Largest Box Problem

Group Name_____

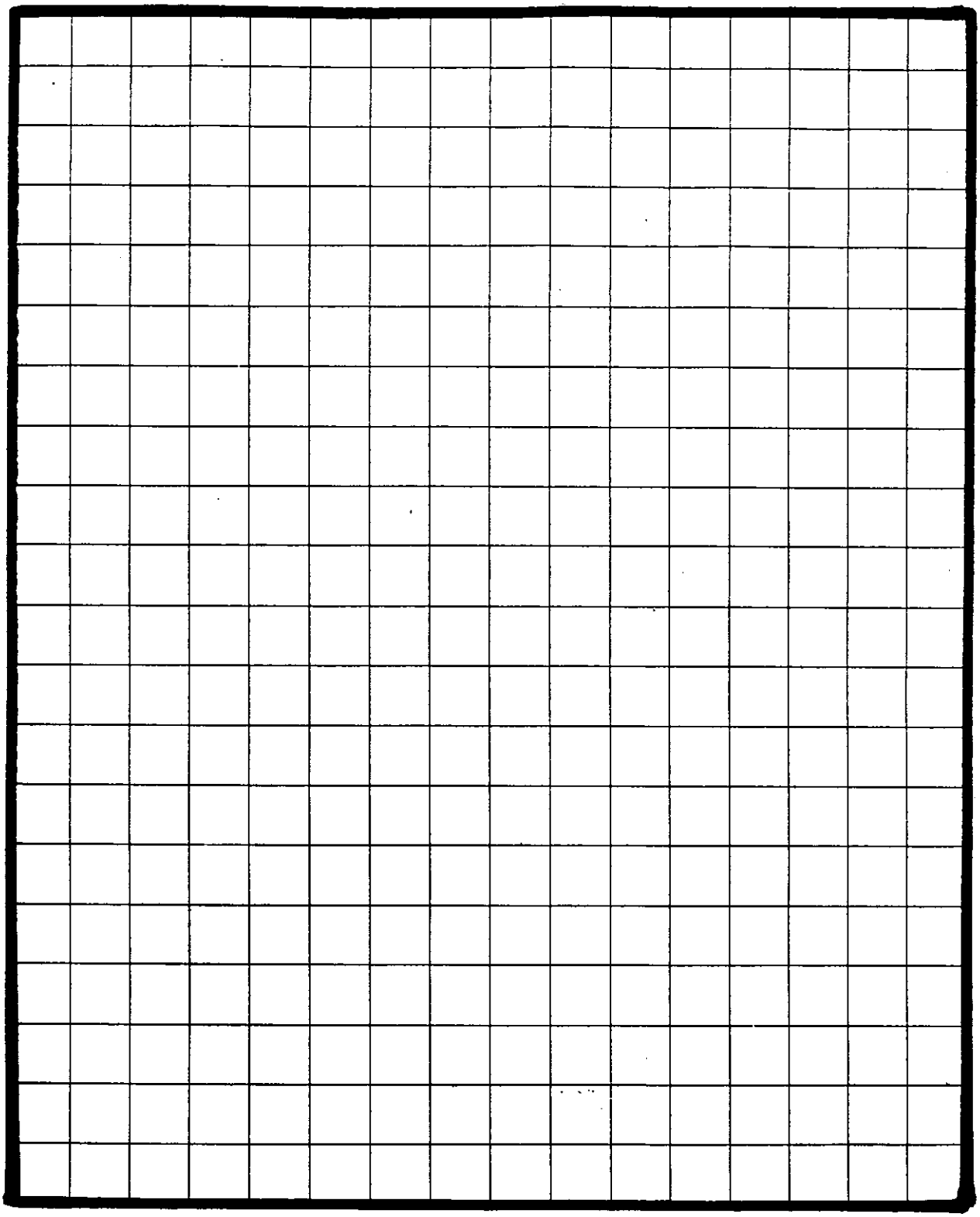
Make the largest (volume) single open box using the grid sheet (20 cm. by 16 cm.). You may cut and paste the sheet to get your perfect box.
Remember to plan before you cut.

Answer these questions in your group...

1. What strategies did your group use to get the dimensions of your box?

2. What is the volume ($cm.^3$) of your box?

3. How do you know that your box has the largest volume?



ACTIVITY

TITLE: Largest Bentwood Box

SENSE: Spatial and Number

PROCESSES: Reasoning, Connecting, Estimating, Visualizing, and Technology

EQUIPMENT: A Bentwood Box, Blackline Masters, Scissors, Glue, Calculator, colored pens

GRADE LEVEL: Middle School / High School

DESCRIPTION:

Part 1

- show the students a bentwood box and give them the background information
- give a sheet of grid paper 20 cm by 16 cm to each group of 4 students
- assign each group to make a unique box with different dimensions
- each unique box has four sides, a bottom and a top
- compare the boxes and discuss which box has the largest volume
- discuss the advantages and disadvantages of each box

Part 2

- in the second part allow students to cut and paste the sheet to make their largest box (volume) by guess and check
- the sides of each box should be made from a single sheet of paper
- make sure the students do their calculations before cutting the grid paper
- the only restriction for the box is that it is a rectangular prism with length, width and height, and you can only use the sheet of grid paper 20 cm. by 16 cm.
- the dimensions of the box do not have to be integers

Part 3

- in the third part students draw a unique design on each side of the box (preferably an aboriginal design)
- color the design

COMMENTS:

- this problem can be extended to include other shapes.
- another extension is to give the students a sheet of 8.5 by 11 paper and ask them to wrap as many unifix cubes as they can in the sheet.

LINKS:

- investigate bentwood boxes from the Northwest and look at their similarities and differences
- simulates a real-world environmental problem, where a company has to use numeracy skills to figure out the optimal box, which will give the maximum volume with a certain surface area.
- informed consumer choices, labeling regulations, airline carry-on baggage dimension restrictions, spatial awareness, optimization for packaging

ATTACHMENTS: Blackline Master

Bentwood boxes

Bentwood boxes were made in all sizes, and were used to store food, clothing and many household and ceremonial items. Some were painted and others were elaborately carved, but the majority were left undecorated. Contemporary artists have revived the art of making bentwood boxes.

Product characteristics

- Boxes were made of western red cedar from one piece of wood.
- Boxes were traditionally of varying shapes and sizes.
- Served as storage of food, clothing, ceremonial regalia, tools, and many household items.
- Specialized items were used as cradles, canteens and coffins.

Construction

- The sides of the boxes were made from 1 plank of cedar.
- The plank was beveled or kerfed to allow the 4 sides to be bent into a box shape.
- After beveling, the plank was steamed, bent and sewn together using cedar roots or wooden pegs.
- The bottom was fitted snugly against the sides to create a watertight box. A snug fitting lid was added.
- Some boxes were painted and others were elaborately carved but the majority were left undecorated.
- Designs on the boxes were based on legends of region.