

Volume

Measuring a volume is compared with the unit volume (a $1 \times 1 \times 1$ cube of volume 1).

Opening Activity

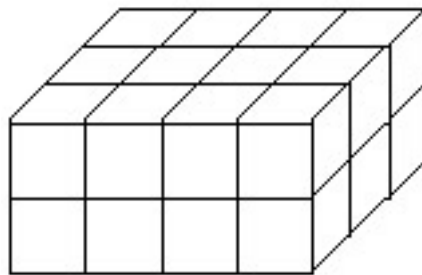
Build a two by three by four rectangular solid using the unit cubes. How many cubes did you use? How can you count the number of cubes in a systematic way?

The number of cubes in this rectangular solid can also be obtained by multiplying $2 \times 3 \times 4$, that is, multiplying length times width times height. Discuss in your group why this is so. Break your rectangular solid into slices. Count the number of cubes in one slice. There are several ways to slice the rectangular solid. Depending on the slicing describe what do the partial products 2×3 or 2×4 or 3×4 represent.

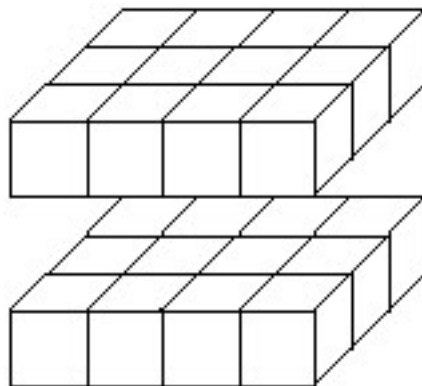
Volume formulas

Activity 1. Explaining the formula for volume Base times height

1) A rectangular box has a base of area B and a height of length c . The volume of the box is $V = \text{area of the Base} \times \text{height}$. Justify this formula in terms of the number of unit cubes inside the box.



- 2) Imagine the prism cut into slices (1 unit thickness). Compute the number of unit cubes in a slice.
- How is this related to the area?
 - How many slices?
 - How is this related to the height?



Activity 2. Explaining the formula length times width times height

1) A rectangular box has dimensions a , b , c . Another formula for the volume of the rectangular box is $V = a \times b \times c$. Justify this formula in terms of the number of unit cubes inside the rectangular box.

- 2) Show that the two formulas are equivalent. The volume of water for irrigation purposes is measured sometimes in acre-feet.
- What formula is being used?