What is happening???
Density

How much “stuff” crammed into how much space?
Density

Usually used for solid and gas

How much “stuff” ➔ mass
crammed into ➔ “per”
How much space ➔ volume

\[
\begin{align*}
\text{g} & \quad \text{g/mL} \\
\text{g} & \quad \text{g/cm}^3 \\
\text{kg} & \quad \text{L} \\
\text{Etc…}
\end{align*}
\]

REMEMBER: 1mL = 1cm³
Density Equation

\[ D = \frac{m}{V} \]
Which one is more dense?
Which one is more dense?
Density of Liquids Not Just Solids

LAMP OIL
RUBBING ALCOHOL
VEGETABLE OIL
WATER
DISH SOAP
MILK
100% MAPLE SYRUP
CORN SYRUP
HONEY
PING PONG BALL
SODA CAP
BEADS
CHERRY TOMATO
DIE
POPCORN KERNEL
BOLT
Density of Water

1 \( \frac{\text{g}}{\text{mL}} \quad \text{and} \quad 1 \frac{\text{g}}{\text{cm}^3} \)

Memorize this!
Density of Air – Air Pressure

Atmosphere

Mount Everest 8,850 m

Low Density

High Density

0 kPa

31 kPa

101 kPa
Density of Air – Air Pressure

Look at how few atoms are pressing down on the guy at the top of the mountain.

Look at all the atoms pressing down on the guy at the bottom of the mountain.
Different densities lead to earth having layers.
Denser plate goes under less dense plate
One way diamonds get to the surface!
Japan - 2013
Japan - 2014
A new island!
<table>
<thead>
<tr>
<th>Try these...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1)</strong> Jack has a rock. The rock has a density of 6.73 g/mL and a volume of 8 cm$^3$. What is the mass of the rock? (1 mL = 1 cm$^3$) <strong>53.84 g</strong></td>
</tr>
<tr>
<td><strong>2)</strong> What is the volume of an object if the density is 1.45 g/mL and it has a mass of 15.2 grams? <strong>10.48 mL</strong></td>
</tr>
<tr>
<td><strong>3)</strong> What is the density of a block if it has the following dimensions and it weighs 45.8 g? 12 cm long, 3 cm tall, and 6.5 cm wide <strong>0.196 g/cm$^3$</strong></td>
</tr>
</tbody>
</table>
The Density of Pennies
Not all pennies are the same!
Some are 95% copper and 5% zinc
Some are 2.4% copper and 97.6% zinc
Using a Graduated Cylinder
Read from eye level at the bottom of the meniscus!!!!!!!
<table>
<thead>
<tr>
<th>GROUP #</th>
<th>PRE-1982 % error</th>
<th>POST-1982 % error</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>
Calculating % Error

\[
% \text{ Error} = \left| \frac{\text{Accepted Value} - \text{Your Value}}{\text{Accepted Value}} \right| \times 100
\]