INDIGENOUS WISDOM:
CENTURIES OF PUEBLO IMPACT IN NEW MEXICO

A Pueblo-Based Educational Curriculum • IndianPuebloEducation.org

ELEMENTARY SCHOOL CURRICULUM

2nd Edition

Title of Unit: Pathways to Wisdom through Family and Community

Content Area: Mathematics

Grade Level: K-1

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Section A: Introductory Materials

Name: Odell Jaramillo
Title of Unit: Pathways to Wisdom through Family and Community
Content Area: Mathematics
Grade Levels: Grades K-1

Rationale:

Pueblo families and communities are subject daily to numerous government policies at the state and federal level that minimize their traditional and cultural practices and devalue their core values.

Fortunately, the wisdom and holistic views of Pueblo elders have helped them to utilize traditional ways of thinking, knowing, learning, and understanding to cope with outside influences.

This unit is designed to engage students in connecting and relating mathematics through the activities practiced in their culture. The connections that children experience between culturally diverse worlds can make them more resilient and build their wisdom so that they become better citizens of both worlds.

Unit Goals:

1. Students will be able to increase their knowledge of self and family through practical applications of mathematics in everyday life.
2. Students will be able to demonstrate strategies for counting and cardinality.
3. Students will be able to use representations for measurements.
4. Students will be able to communicate their mathematical thinking and reasoning through oral and written language.

Standards:

Common Core Standards	Common Core Standards for Mathematical Practice
CCSS K.B.1	**CCSS.MATH.PRACTICE.MP2**
CCSS K.B.5	**CCSS.MATH.PRACTICE.MP5**
CCSS K.G.1	**CCSS.MATH.PRACTICE.MP6**
CCSS K.N.1 - 4	CCSS.MATH.PRACTICE.MP7
CCSS K.N.6	
CCSS K.H.2	
CCSS K.Q.1	
CCSS K.Q.4	
CCSS K.Q.5	
CCSS 1.A.1	
CCSS 1.A.6	
CCSS 1.N.2	
CCSS 1.N.5	
CCSS 1.M.1	
CCSS 1.B.3	
CCSS 1.G.2	
CCSS 1.G.3	

Section B: Lesson Plan One
Title: Mathematics Applied to a Chile Ristra
Duration: 40 minutes
Grade Level: K-1

Learning Objectives:

1. Students will be able to count by twos and fives.
2. Students will be able to use words and drawings to represent mathematical ideas.
3. Students will be able to explain multiple strategies of measuring quantities.

Prerequisite Skills and Knowledge:

1. Appropriate listening and behavior
2. Oral sharing
3. Pre-writing and reading (dictation for kindergarten)
4. Pre-fine motor skills
5. Understanding of respect for self and respect for others

Materials and Resources

1. Large group area with tables
2. Large chart, markers (bold)
3. Photographs of chile ristra
4. Chile pods - one bushel
5. String
6. Twine
7. Rulers, tape measure, and a yard stick or meter stick
8. Writing materials (pencils, paper, crayons, colored pencils)

Guiding Questions

1. How do people use mathematics in the Pueblo community?
2. Why is mathematics important in everyday life?
3. What makes me special in my family?
4. How does my family use mathematics in daily life?

Core Values: Love and Respect

Procedure:

1. Establish appropriate listening and behavior skills.
2. Introduction
    a. Introduce the activity by showing photographs of a Chile ristra.
    b. Explain how Chile is grown and present the photographs of Chile being grown in the fields, with Chile ristra hanging from homes.
    c. Explain to students that they will learn how to make a Chile ristra. (Hold a Chile pod for children to see: Attachment #1).
3. Go over general rules about handling Chile pods or any vegetables.
    a. Do not break the pods.
    b. Do not rub eyes after handling a broken pod.
    c. Do not bite the pods.
4. Divide the class into groups of four or five.
    a. Distribute the pods to each group.
    b. Explain and show the different sizes and lengths of the Chile pods.
    c. Students sort the pods according to size as long, longer, and longest.
    d. Students count and place the chile into groups of five, making sure to have a group of 5 long, 5 longer and 5 longest chile pods (show photographs of five long, five longer, and five longest groups of Chile pods; see Attachment #2).
5. Grouping
    a. Cut multiple pieces of cotton string, each about 10" long (show photograph of string size).
    b. Explain how Chile stems can be put together.
        i. Show pictures, starting with the five longest chile pods.
        ii. Hold the Chile stems together and wrap around all five stems with string.
        iii. Go between two stems to secure, tie several knots, and cut the remaining string.
    c. Take five longer Chile pods and tie them together.
    d. Take five long Chile pods and tie them together.

