or NO	YES or NO																						
Notes																									
Ideas for Improvement	What went well? What would you do differently next time?																								

Tangram Master Sheet



Science Session: Potato Mix-Up

Subject:

Approximate Grade Level Range:

Domain:

Learning Objective:

Preparation of Materials
and/or Environment:

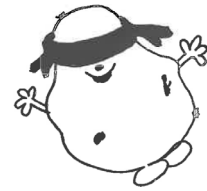
Science

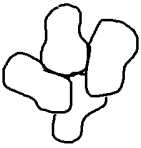
Grades 1–2

- Life Science

To identify the physical properties of a plant
through observation and touch

- Assemble potatoes of unusual sizes, shapes, and textures—one potato per student.
- Blindfold



	Instructional Sequence
Activity 	<p>Students will examine a potato and subsequently attempt to identify the same potato through touch.</p> <ol style="list-style-type: none"> 1. Each student is given a potato to observe and examine for a period of two minutes; encourage students to notice the shape and to touch the texture of the potato. 2. Divide the class into groups of four students. The students will place their four potatoes in a pile. 3. One student will be blindfolded. The other students in the group will hand their classmate each of the four potatoes in the pile, one at a time. The blindfolded student will try to decide which potato is his or hers. 4. Repeat the exercise so that each student has a chance to identify his or her potato.
Notes	If this exercise is carried out with older students (third grade and up), they can document the fraction or percentage of students in their group or in the class who correctly identified their potatoes.
Ideas for Improvement	What went well? What would you do differently next time?

Science Session: Seed Sorting

Subject:

Science

Approximate Grade Level Range:

Grades 1–3

Domain:

- Life Science

Learning Objectives:

1. To observe and describe the physical properties of plant seeds
2. To sort objects by observable properties

Preparation of Materials and/or Environment:

- Collect a variety of fruits and vegetables; if appropriate, ask each student to bring in a different fruit or vegetable from home.
- Distribute paper and pencil to students.
- Glue
- Scissors



Instructional Sequence	
<p>Activity</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>apple orange</p> <p>watermelon grape</p> </div>	<p>Students will extract seeds from a fruit or vegetable, examine them, and sort them.</p> <ol style="list-style-type: none"> 1. Working in pairs, students will dissect a fruit or vegetable and extract its seeds. <i>(If the dissection requires scissors or a knife, the instructor will assist.)</i> 2. Distribute the various seeds around the classroom so that each pair of students has a sample of many different kinds of seeds. 3. Have the students sort the seeds: <ul style="list-style-type: none"> • Younger students may sort the seeds according to size or color. • Older students may classify the seeds based on such attributes as the texture of the seed covering or the total number of seeds extracted from a fruit or vegetable. 4. Students may glue their seeds onto a sheet of paper and write the name of each seed underneath. They can also cut and glue flaps of paper over the name of each seed to create a guessing game for classmates or family members.
<p>Notes</p>	<p>Try to ensure that there is a variety of seed types by procuring a range of local fruits and vegetables.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Bubbles!

Subject:

Approximate Grade Level Range:

Domain:

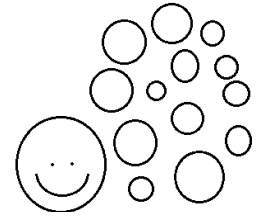
Learning Objectives:

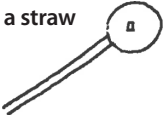
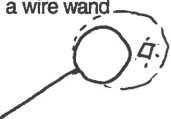

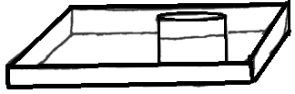
Preparation of Materials
and/or Environment:

Science

Grades 2–4

- Physical Science
1. To observe changes in the shape of physical material
 2. To describe and record the physical properties of an object
- Shallow pans or basins
 - Jars of liquid dish soap, diluted slightly with water
 - Straws
 - Thin wire to form bubble wands



