INDIGENOUS WISDOM:
CENTURIES OF PUEBLO IMPACT IN NEW MEXICO

A Pueblo-Based Educational Curriculum • IndianPuebloEducation.org

ELEMENTARY SCHOOL CURRICULUM

2nd Edition

Title of Unit: Our Environment and Way of Life

Content Area: Mathematics

Grade Level: 4-5

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Section A: Introductory Materials

Name: Marie S. Martinez
Title of Unit: Our Environment and Way of Life
Content Area: Mathematics
Grade Levels: Grade 4 -5

Rationale:

Many of the core values in Pueblo communities-such as love, respect, compassion, faith, balance, and service—need to be reinforced in school lessons, whether the subject is reading or mathematics. These core values can impact how important and relevant students find learning.

To succeed in the world of mathematics today, students must have Real-World problem solving skills and recognize the importance of knowing necessary mathematics skills. We must help students to find and connect their sacred place in the community-their place of work and play-with what they are learning in academics. These activities will provide opportunities for students to conduct research on the particulars of finding safe and sacred places so that utmost learning can take place. Places of reference could include areas of farming, homes, and buildings.

Unit Goals:

1. Students will be able to identify geometric shapes and structures in their community and categorize the figures according to similar properties, which may include areas of farming, homes, sidewalks, etc.
2. Students will be able to calculate the area and perimeter, estimate measurements, and use mathematics to create a model of a Pueblo house, and other activities as necessary.

Standards:

Common Core Standards	Common Core Standards for Mathematical Practice
CCSS 5.G.3 CCSS 5.G.4 CCSS 5.MD.3 CCSS 5.MD.4 CCSS 5.MD.5 CCSS 3.MD.7.a CCSS 3.MD.8	CCSS.MATH.PRACTICE.MP1 CCSS.MATH.PRACTICE.MP2 CCSS.MATH.PRACTICE.MP3 CCSS.MATH.PRACTICE.MP5 CCSS.MATH.PRACTICE.MP6 CCSS.MATH.PRACTICE.MP7

Section B: Lesson Plan One
Title: The Perimeter & Area of Community Structures
Duration: 90 minutes
Grade Level: 4 - 5

Learning Objectives:

1. Students will be able to estimate the perimeter of a school building, sidewalks, etc.
2. Students will be able to measure the perimeter of a school yard,
3. Students will be able to compare and contrast the estimations and actual measurements of a school building (any area/building that students are measuring.)
4. Students will be able to calculate the area of a building by using the perimeter.

Prerequisite Skills and Knowledge:

1. Definitions of Perimeter and area of a rectangle (i.e., 2L+2W=P; L x W=A)
2. Using measuring tapes
3. Perimeter of a circle

Materials and Resources

1. Student journals or math notebooks
2. Cloth measuring tapes
3. Cotton twine
4. Definitions: How to Find Area and Perimeter https://www.youtube.com/watch?v=rSVMrPu0__U

Guiding Questions

1. How can we define and measure the perimeters of different structures of interest?
2. How can we calculate the area of a given space when only the perimeter is known?

Core Values: Love and Respect Read "The Three Sisters"

a. Ask students: "Have you ever wanted a vegetable garden? Think about planting corn, bean, and squash seeds in the same mound. You will have your own 'three sisters' garden. Discuss about how you will know how big the area and perimeter would be. How could find out how much land you would need if you had more than one mound of 12 in X12in? 4 mounds?"

Procedure:

1. Form groups of mixed abilities

    a. Each group will have a reporter, a recorder, and a note taker. (A materials handler may also be assigned.)
    b. Provide each group with a check-list. (Handout #1)
    c. Each group is provided with a clip board or a recording device for the reporter to record the group's findings.

