



Whitewash

Introduction

Objective:

- Student will use techniques for problem solving involving length and area.
- Student will analyze and explain what happens to area and perimeter of surface area when the dimensions of an object are changed.
- Student will identify appropriate tools and apply counting techniques for measuring area of quadrilaterals.

Academic Content Standards:

- ❖ National Council of Teachers of Mathematics Standards: Measurement
 - *Apply appropriate techniques, tools, and formulas to determine measurements*
- ❖ National Council of Teachers of Mathematics Standards: Number and Operations
 - *Understand numbers, ways of representing numbers, relationships among numbers and number systems*
 - *Understand the meaning of operations and how they relate to one another*
 - *Compute fluently and make reasonable estimates*
- ❖ National Council of Teachers of Mathematics Standards: Problem Solving
 - *Build new mathematical knowledge through problem solving; solve problems that arise in mathematics and in other contexts.*
 - *Apply and adapt a variety of appropriate strategies to solve problems*
 - *Monitor and reflect on the process of mathematical problem solving.*
- ❖ Ohio Academic Content Standards for Social Studies #2 Measurement
 - *Students estimate and measure to a required degree of accuracy and precision by selecting and using appropriate units, tools and technologies.*
 - *Benchmarks: D (4th Grade)*
 - *Benchmarks: C, D, E, F and G (5th & 6th Grades)*
- ❖ Ohio Academic Content Standards for Social Studies #1 Number and Number Sense
 - *Students demonstrate number sense, including an understanding of number systems and operations and how they relate to one another.*
 - *Benchmarks: J, K, L, and M (4th Grade)*
 - *Benchmarks: H and I (5th & 6th Grades)*
- ❖ Ohio Academic Content Standards for Social Studies #6 Mathematical Processes Standard
 - *Embedded within the grade level indicators.*

Getting Started

Materials:

- Rulers
- Yard Sticks
- Pieces of wood (in the simulated shape of slat from a picket fence) in different lengths, widths and heights
- Pencil
- Paper
- Handout (Create a record sheet that students will use to collect data throughout the activity that is consistent with the key points of emphasis and the types of wood being used for your activity.)

Vocabulary:

- Area (formula, length x width= area)
- Perimeter
- Square inch
- Square foot

Technology:

Use a spreadsheet and formulas to create a template for deciding how much paint is needed to cover a certain area of fence. Students will be able to input length, width and height of each piece of wood for the fence and the number of pieces of wood for the fence. Students will calculate using the formulas and then give the output of how many gallons of paint is needed to paint the fence.

Lesson

Orientation Activity:

Students will use measurements to calculate the area of the fence that needs whitewashing (painting) and the amount of paint it will take to cover that area.

Learning Activity:

Present to the students the different sized pieces of wood that simulate slats from a picket fence. Students will measure the length of all sides of a slat, calculate the perimeter of each face and calculate the area of each face. The areas of each of the faces are then added together for calculation of the total surface area of the entire piece of wood. These measurements will be calculated and recorded for each piece of wood.

Give the students the amount of surface area the paint will cover. Then have students answer questions such as the following. (Each # represents a different size of wood.)

- How many pieces of wood #1 could I cover with one gallon of paint?
- How many pieces of wood #2 could I cover with one gallon of paint?
- How many pieces of wood #3 could I cover with one gallon of paint?
- If each piece of wood cost the same and was of the same quality, which piece of wood would cost less to build a fence and paint it?
- What is the cost of painting a fence given the piece of wood, the number of pieces of that wood, and the cost per gallon of paint? (Paint may only be bought in gallon increments.)

Extension:

- Change the increments for paint purchasing to—pints, quarts, half gallons, 5 gallons, liters and kiloliters.
- Design a fence and calculate its cost to build and paint.

Evaluation and Follow-Up

Assessment Tools and Methods:

Student will design a fence for the schoolyard. Student will decide on the location, the length, and how much wood is needed for construction. Student will calculate the area that will need painting, the cost of the paint and the area it will cover, as well as calculate the cost to draw blueprints and present findings and culminations to the class or the local school community.