Instructional Sequence	
<p>Activity</p> <p>a straw </p> <p>a wire wand </p> <p>cupped hands </p>	<p>Students will create bubbles and observe the differences among them.</p> <ol style="list-style-type: none"> 1. Divide the class into small groups; each group is provided with a shallow pan, a jar of liquid soap, straws, and a wire bubble wand. <div style="text-align: right; margin-top: 10px;">  </div> 2. Instructor will encourage students to explore various methods of creating bubbles: blowing through a straw; blowing on or waving a wire wand; and blowing through one's cupped hands. 3. Possible activities include: <ul style="list-style-type: none"> • Observe and document the color spectrum in a bubble. • Using a stopwatch or clock, count the number of seconds that your bubble stays intact, from the time it forms until it pops; write down your results. • See who can make the biggest bubble. How can you compare the size of one bubble to another?
Notes	Older students can document their observations in graph form.
Ideas for Improvement	What went well? What would you do differently next time?

Science Session: The Four Food Groups

Subject:

Science

Approximate Grade Level Range:

Grades 2–4

Domain:

- Health/Nutrition Science

Learning Objective:

To use inductive reasoning to classify objects based on similarity of characteristics

Preparation of Materials and/or Environment:

- Four large cards or paper tents labeled “MILK,” “MEAT,” “GRAINS,” and “FRUITS & VEGETABLES.”
- Several samples of foods from each of the four food groups



	Instructional Sequence
<p>Activity</p>	<p>Students will sort an array of foods into the four major food groups.</p> <ol style="list-style-type: none"> 1. Instructor will review the names of the foods displayed at the front of the room. 2. Instructor will introduce the four food groups and some examples of them: <ul style="list-style-type: none"> • Milk = milk, yogurt, cheese • Meat = beef, chicken, turkey, pork, fish, eggs, nuts, beans • Grains = bread, cereals, rice, pasta, couscous, quinoa • Fruits & Vegetables = bananas, berries, oranges, melon, coconut, pineapple, tomatoes, greens, broccoli, carrots 3. Place one of the cards or paper tents on each of four tables around the room. 4. Each student will take a turn to choose a food from the display and place it on the appropriate table. (If a student makes an error, the instructor or classmates can help to explain why the food belongs to another group.)
<p>Notes</p>	<ul style="list-style-type: none"> • Foods listed as examples of the four food groups should be modified to reflect the local cuisine. • Beans and nuts belong to the “meat” group because of their protein value, even though they are not derived from animals.
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: New Taste Sensations

Subject:

Approximate Grade Level Range:

Domain:

Learning Objective:

Preparation of Materials
and/or Environment:

Science

Grades 2–4

- Health/Nutrition Science

To describe an object's properties in terms of taste and texture

- Prepare bite-sized samples of local, healthful foods that students may not have eaten before.
- Blindfold



	Instructional Sequence
<p>Activity</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Describing Words</p> <p>crunchy _____</p> <p>sweet _____</p> <p>sour _____</p> <p>tangy _____</p> <p>_____</p> </div>	<p>Students will taste and describe new foods.</p> <ol style="list-style-type: none"> 1. Keep the food samples hidden from students in a closed, opaque container. 2. Each student will take a turn. The instructor will place a blindfold around the student's eyes and place a small piece of food in his or her mouth. 3. The student will share three adjectives to describe the taste or texture of the food. Some examples might include: dry, wet, moist, hard, soft, crunchy, smooth, salty, sweet, bitter, sour, thick, runny, rubbery, or stringy. 4. If the student thinks s/he knows what food it is, s/he can guess! 5. Instructor (or another student, depending on writing skill level) will keep a list of all of the words used to describe the foods.
<p>Notes</p>	<p>Two safety precautions:</p> <ul style="list-style-type: none"> • Before beginning this activity, consult with parents or guardians to inquire if students have dietary restrictions of any sort. • Instructor must wash his or her hands before placing food in students' mouths. Ideally, a clean utensil could be used to "feed" each student.
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Growing Beans in a Bag

Subject:

Science

Approximate Grade Level Range:

Grades 2–4

Domain:

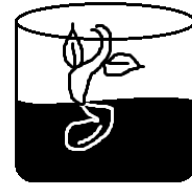
- Life Science

Learning Objectives:

1. To observe the life processes of a plant
2. To recognize plant structures and functions

Preparation of Materials and/or Environment:

- Beans soaked in water overnight
- Clear plastic bags
- Tissue, paper napkins, or paper towels
- Water
- Marker



