Classroom Activity: Volumes!

The Great Pyramid of Giza, completed in 2,560 BC was the tallest man-made structure for an estimated 3,800 years. At the time of construction (there has been significant erosion), it was approximately 145 meters tall and 230 meters wide at each base. The corners of the great pyramid point in the four cardinal directions: North, South, East, and West. The accuracy of the pyramid is astonishing: the four sides and base have an average error of only 58 millimeters.

A) Estimate the volume of the great pyramid to at least two significant digits. The pyramid does contain two interior chambers, but their relative volume is negligible.

B) There is not general agreement about how many blocks are used in the pyramid, (it's difficult to count any that aren't on the outside!). Say for the sake of our calculations that the average block is 1m x 2m x 3m in size. Approximately how many blocks are in the great pyramid?

C) It took 20 years to build the great pyramid. Approximately how many blocks had to be placed EACH DAY in order to complete this task?

Your fish bowl appears to be spherical, but the top and bottom are symmetrically 'missing':

After removing your fish to a safe place and cleaning out his bowl, you put it under the sink faucet to refill it. If the water is coming out of the faucet at a rate of 30 cm^3/sec, how long will it take to refill your fishbowl?

The region enclosed by the curves $y = x$, $y = x^2$ is rotated around the y-axis to create a solid.

A) Sketch this solid below

B) Find the volume of this solid using the washer method:

C) Find the volume of this solid using cylindrical shells:

D) If this solid were a bowl, how much volume would it hold?