6. Summary
    a. Cut heavy twine into pieces each about 36" long to hold the groups of Chile pods together.
    b. Use a tape measure or yard stick to measure.
    c. Tie a Popsicle stick or a sturdy stick about 4-5 inches long at one end for a base.
        i. Teacher holds up the center twine with the base on the bottom.
        ii. Start stringing the **longest** group of Chile pods by placing the tied Chile pods to the center twine and overlapping two Chile stems to hold (show photograph)

        iii. Push down gently, leaving little space for air circulation.
        iv. Next, repeat the same process using **longer** Chile: put the tied Chile between the center twine and overlap the two Chile close to the stem to hold, pushing down gently.
        v. Repeat the same process with **long** Chile until all grouped Chile pods are tied to the center twine.
7. Data collection
    a. Measure how long the Chile ristra is and record the lengths.
    b. Hang the Chile ristra outside or inside.

Modifications:

1. Encourage students to illustrate or write more than one sentence; dictation may be necessary for some students.
2. Provide teacher support for kindergarten students tying Chile.
3. Give directions in small steps using as few words as possible.
4. Provide visual aids; use pictures or graphics.
5. Show a model of the end product (such as a completed math problem or a finished quiz).
6. Allow enough time for students to illustrate and write.
7. Allow students to sit at tables during the writing and illustrating period.
8. Display charts and pictures for redirecting.
9. Students can stand around tables during the activity or work on the floor.
10. Prepare pictures or photographs and a chart before the activity begins.
11. Encourage students to work in small groups.

Notes to Teacher:

Chile is a common staple food used in various cooking activities throughout Pueblo communities for special events. Traditional Pueblo families and communities are like connected Chile pods. By wrapping groups of pods around the core twine, students are symbolizing the core values holding Pueblo families together like twine holding the ristra together. Through this activity students can develop strength that relates to love, respect and sharing.

Oral Presentation Rubric: Rubric for Chile Ristra Activity

Name: _____

Category	4	3	2	1
Collaboration with peers	Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others in the group.	Often listens to, shares with, and supports the efforts of others in the group.	Rarely listens to, shares with, and supports the efforts of others in the group.
Content Under-standing	Shows a full understanding of the mathematic concept.	Shows 8 out of 10 ways to express his/her understanding of the math concept.	Shows 5 out of 10 ways to express his/her understanding of the math concept.	Shows no indication to understand mathematic concept presented.
Listens to Others	Listens intently does not make distracting noises or movements.	Listens intently with minimal distracting noises	Sometimes does not appear to be listening, but is not distracting	Sometimes does not appear to be listening makes distracting noises and movement

Project Total: _____

Rubric for Chile Ristra Activity
Name:
_____

Category	3	2	1
Mathematical Concepts	Work shows understanding of the mathematic concepts needed to complete the project.	Work shows some understanding of the mathematical concepts needed to complete the project.	Work shows very limited under-standing of the mathematical concepts needed to complete the project.
Completed Project	Project is fully completed.	Project is somewhat completed.	Project was attempted but not completed.

Total: _____

Attachment #1: Making a Chile Ristra

Chile field

Pods on a plant

Chile ristras

Variety of Chile pods

Picking pods

Sorting pods into long, longer, and longest

Attachment #2: Tying Pods in Groups of Fives - Ristra

Lesson Plan Two
Title: Mathematics in Blue Corn Pancakes
Duration: 40 minutes
Grade Level: K-1

Lesson Objectives:

1. Students will be able to explain how their families use mathematics in cooking.
2. Students will be able to use non-standard and standard measurements.
3. Students will be able to summarize the sequence of making blue corn pancakes.

Prerequisite Skills and Knowledge:

1. Listening skills
2. Counting numbers by 1s, 2s, and 5's
3. Pre-writing (dictation for Kindergarten)
4. Pre-fine motor skills
5. Understanding of respect for self and respect for others

Materials and Resources:

1. Large group area with tables
2. Attachment photos of blue corn pancakes
3. Large chart & markers (bold)
4. Blue corn meal
5. White flour, baking powder, non-fat dry milk, water
6. Measuring cup, spoons, medium size bowl, electric griddle
7. Pencils, paper crayons/colored pencils

Guiding Questions:

1. How do people use mathematics in cooking and food preparation?
2. Are measurements taken in traditional Pueblo cooking different from cooking in other cultures?
3. How does my family and my community use math in everyday life?
4. Why is math important to me and my family?
5. Why am I special in my family?

