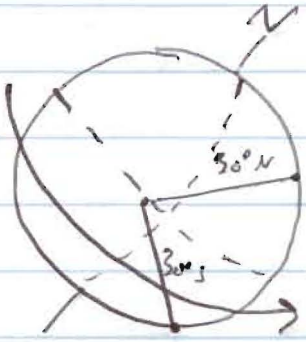
Beer Ball Mathematical Analysis



$r = 4 \times 10^3$ mi

$d = 8 \times 10^3$ mi

1 pint = 16 oz

1 L = 1000 mL

1 mL = 1 cm^3

~~1 pint ≈ 1 L~~ 1 pint ≈ 0.5 L

approximating a sphere

Geoide

1 pint of ale

$$V_E = \frac{4\pi r^3}{3} = \frac{4\pi (4\times10^3 \text{ mi})^3}{3} = 2.68 \times 10^{11} \text{ mi}^3$$

$$2.68\times10^{11} \text{ mi}^3 \times \frac{(5280 \text{ ft})^3}{\text{mi}^3} = 3.945 \times 10^{22} \text{ ft}^3$$

$$3.945\times10^{22} \text{ ft}^3 \times \frac{\text{L}}{.0353 \text{ ft}^3} = 1.118\times10^{24} \text{ L} \times \frac{1 \text{ pint}}{0.5 \text{ L}} = \boxed{2.24\times10^{24} \text{ pints of ale}}$$

V_e in acre-feet

$r = 4\times10^3$ mi

$$V_e = \frac{4}{3}\pi r^3 = 2.68\times10^{11} \text{ mi}^3 = 3.945\times10^{22} \text{ ft}^3 \times \frac{1 \text{ ac-ft}}{43560 \text{ ft}^3} =$$

~~9.06 ac-ft~~

$\boxed{9.06\times10^{17} \text{ ac-ft}}$