	Instructional Sequence
<p>Activity</p>	<p>Students will observe the development of a plant's stem and root system.</p> <ol style="list-style-type: none"> 1. Each student is given a bean, a paper towel, some water, and a clear plastic bag. 2. Slowly drop water onto the paper towel, until it is damp but not soaked. 3. Place the bean in the center of the paper towel. 4. The student will label the plastic bag with his or her name and then carefully place the paper towel and bean inside of the plastic bag. 5. Seal the bag and place it in a well-lighted part of the classroom—but not in direct sunlight. Check the paper towel periodically to be sure it is still damp. If it dries out, add water as needed. 6. After one week, the bean should sprout a stem and root system. Have the students describe what these look like.
<p>Notes</p>	
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Plant Maze

Subject:

Approximate Grade Level Range:

Domain:

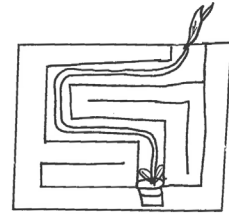
Learning Objectives:

Preparation of Materials
and/or Environment:

Science

Grades 2–4

- Life Science
 - 1. To observe plant behavior
 - 2. To recognize a plant's need for light
- Sprouted, potted bean plant
 - Box with a lid
 - Cardboard
 - Scissors
 - Tape



	Instructional Sequence
<p>Activity</p>	<p>Students will observe how a plant's stem will bend toward a source of light.</p> <p>This activity can be modeled by the instructor or carried out by groups of students.</p> <ol style="list-style-type: none"> 1. Cut a hole in the lid of the box. The hole should be cut at one end of the lid and should measure approximately 3 cm by 3 cm. 2. Cut two pieces of cardboard to fit inside the box in order to make a maze. 3. Place a small potted bean plant from the previous activity at one end of the box. 4. Cover the box with the lid, taking care that the bean plant is at one end of the box and the hole in the lid is located at the opposite end. 5. Open the box daily to observe the plant's growth through the maze. Water the plant as necessary. 6. Continue daily observations until the plant grows out of the hole in the box. What are students' ideas about why the plant behaved as it did?
<p>Notes</p>	<p>Background information: Plants have a natural tendency to grow toward light. This phenomenon is called phototropism.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Bread Mold

Subject:

Science

Approximate Grade Level Range:

Grades 3–4

Domain:

- Life Science

Learning Objectives:

1. To observe and compare the behavior of living systems
2. To make inferences or draw conclusions based on observations

Preparation of Materials and/or Environment:

- Discarded pieces of bread
- Clear plastic bags
- Water



	Instructional Sequence
<p>Activity</p>	<p>Students will observe the life cycle of a fungus and the decomposition of food matter.</p> <ol style="list-style-type: none"> 1. With the students as the “audience,” the instructor will take a minimum of four plastic bags and place a few pieces of bread into each of them. 2. Sprinkle the bread in half of the bags with 8 to 10 drops of water. 3. After sealing the bags tightly, the instructor will place the bags with the wet bread in a dark place and leave the bags with the dry bread exposed to light or sunlight. 4. Each day, the class will observe the bags and note the changes that are taking place. 5. What are students’ ideas about why the wet bread kept in the dark looks different from the dry bread exposed to the light?
<p>Notes</p>	<p>Background information: Mold is a form of fungus which produces tiny spores that are released into the air. Therefore, bread has tiny spores of mold on it. The combination of water, warmth, and darkness helps the spores to grow more quickly.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Bananas and Yeast

Subject:

Science

Approximate Grade Level Range:

Grades 3–4

Domain:

• Life Science

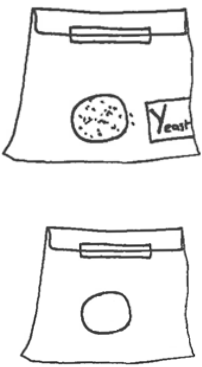
Learning Objectives:

1. To observe and compare the behavior of living systems
2. To make inferences or draw conclusions based on observations

Preparation of Materials
and/or Environment:

- Banana
- Dry yeast
- Water
- Plastic bags, or jars with tightly-fitted lids (2)
- Marker