Core Values: Love and Respect

Procedure:

1. Instruct students to display appropriate listening skills and behavior.
2. Introduction
   a. Teacher explains to students how Pueblo families use blue corn meal for traditional cooking and why it is a stable commodity among Pueblo nations.
   b. Teacher shows ready-made blue corn pancakes or a picture of blue corn pancakes.
      - Students taste the product or visualize what the product may taste like.
   c. Teacher tells students that they will learn how to make blue corn pancakes.
3. Sharing experiences
   a. Teacher inquires students about their own experiences to connect math to real life. (Teacher writes response on a large chart.)
      - How does your family make pancakes?
      - How do you help with cooking at home?
      - What makes you feel special when you help? Why?
      - How does your family use math when cooking?
      - What can happen if people do not know how to measure quantities?
4. Cooking and doing math
   - Explain to students that they will observe and explore using their five senses (students use their palm and finger for the activity).
   - Teacher displays an electric griddle.
   - Teacher introduces the ingredients they will use in the activity.
      - blue corn meal - one cup
      - white flour - one cup
      - baking powder one teaspoon
      - non-fat dry milk - ¼ cup
      - water - one cup
   - Teacher prepares a chart with a step-by-step recipe on how to make blue corn pancakes using *non-standard* measurements. (Use non-standard measurement pictures for students viewing.)
      - Teacher heats griddle to 400°
      - Teacher slowly pours water into the dry mix while stirring. The mixture should have the consistency of thick gravy.
         a. Tell students to use less water for thick pancakes.
         b. Tell students to use a little bit more water for thin pancakes.
   - Teacher assists pouring batter onto hot griddle.
   - Teacher lets students observe during the process.
   - Teacher tells students to cook both sides of the pancake for about 1 minute.
5. Using the five senses
   - Teacher asks the following questions:
      - What did you see?
      - What did you hear?

- What did you smell?

- What other foods have you seen, heard, smelled, tasted, or touched when your family cooked?
- Can you touch the blue corn pancakes now? When do we need to be careful with food? How?
- Can you taste the blue corn pancakes now?

6. Summarizing
   - View the photographs for each ingredient then transfer the list to a larger representation for the children to see, read, and follow.
   - Ask: As you mixed the ingredients, what did you put first, second, third, fourth, and last into the bowl?

Modification:

1. Encourage students to ask clarifying questions
2. Allow enough time for students to illustrate and write
3. Display chart and photos for reviewing
4. Students may stand around tables during the activity

Notes to Teacher:

As this lesson aims to help students understand how math concepts are used in the family and community, please reach out to the parents and collect various recipes for making blue corn meal or other foods for special Pueblo events. Students may also appreciate making a booklet of the activity as a class and displaying it in the classroom or at the library. Since this lesson provides a learning experience with non-standard measurements, another lesson featuring standard measurements (see Attachment #2) may be helpful for students in understanding various strategies of measurement.

Culminating Activity:

The teacher may invite parents to participate in a cooking project with a family recipe. The class can celebrate with parents as a community by cooking and enjoying the food together, thinking about mathematics in the process.

Attachment #1: Non-Standard Measurement

Attachment #2: Standard Measurement

Dry ingredients and tools.

Measure 1 cup blue corn meal.

Measure 1 cup enriched flour.

Measure ¼ cup non-fat powdered milk.

Measure 1 teaspoon baking powder

Slowly pour water into the mix and stir until you have thick, smooth, gravy-like batter.

Enjoy the scrumptious blue corn pancakes plain or with butter, flavored syrup, or jam before it gets too cold.

Lesson Plan Three Title:
Blue Corn Porridge
Duration: 60 minutes
Grade Level: K-1

Lesson Objectives:

1. Students will be able to explain how their families use mathematics in cooking.
2. Students will be able to use standard measurements in making blue corn marbles.
3. Students will be able to summarize the sequence of making blue corn porridge.
4. Students will be able to experience learning through their five senses and fine motor skills.

