

Volume Lesson Plan

Anticipatory set: Ask students if they have ever been to the Lucky Peak Dam. If so, ask students to describe the dam to the class. If not, skip right to a picture of Lucky Peak. Inform students that the dam holds 1 million cubic feet of water on most days. A cubic foot of water is basically the size of a basketball and ask them to imagine what a million basketballs might look like.

Procedure: Tell students that they are going to figure out how many cubic feet of water would fit into our classroom. Let them know what the dimensions of the room are and have each group estimate how many cubic feet of water will fit into the classroom. Have a recorder write down the group's estimate (the group must all agree on the estimate). After all estimates are recorded, pass out the attached student worksheet. Have each group work through the worksheet, using both strategies to determine the volume of the classroom.

Wrap up: After all groups are finished, make sure they answer the reflection questions. Write each group's estimate on the board and have each group discuss which of the strategies they are most comfortable with and why. Beforehand, make sure you figure out the answer and reveal it to the students. Make the point that we just estimated the volume of our classroom.

Extensions: You could change up the objects used to fill up the classroom; marbles, ping pong balls, dice, rubrics cubes, or ice cream sandwiches. You could also vary the room; cafeteria, gym, office or choir room.

Student Worksheet

1. An approximation strategy: Figure out how many basketballs will fit on the floor of the room, and then imagine filling the room up in layers. To actually put this idea into practice, answer these questions with your group.
 - a. How do you visualize a layer of basketballs covering the floor? Discuss some different patterns that are possible. Draw some diagrams of the different possibilities here.
 - b. Of the patterns you considered, which do you expect to give the most accurate estimate? Which do you expect to be the easiest to work with? Discuss the tradeoffs, and then choose one pattern as a group.
 - c. Estimate how many basketballs would fit on the floor of the classroom in the pattern you chose. Use whatever measuring tools you have handy. If no one has a ruler, for example, you can use other objects of known size: 8.5 x 11 inch paper; floor or ceiling tiles; 3 x 5 index cards; body parts, etc. Describe any measurements or estimates you made and explain how you came up with your total estimate for pingpong balls on the floor, and what that estimate is.
 - d. Do you expect your estimate to be high? Low? Or can you not tell? Discuss as a group and record the answer below.

e. Now that you know how many basketballs fit in one layer, come up with a way to estimate the number of layers that will fit in the room. Use that to estimate the number of basketballs that will fit in the room. Explain below what your method was and what answer you found. Also explain whether you think the estimate is high, low, or are not sure.

2. A different strategy: If you know the volume of the room and the volume of a ping pong ball in some units (say quarts, for example) you could divide one by the other.

a. Discuss the pros and cons of this strategy. How could you estimate the volume of the room? What units of measurement would be convenient? Answer the same questions for a basketball. If you could measure those accurately and divide on a calculator, do you expect the result to be an accurate estimate of how many basketballs would fit in the room? Would your answer be too high or too low, and why?

b. Actually carry out this plan: estimate the volume of the room and the volume of a ping pong ball (or perhaps a cube that would just contain a basketball), and then divide to estimate the number that would fit into the room.

c. Compare your answers from the two approaches you have followed above. Discuss whether you can have any confidence in the answer, or how far off the answer might be. Compare your confidence in these answers with the confidence you felt at the beginning for the guesses that the class came up with.