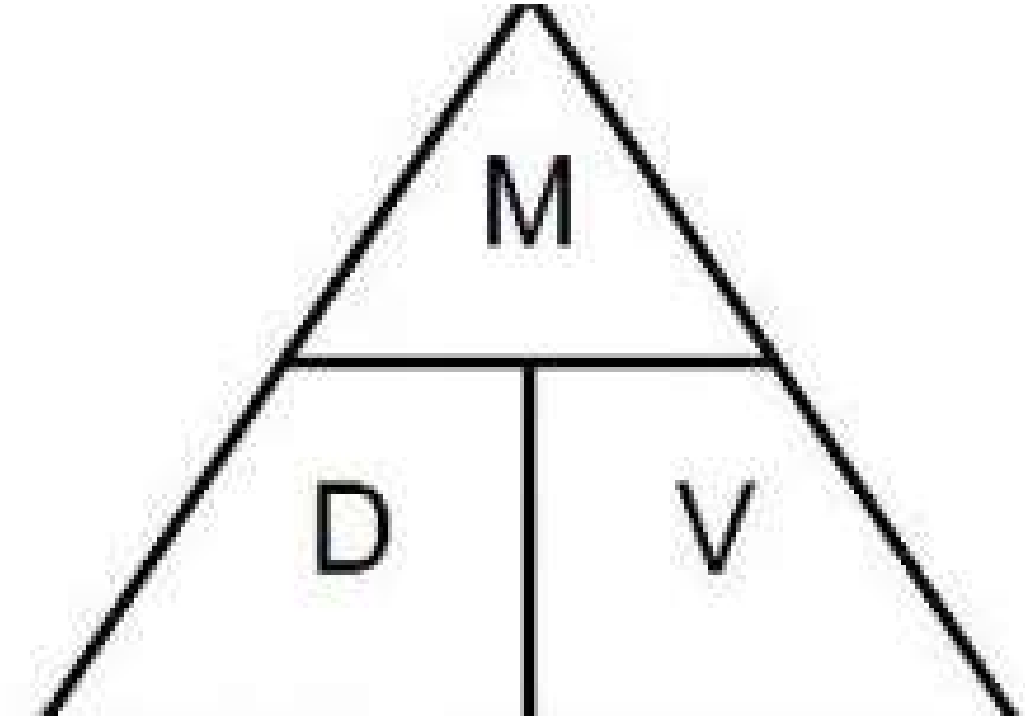
U01 Ch1.1 Density Calculations

Warm-up

- **What is the definition of density?**
- **How can you determine the volume of a block, a sphere (ball), or any regularly shaped object?**
- **How do you determine the volume of an oddly shaped object such as a rock, a candy bar, or a plastic dinosaur?**



Density = mass/volume
D = M/V

- Density is the mass per unit volume of a substance.
- How much material is packed into a given space.
- <u>Everything</u> has a density.

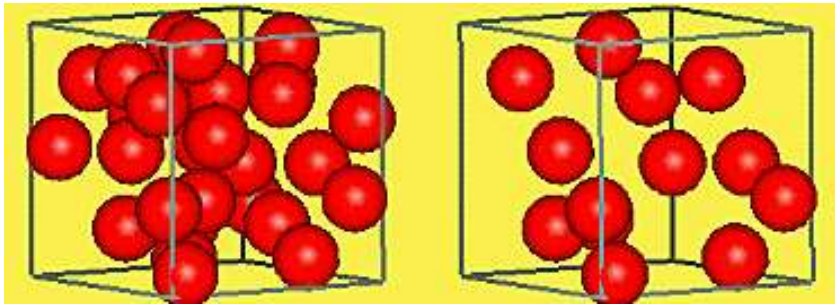
Density **is NOT:**

“When two people meet randomly and fall in love”

