

Cube Doggie

Teacher Notes

Synopsis

Students build and enlarge a figure to learn about the relationship that the change of dimensions have on length, area, and volume. Students extrapolate to find the general formula for finding a volume when a figure is enlarged.

Main Standard

11.0 Students determine how the changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.

Materials

- cm cubes (grouped into bags of 100 and 300, each team will get either bag of 100 or bag of 300)
- calculators
- Copies, *Cube Doggie*
- Copies, *Cube Doggie Chart*

Teacher Directions

Pass out copies of *Cube Doggie* to each person at the table. Put the students into teams of 4. Pass out the bags of cm cubes. Half of the groups will get bags of 100 and the other half bags of 300. You may want to give those that you feel would be the “speedier” groups the bag of 300. Students should have calculators as well.

Have students build the cube doggie as pictured. Check that all of the groups came up with the correct surface area and volume. Often, the surface area is the one that is most difficult to figure out. Once they have done this, let the teams know that if they have the bags of 100 they will be enlarging the figure by a scale factor of 3. If they have the bags of 300, then they will be enlarging the figure by a scale factor of 3. Note that in this part, student teams often enlarge the figure height wise but sometimes do not realize that they need to enlarge it in all dimensions (width, length).

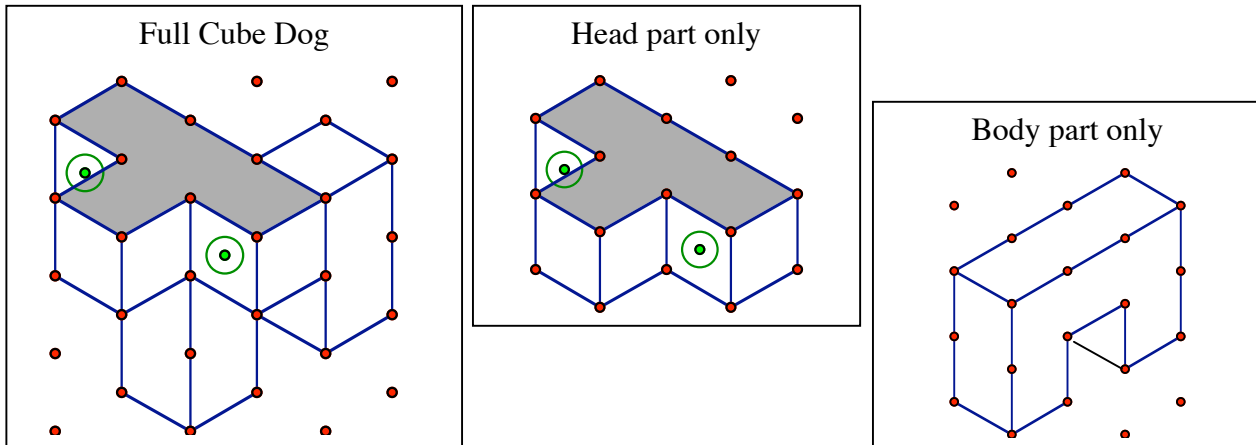
When most teams are done and you are ready to share the information, get a consensus on what the answers they should have come up with. Then, model how to fill out the ratio part of the table. Discuss any patterns they may see as to how the changes in scale effect the changes in surface area and volume. Challenge them to figure out how to fill out the information on the enlargement of a scale factor by 4 without creating the figure.

Then in their groups assign the rest of the activity sheet, problems 3 and 4.

Suggested homework: give them a few figures to enlarge and have them fill out similar charts to what they have created during this activity.

Cube Doggie

Here is an isometric drawing of a cube dog. Build it with centimeter cubes. You will need to build the head and body separately and set the head on the body.



1. Calculate the volume and surface area of this original Cube Doggie and enter the total surface area and volume in the table provided.

Scale Factor: a number which is multiplied by each linear measure of a figure

2. Now, the teacher will assign some teams of people to build a new dog with the scale factor of 2 and some with the scale factor of 3. Have half of your team work on the head and half work on the body to expedite your work. When you are done, fill in the first three boxes in the table provided (height, surface area, and volume)

++++ Class Discussion ++++++

Use what you learned from your class discussion to do/answer the following.

3. Fill in the table for the scale factor of 4, 19, and 138
4. Answer the “Geometry Standard” question on the bottom of the chart using what you learned from this activity.

Cube Doggie Table

Scale Factor	Height	Total Surface Area	Total Volume	Ratios (decimal to nearest hundredth)		
				$\frac{\text{New Height}}{\text{Original Height}}$	$\frac{\text{New SA}}{\text{Original SA}}$	$\frac{\text{New Volume}}{\text{Original Vol.}}$
Original 1	3 cm					
2						
3						
4						
19						
138						
n						

Geometry Standard 11.0

How does the change in dimension affect the perimeter, area, and volume of common geometric figures and solids?