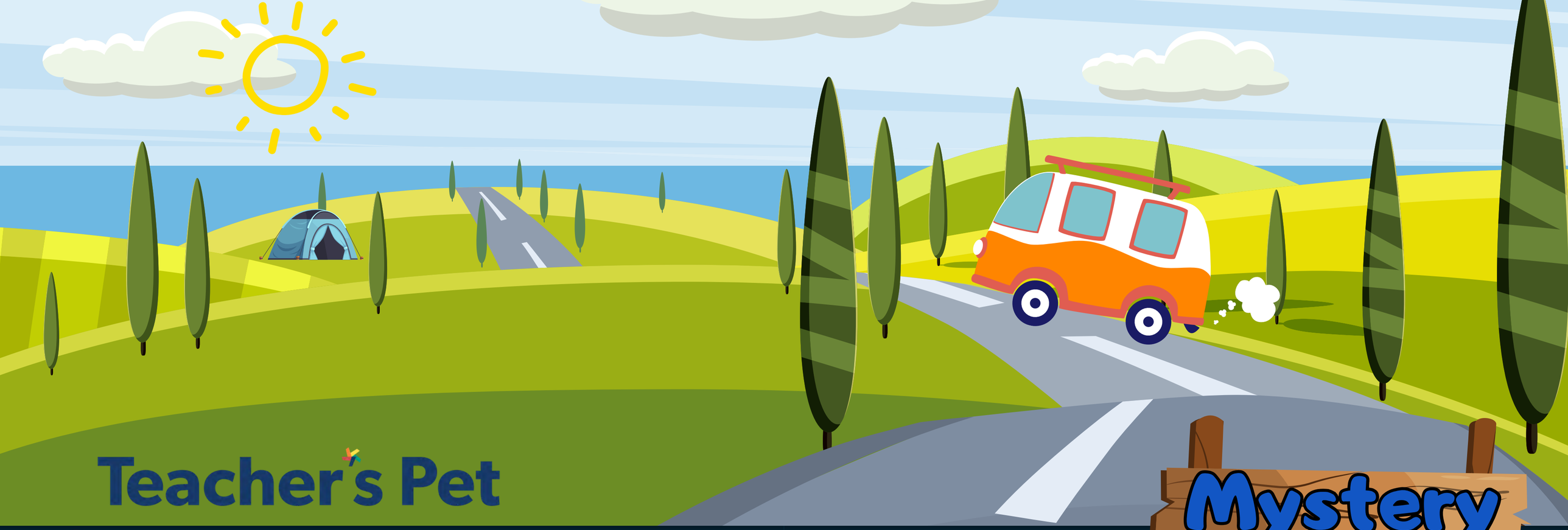
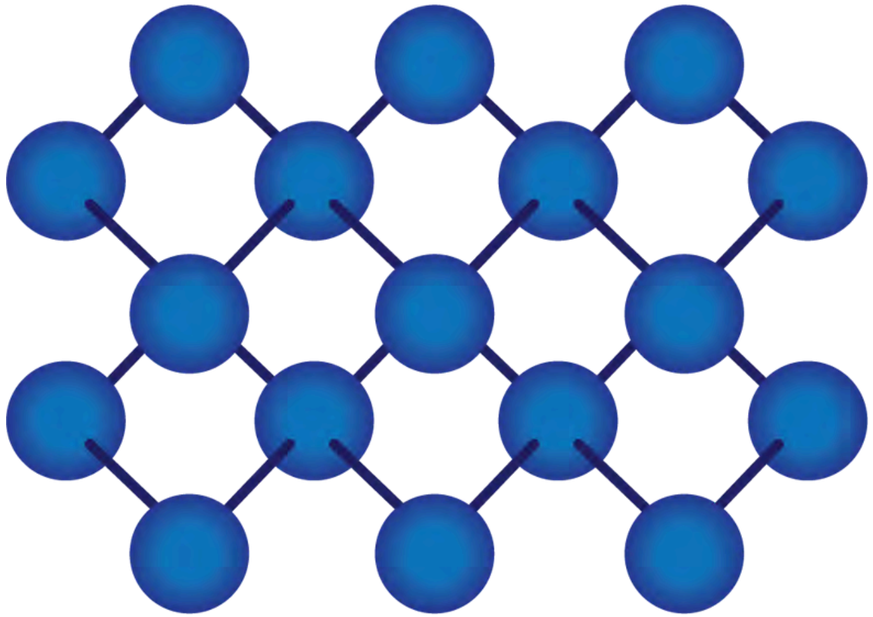