2. Concept of perimeter Students will view the youtube video of "How to find Area and Perimeter".

    a. Show and tell the *perimeter* of an object or place.
    b. Have students Google or find the definition of *perimeter*. Record definitions into their journals.
    c. Discuss ways to quantify the perimeter.
        - Use a measuring tape to measure the distance around a student's desk or a rectangular table.
            - Provide each group with a measuring tape, preferably a tailor's cloth tape or a yard-stick.
            - Provide each group with a ball of twine or yarn and challenge students to share their strategies to measure the perimeter.
        - Talk about the various units that can be used to indicate the perimeter.
    d. Math talk: Have each group select a spokesperson to present their findings.

3. Outdoor activity I

    a. Take students outside to measure the perimeter of the school grounds.
        - Ask students to select a structure or an object with measurable lengths (e.g., fencing area surrounding the school property) and take its measurements.
        - Encourage students to draw the object they measured and describe its measurements (including the starting point, ending point, gaps, etc.)

4. Classroom discussion

    a. Once the measuring and observing is accomplished, have students return to the classroom to discuss their experience of measuring objects and whether their school is safe.

        - Write the names of the students' different objects, their measurements, and methods used to measure the perimeter.
        - Write students' ideas of what they think or consider to be safe.

5. Outdoor activity II

    a. Have students walk around the building and make estimations about the perimeter of the building based on their previous experience taking measurements.

    b. Each group recorder will note their group estimation. Students may work in groups of 4-5 peers.

    c. Students report their measurements and post their data:

        - Students share their methods of getting an actual measurement.
        - Students compare and contrast their estimates vs. actual measurements (if available).

6. Exploring the relationship between the perimeter and area

    a. Calculating areas

        - Students measure the perimeter
            - Use the four walls of the classroom or other rectangular-like structures to determine the length and width.
            - Use the formula A = 2L X 2W to determine the area of the classroom or other spaces or objects.
                a. Consider using the 1 square ft. tiles to determine a square footage of a structure
                b. Compare the method of using the perimeter (i.e., distance) to calculate an area versus the method of unit squares to quantify a given space

7. Reflection
    a. Students write a short paragraph about their experience with measurement.
    b. Students write the definitions of the perimeter and area in their own words.
    c. Students write the procedures related to measuring geometric objects.
    d. Students write about possibilities or challenges related to measurement.

Assessments

- Summative assessment:
    - Provide students with a rectangle of appropriate dimensions and ask them to calculate the area.
    - Ask students to draw a figure and indicate its perimeter using appropriate units and segments of the closed figure.

Modifications:

1. Timing accommodations: Give more time to complete a task as well as extra time to process oral information and directions
2. Scheduling accommodations: Give more time to complete a project
3. Assignment modifications: Create alternate projects or assignments
4. Give directions in small steps using as few words as possible
5. Provide visual aids: Use pictures or graphics
6. Show a model of the end product (such as a completed math problem or a finished quiz)
7. Provide a table of math facts for reference
8. Circle math computation signs
9. Use worksheets for perimeter and area for practice.

Notes to Teacher:

1. Students may need support defining the perimeter and using the definitions to take measurements and defining units.
2. Students may need clarity on the concept of an area of one object being expressed as different areas according to the units used.

Culminating Activity:

The experience of measuring the perimeter of linear closed objects can be extended to finding the perimeter of complex polygons with various strategies of decomposition. In addition, students may explore various ways to define the perimeter and measure nonlinear objects such as circular structures. Students may develop a deeper understanding of circumference, diameter, and radius as they shift from linear to nonlinear objects while applying various strategies, methods, and formulas to indicate the quantity of a closed figure in common life structures in their communities.

The Three Sisters

A Native American Legend

There is a Native American story about three sisters who loved each other very much. Each sister could only be happy when she was with her sisters.

The oldest sister stood tall and golden. Her name was Corn. Corn was graceful and strong.

The middle sister like to twine around her sister Corn. Her name was Bean. As Bean grew taller, she could give Corn a bigger hug.

The youngest sister was very brave. She stayed at the feet of Corn and Bean to protect them from danger. Her name was Squash.

Where one of the sisters grew, the other two wanted to grow. They never wanted to be separated. That is why they were always planted together in the same field.

