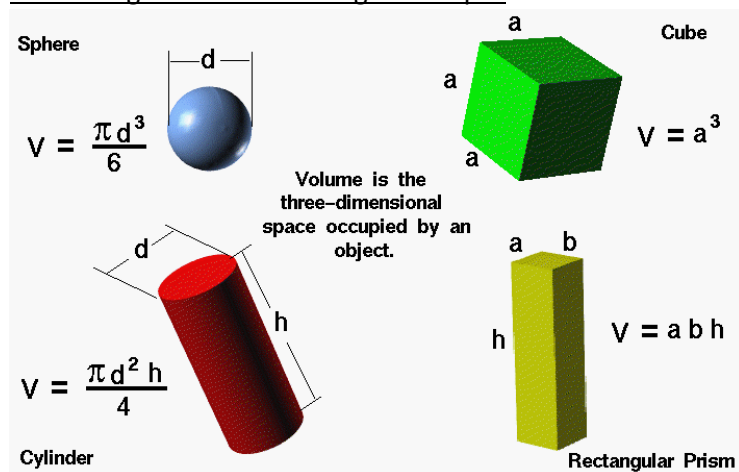
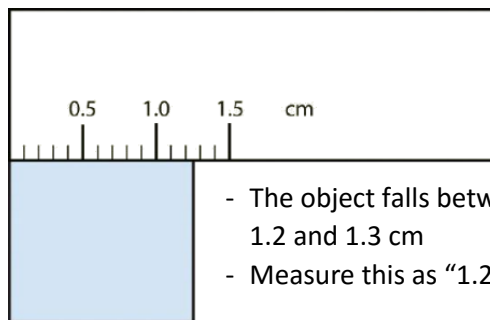


**Sink or Float Lab****BACKGROUND:**

Density is a physical property of matter that describes how tightly packed the particles are in a substance by comparing the amount of matter in the object to the amount of space that the matter takes up. The object's density can be calculated by dividing its mass (how much matter is in it) by its volume (how much space it takes up). Because density is a physical property of matter, it is independent of the sample size, meaning that a large sample of a substance will have the same density as a small sample of it.

**Calculating the Volume of Regular Shapes****Measuring Distance with a Ruler (estimating)**

- Measure in centimeters (cm)
- Line the object up with the zero line
- For more precision, estimate between lines

**TASK:**

Investigate the relationship between an object's density and its ability to float.

You will need to determine what data is important to collect, how to collect it, what it means, and the best way to communicate your findings. You will have access to the following materials:

- |                  |                  |                       |
|------------------|------------------|-----------------------|
| • Rulers         | • Ping Pong Ball | • Wooden Block        |
| • Digital Scales | • Marble         | • Silver Metal Block  |
| • Calculators    | • Wooden Dowel   | • Gold Metal Block    |
| • Water          | • Smooth Cork    | • Clear Plastic Block |
| • Golf Ball      | • Rough Cork     | • Dice                |

**GUIDING QUESTION:**

What is the relationship between an object's density and its ability to float?

**TIPS:**

- 1) Use your textbook as a reference.
  - 8<sup>th</sup> Grade Text (yellow/orange) – page 122
  - Phys. Sci. Adv. Text (blue) – page 94
- 2) Organize your data. Record every measurement/observation (label it).
- 3) Have a purpose. Don't use something just because it is available to use...know why/how you are using it.
- 4) Take care of the equipment (be gentle, keep it clean)

**SAFETY:**

- There are no major safety concerns in this investigation.

**DATA:**

Use the back of this paper to organize your data.

OBJECT	MASS (g)	VOLUME (cm <sup>3</sup> )		DENSITY (g/cm <sup>3</sup> )			SINK or FLOAT?	
Golf Ball	45.7g	$V = \frac{\pi d^3}{6}$	$V = \frac{\pi(4)^3}{6}$	33.51cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{45.7}{33.51}$	1.36g/cm <sup>3</sup>	SINK
Ping Pong Ball	2.6g	$V = \frac{\pi d^3}{6}$	$V = \frac{\pi(3.7)^3}{6}$	26.52cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{2.6}{26.52}$	0.10g/cm <sup>3</sup>	FLOAT
Marble	5.7g	$V = \frac{\pi d^3}{6}$	$V = \frac{\pi(1.6)^3}{6}$	2.14cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{5.7}{2.14}$	2.66g/cm <sup>3</sup>	SINK
Wooden Dowel	1.7g	$V = \frac{\pi d^2 h}{4}$	$V = \frac{\pi(0.65)^2(7.6)}{4}$	2.52cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{1.7}{2.52}$	0.67g/cm <sup>3</sup>	FLOAT
Smooth Cork	7.7g	$V = \frac{\pi d^2 h}{4}$	$V = \frac{\pi(2.1)^2(4.4)}{4}$	15.24cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{7.7}{15.24}$	0.51g/cm <sup>3</sup>	FLOAT
Rough Cork	4.6g	$V = \frac{\pi d^2 h}{4}$	$V = \frac{\pi(2.3)^2(4.5)}{4}$	18.70cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{4.6}{18.70}$	0.25g/cm <sup>3</sup>	FLOAT
Wooden Block	19.2g	$V = l \times w \times h$	$V = (7.7)(2.5)(1.9)$	36.58cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{19.2}{36.58}$	0.52g/cm <sup>3</sup>	FLOAT
Silver Metal Block	20.4g	$V = s^3$	$V = 1.95^3$	7.41cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{20.4}{7.41}$	2.75g/cm <sup>3</sup>	SINK
Gold Metal Block	20.9g	$V = s^3$	$V = 1.35^3$	2.46cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{20.9}{2.46}$	8.50g/cm <sup>3</sup>	SINK
Clear Plastic Block	1.7g	$V = l \times w \times h$	$V = (1.9)(1.25)(0.6)$	1.43cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{1.7}{1.43}$	1.19g/cm <sup>3</sup>	SINK
Dice	5.6g	$V = s^3$	$V = 1.5^3$	3.38cm <sup>3</sup>	$d = \frac{m}{V}$	$d = \frac{5.6}{3.38}$	1.66g/cm <sup>3</sup>	SINK

The density of water is 1 g/mL.

- Objects with a density greater than 1 g/mL sink
- Objects with a density less than 1 g/mL float.