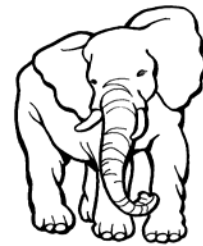


For #4 & 5, see <http://www.worsleyschool.net/science/files/scalefactor/factors.html>

4. Every living thing processes food for energy. This energy creates heat that radiates from its surface skin. Imagine two similar animals, the larger of which is three times the length (1-D), width (1-D), and height (1-D) of the smaller.

a) How would the surface areas (2-D) of these two animals compare? How much more heat could the larger animal radiate through its surface?

b) How would the volumes (3-D) of these two animals compare? If the animals' bodies produce energy in proportion to their volumes (3-D), how many times as much heat would the larger animal produce?



c) Why do elephants have big ears?

5. The strength of a bone or a muscle is proportional to its cross-sectional area (2-D). Imagine a 7-foot-tall basketball player and a 42-inch-tall child. [7 feet = 84 inches]

a) How would the dimensions (length, width, height) of the bones of the basketball player compare to the corresponding bones of the child?

b) How would the cross-sectional areas (2-D) of their corresponding bones compare?

c) How would their weights (3-D) compare?

d) How many times as much weight (3-D) would each cross-sectional square inch of bone (2-D) have to support in the basketball player?

e) Why do hippos and rhinos have short, thick legs?



6. Use the constructions you performed on the *Lenart Sphere* to help answer the following questions. All of the questions refer to a sphere. Brief responses will suffice.
- a) What is the sum of the measures of the angles of a triangle?

 - b) Are equilateral triangles always similar?

 - c) What is the relationship between the angles of a triangle and its size?

 - d) Is there a largest circle?

 - e) Is there a largest triangle?
7. Suppose that wildlife workers capture 328 penguins on an island, mark them, and allow them to mix with the rest of the population. Later, they capture 200 penguins, 64 of which are marked. Use the appropriate formula to estimate the number of penguins on the island.
8. In a randomized responses experiment conducted in a Math 113 class, 12 of 37 students responded YES to the question "*Have you used illegal drugs?*" Estimate the real proportion of students who have used illegal drugs using the appropriate formula.