On summer nights, when stars shined in the moonlit sky, the three sisters changed into young girls. Dressed in green, they would dance and sing. They praised their Mother Earth and their Father Sun.

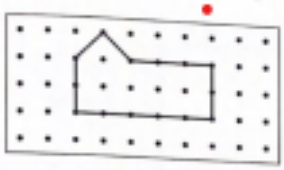
Think about planting corn, bean, and squash seeds in the same mound. You will have your own "three sisters" garden. Maybe some warm summer night you will see the three sisters dancing in the moonlight in your garden.

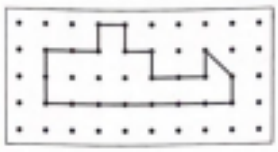
Name _____

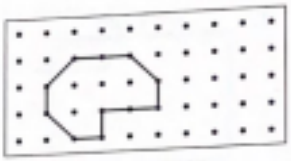
Finding Area

P 9-7

Find the area of each figure.

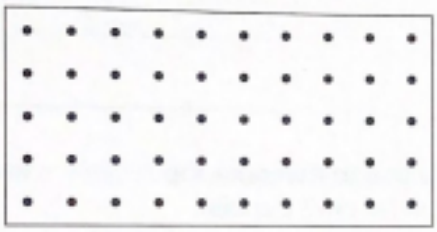
1. 

2. 

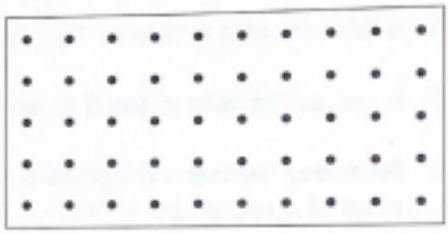
3. 

On each dot paper, draw a shape with each given area.

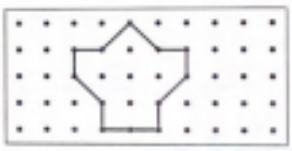
4. 7 square units

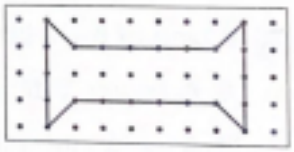


5. $5\frac{1}{2}$ square units



6. Tara was asked to draw a figure with an area of 11 square units. Is her drawing correct? If not, what is the area of the figure she drew?





Test Prep

7. Which is the area of this figure?

   A. 17 square units **B.** 16 square units

   C. 15 square units **D.** 14 square units

8. **Writing in Math** Can shapes with the same area have different perimeters? Explain.

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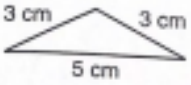
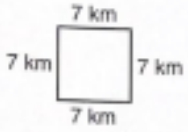
Name _____

Finding Perimeter

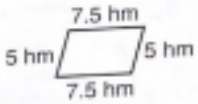
P 9-5

Find the perimeter of each figure.

1. 

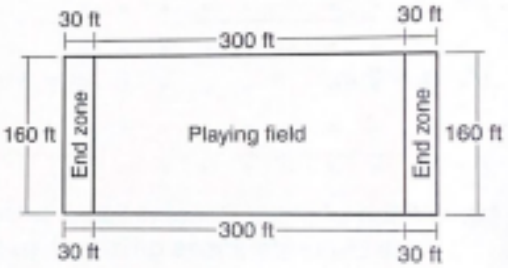
2. 

3.

4. 

5. **Number Sense** What is the perimeter of a square if one of the sides is 3 mi?

The dimensions of a football field are shown at the right.

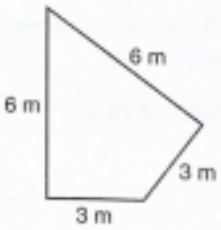


6. What is the perimeter of the entire football field including the end zones?

7. What is the perimeter of each end zone?

Test Prep

8. What is the perimeter of this figure?



A. 18 m **B.** 15 m

C. 12 ft **D.** 10 ft

9. **Writing in Math** A square has a perimeter of 12 m. How many possible lengths are there for each side? List them and explain your answer.

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