

MORE ON VOLUME AND THE UNIT CUBE

The Problem

As you have learned in earlier *GeoGebra* labs, a solid or 3-dimensional figure which can be packed without gaps or overlaps using X unit cubes is said to have a volume of X cubic units. For example, if a solid figure or container can hold exactly 5 unit cubes, its volume is said to be 5 cubic units.

But what if there are gaps or overlaps? What then? How do we deal with the gaps or overlaps if a 3-dimensional figure or container can't be filled neatly with unit cubes?

Step 1. Figure A



Each unit cube has a red dragging point. Move a unit cube by selecting the MOVE tool and then grabbing this red point and dragging it to a new location.

Move enough unit cubes to find the volume of Figure A.

Volume of Figure A = _____ unit cubes

Step 2. Figure B

Move as many unit cubes as possible into Figure B.

How many unit cubes fit into Figure B **without any overlap** outside the container?
_____ unit cubes

Notice the Half Unit Cubes. Each of these figures has a volume equal to $\frac{1}{2}$ the volume of a unit cube.

How many half unit do you need to complete filling Figure B?
_____ half unit cubes

So what is the total volume of Figure B? _____ unit cubes

Step 3. Figure C

Move as many unit cubes as possible into Figure C.

How many unit cubes fit into Figure C **without any overlap** outside the container?
_____ unit cubes

Notice the Half Unit Cubes. Each of these figures has a volume equal to $\frac{1}{2}$ the volume of a unit cube.

How many half unit do you need to complete filling Figure C?
_____ half unit cubes

So what is the total volume of Figure C? _____ unit cubes

Conclusion

Not all 3-dimensional figures can be exactly filled using unit squares. Finding the volume of some figures will require the use of fractional parts of the unit square.