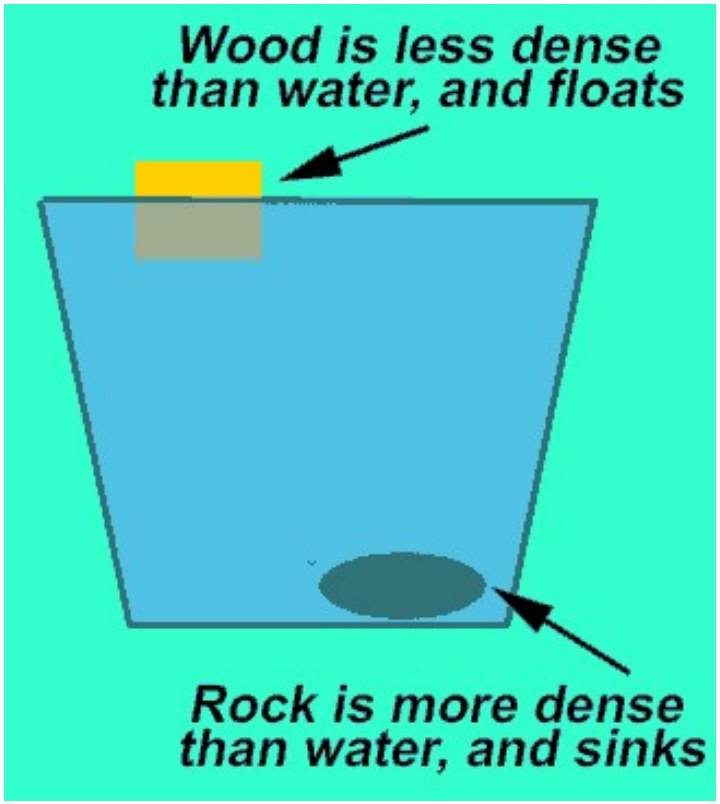
Romeo and Juliet

Theater

Density is how much "stuff" is packed into a given space…



- If you have an elevator with 3 people in it and an elevator with 12 people in it, which is more dense?
- (Hint: which one has more socks in the given space?)



