

Scaling Lab:

1.
 - a. What is the total surface area of the small cube (1x)? [Hint: $6(A)$ where $A = l^2$]
 - b. What is the total surface area of the medium cube (2x)?
 - c. What is the total surface area of the big cube (3x)?
 - d. When scaled up, does the surface area increase or decrease? Look for a pattern.
 - e. Predict what the surface area of the next scaled-up cube (4x)? [Hint: Use the pattern]
2.
 - a. What is the volume of the small cube? [Hint: $V = l^3$]
 - b. What is the volume of the medium cube?
 - c. What is the volume of the big cube?
 - d. When scaled up, does the volume increase or decrease? Look for a pattern.
 - e. Predict what the volume of the next scaled- up cube (4x)? [Hint: Use the pattern]
3.
 - a. Compare the ratio of surface area to volume of the small cube; Ratio = $\frac{\text{surface area}}{\text{volume}}$
 - b. . Compare the ratio of surface area to volume of the medium sized cube; Ratio = $\frac{\text{surface area}}{\text{volume}}$
 - c. . Compare the ratio of surface area to volume of the big cube; Ratio = $\frac{\text{surface area}}{\text{volume}}$
 - d. When the size of a cube is scaled up by a certain factor (2 and then 3 for the above examples), the area increases as the _____ of the factor, and the volume increases as the _____ of the factor.
 - e. Does the ratio of the surface area to volume increase or decrease as things are scaled up?

f. Does the rule for the scaling up of cubes apply also to other shapes? _____ Would your answers have been different if we started with a sphere of diameter 1 cm and scaled it up to a sphere of diameter 2 cm, and then 3 cm? _____

g. The effects of scaling are beneficial to some creatures and detrimental to others. Check either beneficial (B) or detrimental (D) for each of the following:

i) An insect falling from a tree _____ A Bear falling from the same tree _____

ii) A small fish trying to flee a big fish _____ A big fish chasing a small fish _____

iii) A hungry mouse _____ A hungry bear _____

iv) An insect that falls in the water _____ A Bear that falls in the water _____

v) A small lizard in the hot sun _____ A big lizard in the hot sun _____

v) A Cheewawa dog in the snow _____ A St. Bernard Dog in the snow _____

4. a. What is the mass of the small cube(1x)?

b. What is the mass of the medium-sized cube (2x)?

c. What is the mass of the big cube(3x)?

d. When scaled up, does the mass increase or decrease? Look for a pattern.

e. Predict what the mass of the next scaled-up cube (4x)? [Hint: Use the pattern]

5. What increases faster when scaled up, surface area or volume?

6. What increases faster when scaled up, surface area or mass?

7. What increases faster when scaled up, volume or mass?

5. a. What is the density of the small cube? [Hint: Density = $\frac{Mass}{volume}$]

b. What is the density of the medium-sized cube? [Hint: Density = $\frac{Mass}{volume}$]

c. What is the density of the big cube? [Hint: Density = $\frac{Mass}{volume}$]

d. When scaled up, does the density increase or decrease? Look for a pattern.

e. Predict what the density of the next scaled-up cube (4x)? [Hint: Use the pattern]

