

# Determining Porosity

Porosity is the ration of the volume of pore space (open space) to total volume in a given sample. Porosity is measured in percent (%). For example, if a cubic meter of soil was found to contain 0.7 cubic meters of soil particles and 0.3 cubic meters of pore space, the porosity of the sample would be 30%. If we assume the particles to be perfect spheres located in geometric models we can calculate porosity in various packing arrangements.

Figure One represents cubic packing and Figure Two represents tetrahedral packing. Use the following formulas to find the porosity of each type of packing:

Volume of a sphere:  $V = \pi/6 * d^3$ ; where d=diameter of a sphere .

Volume of a cube:  $V = d^3$ ; where d=length of any edge of the cube.

Volume of a tetrahedron:  $V = 0.1179 * d^3$ ; where d=length of any edge of the tetrahedron.

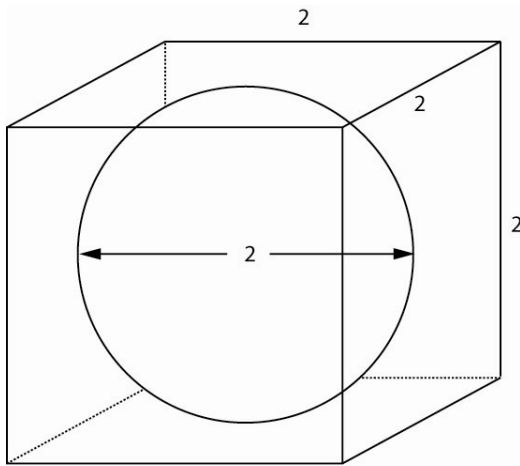


Figure One

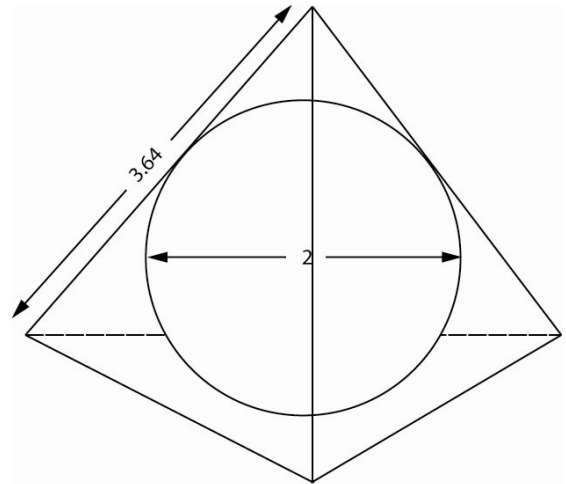


Figure Two

## Questions:

1. What is the porosity of cubic packing? \_\_\_\_\_%
2. What is the porosity of tetrahedral packing? \_\_\_\_\_%
3. Does porosity change as the size of the particle changes? \_\_\_\_\_ Explain your answer.
4. How might a porosity study be useful in the study of rocks and soil?