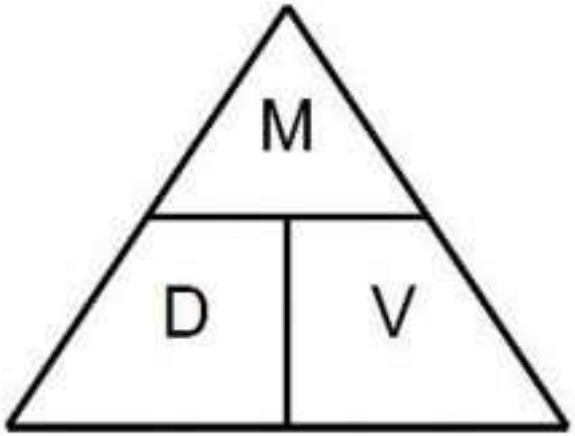
Some Things Float…
Some Things Sink…

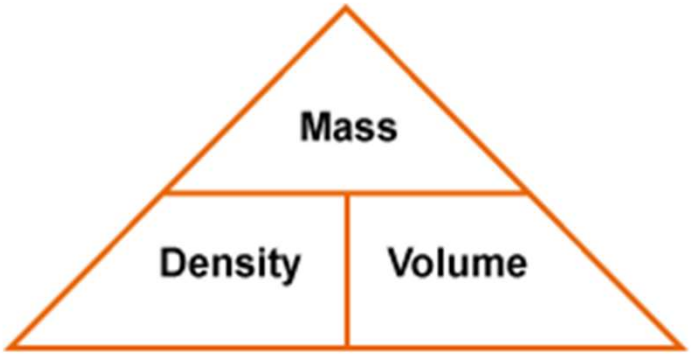
- More dense sinks, less dense rises

Density

Wood < Water < Rock

Finding Density





$$\text{Density (D)} = \frac{\text{Mass (M)}}{\text{Volume (V)}}$$

D = m / v

V = m / d

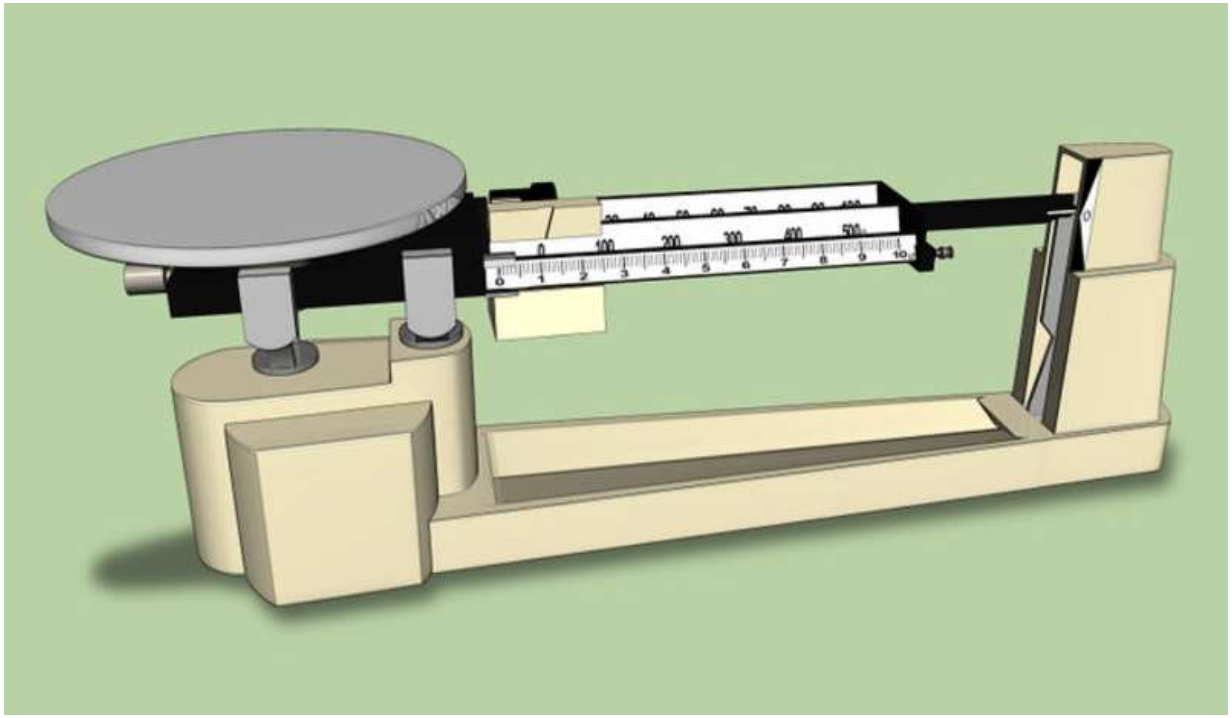
M = dv

Units

D = g/mL or g/cm3

V = mL or cm3

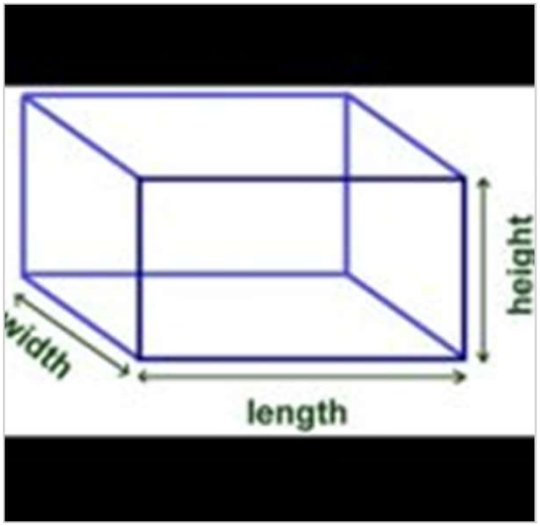
M = g

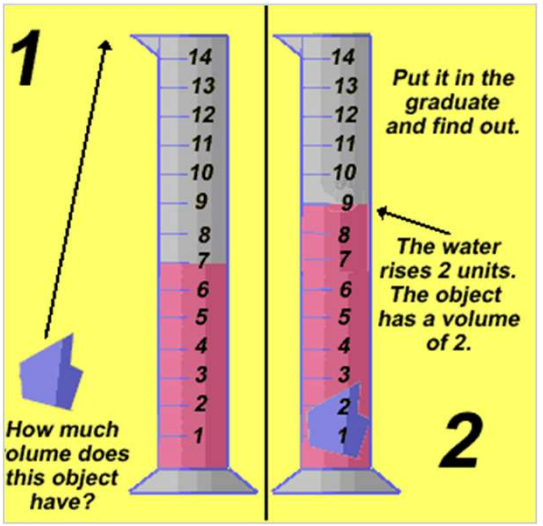


Finding Mass

- Measured in grams (g)
- Could be milligrams (mg) or kilograms (kg)
- This is <u>not weight</u>, the balance offsets the effect of gravity

Finding volume?