Prerequisite Skills and Knowledge:

1. Listening skills
2. Counting numbers by 1s, 2s, and 5's
3. Pre-writing (dictation for Kindergarten)
4. Pre-fine motor skills
5. Understanding of respect for self and respect for others

Materials and Resources:

1. Large group area with tables
2. Large chart or erasable board with markers (bold)
3. Photos of recipe with step-by-step snapshots
4. Blue corn meal - five pounds
5. White flour - enriched
6. Water - 2 cups boiling.
7. Baking powder - small can (1 teaspoon per group)
8. Measuring cups & measuring spoons
9. 6 medium size bowls - for each group
10. One large bowl - for all the marbles
11. Medium size pot - 4 quart
12. Pencils, paper, crayons/colored pencils

Guiding Questions:

1. How do people use mathematics in cooking and food preparation?
2. Are measurements in traditional Pueblo cooking different from cooking in other cultures?

3. How does my family and my community use math in everyday life?
4. Why is math important to me and my family?
5. Why am I special in my family?

Core Values: Love and Respect

Procedure:

1. Set a positive learning environment with appropriate listening and behavior skills.
    a. Students wash their hands prior to this activity or before touching the blue corn dough
2. Conversation (Teacher records responses on a large chart.)
    a. Teacher asks students how their families use blue corn meal for cooking.
        - Does your family use blue corn meal for cooking? What kind of food do they cook?
        - Do you help with cooking at home?
        - Do you feel special when you help? Why?
3. Cooking
    a. Teacher tells students they be learning how to make blue corn marbles.
    b. Teacher introduces the utensils and two medium sized bowls they will use.
    c. Teacher introduces the ingredients.
        - Blue corn meal, white flour, baking powder, and water
    d. Teacher shows a chart with a step-by-step recipe using standard measurements.
        - Students observe a teacher demonstration:
            1) Teacher explains that Pueblo people cook blue corn meal for special events like feast days.
            2) Teacher tells students that boiling water is used and mixes the ingredients to make the dough.
            3) Teacher tells students that the dough will be divided equally (approximately ½ cup) per student.
                - Wait until the dough is cool for students to touch.
                - Roll out the dough like a Tootsie Roll and divide into six equal parts. (Use the edge of the palm or a butter knife to divide.)
            4) Teacher instructs students to take a small piece of dough and roll the dough in the palm of their hands until it is round like a small marble.
                - Size does not matter as long as it is round like a marble.
                - Students place all the round marbles into a bigger bowl.
            5) Teacher boils water: the pot of water should be placed on the burner before the session starts so that the right temperature is made when the blue marbles are ready.

6) Teacher tells students to observe while the teacher places all the round marbles into the boiling water.

7) Ask students: What is happening to the round marbles? How long will it cook? Can you see, hear, smell, touch, and taste the blue corn marbles? Why?
8) Students observe as the blue corn marbles take on a gray consistency.
9) Tell students that the blue corn marbles will cook for 15-20 minutes until thick gravy develops.
10) Instruct students to wait until the blue corn marbles have cooled down a bit. (Students may place a little sugar or salt to taste.)

4. Mathematics in cooking
    a. Ask the following questions and use student responses for classroom discussion
        - With six groups in class, when each group adds 1 cup blue corn meal to the bowl, how many cups of blue corn meal in all? Count (6 cups blue corn meal).
        - If each group places 1 cup white flour in the bowl, how many cups of white flour in all? Count (6 cups white flour).
        - If each group places 1 teaspoon baking powder in the bowl, how many tablespoons in all?
        - What happens when you divide the dough equally?

Modifications:

1. Redirect to the step-by-step chart for questions.
2. Allow enough time for student illustration, dictation, and writing.
3. Display chart with photos for reviewing.

