

Activity 14

Concepts/Skills:

Geometry, measurement, problem solving

Calculator:

TI-30Xa SE or TI-34

Objectives:

Students determine how many volleyballs can be stuffed in a room.

Stuff It!**Materials**

Volleyballs, tape measures

Getting Students Involved

- ◆ If you try to stack volleyballs, what do you notice?
- ◆ How many volleyballs do you think could be put in our classroom?

*They don't stack in neat rows.**Write the estimates on the overhead or chalkboard. Briefly discuss the range of answers.***Making Mathematical Connections**

Review the formulas for computing attributes of circles, spheres, and rectangular prisms:

circle: $A = \pi r^2$, $C = 2 \pi r$

sphere: $V = (4/3) \pi r^3$, Surface Area = $4 \pi r^2$

rectangular prism: $V = l w h$

If necessary, review the use of the π key.

▮ Transparency Master J: Use pi

Carrying Out the Investigation

Assign students to groups. You may want to use cards (or other devices) to generate groups at random. Assign jobs to people in each group. Suggested jobs are director, calculator operator, recorder, questioner. Use whatever group problem-solving rules you normally expect; for example, the group may not ask for help or information unless there is complete consensus, or they may ask no more than four questions during the assignment.

Provide the following information:

Cost of volleyball is about \$25.00

Circumference of a volleyball = 26 inches

Length, width, height of room: Use the dimensions of the classroom

Remind students that their math books are excellent resources for finding formulas!

You may want to ask the PE teacher to loan you several volleyballs for use during this activity. Let groups begin to work, and intervene only if groups flounder. Students are not expected to use all of the formulas above; they will have to decide which formulas are useful.

Making Sense of What Happened

Have students share their solution strategies. Ask students to compare the different strategies in terms of whether they would generate the same answers.

Continuing the Investigation

Ask students to repeat the activity for baseballs or tennis balls or golf balls.

Solutions

This activity is truly a problem solving activity. Solving it will require use of visualization skills. Of course, answers will vary, depending on the size of the classroom.

One over-estimate is to divide the volume of the room by the volume of one volleyball.

Some students may want to put volleyballs in a cardboard box (such as a paper box) and then try to generalize. This technique should be fairly accurate, though it may be difficult for students to adjust for the extra empty space in such a small space that results from not being able to stack volleyballs efficiently.

Some students may want to imagine a box around each volleyball and find out how many boxes would fit in the classroom. This technique will *under-*estimate the number of volleyballs.

Some students may suggest deflating the volleyballs and stuffing them into the classroom. This solution is creative, but it avoids the problem of dealing with the fact that blown-up volleyballs do not stack well.