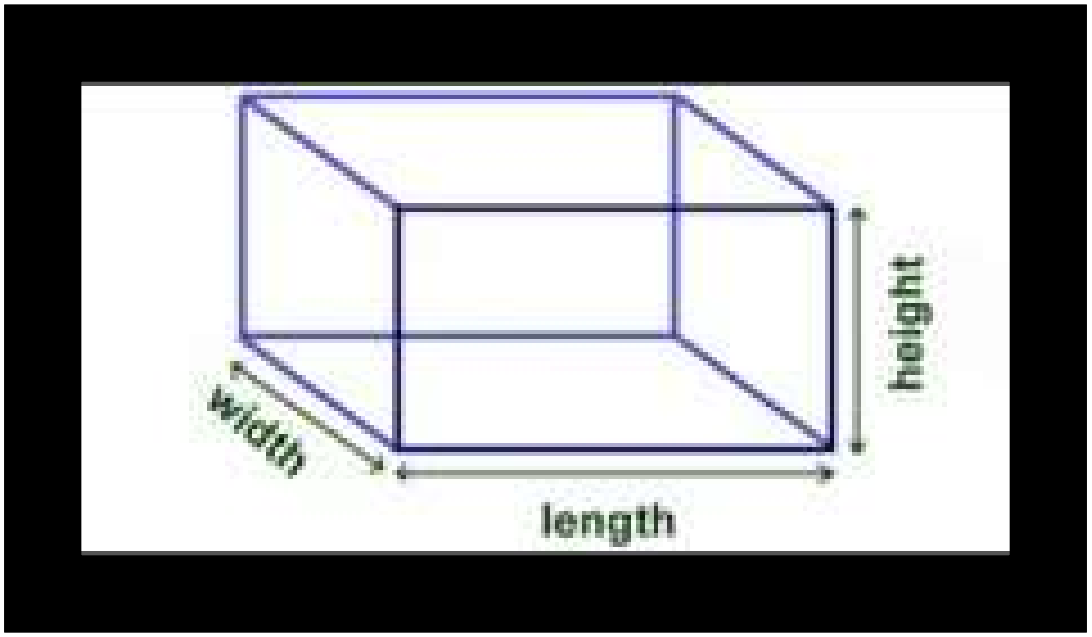


- Object with smooth flat surfaces like a cube or a rectangle
- Object with uneven, hard to measure surfaces

Finding volume? - Regular Shape

Object with smooth flat surfaces like a cube or a rectangle

Volume= LxWxH



The Density of Water

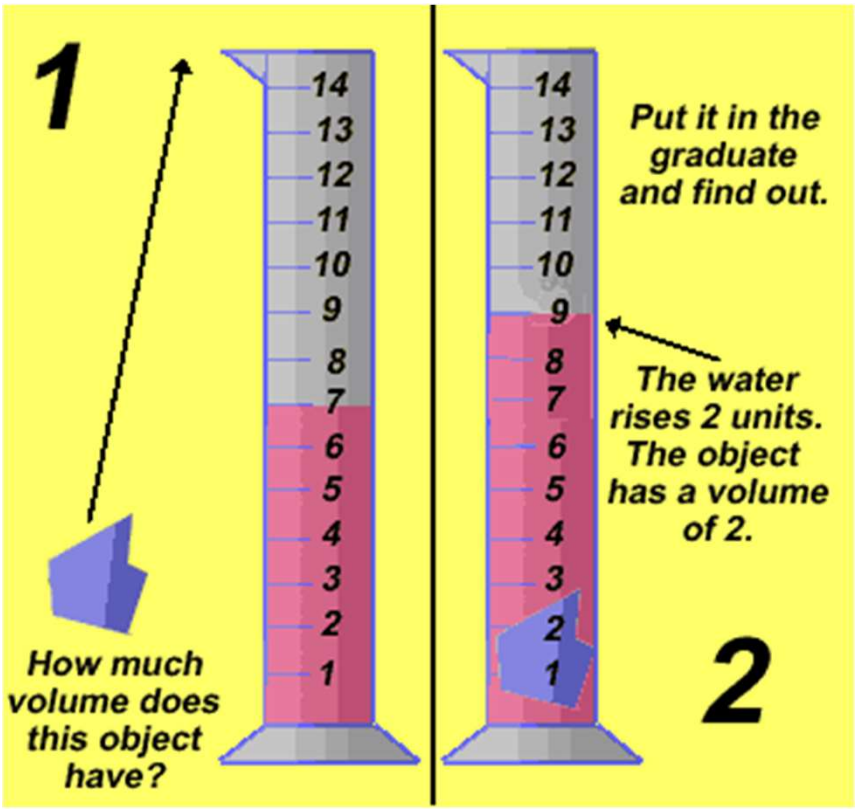
- Water is very unique.
- 1mL ~ 1cm^3 ~ 1g
- 1g/cm^3 of Density