Particle Model of Matter


STOP
CAUTION

PROPERTIES OF A SOLID

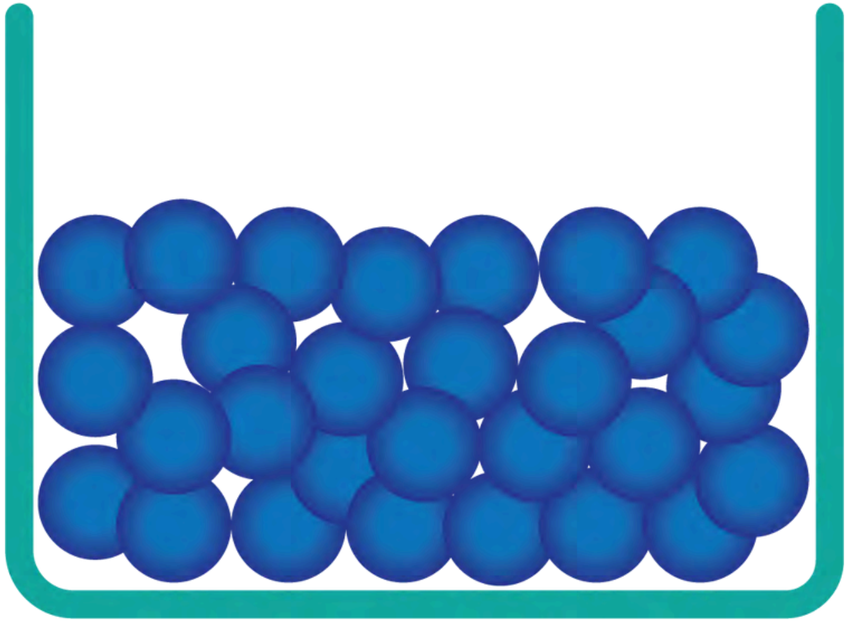
- definite shape
- definite volume
- particles tightly packed in a regular arrangement
- rigid



Transferring a solid from one container to another will not change its properties unless you do something to change it.

PROPERTIES OF A LIQUID

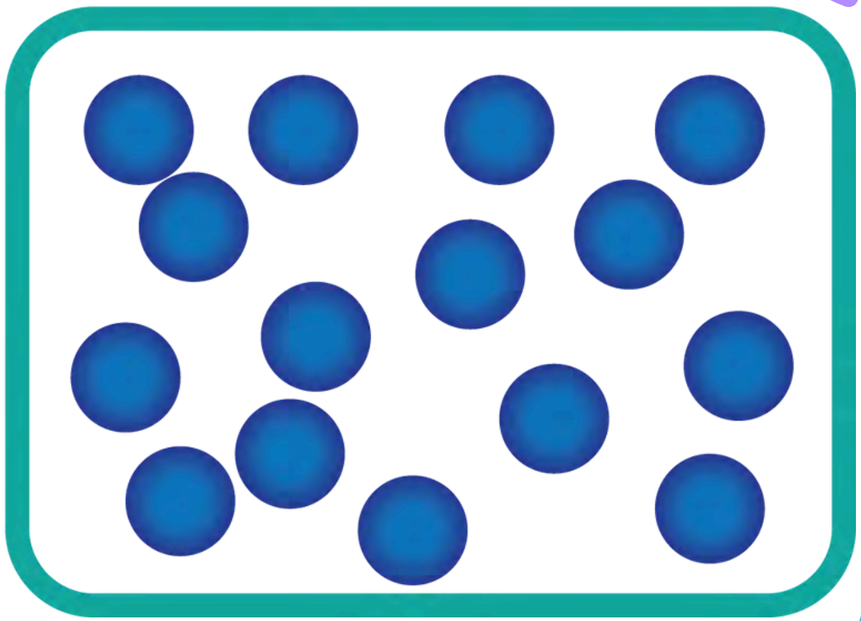
- no definite shape
- definite volume
- able to flow
- takes the shape of container
- not rigid



Volume is the amount of space an object occupies. A liquid takes up the same space even when you transfer it to another container.

PROPERTIES OF A GAS

- no definite shape
- no definite volume
- particles are spread out
- fills shape of container
- not rigid



The amount of space a gas occupies depends on the volume of its container.

Mystery Matter Roadtrip Worksheet

Name:

Cross off one mystery item at a time as clues are revealed. What is the final mystery item?

Mystery Item #1 • 71g • Denser than water • Not compressible	**Mystery Item #2** • 500mL • Denser than water • Compressible	**Mystery Item #3** • 175mL • Denser than water • Compressible
Mystery Item #4 • 205g • 199mL • Denser than water • Not compressible	**Mystery Item #5** • 21g • 25mL • Denser than water • Not compressible	**Mystery Item #6** • 196g • Less dense than water • Compressible