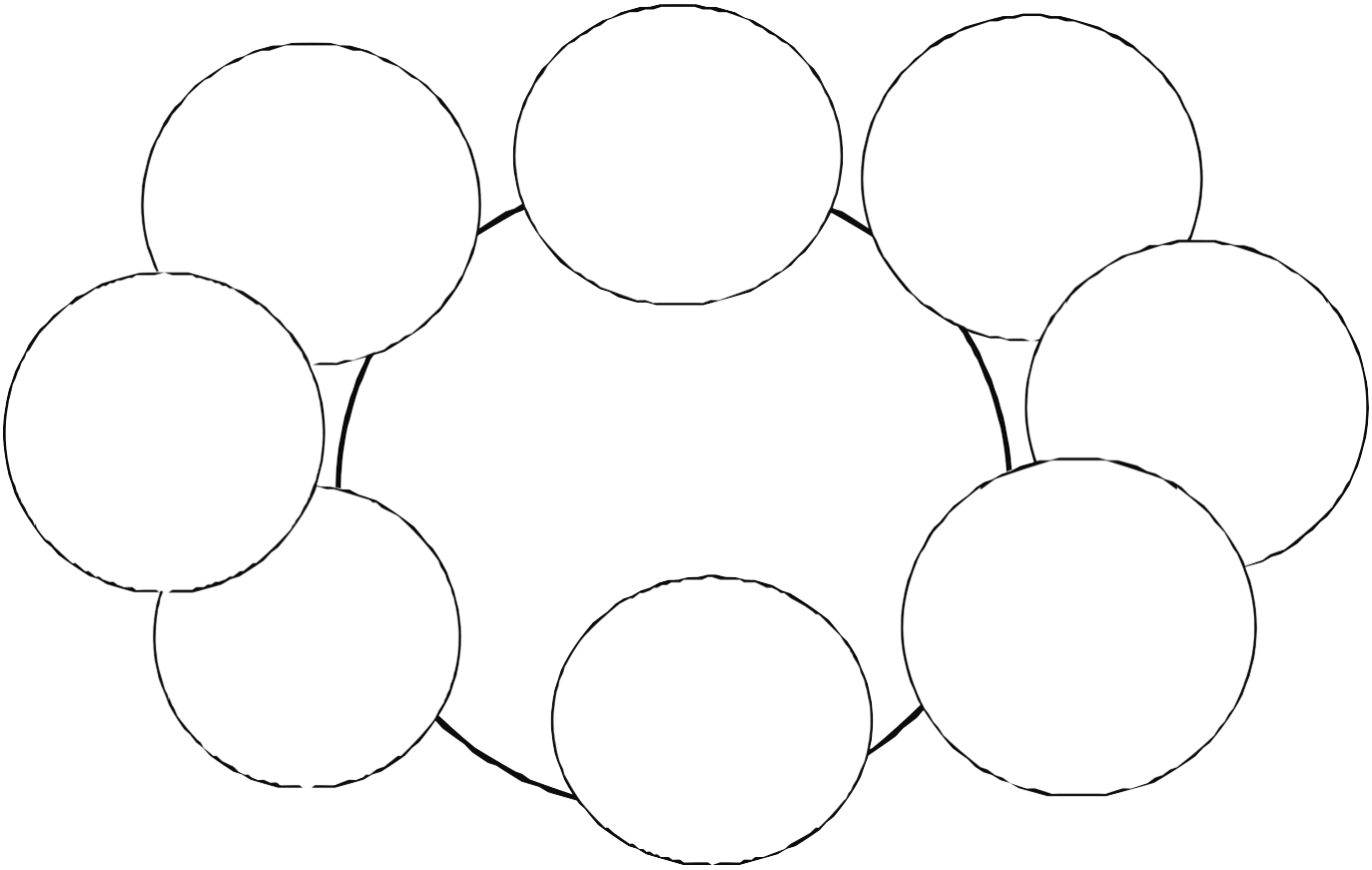
Notes to Teacher:

1. Dry ingredients may be mixed with boiling water to make dough.
2. Encourage students to write more than one sentence.
3. Each child should have a medium size bowl and a teaspoon.
4. Prepare photo pictures on the chart before starting the activity.
5. Blue corn is readily available at Sprouts or any store.

Culminating Activity:

The teacher can take pictures of the students at each step (6 total) of the cooking sequence and have students write sentences describing the procedures of the cooking activity, showing counting for measurements in their student illustrations.

#1 Student Hand-out
My Name:_____ **Date:** _____



- Student draws a self-portrait.
- Student makes illustrations of family members and show how they help each other at home.
- Student writes in multiple sentences

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First Page: Making marbles –blue corn spheres

Required tools

1 cup of blue corn meal

Measured 1 cup of blue corn meal

Measured 1 cup of flour

Mix dry ingredients.

Slowly pour boiling water into mix and stir to consistency of thick dough.

Second page: Making marbles –blue corn spheres

Continue stirring with wooden spoon.

Create the dough.

Measure ½ cup of dough into a roll.

Roll the dough and shape into tube-like form. Then divide tube into six equal parts.

Each divided part will now be rolled.

Roll parts into marble-like shape or sphere.

Third page: Making marbles – blue corn spheres

Use large bowl to collect the spheres.

Gently pour the spheres into boiling water.

Use medium heat to boil the spheres.

Let porridge boil for approximately 10 minutes.

After cooling momentarily, allow students to sample. Have cups or small bowls ready for each student. Teacher has the discretion to disseminate the meal.