	Instructional Sequence
<p>Activity</p> 	<p>Students will compare the rates of decomposition between untreated food matter and food matter mixed with a fungus.</p> <ol style="list-style-type: none"> 1. With the students as the “audience,” the instructor will put a large slice of banana into one plastic bag and another large slice of banana into the other bag. 2. Sprinkle one of the banana slices with 1/2 teaspoon of dry yeast; write “YEAST” on that bag. 3. Seal both bags. 4. After one week, study the contents of the bags. Discuss students’ observations. 5. What are students’ ideas about why one banana is decomposing more quickly?
<p>Notes</p>	<p>Background information: Yeast is a fungus. Fungi cannot produce their own food, so they depend on other organisms for food. In this experiment, the yeast feeds on the banana slice. Therefore, the banana slice sprinkled with yeast decays at a faster rate than the banana that has not been sprinkled with yeast.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Coloring Flowers

Subject:

Science

Approximate Grade Level Range:

Grades 3–5

Domain:

- Life Science

Learning Objectives:

1. To make predictions in the context of scientific investigation
2. To observe plant behavior
3. To understand plant structures and functions

Preparation of Materials and/or Environment:

- White flowers with long stems
- Food coloring (*dyes or saffron can be substituted*)
- Jars
- Water



	Instructional Sequence
<p>Activity</p>	<p>Students will observe how water is transported through a plant stem.</p> <ol style="list-style-type: none"> 1. Divide the class into groups of three or four students; each group will be given a white flower, two jars, and some water. 2. Students will take their flower and make a cut in the stem lengthwise, from the bottom of the stem about half-way up toward the petals. 3. Fill each jar about 3/4 full with water. Put a different color dye in each jar, e.g. red food coloring in one jar and blue food coloring in the other. 4. Place the jars side by side. Set the flower in the water so that one-half of the stem goes into each jar. Let the flowers stand for 48 hours. 5. In the interim, record students' predictions: What do they think will happen to the flower? Why? 6. After two days, observe the flowers. Did anyone predict this outcome? What are students' ideas about why this happened?
<p>Notes</p>	<p>Background information: Inside the stem of the plant are small tubes called xylem. These tubes transport water up the stem of the plant to the rest of the flower. In this experiment, the coloring is transported along with the water and is distributed throughout the cells in the flower, causing the flower's petals to change color.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Transpiration in Plants

Subject:

Approximate Grade Level Range:

Domain:

Learning Objectives:


Preparation of Materials
and/or Environment:

Science

Grades 3–5

- Life Science
 - 1. To make predictions in the context of scientific investigation
 - 2. To observe plant behavior
 - 3. To understand plant structures and functions
- Living, growing plant
 - Clear plastic bag
 - Tape or rubber band



	Instructional Sequence
Activity 	<p>Students will observe transpiration—the process by which a plant loses water through its leaves.</p> <ol style="list-style-type: none"> 1. The class will observe and describe the plant. 2. Instructor will ask students to choose one leaf as the focus of the experiment and cover the chosen leaf with a clear plastic bag. 3. Secure the bag with tape or a rubber band, making sure that the seal is air-tight. 4. Place the plant in direct sunlight for the next two to three hours. 5. In the meanwhile, record students' predictions: What do they think will happen to the covered leaf? Why? 6. At the end of the allotted time, have students observe the inside of the plastic bag. Did anyone predict there would be water on the inside of the bag? Where do the students think the water came from?
Notes	<p>Background information: Plants absorb water through their root systems. The water is then released into the air through the pores on the underside of a plant's leaves. This process is called transpiration.</p>
Ideas for Improvement	<p>What went well? What would you do differently next time?</p>

Science Session: Parachute Float

Subject:

Approximate Grade Level Range:

Domain:

Learning Objectives:

Preparation of Materials
and/or Environment:

Science

Grades 3–6

- Physical Science
- 1. To observe the interplay of motion and resistance
- 2. To measure and compare time-related data
- Three slips of paper, with one of the following dimensions written on each: 20 cm x 20 cm; 30 cm x 30 cm; 40 cm x 40 cm
- Large plastic bags (e.g. garbage bags)
- 12 pieces of string measuring 10 cm each
- Ruler or meter stick
- 12 paper clips
- Scissors