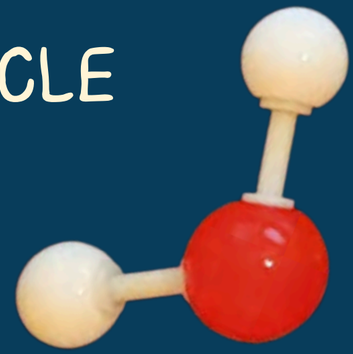

STOP
CAUTION

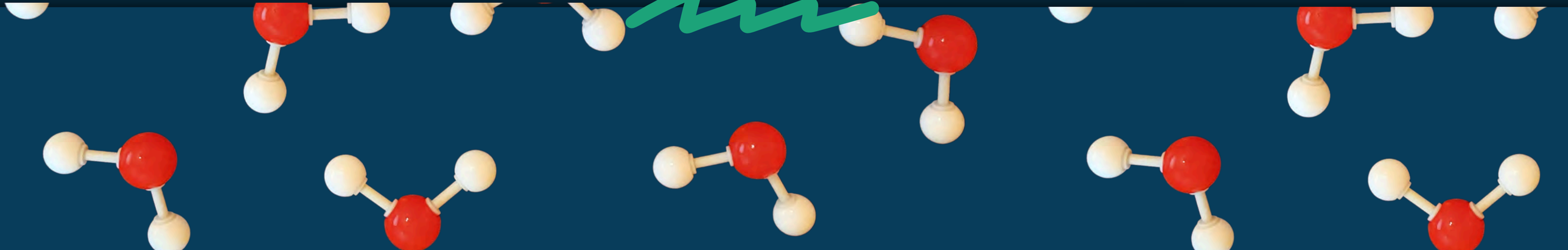
Hit the Road!


STOP
CAUTION
FUEL

Building Solids, Liquids & Gases

1. 1 RED + 2 WHITE + 2 CONNECTORS = 1 PARTICLE
2. Each group builds 12 particles.
3. Use 4 particles to show each state: SOLID, LIQUID & GAS..

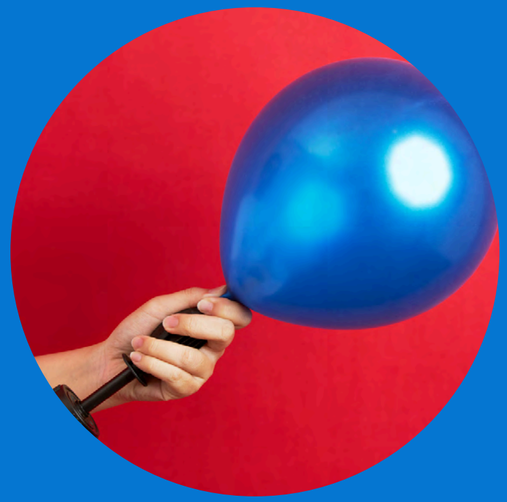




Am I a Solid, Liquid or Gas?
Mystery Check Stop #1

Clues:

1. My particles slide pass each other.
2. I have a definite volume, but not a definite shape.
3. My particles are separated by spaces.



Am I a Solid, Liquid or Gas?
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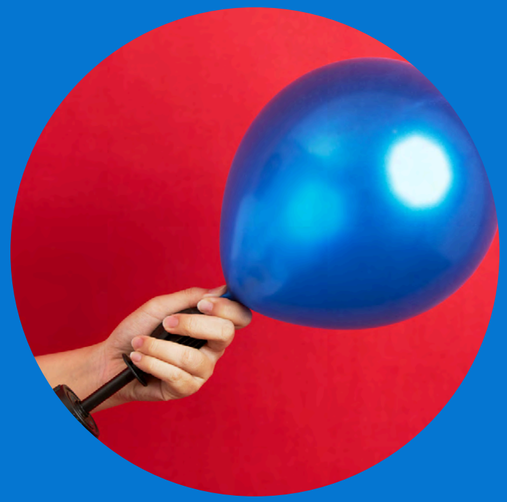


Am I a Solid, Liquid or Gas?

Mystery Check Stop #2

Clues:

1. My particles are separted by large spaces and constantly moving in all directions.
2. I have no definite volume and shape.
3. The attractive forces between my particles are weak.

Am I a Solid, Liquid or Gas?
Mystery Check Stop #2

Clues:

1. My particles are separted by large spaces and constantly moving in all directions.
2. I have no definite volume and shape.
3. The attractive forces between my particles are weak.