- Water is more dense in its liquid form, than its solid form… this is why ice floats.

Finding volume? - Irregular Shape

Object with Irregular edges and surfaces

Displacement Method



Teacher Demo

Return to your equation…plug in your numbers and solve.

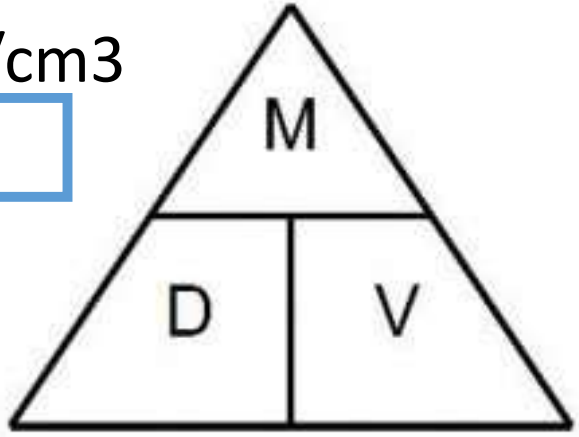
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Units

D = g/mL or g/cm3

V = mL or cm3

M = g



Equations

D = m / v

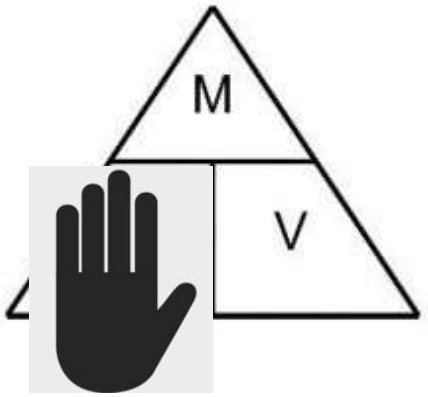
V = m / d

M = dv

You have a mineral that has a mass of 32 g and a volume of 4 mL. What is the density?

- **Mass (m) = 32 g**
- **Volume (V) = 4 mL**

$$Density = \frac{m}{V}$$



$$Density = \frac{32g}{4mL} = 8\,{}^{g}/_{mL}$$

Check Units

Units

D = g/mL or g/cm^3

V = mL or cm^3

M = g

Equations

D = m / v

V = m / d

M = dv

Resource 2

Density Practice Problems (8 Problems w/ charts)

Problem Statement	Formula	Define Variables	Substitution	Answer
Sample: What is the density of a billiard ball that has a volume of 100 cm^3 and a mass of 250 g?	$D = \frac{m}{V}$	M = 250 g V = 100 cm^3	$D = \frac{250\ g}{100\ cm^3}$	2.5 g/cm^3
1. A loaf of bread has a volume of 2270 cm^3 and a mass of 454 g. What is the density of the bread?				
2. A block of wood has a density of 0.6 g/cm^3 and a volume of 1.2 cm^3. What is the mass of the block of wood?				
3. A 800g boulder has a density of 8 g/cm^3. What is the volume of the boulder?				
4.What is the mass of the block of iron illustrated below?