Lab Framework

Text:CORD Classic
Unit number and title: 8 - Working with Shapes in Three Dimensions
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Lab Title

Draw It, Cut It, Build It

Contact Information: wculver@egreen.wednet.edu
Short Description: Using graph paper and a ruler, the student will design and construct a model of a simple rectangular house with a gable roof. Students will then calculate the total surface area of the structure and its volume. Students will also determine the usable floor space within the house.

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  Students will select the appropriate formulas to accurately calculate the total surface area and volume of the house.
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  Vocabulary:
  Total Surface Area
  Volume
  Measurement Techniques:
  Using Fractions and Mixed Numbers
  Using millimeters and centimeters
  Formulas:
  Total Surface Area
  Volume
  Area of a Rectangle
  Area of a Triangle

- **New Vocabulary**
  Gable Roof
  Floor Space
- **Materials List**
  Graph Paper: Fractional or Metric (One per student)
  Ruler: Fractional/Metric (One per student)
  Scissors (One pair for every 3 - 4 students)
  Clear Tape (Minimum of 10 tape dispensors with tape)
  Calculator (One per student)
  Pencil (One per student)
  Lined paper (One per student)
  Student Instruction Sheet (One per student)

- **GLEs addressed**

  Math:

  1.2.1 Understand the relationship between change in one or two linear dimension(s) and corresponding change in perimeter, area, surface area, and volume.

  1.2.3 Apply unit conversions within measurement systems, U.S. or metric, to maintain an appropriate level of precision.

  1.3.1 Understand the properties of and the relationships among 1 dimensional, 2 dimensional, and 3 dimensional shapes and figures.

  Reading:

  Writing:

  2.2.1 Demonstrates understanding of different purposes for writing.

- **Leadership Skills**

  Group Skills

  2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals.

- **SCAN Skills**

  Writing

  B. Records information completely and accurately

  Arithmetic

  A. Performs basic computations

  Mathematics

  A. Approaches practical problems by choosing appropriately from a variety of mathematical techniques

- **Set-up information**

  Divide students into pairs

  Display example of sample house drawn on graph paper (unfolded)

  Display example of sample house cut and folded to form three dimension shape.

  Students layout house on graph paper

  Students dimension each side of the house

  Students calculate the area of each side of the house (write answer on outside face of each side).

  Calculate total surface area of the house

  Calculate the volume of the house

  Calculate the usable floor space of the house

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**

  Minimum of 2 class periods

  Team supply clerk

  Individual construction and calculations

  Peer evaluation of model and calculations

- **Teacher Assessment of student learning** (scoring guide, rubric)

  Teacher observation

  Peer Evaluation

  Grading of calculations sheet

- **Summary of learning** (to be finished after student completes lab)

-discuss real world application of learning from lab
-opportunity for students to share/present learning

- **Optional activities**
  Add door, window, and/or skylight openings to the house. How does this effect the total surface area calculation?
- **Career Applications**
  Carpenter
  Interior Designer/decorator
  Architect

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STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  Using graph paper and a ruler, the you will design and construct a model of a simple rectangular house with a gable roof. You will then calculate the total surface area of the structure and its volume. You will also determine the usable floor space within the house.

- **Grouping instructions and roles**
  Supply clerk
    Retrieve enough gragh paper and ruler for you and your partner
    Oversee the clean-up
  Each individual
    Complete the work individually, however, frequently checking for understanding with your partner is encouraged.
    Evaluate partner's work

- **Procedures** – steps to follow/instructions
- Divide students into pairs
- Display example of sample house drawn on graph paper (unfolded)
- Display example of sample house cut and folded to form three dimension
- shape.
- Students layout house on graph paper
- Students dimension each side of the house
- Students calculate the area of each side of the house (write answer on outside
- face of each side).
- Calculate total surface area of the house
- Calculate the volume of the house
- Calculate the usable floor space of the house
- Complete lab data collection sheet
- After work is complete, evaluate your partner's work

- **Outcome instructions**
  Once you have completed the layout of your house, have your partner check over your drawing.
  Once all calculations and data collection are complete, have your partner check your work.
  Clean up your work area
  Turn in all work to your instructor.

- **Assessment instructions** (peer-teacher)
  Teacher observation - follow directions carefully
  Completed calculations sheet and data collection sheet
  Complete peer evaluation
  Work area is clean

Lab Data Collection

Student: _____ **Date:** _____

Unit: Unit 8 - Working with Shapes in Three Dimensions

Lab Title: Draw It, Cut It, Build It

Criteria: Write the problem/objective in statement form

Data Collection: Record the collected/given data

Calculations: Complete the given calculations to solve for an answer(s)

Summary Statement:

Other Assessment(s)