Am I a Solid, Liquid or Gas?
Mystery Check Stop #3

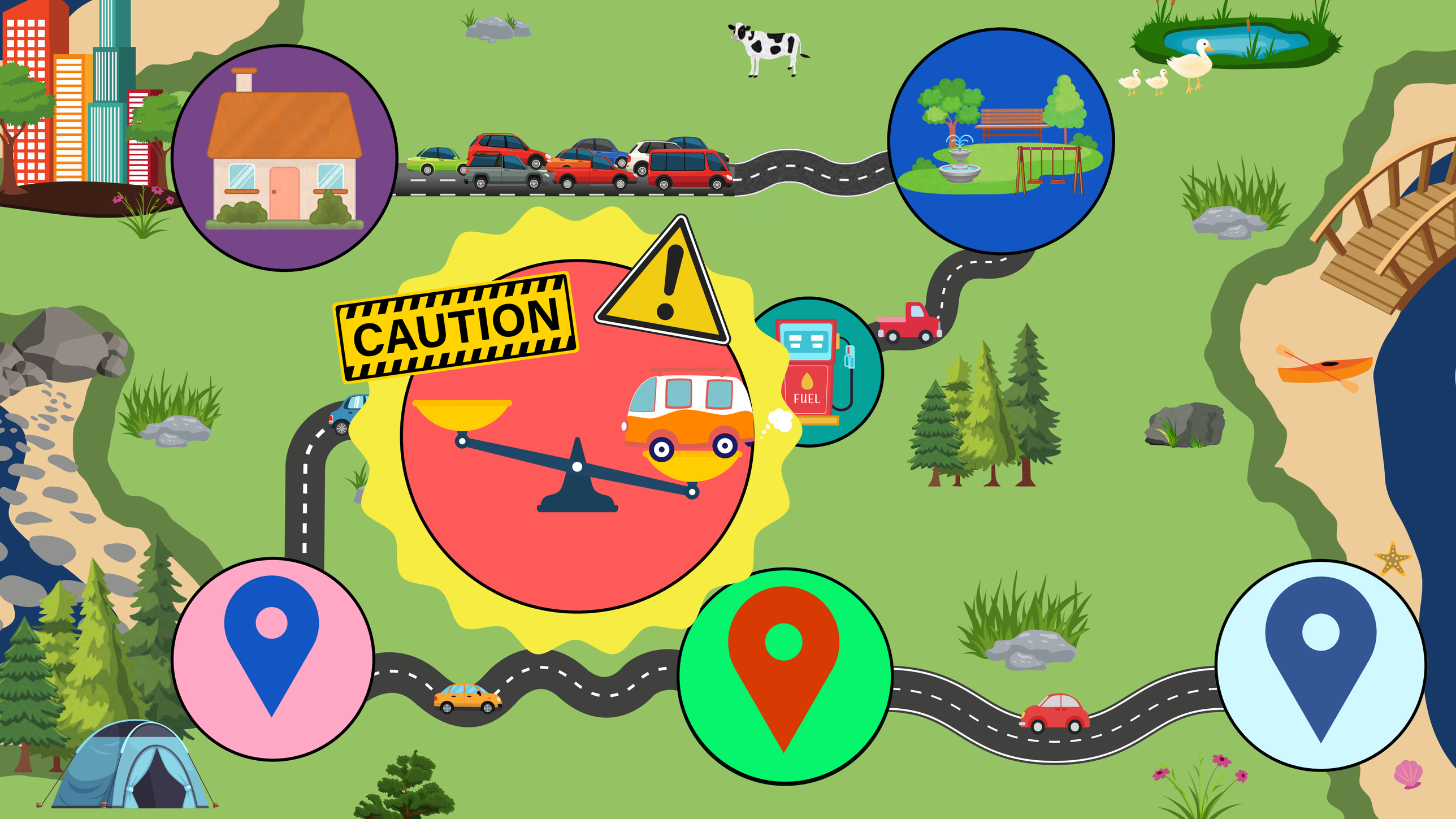
Clues:

1. My particles vibrate in place and are close together.
2. I have definite volume and shape.
3. The attractive forces between my particles are strong.

Am I a Solid, Liquid or Gas?
Mystery Check Stop #3

Clues:

1. My particles vibrate in place and are close together.
2. I have definite volume and shape.
3. The attractive forces between my particles are strong.


CAUTION
FUEL

Weigh Station Weigh In: Mass

Mass is the amount of matter in a solid, liquid or gas.

Standard units of measurement for mass are:

gram (g) or **kilogram (kg)**

Mass

VS

Weight

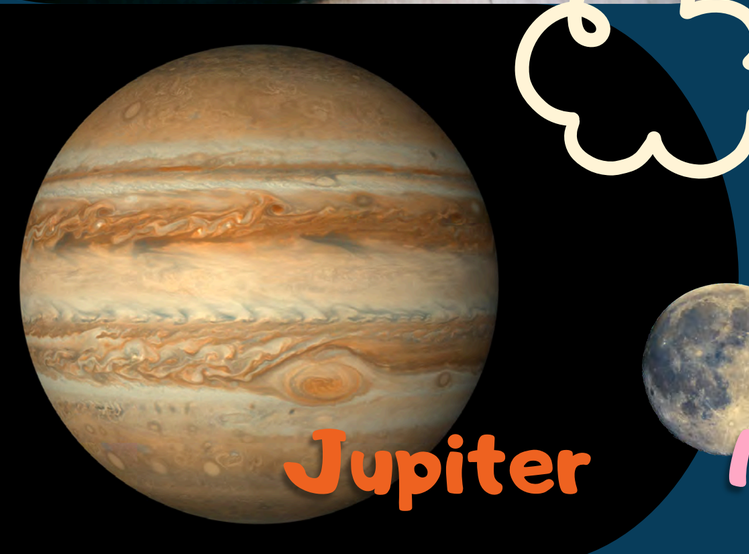
- is the amount of matter in a solid, liquid or gas
- always the same and never changes

- is the force of gravity on an object
- changes depending on how much gravity is acting on the object

Mass vs Weight

Mercury

Fun Idea!
Research how much you weigh on different planets!



