CHAPTER 1

41. GIVEN : TYPICAL ROOM
PING PONG BALL

FIND : NUMBER OF BALLS THAT WILL FIT

ROOM - MY OFFICE 14' x 10' x 10' (I COUNTED CEILING TILES)
PING PONG BALL 1" DIAMETER

METHOD I: VOLUME RATIOS - WRONG BECAUSE IT DOES NOT CONSIDER SPACE BETWEEN BALLS

$$\text{VOLUME OF OFFICE} = (14\,ft)(10\,ft)(10\,ft) = 1400\,ft^3$$

$$\text{VOLUME OF BALL} = \frac{4}{3}\pi\left(\frac{1}{2}\,in\right)^3 = .523\,in^3\left(\frac{1\,ft}{12\,in}\right)^2 = .000303\,ft^3$$

$$\text{NUMBER OF BALLS} = \frac{V_{OFFICE}}{V_{BALL}} = \frac{1400\,ft^3}{.000303\,ft^3} = 4.6\times10^6 \text{ BALLS}$$

METHOD II: CUBIC PACKING - WRONG BECAUSE BALLS CAN PACK IN OTHER WAYS (BODY CENTERED CUBES OR FACE CENTERED CUBES)

$$\text{VOLUME OF BALL} = 1\,in \times 1\,in \times 1\,in = \left(\frac{1}{12}\right)^3 ft^3$$

$$\text{NUMBER OF BALLS} = \frac{1400\,ft^3}{\left(\frac{1}{12}\right)^3 ft^3} = 2.4\times10^6 \text{ BALLS}$$

ACTUAL ANSWER IS PROBABLY IN BETWEEN THESE NUMBERS