

Ready, Set, Decorate!

Abbey Alexander

Mathematical Concept

Surface area and volume of prisms, cylinders and cones

Grade

Mathematics 9

Purpose

Culminating activity for the shape and space unit

Objective

Students will apply their knowledge and understanding of the area of two-dimensional shapes and the surface area and volume of prisms, cylinders and cones to a room design or set-up activity.

Concepts Addressed

(From Alberta Education Program of Studies)

Shape and Space (Measurement)

Describe and compare everyday phenomena, using either direct or indirect measurement

General Outcome

Describe the effects of dimension changes in related two-dimensional shapes and three-dimensional objects in solving problems involving area, perimeter, surface area and volume

Specific Outcomes

- Relate expressions for volumes of pyramids to volumes of prisms, and volumes of cones to volumes of cylinders
- Calculate and apply the rate of volume to surface area to solve design problems in three dimensions
- Calculate and apply the rate of area to perimeter to solve design problems in two dimensions

Materials

- Copy of activity (see Description)
- Blank pieces of paper (two per student)
- Overhead transparency of activity

- Pencil and eraser
- Calculator if needed
- Two worksheets of room to decorate and set up (one for rough copy, one for good copy)

Vocabulary

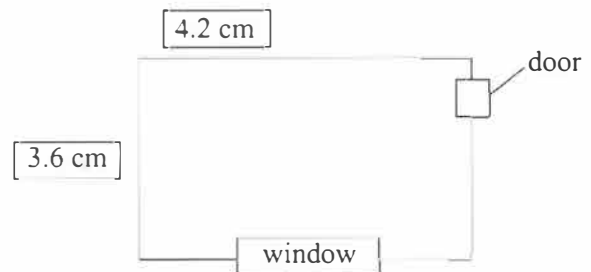
Surface area—the amount of material required to cover an object

Volume—the amount of space that an object occupies

Feature wall—a wall in a room that stands out from the rest

Description

Scenario: Your parents and/or guardians are renovating their home, and you must decide how to renovate your bedroom. Your bedroom is 4.2 m long, 3.6 m wide and 3 m high. The door (2.5 cm × 0.5 cm) and window (1 cm × 1.5 cm) are marked in the diagram below (scale: 1 cm = 1 m).



Decorate and set up your bedroom by doing the following:

1. Decide on the paint colour and quantity. Choose any colour you want; paint all walls the same colour, each a different colour or have a feature wall if you like. You must justify the amount of paint you need (surface area).
2. Hang a minimum of three pictures of any dimension or shape in your room. For each picture, justify why you chose the particular dimensions and shape, and why you hung it in a certain place (area in 2-D).
3. In your bedroom set-up, you must have a minimum of one window, one bed, one dresser, one garbage

can, one lamp and lamp shade, one hanging light fixture and four trinkets.

4. First figure out how much space you have to work with (volume). Then decide what the items in your bedroom will look like and include dimensions. Use at least one of each 3-D shape listed below:
 - cube
 - square pyramid
 - triangular pyramid
 - rectangular prism
 - rectangular pyramid
 - cone
 - triangular prism
 - cylinder

Note: For some students, building nets may be a useful strategy to employ.

5. Indicate how much space each item in your bedroom takes up.
6. When you are done setting up your bedroom, indicate the total space your set-up occupies.
7. When you have completed the activity, we will showcase the bedrooms for all to see.

For the Student

Complete a rough copy of your room. Then do a good copy to hand in, and write your name, date and class on the back. Accompanying your room design on a separate piece of paper, provide the following:

Paint

- The paint colour you chose (provide a sample if possible) and, if more than one colour was used, indicate the colour of each wall
- How much paint you needed and your justification for the amount of paint needed; that is, surface area

Pictures

- The dimensions and shapes of pictures you hung in your room and justification for your decisions; that is, how much area the picture took up on the wall versus how much area you had to work with
- Explain why pictures were hung in certain places

Set-Up

- The amount of space you had to work with in your room; that is, volume
- The dimensions you used for each item and how much total space each item occupied
- The total amount of space all your items used and how much space was left over

Grading Rubric

Level	Descriptors
A	The work is exceptional and exceeds minimum expectations of the project. Justifications for choices are clear and logical. The student demonstrates initiative, creativity, insight and ability to solve problems.
B	The work is generally of high quality. It is accurate and meets minimal requirements. Most justifications are clearly stated. However, the project is not creative or insightful in the judgment of the teacher and problem-solving skills are not exceptional.
C	The work is adequate but unexceptional. Significant errors in understanding, ability to problem solve, superficial justification or poorly described ideas are evident.
D	The work is inadequate or nonexistent. No requirements are met.

Abbey Alexander is in her final practicum in the University of Lethbridge bachelor of education program. She is interested in how we can make mathematics fun and intriguing for students and teachers. She became interested in education because of her high school math teacher and her experience coaching a girls' rep soccer team.