Moon

Planet	Force of Gravity	Mass	Weight
Earth	9.81 m/s2	34 kg	34 kg
Mercury	3.7 m/s2	34 kg	12.9 kg
Jupiter	24.79 m/s2	34 kg	86 kg
Moon	1.62 m/s2	34 kg	5.6 kg

Types of Scales

Bathroom Scale

Digital scale
(Kitchen/Scientific)

Spring Scale

Balance Scale

Grocery Store Scale

Baby Scale

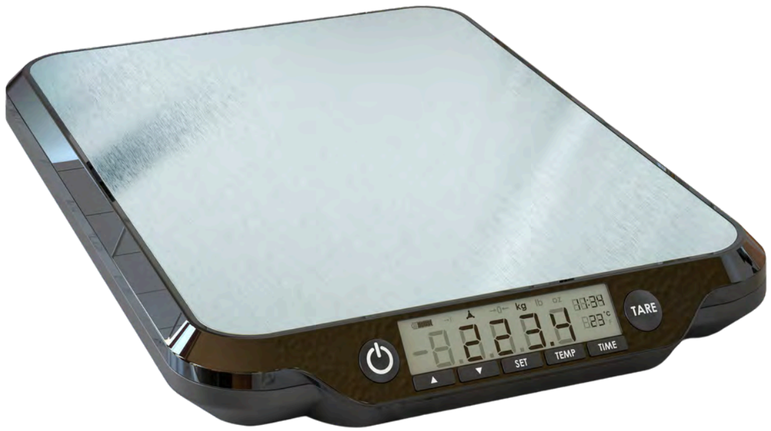
Slide Scale

Balance Scale

1. Have both sides of the scale empty.
2. Put the item on one side of the scale.
3. Add weights slowly until the two sides of the scale are balanced (same height).
4. Depending on the mass of the object, add or take away weights as you go.
5. Add up the total mass of the weights to determine the mass of the object.

Digital Scale

1. Press the power button on the scale.
2. Press the tare button if the scale is not reading zero.
3. Place item on scale.
4. Wait until the number stops changing then record result.



Mystery Item Clue #1

The mass of the mystery item is between **150g** and **400g**.

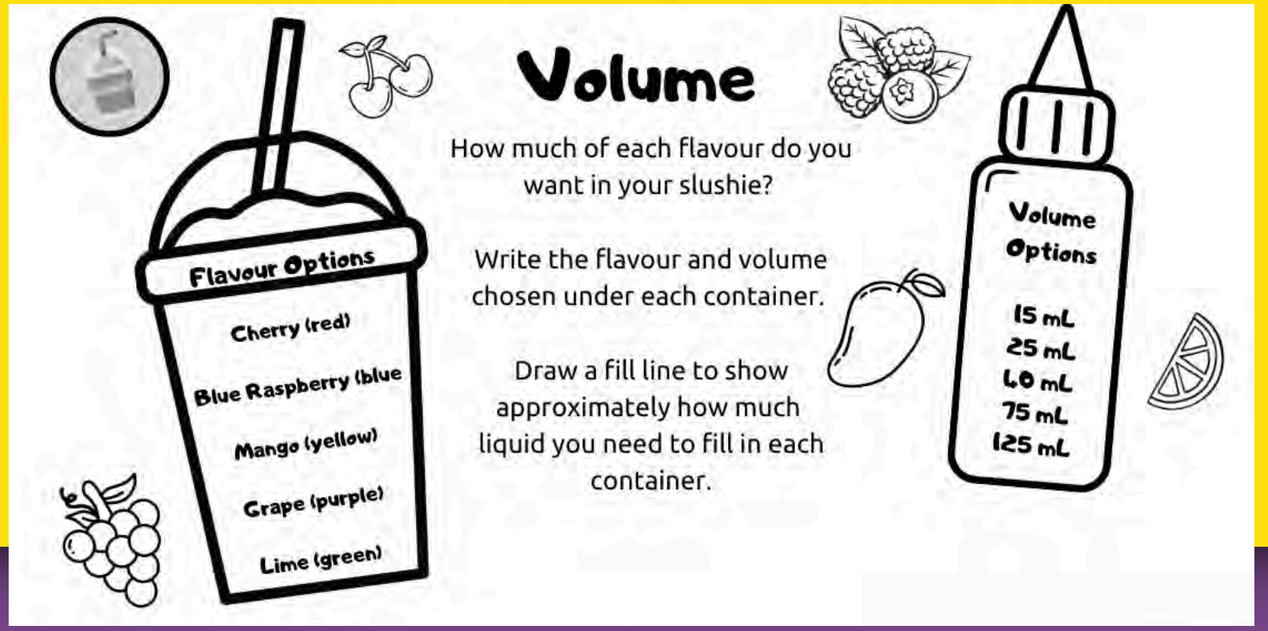
Cross off all the items that have a mass lighter or heavier than that range.


FUEL

Slushie Stop: Volume

- Volume is the amount of space a solid, liquid, or gas takes up.
- The standard units of measurement are **millilitre (ml)** or **litre (L)**.

Measuring Slushies



Beaker Sizes

15mL

30mL

50mL

100mL

150mL

Mystery Item Clue #2

The volume of the mystery item is between **190mL** and **600mL**.

Cross off all the items that have a volume that doesn't fit the clue.


