SCIENCE 8
MS. LANGLOIS

NAME: Key
BLOCK: _____ DATE: _____

DISCOVERING DENSITY

What do you know about density? *Take 5 minutes to collect some information about density. In your own words, explain to your partner what density is.*

P.O.E. - Soda Style

a) A can of regular coke is dropped into water.	**b) A can of diet coke is dropped into water.**
Prediction : _____	Prediction: _____
Observation: Coke Sinks	Observation: Diet Coke Floats
Explanation (Why did this happen)?	Explanation (Why did this happen)?
_____	_____
_____	_____

DENSITY: the mass **per unit of** volume **.**

- Mass of can of Coke = 255g Mass of can of Diet Coke = 249g
- The regular Coke has more mass for the same volume, so the density of the regular Coke is greater.

Density describes how tightly packed **the particles are in a material.**

*In the diagram to the left, describe the **spacing** of the particles in the solid block, the liquid, and in the gas.*

Solid: tightly packed (little space)

Liquid: enough space to slip/slide

Gas: very far apart

.....Most substances are more dense in their solid form than in their liquid form.

→ Knowing this, how do you think temperature and density are related?

as temp ↓, density ↑ (because particles get closer)

→ Can you think of an exception? water! (ice less dense than liquid)

Fluids that <u>do not mix</u> will form layers based on density!

→ Fluids with a lower density "float" on top of fluids with a higher density

→ If a fluid has a density less than water (1.00 g/cm^3), it will float on water.

P.O.E. WACKY WATER

a) **Oil is combined with water.**	b) **Salt water is combined with fresh water.**
Prediction : _____	Prediction: _____
Observation: Oil Floats	Observation: Fresh Water Floats
Explanation (Why did this happen)?	Explanation (Why did this happen)?
Oil is less dense	Fresh water is less dense

Calculating Density:

$$\text{Density} = \frac{\text{mass (g or kg)}}{\text{volume (cm}^3\text{ or mL)}} \quad \left(\frac{g}{cm^3} \text{ or } \frac{g}{mL}\right)$$

<u>Sample Problems</u>

1. The mass of a rock is 75g and its volume is 3cm^3. Determine the density of the rock.

<u>Step 1</u>: ***List known and unknown quantities.***

m = 75g
V = 3cm^3
D = ?

<u>Step 2</u>: ***Use a proportion or algebra to solve for the missing variable*** *INCLUDE UNITS*

$$D = \frac{m}{V} = \frac{75\,g}{3\,cm^3} = 25\,\frac{g}{cm^3}$$

<u>Step 3:</u> ***Make a final written statement (including correct units) that answers the question.***

The density of the rock is $25\,\frac{g}{cm^3}$.

PRACTICE: DENSITY CALCULATIONS

2. A bottle of orange juice has a volume of 100mL and a mass of 250 grams. Calculate the density of the orange juice in g/mL.

① GIVEN
② FORMULA
③ SOLVE
④ SENTENCE

$V = 100\,mL$
$m = 250\,g$

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

$D = \frac{250\,g}{100\,mL} = 2.5\,\frac{g}{mL}$

The density of the juice is $2.5\ g/mL$.

3. A rock is dropped into a can of water and causes 25mL of water to be displaced. The mass of the rock is 150g. Calculate the density of the rock in g/cm^3.

$m = 150\,g$
$V = 25\,mL$

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

$D = \frac{150\,g}{25\,mL} = 6\ g/mL$

The density of the rock is $6\ g/mL$

4. a) The dimensions of a rectangular block of wood are 5 cm for width, 10 cm for length and 2 cm for height. Find the volume of the block.

$V = l \cdot w \cdot h$
$= 10\,cm \cdot 5\,cm \cdot 2\,cm = 100\,cm^3$

b) If the mass is 65g, what is the density of the block?

$m = 65\,g$
$V = 100\,cm^3$

$D = \frac{m}{V} = \frac{65\,g}{100\,cm^3} = 0.65\ g/cm^3$

The density of the block is $0.65\ g/cm^3$

c) Will the block float or sink in water? Give a reason for your answer.

Float! Objects that are less dense float on top of objects that are more dense because their particles are less tightly packed.

Assignment: - add to vocabulary sheet: **meniscus, density, density of water** (Just write the numerical value)
- complete the density worksheet on the back of this page