Instructional Sequence	
<p>Activity</p>	<p>Students will test homemade parachutes of various sizes to see which parachute will float for the longest period of time before falling to the ground.</p> <ol style="list-style-type: none"> 1. Form three groups of students. Fold the paper slips in half; each group chooses one. 2. Each group will construct a small parachute according to their assigned dimensions. 3. To begin, students will use a ruler to cut their plastic bag to the correct size. 4. Attach a piece of string to each of the four corners of the plastic sheet. 5. Tie a paper clip or other weight to the free end of each string; secure the weights with a knot. Be sure all parachutes use the same size and type of weight. 6. “Fly” the parachutes by folding the plastic in half and gathering the four strings into a loose knot; drop all parachutes to the ground from the same height. 7. Record the time it takes for each parachute to reach the ground. Which parachute remained aloft for the longest time? What are students’ ideas about why this is?
<p>Notes</p>	<p>Background information: An object with a larger surface area has more air resistance than an object with a smaller surface. Therefore, as gravity pulls the objects to the ground, air resistance causes the object with more surface area to float more slowly.</p>

	Instructional Sequence
Ideas for Improvement	What went well? What would you do differently next time?

Science Session: Rolling Contest

Subject:

Approximate Grade Level Range:

Domain:

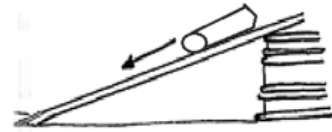
Learning Objectives:

Preparation of Materials and/or Environment:

Science

Grades 3–6

- Physical Science
- 1. To observe force, motion, and energy
- 2. To gather and document data pertaining to linear distance
- 3. To understand the link between weight, energy, and motion
- Cardboard cylinders (like toilet paper rolls)–all of the same size
- Cut-up plastic bags
- Rubber bands or tape
- Scissors
- Small stones, beans, rice, grass, cotton balls, paper scraps
- Flat wooden board at least 1 meter in length
- Ruler or meter stick



	Instructional Sequence
<p>Activity</p>	<p>Students will create cylinder-shaped toys to test how far they will roll.</p> <ol style="list-style-type: none"> 1. Each student will create a rolling toy by filling a cardboard cylinder with a combination of available materials. Students may color or paint their toys. 2. Seal the ends of the cylinder by covering them with plastic; secure the plastic with rubber bands or tape. 3. Lay one end of a wooden board on a chair or a stack of books; rest the other end of the board on the floor to create a 45 degree angle. 4. Clear the floor space in front of the board to allow the cylinders to roll. 5. Each student will roll his or her cylinder down the board and measure the distance it covers. Document the distances on a chart or graph. 6. Review the data. Which toys rolled the farthest? What are students' ideas about why this is?

	Instructional Sequence
Notes	Background information: Heavier objects have more energy to propel them in motion. Therefore, heavier tubes will travel farther than light-weight tubes in this experiment.
Ideas for Improvement	What went well? What would you do differently next time?

Science Session: Soil Erosion

Subject:

Approximate Grade Level Range:

Domain:

Learning Objectives:

Preparation of Materials and/or Environment:

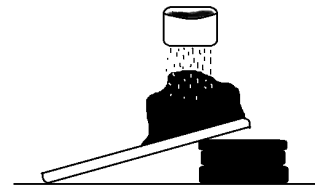
Science


Grades 3–6

- Earth Science

1. To observe the effect of water on soil
2. To understand the role of vegetation in stemming erosion

- Shallow baking pan or flat board
- Soil
- Water
- Tin can with four or five holes poked in the bottom
- Leaves, grasses, and twigs collected from outside—a small rooted plant is even better!