FUEL
HOTEL

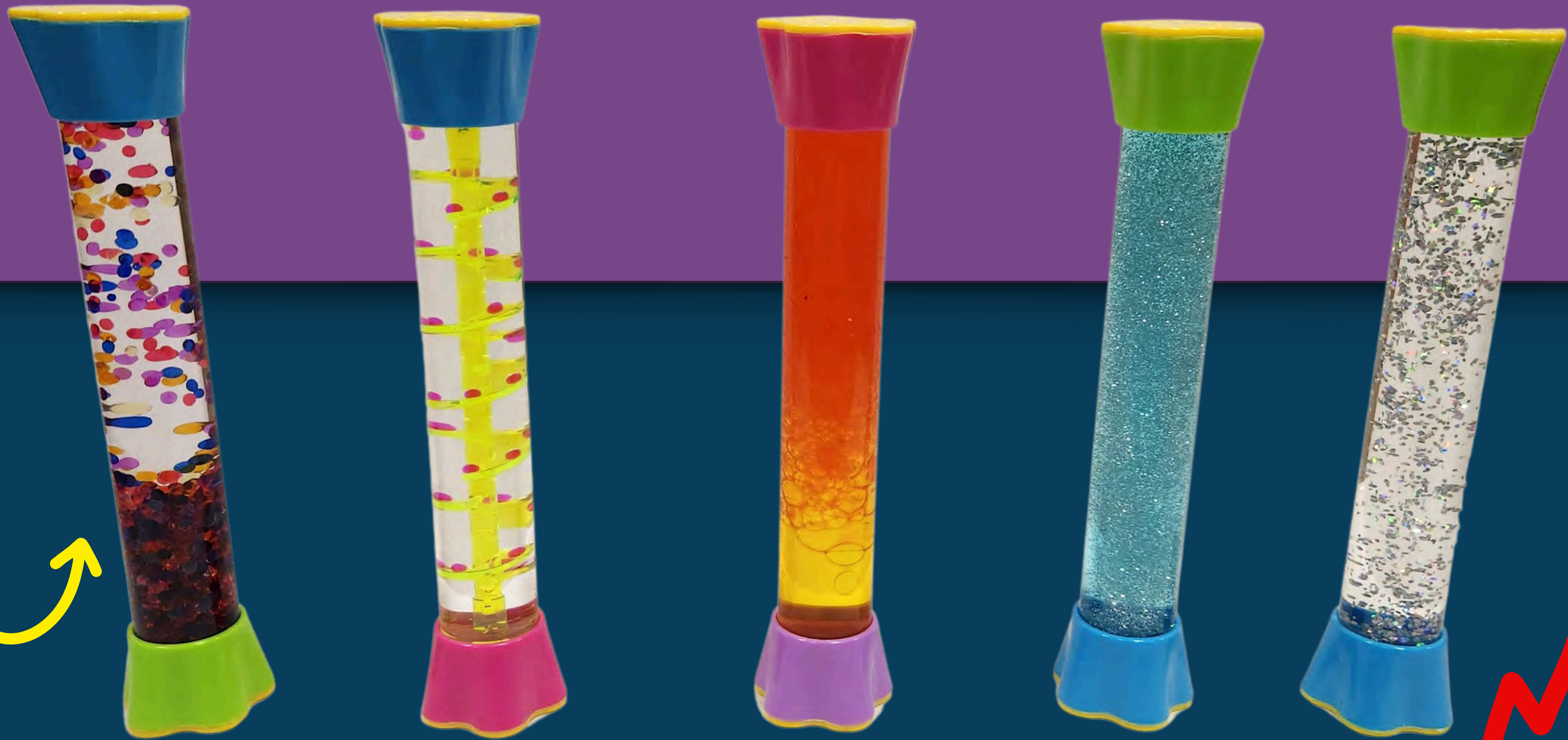
Packing It All In: DENSITY

Density is the comparison of the mass of a solid, liquid or gas to its volume.

The greater the mass of a solid, liquid or gas compared to its volume, the higher its density.

