

1. On the campus of Notre Dame there is a blue water tank near the powerhouse. The shape of the tank is approximately that of a right circular cylinder.
  - (a) Estimate the radius and height of this cylinder and compute the approximate volume in cubic feet.  
(Use formula  $V = \pi r^2 h$ ;  $r$  = radius,  $h$  = height)  
Explain your method of estimation.
  - (b) Use the result of part (a) to compute the approximate number of gallons of water it would hold.
  
2.
  - (a) The legendary logger Paul Bunyan had a great blue ox named "Babe". This ox was very large and, in fact, measured forty two ax handles and a plug of chewing tobacco between the horns at their bases. Assuming that the relative sizes of Paul and Babe were the same as those of a normal person and a normal cow, estimate Paul's height. (an ax has a handle of about 3 feet. You can ignore the plug of chewing tobacco.)
  - (b) A story about Paul Bunyan describes how he was walking and dragging a peavey (a hook like tool for moving logs) behind him. The resulting groove cut by the peavey is what is now the grand canyon. Is this story consistent with the result of part (a)? Why or why not?
  
3. Mozart wrote a waltz in which he specified eleven variations for fourteen of the sixteen bars of the waltz and two possibilities for the other two. Estimate the number of possibilities for the waltz; and how long it would take if one variation were played each day.

4. In Rabelais' book "Gargantua and Pantagruel" the baby Gargantua needed 17,913 cows to supply him with milk. As a young student in Paris he rode on a mare as large as six elephants. He combed cannonballs out of his hair with a 900 foot comb, and, for salad, cut lettuces as large as walnut trees and ate a half a dozen people who had hidden among the trees.

(a) Estimate Gargantua's height

(b) Can you spot any internal inconsistencies in this account?

5. In the biblical account of the deluge it states that it rained for forty days and forty nights and "all the high hills that were under the heavens were covered." Suppose this is taken literally and assume that between 10000 to 20000 ft. of water covered the entire earth.

(a) Using a radius of 4000 miles for the earth estimate the number of cubic feet of water in the flood.

(b) Since one cubic foot equals about 7.4 gallons estimate the number of gallons of water.

(c) Since the rain lasted 960 hours (forty days and forty nights), estimate the rate of rainfall in inches (or feet) per hour needed to accomplish the flood.