	Instructional Sequence
<p>Activity</p> 	<p>Students will compare the effects of water on a barren “landscape,” versus the effects of water on a “landscape” that includes vegetation.</p> <ol style="list-style-type: none"> 1. Elevate one end of a baking pan to form a slight slope. 2. Create a small “hill” of soil at the top end of the pan. 3. Use the tin can to create a shower; position it above the soil and fill it with water. 4. Allow the water to “rain” onto the hill. What happens to the soil? How much water runs to the bottom of the pan? Record students’ observations. 5. Build a second hill out of soil, but this time add twigs, leaves, grass, and/or a potted plant (taken out of its pot) to simulate vegetation. Repeat the “rain” experiment with the same amount of water. What happens to the soil when the vegetation is added? How much water runs to the bottom? Record students’ observations. 6. What are students’ ideas about why the two experiments had different outcomes?
<p>Notes</p>	<p>Background information: Erosion occurs when forces like rain and wind wear away at the land. Barren landscapes erode more easily than those that are covered with trees and plants, because vegetation absorbs water and its roots help to keep the soil intact.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Garbage Studies

Subject:

Science

Approximate Grade Level Range:

Grades 3–6

Domain:

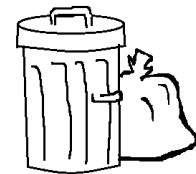
- Life Science

Learning Objectives:

1. To differentiate between living and nonliving things
2. To document and compare observations
3. To make inferences based on knowledge of decomposition

Preparation of Materials and/or Environment:

- Arrange a visit to a local trash or garbage site
- Paper
- Pencils



	Instructional Sequence																				
Activity	<p>Students will examine the types of garbage that are commonly disposed of.</p> <ol style="list-style-type: none"> On site at the dump, divide the class into small groups and assign each group to a section of the dump. Have the students make lists of the types of garbage they observe in their section, e.g. orange peel, cardboard box, plastic bag, carrot top, yogurt container, soda bottle, egg shells, and egg cartons. Back in the classroom, each student group will create a chart to record their findings. Classify the garbage into five main categories: <table border="1" data-bbox="548 604 1365 816"> <thead> <tr> <th>PAPER PRODUCTS</th> <th>PLASTICS</th> <th>FOOD WASTE</th> <th>GLASS</th> <th>OTHER ITEMS</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Students will share their observations and discuss the following questions: <ul style="list-style-type: none"> What was the most common category of garbage you observed? Which items in the garbage pile could have been reused or recycled? What types of garbage will take the longest to decompose? Why? 	PAPER PRODUCTS	PLASTICS	FOOD WASTE	GLASS	OTHER ITEMS															
PAPER PRODUCTS	PLASTICS	FOOD WASTE	GLASS	OTHER ITEMS																	
Notes	<ul style="list-style-type: none"> If you are unable to bring students to a garbage site, you can collect garbage over time to bring into the classroom. If students are unfamiliar with recycling, give a brief introduction– and develop another activity you can carry out to teach them more! 																				
Ideas for Improvement	What went well? What would you do differently next time?																				

Science Session: Life Without Sunlight

Subject:

Science

Approximate Grade Level Range:

Grades 4–6

Domain:

- Earth Science
- Life Science




Learning Objectives:

1. To make predictions in the context of scientific investigation
2. To recognize the function of the sun in plant life
3. To understand plant structures and functions

Preparation of Materials and/or Environment:

- Broad-leaf plant
- Black construction paper
- Scissors
- Tape or glue
- Sunlight

	Instructional Sequence
<p>Activity</p> 	<p>Students will observe the effects of the absence of sunlight on a plant.</p> <ol style="list-style-type: none"> 1. Cut two pieces of black paper that are each slightly larger than a leaf on the plant. 2. Place the two pieces of black paper on either side of a leaf. 3. Use tape or glue to secure the black papers closed, taking care that the leaf inside is not exposed to any sunlight whatsoever. 4. Leave the plant for one week. 5. In the interim, record students' predictions: What do they think will happen to the leaf? Why? 6. At the end of the week, uncover the leaf and observe its color in comparison to the plant's other leaves. Did anyone predict this outcome? Does anyone think they know why this happened?
<p>Notes</p>	<p>Background information: Chlorophyll is the substance that gives plants their green color. Plants need sunlight in order to replenish the chlorophyll in their leaves, which keeps the leaves green and healthy.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: Growing Crystals

Subject:

Science

Approximate Grade Level Range:

Grades 4–6

Domain:

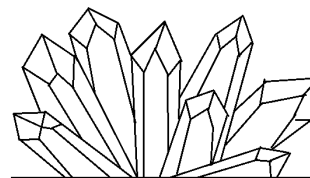
- Physical Science

Learning Objective:

To observe the transformation from one state of matter (liquid) to another state of matter (solid crystals)

Preparation of Materials and/or Environment:

- Butane gas burner or other source of safe heat
- 250 ml of water in a pot
- Spoon
- Sugar
- Glass jar with lid
- String



	Instructional Sequence
<p>Activity</p>	<p>Students will observe the growth of crystals.</p> <ol style="list-style-type: none"> 1. Instructor will heat 250 ml of water in a pot; when the water begins to boil, slowly stir in the sugar, one spoonful at a time. 2. Continue to add sugar until the water is saturated, at which point the sugar will no longer dissolve in the water. 3. Remove the sugar water from the heat and carefully pour it into a glass jar. 4. Tape or otherwise affix a string to the inside of the jar lid so that it is hanging down. (You may tie a small weight, like a screw, to the end of the string, if you wish.) 5. Lower the string into the jar so that it is immersed in the sugar solution; loosely place the lid on top of the jar—keeping out debris but allowing for evaporation. 6. Place the jar on a table where it will not be disturbed. Over the next few weeks, have students observe changes in the jar. What do they see?
<p>Notes</p>	<p>Background information: A saturated solution of water and sugar gives the sugar molecules the opportunity to “bump into” each other and form crystals, which cling to the string. The crystals attract other sugar molecules, which stack on top of each other.</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Science Session: The Bouncing Egg

Subject:

Science

Approximate Grade Level Range:

Grades 4–6

Domain:

- Physical Science

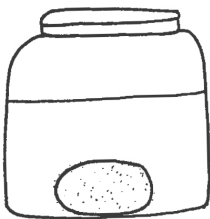
Learning Objective:

To observe and begin to understand physical transformations resulting from a chemical reaction

Preparation of Materials and/or Environment:

- Raw egg in its shell
- Glass jar with lid
- Vinegar



	Instructional Sequence
<p>Activity</p> 	<p>Students will observe changes in an egg after its immersion in vinegar.</p> <ol style="list-style-type: none"> 1. Ask students to describe the raw egg in its shell; have one student list the descriptive words on the chalk board. 2. Instructor will place the raw egg inside a jar, taking care not to crack the shell. 3. Pour enough vinegar into the jar to completely cover the egg; cover with the lid. 4. Allow the egg to sit for three days, occasionally observing its appearance. 5. Carefully remove the egg from the jar. What does the egg look like now? Document students' observations in a column next to their original descriptions of the egg. 6. Instruct one student to hold the egg 4 to 5 cm above the table top and drop it gently. What happens? What happens if the egg is dropped from 10 cm? 20 cm? 7. Have students guess what might have happened to cause the changes in the egg.
<p>Notes</p>	<p>Background information: Egg shells contain a high concentration of calcium. Vinegar is highly acidic. When calcium is exposed to an acidic solution, it dissolves; this is what causes the egg shell to disintegrate, leaving only the inner membrane of the egg intact. The membrane is rubbery, which permits the egg to bounce—at least a few times!</p>
<p>Ideas for Improvement</p>	<p>What went well? What would you do differently next time?</p>

Appendix

Additional Resources related to teaching, education, literacy, math, and science:

ESP: Teaching English for Specific Purposes

This resource is a supplemental resource for Peace Corps Volunteers teaching English as a foreign language. It provides step-by-step procedures for designing a program and creating materials and activities for the classroom. It covers the basic language skills (reading, writing, listening, and speaking) and includes information on teaching grammar, enhancing study skills and classroom management.

Idea Book Series: Classroom Management

This book was written in response to feedback from Volunteer teachers who feel that the time spent dealing with classroom management issues detracts from the time they spend actually teaching content. Volunteers and staff members provided practical strategies for dealing with the most commonly reported challenges. Chapters include teaching in a cross-cultural context, strategies for developing classroom procedures and rules, motivation, managing disruptive behavior, assessment, and grading. Sensitive and complicated questions, such as how to teach in a school where cheating and corporal punishment are common, are addressed. There are exercises to exchange information with host colleagues to gain mutual respect and understanding. It would be helpful to read this book before starting to teach, but equally useful once teaching. It will help Volunteers think about their classrooms, students, and colleagues from new perspectives to they can adapt to a new teaching environment.