Density Tower

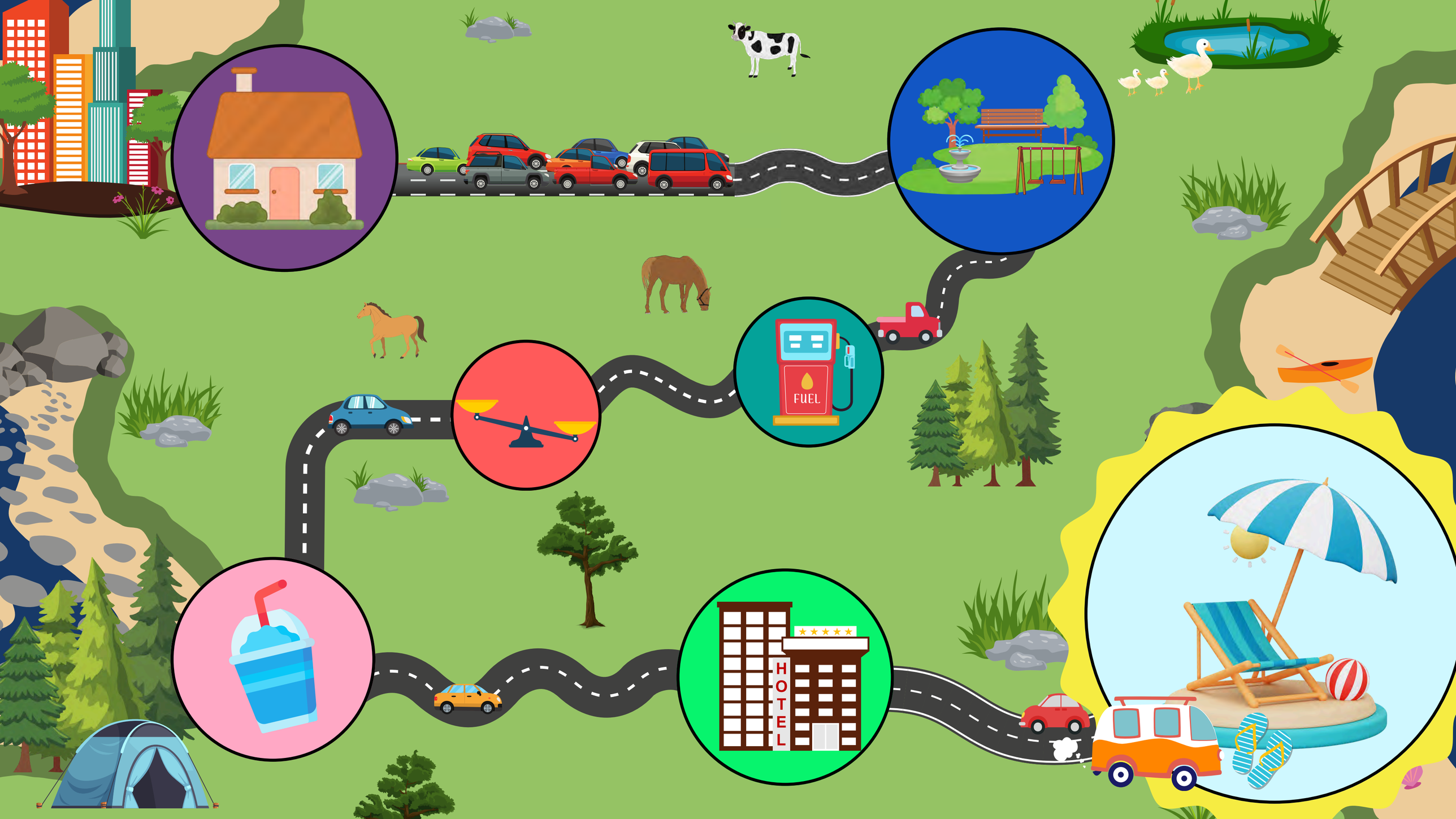
Density Tubes



Mystery Item Clue #3

The density of the mystery item is **more** than water.

Cross off all the items that have a density that doesn't fit the clue.

