Volume Quiz

Tom Blasingame
Department of Petroleum Engineering
Texas A&M University
College Station, TX 77843-3116 (USA)
+1.979.845.2292 — t-blasingame@tamu.edu
Question:
What is the length dimension (in km) of a cube containing 1 trillion ($1 \times 10^{12}$ bbls)? *(this is approximately the current (estimated) volume of global oil reserves)*

$$V_{\text{cube}} = L \times L \times L = (L^3)$$
Required Conversions:
1 bbl = 5.614583 ft$^3$
1 ft = 0.3048 m 1 mile = 1.609344 km

Calculations:

\[ V(m^3) = 1 \text{ trillion } (1 \times 10^{12}) \text{ bbl} \]
\[ \times \left[ 5.614583 \frac{ft^3}{\text{bbl}} \right] \times \left[ 0.3048 \frac{m}{ft} \right]^3 = 1.589873 \times 10^{11} m^3 = 158.9873 km^3 \]

\[ L(km) = \frac{3 \sqrt{V(m^3)}}{1000 \frac{m}{km}} (L \text{ is the } "\text{cubic}" \text{ length}) \]
\[ = \frac{3 \sqrt{1.589873 \times 10^{11} m^3}}{1000 \frac{m}{km}} \frac{1}{1000 \frac{m}{km}} \]
Answer:

\[ L_{\text{cube}} \text{ (km)} = 5.4174 \text{ km} \]
\[ L_{\text{cube}} \text{ (miles)} = 3.3662 \text{ miles} \]

Comment:

Not very big — is it?
**Question:**
What is the RATIO of the world's ocean volume to the world's estimated oil volume?

**Data:**
- $V_{oil} \,(\text{km}^3) = 158.9873 \,\text{km}^3$
- $V_{oceans} \,(\text{km}^3)^* = 1.320 \times 10^9 \,\text{km}^3$
  
  *From wikipedia.org

**Answer:**

$$\frac{V_{oceans}}{V_{oil}} = \frac{1.320 \times 10^9 \,\text{km}^3}{158.99 \,\text{km}^3} = 8.303 \times 10^6 \,(\approx 10 \text{ million to 1!})$$
Question:
What lake in the United States has a volume of 1 trillion bbls (approximately 159 km³)?
Zoom View 1: North America
Zoom View 2: Western United States
Zoom View 3: California and Nevada
Zoom View 4: Lake Tahoe (California/Nevada)
Facts and Figures About Lake Tahoe:

**Location:** Lake Tahoe covers the Nevada/California border. It is 100 miles northeast of Sacramento and 58 miles southwest of Reno.

**Size:** Lake Tahoe is the largest alpine lake on the North American continent. It is 22 miles long and 12 miles wide, with a surface area of 122,200 acres or 193 square miles.

**Depth:** The average depth of Lake Tahoe is 989 feet. The deepest point is 1,685 feet. It is the third deepest lake in North America.

**Purity:** The water in Lake Tahoe is 99.7 percent pure, about the same as distilled water.

**Volume:** Lake Tahoe contains an estimated 39.75 trillion gallons (or approximately 0.95 trillion bbls). This is enough water to cover the entire state of California to a depth of 14.5 inches.