Idea Book Series: In the Classroom: Empowering Girls

This idea book provides background information on the importance of focusing on girls' education with a holistic approach. It provides specific ideas for creating a girl-friendly learning environment, classroom and curriculum-related activities, co-curricular activities, awards, and incentives and scholarships. It also includes an appendix with a model session plan, an article on girls' education festivals, and a school development workshop.

Libraries for All! How to Start and Run a Basic Library

This manual and resource guide for small libraries is a basic reference and contains practical, step-by-step instructions for creating and managing a successful library. Published by UNESCO, it was written by Laura Wendell, RPCV. It is a useful resource for Information Resource Center (IRC) managers and volunteers involved in community resource center projects and school libraries.

Nonformal Education (NFE) Manual

The content of the Nonformal Education (NFE) Manual is grounded in the theory and practice of some of the great educational thinkers of our time, including Paolo Freire, Howard Gardner, David Kolb, Malcolm Knowles, and Bernice McCarthy. This manual includes information from previous Peace Corps publications as well as current research from the field of education. There are field-tested ideas, activities, and tips drawn from the experiences of Peace Corps Volunteers and staff around the world. Not only for education Volunteers, this manual will help any Volunteer who has to teach, train, or facilitate in the field. See also Community Based Instruction (CCBI) Instruction Manual [ICE No. T0112].

Preserving Food by Drying: A Math/Science Teaching Manual

This is a step-by-step experiential approach to learning the scientific principles of solar food drying. The lessons teach construction and use of home food dryers as students are introduced to principles of conduction, evaporation and nutrition, among other concepts.

Setting up and Running a School Library

This book provides a practical set of tips and techniques to use when setting up and managing a school library. It also offers activities to make the library an engaging, exciting place for teacher and students alike. This is a resource for Volunteers who are involved in library work of any kind—the activities can be adapted for non-school library settings.

Sources of Donated Books for Schools and Libraries

This publication helps Volunteers identify organizations that can provide books and other education resources to their communities. It provides contact information and guidance on how Volunteers and their community partners can submit requests and receive donations from the organizations listed, and it emphasizes the importance of sustainability in library development activities. Volunteers involved with library or resource center development will find this manual of particular value.

Peace Corps Literacy Handbook

This publication provides an introduction to literacy work for Volunteers and other development workers. It provides straightforward information on planning and preparing; offers guidance on program and materials development; and suggests strategies for evaluating and improving programs. Content focuses on three specific literacy activities, which includes several case studies, an annotated bibliography, and suggestions for continuing and expanding a literacy program. Also available digitally in French, Manuel d'Alphabétisation du Peace Corps [ICE No. M0032], and Spanish, Manual de Alfabetización del Cuerpo de Paz [ICE No. M0028].

Teaching English as a Foreign Language to Large, Multilevel Classes

This publication draws on suggestions from Volunteers working under difficult conditions with limited resources. In particular it offers ideas and activities to help teachers facing classes of up to 150 students, most without textbooks. Content addresses issues such as student interests and needs, classroom management, theme-based lesson planning, the national curricula, emphasis on rote memorization, and resistance to group work. It aids Volunteers in creating classrooms where students are given opportunities to think critically, work cooperatively, and enjoy the experience of learning.

Teaching in the Whole Garden

This manual provides primary school teachers with ideas for lessons and activities that can be taught in the school garden. Specific examples include lesson plans for using gardening to teach science, health, math, social studies, and language arts; and all phases of gardening from selecting the crops, the garden's location and soil requirements, to planting, growing, harvesting, and marketing the crops.

Overseas Programming and Training Support

The Peace Corps Office of Overseas Programming and Training Support (OPATS) develops technical resources to benefit Volunteers, their co-workers, and the larger development community.

This publication was produced by OPATS and is made available through its Knowledge & Learning unit (KLU). Volunteers are encouraged to submit original material to KLU@peacecorps.gov. Such material may be utilized in future training material, becoming part of the Peace Corps' larger contribution to development.

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Abridged Dewey Decimal Classification (DDC) Number: M0106