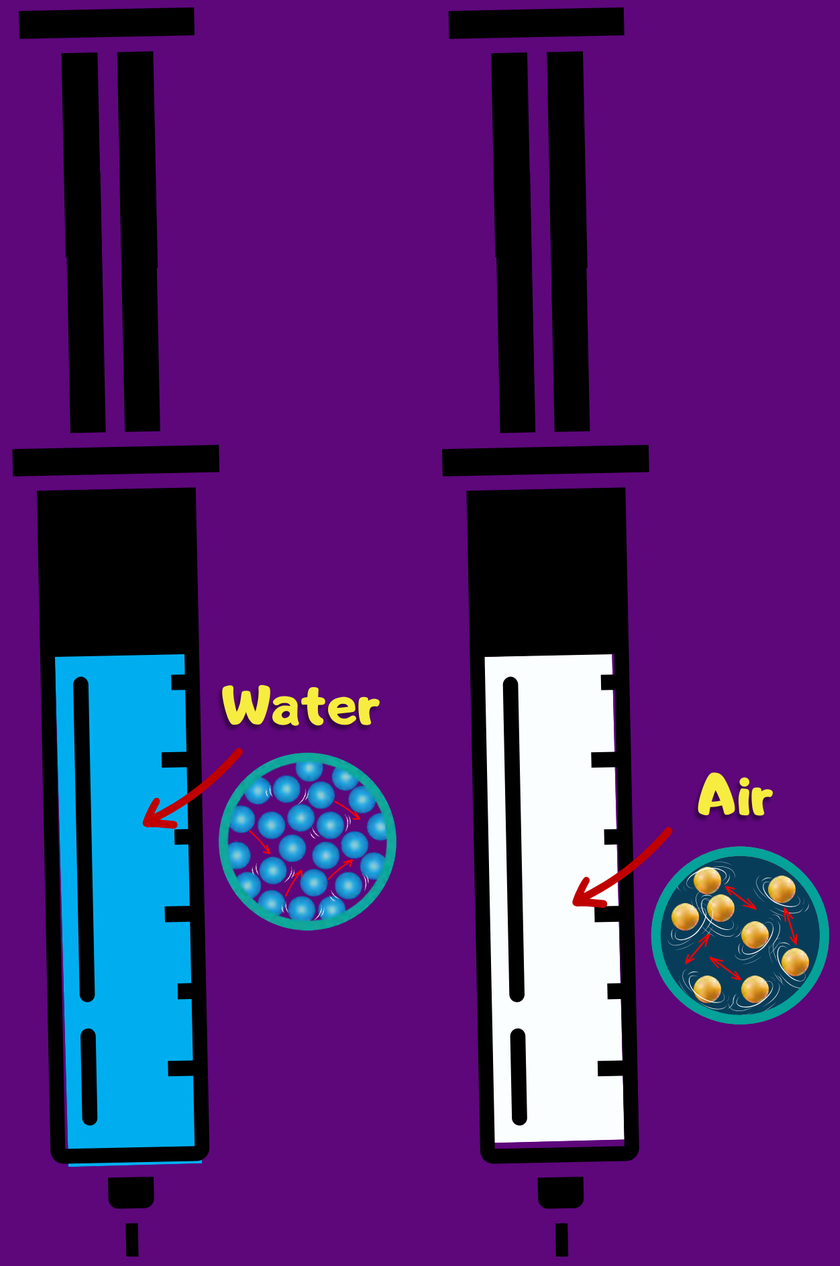

FUEL
HOTEL

Time to De-Compress: Compressibility

Compressibility is the ability of a liquid or gas to reduce in volume when under pressure.

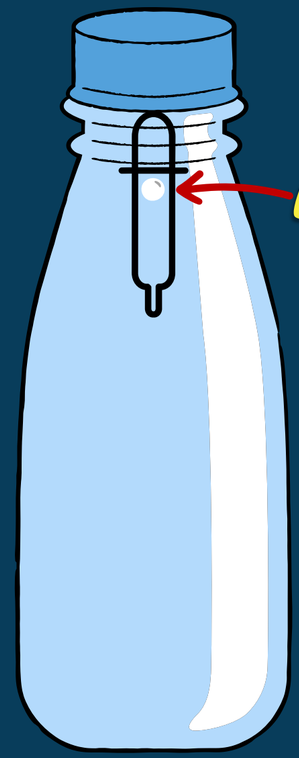
Compressibility of Air and Water

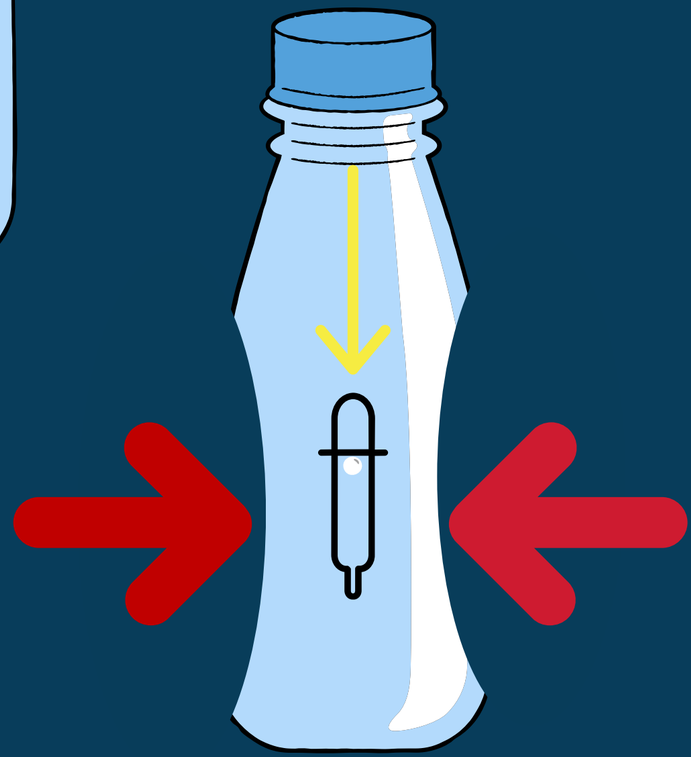
1. Place finger on the end of the syringe.
2. Push down on the plunger as much as you can.
3. Observe where the plunger ends up and what volume of air or water it is showing.
4. Draw that line on your worksheet under compressibility on a picture of a syringe.
5. Repeat steps 1-4 with the other syringe.



Cartesian Diver

- water bottle has to be very full so there is no air inside to compress
- air bubble in the eyedropper will be compressed during the experiment
- when the bottle is squeezed the air bubble get compressed and the eye dropper sinks since the density changes
- different sized air bubbles will allow the eyedropper to move differently when compressed





Mystery Item Clue #4

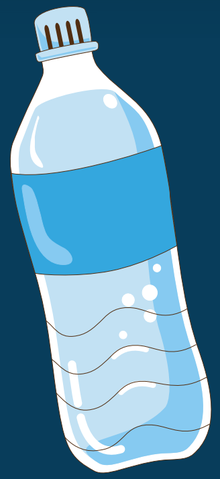
The mystery item is **not** compressible.

Cross off all the items that have a density that doesn't fit the clue.

Mystery Items Revealed

#1

#2



#3

#4

#5

#6


THANK YOU!